Effortful Control and Emotion Understanding: Relations with Children's Maladjustment, Social Competence, and Adult-Child Relationships

by

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ABSTRACT

The present study examined the relations of children's effortful control (EC), emotion understanding, maladjustment, social competence, and relationship quality with nonparental caregivers in a sample of 30-, 42-, and 54-month olds. EC was measured with mothers' and caregivers' reports, as well as observed behavioral tasks. Emotion understanding was assessed by asking children to identify emotions during a puppet task. Mothers and caregivers also reported on children's problem behaviors and social competence. Caregivers provided reports of the quality of their relationship with children. Results from longitudinal structural equation models indicated that even after controlling for sex, SES, language ability, and previous levels of constructs, emotion understanding predicted EC one year later at 42 and 54 months. In addition, children with higher EC had more positive relationships with caregivers at 42 and 54 months. Although EC and EU were not significantly related to maladjustment and social competence after accounting for within time covariation among constructs and longitudinal stability, marginal findings were in expected directions and suggested that more regulated children with better emotion understanding skills had fewer behavioral problems and were more socially skilled. Findings are discussed in terms of the strengths and limitations of the present study.

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Chapter 1

INTRODUCTION AND BACKGROUND

Children's social competence and maladjustment have been topics of considerable research, particularly because such problems can be stable and predictive of later maladjustment (Smith, Calkins, Kean, Anastopoulos, & Shelton, 2004; Kerr, Lunkenheimer, & Olson, 2007; Keenan et al., 2008). In understanding the factors predicting children's problem behaviors and social competence, there is a large body of literature providing evidence that temperamentally well-regulated children have relatively high socio-emotional skills, positive relationships with teachers and peers, and low levels of problem behaviors (e.g., Eiden, Colder, Edwards, & Leonard, 2009; Eisenberg et. al., 2003, Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Silva, et al., 2010; Spinrad, Eisenberg, Cumberland et. al., 2006). However, the joint contribution of regulation and emotional competence skills to later outcomes across socioemotional domains (e.g., behavioral problems, social competence, interpersonal relationships) have been less thoroughly examined, particularly at younger ages. The purpose of this study is to investigate simultaneous roles of children's emotion-related regulation and emotion understanding in predicting the quality of children's relationships with nonparental adults (e.g., caregivers/teachers), social competence, and maladjustment over time. Early parenting and gender will be explored as moderators of the relation of regulation to maladjustment and the relation of emotion understanding to children's relationships with nonparental caregivers.

The quality of children's relationships with close, nonparental adults, such as teachers has emerged as an important factor related to social adjustment, as well as academic success (Pianta, 1999; Pianta & Stuhlman, 2004). However, the number of studies that have examined the antecedents of children's relationships with adults outside of the home environment has been limited. This study will contribute to the literature by focusing on how children's characteristics, both temperamental qualities and those skills related to emotional competence (e.g., emotion understanding), predict teacher/caregiver relationship quality and children's adjustment and maladjustment. Moreover, because longitudinal data will be used, stability/change in many of the variables can be examined and controlled for in predictive analyses.

First, emotion-related regulation and emotion understanding will be defined. Next, associations of regulation and emotion understanding to hypothesized outcomes (e.g., social competence, problem behaviors, and relationship quality) will be reviewed. Finally, a section describing possible moderators of these relations will be discussed.

Emotion Regulation: Definition and Development

There are numerous definitions of emotion regulation in the literature. As summarized by Kopp and Neufeld (2003), definitions of emotion regulation have focused on the content, (i.e. components of emotion regulation), function (i.e. activities related to emotion regulation), and processes (i.e., how emotion regulation occurs) of emotion regulation. For this study, emotion regulation encompasses the processes by which an individual activates, avoids, modulates,

or maintains the frequency, timing, and intensity of emotion, as well as the motivational and physiological states associated with emotions in an effort to achieve individual goals (Eisenberg & Spinrad, 2004). The processes of emotion regulation include managing one's own emotional state, facilitating or impeding an emotional experience by selecting or avoiding situations, altering the significance of an event, and changing how emotion is expressed verbally and non-verbally (Eisenberg, Hofer, & Vaughn, 2007). These processes that encompass self-regulation are differentiated from emotion regulation that comes from external sources. Although external regulation (e.g., parental actions to reduce children's emotions) is thought to be critical for controlling emotions, especially early in life before children have fully developed more advanced self-regulation skills and strategies, Eisenberg and Spinrad (2004) argued that the definition of emotion regulation should consider individual differences in self-directed regulation, rather than regulation that is facilitated by others, such as socializers. Further, it should be noted that some elements of regulation are used to modulate behaviors that are not related to emotion or emotionally arousing situations.

Recent thinking about emotion regulation has distinguished between involuntary control and voluntary control (Eisenberg, Smith, Sadovsky, & Spinrad, 2004; Derryberry & Rothbart, 1997). Effortful control (EC), considered to be voluntary, has been formally defined as "the efficiency of executive attention, including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and detect errors (Rothbart & Bates, 2006, p.

129)," and includes the abilities to focus and shift attention, and inhibitory control, as well as activational control (i.e., the ability to perform an action, even when one does not want to). Processes associated with EC are regulatory and adaptive in that these strategies can be easily utilized to meet the demands of a variety of situations. Although EC is voluntary and purposeful in nature, often such actions may become routine so that the individual is unconscious of their use (Eisenberg et al., 2007). In contrast to EC, involuntary, or reactive, control includes processes that seem to be automatic, and not under voluntary control (Valiente, Eisenberg, Smith, Reiser, et. al., 2003; Eisenberg & Spinrad, 2004). These reactive systems are associated with both less voluntary approach/undercontrol (i.e., impulsivity) and over control/behavioral inhibition (Derryberry & Rothbart, 1997).

Children's capacity for emotion regulation, particularly EC, increases with age. In the first years of life, infants are dependent on external forms of regulation (e.g., soothing by caregivers) that are not considered voluntary self-regulation (Kopp, 1982). As children develop more complex cognitive and physical abilities, they are better able to exercise control over their own emotions, or self-regulate, using attentional processes and inhibitory control. The shift from more external forms of regulation (e.g., soothing by caregivers) to internal forms of self-regulation emerge between 6 and 12 months of age (Diamond, 2006; Kopp & Neufield, 2009). The ability to self-regulate, to exercise EC, plays an increasingly important role in the second year of life and the years after as children demonstrate the capacity to focus attention and inhibit behavior (Kochanska,

Murray, & Harlan, 2000). By approximately 30 months, young children experience a marked increase in the ability to exercise executive attention and inhibit behavior through EC (Posner & Rothbart, 2000; Kochanska & Knaack, 2003). It appears that preschool-aged children are developmentally capable of utilizing EC, although there are clear individual differences in this ability. Improvements in EC have been found to occur beyond the age of four, but the growth seems to slow (Eisenberg, Spinrad, & Eggum, 2010). Rueda and colleagues (2004) found gains in children's abilities to control their attention up to age seven. In another study that examined four age groups, performance on a rule-switch task improved from 8-10 years through 12-14 years and through 16-18 years (Crone, Ridderinkhof, Worm, Somsen, & Molen, 2004).

EC has been established as an important skill for healthy development; however, there are other aspects of emotional competence that children need to successively navigate social interactions and be less likely to develop socioemotional difficulties. Emotion understanding is one of these essential skills. This construct will be defined next, followed by a review of the associations of EC and Emotion understanding to study outcomes.

Emotion Understanding: Definition and Development

In addition to EC, the relations of children's emotional competence, more specifically emotion understanding (EU), to adult-child relationship quality and (mal)adjustment/social competence will also be examined. EU refers to children's ability to recognize and differentiate their own and other's emotions, to understand the situations that cause emotions, which emotions are appropriate to

express in a given situation, and the causes and implications of emotion (Denham, 1998). EU has been well-established as an important component of emotional competence (Denham, 2006). Given the significance of this construct in children's overall social competence, researchers have studied the development of EU, as well as individual differences in this skill. There is evidence to suggest that even at one year of age children are able to decipher some emotions from facial expressions, and alter their behavior based on parental expressions (Denham, 1998; Harris, 1989; Saarni, Mumme, & Campos, 1998). By the second year of life, children begin to incorporate emotion words into their vocabulary and attach labels to emotions. Around 28 months, children can discuss their own feeling states using emotion words (Bretherton & Beeghly, 1982). Researchers studying the frequency of children's use of emotion labels have found that younger children (between 39 and 50 months) more frequently use the terms happy, angry and sad, whereas older children (56 months) begin to include labels such as surprised and disgusted during free-labeling emotion tasks (Widen & Russell, 2003). Younger children also can identify emotions more easily when asked to do so receptively (e.g., pointing) as compared to expressively (e.g., verbally). EU continues to develop through childhood, and by 7 years of age children can comprehend more complex emotions such as pride, jealousy, and worry (Harris, Olthof, Meerum Terwogt, &Hardman, 1987).

Thus, by the preschool years children demonstrate a basic understanding of emotions showing proficiency in identifying emotions and using emotions to interpret social information in different contexts (Fabes, Eisenberg, Nyman &

Michealieu, 1991; Harris et al., 1987). Young children are better at identifying situations that elicit positive emotions compared to those that elicit negative emotions (Denham & Couchoud, 1990). Children's skills that involve differentiating among negative emotions and the situations that are most likely to lead to specific negative emotions continue to develop through the preschool years and late childhood.

Relations of Effortful Control and Emotion Understanding

Children's regulation is conceptually associated with EU. EU involves the ability to attend and process emotion-related environmental cues. Attentional skills are required to focus on relevant verbal and non-verbal information that facilitates the development of EU in young children (Eisenberg, Sadovsky, & Spinrad, 2005). Further, regulation may provide children with the means to manage their own arousal levels in emotionally-laden circumstances, and in doing so are more likely to learn more about emotions (Hoffman, 1983). By successfully modulating their own arousal levels, children are more apt to attend to the emotional experiences of others; whereas children who become overaroused may only focus on their own experience, while also withdrawing from emotional situations (Hoffman, 2000). In doing so, these children have less opportunity to learn about the emotions of others. In support of these conceptual arguments, Schultz, Izard, Ackerman, and Youngstrom (2001) found that children's regulation during preschool predicted higher levels of EU two years later.

Others have also suggested that EU may also facilitate children's development of emotion regulation. Izard and colleagues (2011) proposed that

with the ability to recognize and understand the emotions of others, children are more aware of the motivations and intentions of others. With this knowledge, children can anticipate the behaviors of others more accurately and thus, manage their own emotions and actions in an attempt to maintain positive interpersonal interactions. In one of the few studies to examine EU as a predictor of emotion regulation, Izard and colleagues (2008) found that the positive effects of an emotion-based intervention program for children in Head Start programs on emotion regulation was fully mediated by EU. This finding suggests that increases in children's knowledge of emotions should be related to increases in their regulation. However, models assessing the transactional relations between EC and EU have not been thoroughly studied using longitudinal data.

Relations of Effortful Control and Emotion Understanding to Externalizing

EC is thought to be related to children's outcomes because regulated children are expected to be able to manage their own emotions and behaviors and engage in competent interactions with others. EC (or components of) is frequently negatively related to children's externalizing problems, including aggression, defiance, and delinquency (e.g., Kochanska & Knaack, 2003; Martel et al., 2007; Olson et al., 2005). Investigators using both adults' reports of attention shifting, attention focusing, and inhibitory control, as well as behavioral measures, have reported negative relations of EC to externalizing problems. For example, in a sample of children aged 4.5 to approximately 8 years, children classified as having externalizing symptoms were rated as having lower levels of regulation (e.g., low attention shifting, focusing, and inhibitory control) than nondisordered

children (Eisenberg et al., 2001). In a sample of 3-year olds, EC measured behaviorally and by parent report, was negatively related to mother-, father-, and preschool teacher-reported externalizing problems, specifically symptoms associated with impulsivity and inattentiveness (Olson et al., 2005).

Moreover, EC has been found to predict relatively low externalizing problems over time. EC measured when children were 4.5 to 8 years old negatively predicted externalizing problems two years later controlling for previous levels of problems (Eisenberg, Spinrad, et. al., 2004). In a slightly older sample, EC at approximately 11 years of age negatively predicted externalizing problems two years later. However, this relation was not significant two years prior (Eisenberg, Zhou et al., 2005). In a study with preschool -aged children, Eiden, Edwards, and Leonard (2007) found that self-regulation at 3 years, including scores on an EC battery, negatively predicted externalizing problems in kindergarten taking into account externalizing problems at ages 3 and 4 years. These relations provide evidence that more EC is related to decreases in the level of externalizing problems in childhood. Examining these relations in toddlers, EC was negatively related to adult-reported externalizing behaviors within time at both 18 and 30 months (Spinrad et. al., 2007). EC at 18 months did not predict externalizing problems at 30 months in models controlling for previous externalizing problems; however, these findings suggest that EC at younger ages (e.g., 18 months) may account for problem behaviors. Due to the stability of EC across 1 year, it may be difficult to find significant effects when previous levels are accounted for, although correlations over time were evident.

There are theoretical frameworks that propose that a lack of EU also is related to psychopathology. It is possible that individuals who do not recognize negative emotions that signal distress in others do not experience motivation to ease the stress of others and thus, act aggressively (Blair, 1995). Research on externalizing problems and behaviors highlights the role of emotional processes (Denham, et al., 2000). More specifically, children's EU has been associated with externalizing problems in preschools-aged children using both a composite of observed and teacher-reports of aggression (Arsenio, Cooperman, & Lover, 2000). Additionally, differences in emotion competence skills have been shown to predict continuity in externalizing problems. Denham and colleagues (2002) found that children who exhibited less age-appropriate EU at age 3 were more aggressive and showed more anger in kindergarten.

Relations of Effortful Control and Emotion Understanding to Internalizing

There are also theoretical arguments and empirical support to suggest that EC is negatively related to internalizing problems in children, but these findings are less consistent, especially earlier in development (Eisenberg, Spinrad, & Eggum, 2010). Well-regulated children (e.g., high in EC) are thought to be able to reduce the experience of negative emotions, such as fear and sadness, by shifting attention from negative or threatening stimuli and thoughts to neutral or positive ones (Derryberry & Rothbart, 1997; Garneifski, Kraaij, & van Etten, 2005). Therefore, children who are not well-regulated may be at risk for internalizing problems. Indeed, emotion regulation observed during the first year of life and attentional control observed during the second year predicted lower levels of

problem behaviors as reported by mothers, including internalizing problems (Feldman, 2009). Eisenberg, Spinrad and colleagues (2004) found that EC was negatively related to internalizing behaviors (through resiliency) in a sample of 4.5 – 8 year-olds at two different points in time, two years apart. Although it has been argued that inhibitory control may be less theoretically related to internalizing problems as compared to attentional components of EC, children with internalizing problems may have difficulty inhibiting negative thoughts (e.g., rumination). EC averaged across the ages of 3.5 and 4.5 negatively predicted internalizing problems at 5.5 years, and this relation was more consistent for inhibitory control as compared to attentional control (Lemery, Essex, Smider, 2002). In another study, first- and second- graders' observed inhibitory control, a component of EC, predicted a decrease in parent-reported internalizing problems two years later (Riggs, Blair, & Greenberg, 2003). Findings from a study with slightly older children (third and fifth-graders) showed that inhibitory control (a composite of parent and child reports) was negatively related to mother-reported internalizing and child-reported depression both within time and 1 year later (Lengua, 2003). In a sample of children with low levels of problem behaviors, only a marginal inverse relation between EC and a composite of problem behaviors (e.g., internalizing and externalizing combined) was reported for toddlers, and a quadratic relation was found in preschoolers (Kochanska & Murray, 2002). Preschoolers who were rated as higher on EC were rated as higher on internalizing problems as compared to children with moderate EC. However, their measures of EC may have included some measures of children's

impulsivity, or reactive control. Thus, children who appeared regulated on these tasks may actually have been overly controlled (e.g., behaviorally inhibited), which may explain this unexpected association. However, in another sample of toddlers, EC was negatively related to separation distress, but not inhibition to novelty, at 18- and 30- months (both are subscales of internalizing problems) (Spinrad et al., 2007). The relations of EC to internalizing problems appear more complex. This study will examine the relations of EC to internalizing, as well externalizing problems, while investigating potential mediators of these relations. Although there are relatively few studies that have investigated EU and internalizing problems, there is some evidence to suggest there is a negative association. Fine, Izard, Mostow, Trentacosta and Ackerman (2003) found that children with low emotion knowledge reported higher levels of internalizing behaviors. It is likely that children who cannot identify their own or other's emotions do not have satisfying social relationships and feel alienated and lonely.

Relations of Effortful Control and Emotion Understanding to Social Competence

Children's EC also has been positively associated with children's social competence. It is likely that children who can effortfully control their attention and behavior can more easily interact with peers and participate in more socially constructive activities. Using longitudinal data, Eisenberg and colleagues (1993) found that preschoolers' attentional control, an aspect of EC, was positively related to adult-reported social skills and peer-reported popularity within and across time. Similar relations were found when controlling for stability in

regulation. EC was positively related to popularity and/or social competence through children's resiliency in early elementary school. Children with higher levels of EC were more resilient, and in turn, rated as more popular and exhibited more socially appropriate behavior (Eisenberg et al., 2000). Using a sample of young children, Spinrad et al. (2007) also examined the relations of regulation to social competence; EC was positively related to social competence within time at 18- and 30 months of age. However, when controlling for previous levels of regulation, the relation was not significant a year later. The authors suggested that this relation may be evident at later ages, or perhaps that the relation was mediated by factors not included in the study. Studies that have examined this relation in slightly older children have found a positive relation between EC and social competence in preschool and kindergarten (Goldsmith et al., 2001).

The relation between EU and children's social competence has been established. The ability to recognize the emotions of others likely aids children in acting in appropriate ways fostering positive relations with their peers. These positive relations have been found for teacher-reports of social competence (Blair, Granger, & Razza, 2005), as well as composites of peers' and teachers' reports social competence (Arsenio, Cooperman, & lover, 2000). Additionally, studies have shown that in highly emotional situations children who demonstrate more emotion knowledge (e.g., recognizing that a peer feels sad rather than angry) are rated as more socially skilled and more liked by peers (Denham, 1986; Denham et. al., 2003).

Relations of Effortful Control and Emotion Understanding to Adult-Child Relationship Quality

Children's early relationships are in integral part of development. Whereas the majority of work studying early relationships has focused on parent-child relationships, children's relationships with caregivers and teachers are also important. Attachment security with nonparental caregivers in child care centers, kibbutzim, and family child care has been related to children's empathy, peer competence, and achievement (Howes, 1997; Howes, Matheson, & Hamilton, 1994; Oppenheim, Sagi, & Lamb, 1988; van IJzendoorn, Sagi, & Lambermon, 1992). Thus, a goal of the present work is to examine the unique contributions of EC and EU to preschoolers' relationships with caregivers.

The quality and nature of children's relationships with nonparental caregivers can be characterized by reciprocal support and warmth, distance, or in some cases overt struggle between child and adult (Deynoot-Schaub & Riksen-Walraven, 2008; Howes & Matheson, 1992; Pianta, Steinberg, & Rollins, 1995). Individual differences in the nature of adult-child relationships, more specifically teacher-child relationships, have been characterized in several ways. These unique characteristics of such relationships may be differentially influenced by components of children's temperament and EU; however, these relations have yet to be examined thoroughly, especially using longitudinal data.

Adult-child relationships characterized by conflict are those high in negativity and in which the teacher and child are at odds with one another. Different teachers' perceptions of conflict with a particular child have been found

to be relatively stable across the preschool to kindergarten transition (Howes, Phillipsen, & Peisner-Feinberg, 1999), and from kindergarten to second grade (Pianta et al., 1995). Even when reports are collected from different teachers, correlations between preschool, kindergarten and first grade teacher-child conflict are shown to be moderate (Pianta & Stulhman, 2004) possibly indicating that children engage in negative patterns or relational styles with different adults that remain relatively stable over time. In the same study, mean levels of conflict significantly decreased (albeit slightly), across these three years (Pianta & Stulhman, 2004). Further, teachers reported more conflict with boys as compared to girls (Birch & Ladd, 1998; Griggs et al, 2009; Hamre & Pianta, 2001; Hughes et al., 2001; Murray & Murray, 2004).

Adult-child relationships characterized by closeness are high in warmth and support (e.g., positive affect, open communication, and affection). Teachers' reports of closeness appear to be more variable across early elementary school (Pianta et al., 1995). Correlations among teacher-reported closeness from preschool, kindergarten, and first grade have been moderate (*r*s = .21 to .31), and teachers' reports of closeness significantly decreased over these years, albeit a relatively small decline.

Given the associations of the quality of adult-child relationships to a variety of outcomes, such as academic success and social competence, it is important to examine mechanisms through which positive relationships are formed. Although there are likely multiple determinants of relationship quality, child characteristics, such as antisocial behavior (Ladd et al., 1999), aggressive

and withdrawn behavior (Ladd & Burgess, 1999), and early behavioral problems (Eisenhower, Baker, & Blacher, 2007) have been found to relate to negative teacher-child relationship quality. However, few researchers have investigated how temperament, specifically EC, is associated with adult-child relationship quality, and even fewer studies have assessed these relations longitudinally. It would be expected that better-regulated children are likely not only to elicit more positive interactions with nonparental caregivers, but also to initiate contact with caregivers, leading to opportunities that foster more closeness and warmth in the relationship. Indeed, Rudasil and Rimm-Kaufman (2009) found that EC was positively related to teacher-child closeness and negatively related to conflict. Interestingly, low EC was positively related teacher-initiated interactions; teachers may need to interact with children low in regulation in order to address misbehavior in the classroom. Similar findings regarding the relation of regulation to children's relationships with teachers were found in an ethnically diverse, low socioeconomic sample of preschoolers; adults' reports and behavioral measures of EC were positively related to higher quality teacher-child relationships (e.g., high closeness and low conflict) (Silva et al., 2010).

The relations of children's EU with the quality of adult-child relationships are less clear and have not been directly studied. Similar to interactions with peers, children who show relatively high EU are probably more apt to have positive interactions with others. Additionally, children who are able to identify their feelings may be better able to communicate with caregivers about their needs and elicit a warm and sensitive response from the caregiver which promotes a

higher-quality relationship. In a study that examined the relations of EU, teacher-child relationships, and school-related competence in preschoolers, children's EU positively predicted teacher-child closeness, but not conflict (Garner et al., 2008). Findings also provided support that emotion knowledge mediated the relation between closeness and school competence. However, this study was correlational in design and longitudinal relations could not be assessed.

Potential Moderators of the Relations between Effortful Control and Emotion Understanding to Outcomes

Direct relations among children's regulation and EU, teacher-child relationship quality, and (mal) adjustment have been demonstrated; however, is it likely that some of these relations are moderated by other variables. Thus, a secondary goal of the present study is to explore children's early socialization as a moderator of the relation of EC to maladjustment and gender as a moderator of the relation of EU to children's relationships with caregivers.

Early Parenting

There has been growing interest in how different temperamental vulnerabilities interact with parenting in the emergence of psychopathology. There are temperamental vulnerabilities that increase a child's risk of experiencing problems; however, less is known about how parenting may affect the level of risk for such children. One of the areas of parenting that has been studied in relation to children's EC is warmth/support and sensitivity. These aspects of socialization refer to the parent's awareness of a child's behaviors and how appropriately a parent responds to the cue and emotions of the child. Kopp

(1989) proposed that mothers who are sensitive and supportive in response to their child's distress can help manage the child's arousal level. By doing so, the child is better able to process and learn self-regulation through the experience. In the same way, mothers who respond by ignoring, minimizing or punishing a child's emotions not only likely exhibit poor regulation themselves, but also increase their child's arousal thus making it more difficult for the child to develop EC that may contribute to later dysfunction(Hoffman, 2000). The lack of sensitive parenting for children low in EC further limits the resources children have to buffer the effects of poor regulation.

There is some evidence that parenting does influence the degree to which EC is related to maladjustment. Kiff, Lengua, and Bush (2011) found that children low in EC reported higher levels of depressive systems when they had mother's low in guidance (e.g., appropriately helping child during difficult task). There was no significant interaction of parenting and child EC predicting anxiety. In contrast to those findings, Morris and colleagues (2002) found that poor parenting did not moderate the relation of EC to internalizing problems, but did find that for children low in EC maternal hostility was positively related to externalizing behavior. This relation was not significant for children higher in EC. Such findings suggest that lack of supportive parenting can serve as a risk factor for poorly regulated children. Given the inconsistencies, more thorough examination of the parenting by child temperament interactions is needed to better understand which aspects of parenting interact with low regulation and how such interactions are differentially related to different problem behaviors.

Child Sex

Previous research provides support that EU is differentially related to developmental outcomes during early childhood for boys and girls. Researchers have suggested that gender role socialization may explain some of these differences. Although there is limited work examining how sex and EU interact to predict adult-child relationships, there is preliminary evidence that relation of EU to socioemotional variables varies for girls and boys. Denham and colleagues (2002) reported that preschool-aged girls who performed worse on EU tasks exhibited more problematic trajectories of aggression/anger. The authors suggested for girls low EU does not coincide with the social expectation that girls are more emotionally skilled and that this mismatch may contribute to aggression and anger. Similarly, less emotionally skilled girls may elicit less warmth from caregivers and teachers due to unmet gender expectations.

The Present Study

The main goal of this study is to investigate the relations of children's EC and EU to children's problematic and socially competent behavior and adult-child relationship quality. Further, children's early parenting/socialization, and sex will be examined as moderators of some of these relations. Given findings from the literature, the following hypotheses were made (see Figures 1, 2, and 3):

Direct Relations

1. Children's EC and EU will be positively related to each other over time even after controlling for stability of the constructs, such that the relations between them are transactional in nature.

2. Children's EC will be positively related to social competence and higher quality adult-child relationship quality, and negatively related to externalizing and internalizing problems, even after controlling for stability of outcomes over time.
3. Children's EU will be positively related to social competence and adult-child relationship quality, and negatively related to externalizing and internalizing problems, even after controlling for stability of outcomes over time.

Moderating Effects

1. Early maternal warmth/sensitivity will moderate the relations of EC to internalizing and externalizing problems.
    a. It is expected that when mothers' are low in maternal warmth/sensitivity, the negative relation of EC to externalizing and internalizing problems will be stronger than when mothers' are high on warmth/sensitivity.
2. Gender will moderate the relations of EU to adult-child relationship quality.
    a. It is expected that for girls, EU will be more strongly negatively related to conflict and positively related to closeness than boys.

Chapter 2

METHOD

Procedure

Participants were recruited for an ongoing longitudinal study of emotional development and regulation at the time of birth at local hospitals in a large Southwestern city. All participants were healthy, full term infants and families. Parents were asked to participate in laboratory sessions when children were 18-, 30-, 42-, and 54- months old. In the present study only data from the 30, 42, and 54 laboratory assessments are used. After voluntary consent was obtained from mothers, a research assistant accompanied mother and child to a laboratory assessment room. While children were participating in the lab portions of the study, mothers completed questionnaires about children's temperament, emotion regulation, parenting, relationship quality, and adjustment. Data from caregivers/teachers were collected by mailing packets of questionnaires to be completed with a stamped self-addressed envelope.

Data for this study were collected from a normative sample of children. The research plan includes examining data at three time points that have been labeled to be consistent with other studies using the same sample, Time 2 (T2) when children were 30 months of age, Time 3 (T3) when children were 42 months of age, and Time 4 (T4) when children were 54 months of age. These ages were chosen because children's emotion regulation and understanding are emerging during these developmental periods. Additionally, including three times points was important to investigate the relations of children's regulation and EU to

teacher-child relationships and maladjustment and social competence over time. At all three time points, questionnaire data were collected from parents and nonparental caregivers. Behavioral measures were assessed during laboratory sessions.

Participants

At T2, 230 children participated in data collection (128 boys, 102 girls; ages 27.2 to 32.0 months, *M* = 29.77 months, *SD* = .65). There were 14 families who participated only by mail. Additionally, 153 nonparental caregivers provided mail-in questionnaires. At T2, 83.5% of children were Caucasian, 5.7% were African American, 2.6% were Asian, 4.8% were Native American, .9% were rated as other, and 1.3% were unknown. Children's ethnicity was also reported; 23% of children were Hispanic/Latino. Parental education ranged from completion of grade school to completion of a Ph.D., J.D., or M.D. However, a majority of parents had some college or a 2-year degree (34.2% of mothers and 39.7% of fathers) or a 4-year degree (37.8% of mothers and 24.2% of fathers).

At T3, 210 children participated in data collection (117 boys, 93 girls, ages 39.17 to 44.20 months, *M*= 41.75 months, *SD* = .65). There were 18 families who participated only by mail. Additionally, 151 nonparental caregivers provided mail-in questionnaires. At T3, 82.9% of children were Caucasian, 6.2% were African American, 2.4% were Asian, 5.7% were Native American, 1.0% were rated as other, and .5% were unknown; 22.4% of children were Hispanic/Latino. In addition, 38.7% of mothers and 35.8% of fathers reported some college or a

2-year degree and 36.8% of mothers and 25.9% of fathers reported completing a 4-year degree.

At T4, 199 children participated in data collection (112 boys, 87 girls; ages 52.97 to 57.20 months, *M* = 53.89 months, *SD* = .80). There were 22 families who participated only by mail and 146 nonparental caregivers provided mail-in questionnaires. At T4, 83.9% of children were Caucasian, 6.0% were African American, 2.0% were Asian, 6.0% were Native American, .5% were rated as other, and .5% were unknown; 21.6% of children were Hispanic/Latino. Information on parental education at T4 was not collected. At all time points annual family income ranged from less than $15,000 to over $100,000, and the average was $45,000 to $60,000.

Measures

Effortful control. *Parent- and caregiver-reported EC.* At T2 parents and caregivers assessed children's EC by reporting on the Attention-Shifting, Attention-Focusing, and Inhibitory Control subscales of the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, 2006). At T3 and T4, parents and caregivers reported on the same subscales on the Child's Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey & Fisher, 2001) intended to assess children aged 3 to 7 years old. Items were rated on a 7-point scale (1 = *never* and 7 = *always* at T2; 1 = *extremely untrue of your/this child* and 7 = *extremely true of your/this child* at T3 and T4).The ECBQ attention focusing subscale consisted of 12 items at T2 (e.g., "After having been interrupted, how often did your/this child return to a previous activity"); αs = .73 and .71, for

mothers and caregivers, respectively. The CBQ attention focusing subscale consisted of 12 items (e.g., "When picking up toys or doing other tasks, my/this child usually keeps at the task until it's done"); αs = .77 and .74, for mothers and caregivers, respectively, at T3, and αs = .77 and .72, for mothers and caregivers, respectively, at T4. The ECBQ attention shifting subscale consisted of 12 items at T2 (e.g., "When engaged in play with his/her favorite toy, how often did your/this child play for more than 10 minutes"); αs = .81 and .85, for mothers and caregivers, respectively. The CBQ attention focusing subscale consisted of 14 (e.g., "My/this child can easily shift from one activity to another"); αs = .67 and .80, for mothers and caregivers, respectively, at T3, and αs = .73 and .82, for mothers and caregivers, respectively, at T4. The ECBQ inhibitory control subscale consisted of 12 items at T2 (e.g., "When asked to do so, how often was your/this child able to stop an ongoing activity"); αs = .88 and .88, for mothers and caregivers, respectively. The CBQ inhibitory control subscale consisted of 13 items (e.g., "My/this child can lower his/her voice when asked to do so"); αs = .77 and .82, for mothers and caregivers, respectively, at T3, and αs = .80 and .80, for mothers and caregivers, respectively, at T4.

Observed EC. Children's EC was measured by administering a set of widely used tasks used to assess children's regulatory capacities (Kochanska, Murray, & Coy, 1997; Kochanska et al., 2000). Children were video recorded throughout the tasks.

Dinky toys (T2, T3, and T4). For this task children were seated at a table and instructed to put their hands in their laps *(*Kochanska et al., 2000). The

experimenter then placed a see-through container of toys within the child's reach, and asked the child to choose a prize by telling the experimenter which toy they wanted while keeping their hands on their lap. Children were allowed to examine the toys for a maximum of two minutes without interruption (at T2 children were given a maximum of two reminders to keep their hands in their lap). The task started when the container was put in front of the child and ended when the child picked a toy. A second trial was conducted using the same procedure. Using a 4-point scale (1 = *no restraint, child reaches for the toy each time,* 2 = *minimal attempt at self-restraint,* 3 = *moderate attempt at self-restraint,* 4 = *extreme attempt at self-restraint*), children's self-restraint was coded once for the entire task; ICCs were .71, .92, and .72 for T2, T3, and T4, respectively.

Rabbit and turtle (T2, T3, and T4.) For the Rabbit Turtle task, children were instructed to negotiate a rabbit and turtle figure down a curved path *(*Kochanska et al., 2000). There were a total of six trials conducted. Two practice trials using a toy figure of the child's sex was conducted to ensure the child understood the task. For the subsequent trials (2 rabbit trial and 2 turtle trials), children were told that the rabbit was the "fastest rabbit on earth" and the turtle was the "slowest turtle on earth." The children were reminded to stay on the path before each trial. All six trials were timed and scored based on if the child stayed on the path (e.g., 0 = *child ignores path* 2 = *child follows general curvature of path*, 3 = *child stays on mat and is within the lines of path*). There were a total of six curves that could have been scored. The points for each trial were summed, and averaged across trials to create a total point score; ICCs were .96 for T2 and

T3, and .98 for T4. In addition, the difference between the average time for the slow trials and the fast trials will be calculated. The ICCs for trial times ranged from .93 - .99, .96 - .99, and .95-1.0, for T1, T2, and T3, respectively.

Waiting for bow (T2, T3, and T4). For this task children were given a gift but told by the experimenter that she needed to get a bow to finish wrapping the gift *(*Kochanska et al., 2000). Children were instructed to try not to touch or open the gift while the experimenter was out of the room. The task lasted three minutes at T2 and two minutes at T3 and T4. At T2 an average latency score was calculated by taking the mean of latency to touch bag, latency to look in bag, latency to put hand in bag, latency to pull box from bag, latency to open box, and latency to leave seat. At T3 and T4, an average latency score was calculated by taking the mean of latency to touch bag, latency to open box, latency to take gift out of box, and latency to leave seat. All latencies were measured in seconds. The ICCs for latencies ranged from .88 to 1.0 at T2 and .95 to 1.0 at both T3 and T4.

Gift wrap (T3 and T4). Before the start of this task, mothers were seated facing away from the child and were instructed to complete her questionnaires while not interacting with the child. During this task children were told not to "peek" and remain seated facing forward while an experimenter noisily wrapped a gift behind them (Kochanska et al., 2000). The task lasted for one minute. The number of seconds that elapsed until the child's first peek was used as the latency to peek score. All latencies were measured in seconds. The ICC for latency to peek was .90 and .77 at T3 and T4, respectively. An overall latency at T3 and T4

was computed by taking the average of the latency score composite for waiting for bow and latency to first peek for gift wrap.

Adult-child relationship quality. Given the small number of children that were in formal child-care settings, adult-child relationship quality was not assessed at T2. At T3 and T4, the quality of children's relationships with nonparental adults was assessed using a shortened version of the Student-Teacher Relationship Scale designed to measure teachers' perceptions of their relationship with students (STRS; Pianta et al., 1995). This instrument was derived from attachment theory, the attachment Q-set (Waters & Deane, 1985), and the body of literature on teacher-child interactions. Although originally designed to assess teacher-child relationship quality, this measure has been used to assess relationship quality between parents and children (Ingoldsby et al., 2001), as well as between caregivers and children in child-care centers (Owen, Klausli, Mata-Otero, & Caughy, 2008). Adults rated 15 items using a 5-point Likert-type scale (*1 = definitely does not apply; 5 = definitely applies*). Scores for two subscales were created: a 5-item closeness scale (e.g., "S/he is open with me about sharing feelings and telling me how things are;" αs = .77 and .67, at T3 and T4, respectively) and a 10-item conflict scale (e.g., "S/he and I always seem to be struggling with each other;" αs = .90 and .86. at T3 and T4, respectively).

Emotion understanding. *Receptive (T2) and expressive (T2 and T3) knowledge***.** Children's EU was measured using an affective labeling task designed by Denham (1986). This measure is developmentally appropriate, and requires minimal verbal ability. Children were first asked to identify emotion s by pointing

(e.g., receptively) to faces that had been drawn onto white fabric. The children were then asked to verbally (e.g., expressively) identify the emotion. Children received a score of 2 for each correct answer and score of 0 for not correctly identifying the emotion. In this study, the experimenter scored the child's responses while administering the task. Another research assistant watched the videotape of the task and checked the accuracy of the experimenter's score. Expressive and receptive scores were created by taking the sum of scores for each. Denham (1986) reported an alpha of .89 for this task.

Situational non-stereotypical knowledge (T3). In 12 of the vignettes, children were asked to identify the appropriate emotion for non-stereotypical equivocal situations. These were situations that may elicit different emotions for different people such as going to school. Prior to the procedure, parents, usually mothers, completed a forced-choice questionnaire and indicated how their child would feel in the listed situations. Parents' responses determined how the protagonist felt in the vignette enacted by the experimenter. For example, if the parent indicated that the child would be happy going to a swimming pool, the protagonist was depicted as feeling sad. Responses were coded using the same scoring as described above (2 = correct, 0 = incorrect). If children did not get at least two of the first six vignettes correct, they were not administered the last six. A composite score for this task was created by summing across all 12 vignettes.

Situational stereotypical knowledge (T2, T3, and T4 see below). For this task, the experimenter enacted a series of vignettes that described situations that would generate one of four emotions (happy, sad, fear, and anger) while making

standard emotion expressions and vocalizations (e.g., Here comes Nancy and his Mommy: we are coming to school, I like it here, we have so much fun!"). The experimenter asked the child to identify how the protagonist would feel in that situation either by labeling the emotion verbally or pointing to one of the four faces. In the first 8 vignettes the emotion expressed by the protagonist was the stereotypical emotion that would be expressed l in that situation (e.g., being angry if another child knocked over a tower of blocks). Responses were coded using the same scoring as described above (2 = correct, 0 = incorrect). A composite score for this task was created by summing scores across all 8 vignettes.

Children's maladjustment and social competence. It was important to control for earlier levels of these behaviors in the longitudinal models. Given the high stability over a one-year period, initial levels of maladjustment and social competence (T2) were used in analyses.

Externalizing (T2 and T4). Parents and caregivers completed the Infant/Toddler Social and Emotional Assessment (ITSEA: Carter, Briggs-Gowan, Jones, & Little, 2003) at T2 and T4. Items were rated on a 3-point scale (0 = *not true* to 2 = *very true)*. The externalizing scale consisted of three subscales including activity/impulsivity (6 items), aggression/defiance (12 items), for mothers and caregivers, respectively), and peer aggression (6 items). However, because the activity/impulsivity subscale is likely to tap measures of temperament and is less indicative of symptoms of behavior problems (see Spinrad et al., 2007) this scale will not be included. An externalizing score was created by averaging the aggression/defiance and peer aggression subscale, αs = .82, 79, and .89, for

mothers, fathers, and caregivers, respectively, at T2, and αs = .86, .81, and .90, for mothers, fathers, and caregivers, respectively at T4.

Internalizing (T2 and T4). Parents and caregivers assessed children's internalizing symptoms using the ITSEA. Items were rated on a 3-point scale (0 = *not true* to 2 = *very true)*. The internalizing scale consisted of four subscales including inhibition to novelty (5 items), separation distress (6 items), depression/withdrawal (9 items), and general anxiety (12 items). However, because the inhibition to novelty subscale is likely to tap measures of temperament and is less indicative of symptoms of behavior problems this scale will not be included. An internalizing score was created by averaging the remaining three subscales, αs = .67, .67, and .79, for mothers, fathers, and caregivers, respectively, at T2, and αs = .73, .73 and .80, for mothers, fathers, and caregivers, respectively at T4.

Social competence (T2 and T4). Parents and caregivers assessed children's social competence also using the ITSEA. Items were rated on a 3-point scale (0 = *not true* to 2 = *very true)*. The social competence scale consisted of three subscales including compliance (8 items), imitation/play (6 items), and empathy (7 items). A social competence score was created by averaging the three subscales, αs = .77, .79, and .80, for mothers, fathers, and caregivers, respectively, at T2, αs = .80, .84, and .86, for mothers, fathers, and caregivers, respectively, at T3, and αs = .80, .83, and .82, for mothers, fathers, and caregivers, respectively at T4.

Early socialization. *Observed maternal sensitivity and intrusiveness.* Maternal sensitivity and intrusiveness was assessed in the laboratory during two mother-child interactions at T2. During a free-play interaction, a basket of toys was given to the mother and she was told to play with her child as she normally would at home for 3 minutes. The second interaction consisted of a teaching paradigm in which mothers and children were given a difficult puzzle. Experimenters instructed mothers to "teach their child to complete the puzzle." The pairs were given 3 minutes to complete the task. Mothers' behaviors were coded every 15 seconds during the free-play interaction and every 30 seconds during the puzzle task (Fish, Stifter, & Belsky., 1991). Maternal sensitivity was assessed by the presence of behaviors indicating that mothers were appropriately attentive to their child and well responsive to their child's abilities, interests, and affect. Behaviors were coded using a 4-point scale (1 = no evidence of sensitivity, 2 = minimal sensitivity, 3 = moderate sensitivity, 4 = mother was very aware of the toddler, contingently responsive to his/her interests and affect, and had an appropriate level of response/ stimulation); ICCs were .86 for free-play and .71for puzzle task. Intrusiveness was assessed by coding maternal behaviors that evidenced over-stimulating the child, physically intruding, or providing help to the child when not needed (1 = no over-controlling behavior observed; 4 = extreme intrusive or over-controlling behaviors; *ICCs* = .81 and .71 for free-play and puzzle task, respectively).

Observed maternal warmth. Maternal warmth was also assessed during the puzzle task at T2. Mothers' behaviors were scored every 30 seconds for

behaviors indicating friendliness, displays of closeness, physical affection, encouragement and positive affect with the child , and the quality of the mothers' tone/conversation (1 = no evidence of warmth, 2 = minimal warmth, 3 = moderate warmth, 4 = engaged with the child for much of the time and touched the child in a positive way, 5 = very engaged with the child, positive affect was predominant, and the mother was physically affectionate).The ICC was .66.

Chapter 3

RESULTS

Data Reduction

Given the number of behaviors that were coded across all three time points and the use of multiple reporters, data were reduced to make analyses more manageable. Additionally, data reduction techniques such as aggregation are thought to provide more reliability and stability than the use of a single measure (Rushton, Brainerd, & Pressley, 1983). For most of the subsequent analyses if measures were correlated at the $p < .05$ level and were collected using the same method (i.e., adult-reported or observed), composites were created by computing the average.

Adult-reported EC. To determine if a composite could be created for the mothers' and caregivers' reports of EC (EC) measures, correlations among the subscales were conducted. Correlations between the attention focusing, attention shifting, and inhibitory control subscales for mothers ranged from .30 to .36 (*df*s ranged from 218 – 221) at T2, .23 to .51 (*df*s = 203) at T3, and .21 to .56 at T4 (*df*s = 187), and all correlations were significant at $p < .01$. Correlations for caregivers ranged from .45 to .53 (*df*s ranged from 141 – 143) at T2, .41 to .68 (*df*s = 147) at T3, and .39 to .64 at T4 (*df*s ranged from 143 – 144), and all correlations were significant at $p < .01$. An EC composite was created for each reporter separately by first calculating an attentional composite (e.g., averaging attention focusing and shifting), and then taking the average of that composite and inhibitory control. Further, given that mother and caregiver reports of EC were

positively related, *r*s(146, 145, and 143) = .23 .30, and .36, *p*s < .01, .001, and .001 for T2, T3 and T4, respectively, and to decrease the number of indicators in the models, an aggregate EC composite was computed by averaging mothers' and caregivers' reports to create an adult report of EC within time.

Descriptive Statistics

Means (*M)* and standard deviations (*SD*) for all variables at T2, T3, and T4 are presented in Table 1. Maintaining the original scales of untransformed variables is preferred; however, four variables exhibited substantial nonnormality based on skewness values >2.0 and kurtosis values > 7.0 (Curran, West, & Finch, 1996). All nonnormally distributed variables were transformed as recommended by Cohen, Cohen, West, & Aiken (2003). A log transformation was performed on the rabbit turtle curve score and EU expressive knowledge at T2. The other two nonnormally distributed variables were maternal sensitivity and intrusiveness during the puzzle task; these variables were to be used in moderation analyses. A log transformation and inverse transformation were performed on observed maternal sensitivity and intrusiveness, respectively. These transformed variables were used in all subsequent analyses. The same variables at the other time points were also transformed for structural equation models for purposes of interpretation. Data also were screened for outliers. Cases with standardized scores that exceeded an absolute value of 3.29 were considered to be potential outliers (Tabachnick & Fidell, 2006). Few cases were found to exceed such a score. There were two cases that had extreme high values on caregiver-child conflict at T3 and two different cases that had extreme high values at T4. There

were two cases that had extreme low values on caregiver-child closeness at T3 (one of these cases was also an outlier on caregiver-child conflict at T3). The raw data was checked on original score sheets and no data entry errors were found. Thus, in order to include these cases and maintain valuable information without biasing estimates, these cases were recoded to be slightly higher or lower than the next highest or lowest non-outlying score and maintained for analyses (Tabachnick & Fidell, 2006).

Sex Differences in Study Variables

Preliminary analyses included examining sex differences in study variables by conducting a series of MANOVAs and ANOVAs. Because of differences in sample size for children with questionnaire data versus children with observed data, ANOVAs were computed for adult-reported EC at each time point, and MANOVAs were computed for curve score, gift latency, and dinky restraint at each time point. In addition, MANOVAs were computed for receptive, expressive, and stereotypical knowledge at T2 and expressive, stereotypical, and non-stereotypical knowledge at T3. One ANOVA was computed for stereotypical knowledge at T4. For T2 and T4 data, separate MANOVAs were computed for mothers', caregivers,' and fathers' reports of children's externalizing, internalizing, and social competence separately by reporter and two MANOVAs were computed for caregiver-child conflict and closeness at T3 and T4.

Results from these analyses indicated several sex differences on study variables at T2. Girls and boys did not differ on adult-reported EC at T2. Multivariate tests were marginally significant for observed measures of EC and

EU, *F*s (3, 198; 3, 211) = 2.51 and 2.31, *p*s< .10. Univariate tests indicated that girls performed better on the gift latency, $F(1, 200) = 7.30$ $p < .01$, and had higher scores for EU stereotypical knowledge, $F(1, 213) = 6.35$, $p < .05$, than did boys. Multivariate tests for mothers,' caregivers,' and fathers' reports of outcome variables were marginal, $F(3, 218) = 2.12$, $F(3, 143) = 2.20$, $F(3, 156) = 2.53$, respectively, *p*s < 10. Univariate results indicated that mothers rated girls significantly higher than boys on social competence, $F(1, 220) = 5.37$, $p < .05$, caregivers rated girls higher than boys on internalizing, $F(1, 140) = 3.44$, $p < .10$, and fathers rated girls significantly higher than boys on social competence, $F(1, 158) = 6.43$, $p < .05$ (see Table 1 for all means).

Sex differences for T3 variables also were found. At T3, girls were rated as marginally higher than boys on adult-reported EC, $F(1, 207) = 3.63$, $p< .08$. Multivariate tests were significant for observed measures of EC, $F(3, 187) = 3.42$, $p< .05$. Univariate tests indicated that girls performed better on the gift latency composite and the rabbit turtle task than did boys, *F*s(1, 189) = 9.27 and 4.02, $p < .01$ and .05, respectively. The multivariate tests for EU variables were not significant, but univariate tests indicated that girls performed better on the expressive task at T3, $F(1, 171) = 5.91$, $p< .05$. No sex differences were found for relationship variables.

In terms of T4 sex differences, findings showed that girls were rated marginally higher than boys on adult-reported EC, $F(1, 188) = 3.25$, $p< .08$. Multivariate effects were found for observed measures of EC and fathers' reports of behavior, *F*s (3, 164; 3, 115) = 4.21 and 4.21, $p < .05$ and .01. Univariate tests

showed that girls had higher scores on the gift latency than did boys, $F(1, 166) = 11.20$, $p < .01$. There was no sex differences found for relationship variables at T4. Given the number of significant differences for EC, EU, and outcomes, sex was included as a covariate in all structural equation models.

Relations of Study Variables to Children's Age at Visit

All children who participated in the lab visits were usually within two weeks of their 30-, 42-, or 54-month birthdays. Given the small variability of ages during lab assessments, age at visit was not expected to be related to study variables. Correlations were computed within time for age at lab visit and all measures. As expected, few relations were found. Children's age at visit was positively related to fathers' reports of internalizing at T4, $r(102) = .26$, $p < .01$, and negatively related to mothers' reports of social competence at T4, $r(164) = -.19$, $p < .05$. There were no relations between age at visit and adult-child conflict or closeness. Based on the small numbers of significant correlations between age at visit and study measures, age at visit was not included as a covariate in structural equation models.

Relations of Study Variables to Socioeconomic Status

Socioeconomic status (SES; the average of household income, mothers', and fathers' education after standardizing at initial time point (T2) was correlated with a number of study variables (23 out of 41 correlations were significant). Adult-reported EC was positively correlated with SES at all time points, *r*s(179-221) = .16 to .20, *p*s < .05. The gift latency and curve score were positively correlated with SES at T2, *r*s(207, 196) = .30 and .20, *p*s < .01, and T3, *r*s(185,

184) = .29 and .33, *p*s < .001. Dinky restraint was positively correlated with SES at T3, *r*(185) = .23, *p* < .01. All measures of EU were significantly and positively correlated with SES at all time points, *r*s(162-208) = .16 to .32, *p*s < .05. SES also was negatively related to all reports of externalizing at T2, *r*s(220, 146, and 157) = -.20, -.23, and -.16, *p*s < .05, for mothers, caregivers and fathers, respectively, and mothers' reports of T4 internalizing, *r*(178) = -.15, *p* < .05. Caregivers' reports of internalizing at T2also were negatively correlated with SES , *r*(145) = -.19, *p* < .05, and T4, *r*(131) = -.29, *p* < .01. T3 caregiver-child conflict was negatively correlated with SES, *r*(145) = -31, *p* < .001 and T4, *r*(139) = -.22, *p* < .01. Caregiver-child closeness at T3 was positively related to SES, *r*s(146) = .16, *p* = .05. Given the numerous significant relations of SES with measures in the study, SES was included as a covariate in structural equation models.

Attrition

Because of the longitudinal nature of the current study, a series of attrition analyses were conducted. The data for the current study comes from a larger study with an initial assessment conducted when children were 18 months old (T1; *n* = 256). At T2, the first assessment used in the current study, 33 children were lost to attrition. Children who dropped out of the study at T2 had mothers with lower levels of education (*M* = 3.68, reported as 1 = *grade school completion*, 2 = *some high school*, 3 = *high school graduate*, 4 = *some college*, 5 = *4 year college graduate*, 6 = *Master's degree*, and 7 = *Ph.D., J.D., or M.D.*) than mothers who participated at T1 and T2, (*M* = 4.36), *t*(238) = 3.25, *p* < .01. Attrited families also had significantly lower incomes, (*M* = 3.44, reported as 1 = *less than*

$15,000, 2 = *$15,000 - $42,000*, 3 = *42,000 - $45,000*, 4 = *$45,000 - $60,000*, 5 = *$60,000 - $75,000*, 6 = *$75,000 - $100,000*, and 7 = *over $100,000*) compared to mothers who continued at T2, (M = 4.16), t(226) = 1.98, p < .05. In another set of attrition analyses, children with complete data for the current study were compared to children who had data at only one or two time points on T2 study variables (n = 53). Children with complete data scored higher on the gift latency composite (M = 1.91) and were rated higher in externalizing by caregivers (M = 1.42) compared to children who did not have complete data (M = 1.53 and M = 1.24), ts(54.18 and 54.76) = 2.19 and 3.70, ps < .05. Differences on T3 study variables were also examined between children with complete data and children who dropped out of the study at T4. Children with complete data scored higher on the gift latency composite and had higher scores on EU expressive knowledge (M = 1.53 and M = 1.92) compared to children who attrited (M = 1.25 and M = 1.24), ts(188, 190) = 2.41 and 2.17, ps < .05. Children with complete data were also younger at the T3 lab visit (M = 41.70) than were children who attrited (M = 42.18), t(190) = -3.29, p < .01. There were no differences in caregiver-child conflict or closeness. Mothers' ethnicity and SES were not related to attrition.

Correlations among Indicators Concurrently

Relations among EC variables within time were examined (see Table 2). The gift latency was significantly positively correlated with all other indicators and dinky restraint was at least marginally positively correlated with all other indicators. Adult-reported EC was unrelated to curve score. At T3 and T4, all EC variables were at least marginally positively correlated.

EU measures were positively related within time (see Table 3). At T2, all EU indicators were positively correlated within time. Similarly, all EU variables were correlated within time at T3 (recall that no correlations are reported for T4 given that only one variable was used).

The within time correlations among the outcome variables at T2 and T4 (T3 and T4 for relationship variables) are reported in Tables 4 and 5. Mothers', fathers', and caregivers' reports of children's externalizing behavior were significantly and positively correlated at T2 and T4. Mothers' reports of internalizing were significantly positively correlated with caregivers' and fathers' reports of internalizing at T3 and T4. Fathers' reports of internalizing were marginally positively correlated with caregivers' reports of internalizing at T2 and T4. The same pattern of correlations was found for children's social competence; mothers' reports were significantly correlated with caregivers' and fathers' reports at T2 and T4. Fathers' and caregivers' reports of social competence were significantly positively related at both times. Caregiver-child conflict and closeness were negatively correlated within time at T4.

Stability of Indicators

Correlations among EC variables across time are presented in Table 6. In general, correlations among EC variables over time were positive and significant. All of the EC variables at T2 were significantly correlated with EC variables at T3 with a few exceptions. T2 curve score was not significantly related to adult-reported EC or dinky restraint at T3 and adult-reported EC at T2 was not related to dinky restraint at T3. Measures of EC at T2 were less consistently correlated

with EC measures at T4. Adult-reported EC at T2 was significantly and positively related to adult-reported EC and marginally and positively related to the other observed EC variables at T4. Gift latency at T2 was significantly and positively related to all EC measures at T4. T2 Mean curve score was at least marginally associated with all measures of EC at T4 with the exception of dinky restraint. Dinky restraint at T2 was marginally and positively related to gift latency and curve score at T4. There were no significant correlations between curve score and dinky restraint at T2 and dinky restraint at T4. EC variables at T3 significantly and positively correlated with a majority of EC variables at T4 with few exceptions. Adult-reported EC at T3 was not associated with T4 dinky restraint and T3 dinky restraint was not associated with curve score at T4.

Next, the stability of EU across the assessments was examined. Measures of EU were significantly and positively correlated across all time points. Correlations are presented in Table 7.

Correlations among reports of children's externalizing, internalizing, and social competence across time are presented in Table 8. Ratings of children's internalizing and externalizing were significantly and positively related over time within reporter. Correlations also indicated considerable stability across reporters over time for these variables, particularly reports of externalizing and internalizing. Reports of social competence were at least marginally positively related within reporter and across reporter except for caregivers' reports at T2 and fathers' reports at T4. Reports of caregiver-child closeness and conflict were positively related over time.

Correlations among Hypothesized Predictors

Concurrent relations. Relations among the hypothesized predictors (i.e., EC and EU variables) were examined (see Table 9). At T2, the correlations of EC variables to EU variables were not consistent. Receptive knowledge was significantly and positively correlated with EC variables with the exception of dinky restraint. Expressive knowledge was at least marginally and positively related to adult-reported EC, gift latency and dinky restraint. Situational knowledge was not significantly related to EC variables with the exception of the gift latency. Within T3, expressive knowledge was significantly and positively related to all concurrent EC variables with the exception of adult-reported EC. Situational knowledge at was significantly and positively correlated with all concurrent EC variables with the exception of a marginal positive relation with adult-reported EC. Non-stereotypical knowledge positively related to all EC variables. All correlations of the T4 measure of EU to EC variables were positive and significant.

Longitudinal relations. Correlations among EC variables and EU variables one and two years later also were examined (see Table 9). T2 EC variables were not consistently correlated to EU measures at T3 with only 3 out of 12 positive significant correlations and one positive marginal relation. T3 EC variables were positively significantly correlated with situational knowledge at T4, with the exception of adult-reported EC.

In general, EU variables at T2 were positively and significantly correlated with EC variables one year later (10 out of 12 correlations were significant). Only

adult-reported EC and curve score were not significantly related to stereotypical situational knowledge. T2 EU variables were not as consistently correlated with EC two years later (7 out of 12 significant correlations). Only adult-reported EC was positively significantly correlated with receptive, expressive, and stereotypical situational knowledge and gift latency was at least marginally related to the EU variables.T3 expressive, stereotypical situational and non-stereotypical situational knowledge were significantly positively correlated with T4 adult-reported EC and at least marginally correlated with dinky restraint at T4. T3 expressive and situational knowledge, but not non-stereotypical, had significant and positive relations to T4 gift latency. None of the EU variables at T3 were related to curve score a year later.

Correlations of Hypothesized Predictors to Outcomes

Relations among hypothesized predictors (i.e., EC and EU) to externalizing, internalizing, social competence, and relationship quality concurrently and at the following time point (e.g., correlations among T2 EC and EU variables with T4 externalizing problems) are reported in Tables 10 and 11.

Relations of EC to outcome variables. T2 Adult-reported EC was significantly and negatively correlated with mothers', caregivers', and fathers' reports of externalizing and caregivers' reports of internalizing, but not with mothers' or fathers' reports of internalizing. In addition, T2 adult-reported EC was positively correlated with all reporters' ratings of social competence. Gift latency at T2 showed a similar pattern of correlations as adult-rated EC with the exception that it was only marginally negatively related to caregivers' reports of

externalizing and unrelated to caregivers' reports of internalizing. The curve score was unrelated to the other EC variables and dinky restraint was negatively and significantly related to fathers' reports of social competence. Correlations indicated that in general adult-reported EC was related to outcomes in expected ways, but that the other observed EC variables were not as consistently related as expected (see Table 10).

Similarly, T3 adult-reported EC was more consistently related to T4noutcomes as expected while observed EC variables were not. Gift latency was at least marginally positively correlated with mothers' and fathers' reports of social competence and significantly negatively correlated with caregiver-child conflict. T3 curve score was negatively correlated with T4 caregivers' reports of externalizing, mothers' and caregivers' reports of internalizing, and caregiver-child conflict. It also was significantly and positively correlated with mothers' and caregivers' reports of social competence. Dinky restraint at T3 was significantly negatively related to caregiver-child conflict a year later.

Within T4, adult-reported EC was significantly correlated with all outcomes in the expected direction with the exception of mother- and father-reported internalizing. The gift latency was not correlated with any outcomes. T4 curve score was only significantly negatively correlated with caregivers' reports of externalizing and caregiver-child conflict.T4 overall restraint was at least marginally positively correlated with all reporters' ratings of social competence.

Relations of EU to outcome variables. There were few relations found between T2 EU and children's externalizing, internalizing, and social competence

within time. There were significant and positive relations of receptive knowledge to mother- and caregiver-reported social competence. Receptive knowledge also was negatively and marginally correlated with caregiver-reported externalizing and father-reported internalizing. There were marginal and positive relations between expressive knowledge and mother- and caregiver-reported social competence. Stereotypical situation knowledge was negatively and marginally correlated with caregivers' reports of externalizing, positively and marginally correlated with caregiver-reported social competence and significantly and positively related to father-reported social competence.

T3 EU measures were somewhat related to outcomes at T4. Reporters' ratings of social competence were significantly and positively related to all EU measures. Additionally, expressive knowledge was negatively and significantly associated with caregivers' reports of externalizing and internalizing. There were significant negative relations among non-stereotypical situational knowledge and mothers' and caregivers' reports of externalizing and reported caregiver-child conflict. The single EU measure at T4 was marginally and negatively related to mother-reported externalizing. No other relations were found.

Confirmatory Factor Analysis

Before SEM analyses were conducted, a series of measurement models were assessed to determine if latent factors could be created from manifest variables. In order to account for missing data, models were tested using Mplus Version 6.1 (Muthen & Muthen, 2010), which uses a maximum likelihood estimation method. This method produces unbiased parameter estimates when

data are missing at random (Schafer & Graham 2002). Because the significance of the chi-square statistic is affected by sample size (Hu & Bentler, 1999; Kline, 1998), model fit also was assessed using three alternative fit indices: the comparative fit index (CFI), the Root-Mean-Square Error of Approximation (RMSEA), and the Standardized Root-Mean-Square Residual (SRMR). CFI values greater than .95 and SRMR values less than .08 indicate good fit and values greater than .90 are considered acceptable (Hu & Bentler, 1998). Values less than .05 for the RMSEA indicate good fit, and values between .05 and .08 are considered acceptable (Browne & Cudek, 1993). Given the low power for these analyses because of model complexity and small sample size relative to the number of parameters estimated, separate models were conducted for each outcome variable (i.e., externalizing, internalizing, and social competence), with the exception of caregiver-child relationship variables (see below). In all measurement models, latent factors were allowed to correlate within time. Additionally, given conceptual reasons to allow error terms to covary within reporters or for the same observed measures, these error terms were allowed to covary based on modification indices. To assess whether indicators were related to latent constructs in the same way across time, a longitudinal model constraining all loadings for the same indicators of the EC and outcome factors was estimated and compared to an unconstrained model using chi-square difference tests. When fully constrained models had significantly worse first than unconstrained models, indicating that factor loadings were not constant across all three time points, partially constrained models were estimated. One parameter

was allowed to be freely estimated at a time to assess whether there was partial invariance. Decisions to free parameters were based on modification indices, as well as examining which unstandardized factor loadings from the unconstrained models seemed to vary the most over time.

Externalizing measurement model. A measurement model that included eight factors was conducted: EC and EU at T2, T3, and T4 and externalizing at T2 and T4. There were four indicators for EC: adult-reported EC, gift latency, and curve score, and restraint for dinky toys. At T2, there were three indicators of EU: receptive, expressive, and stereotypical knowledge. At T3 there also were three indicators of EU: expressive, stereotypical, and non-stereotypical knowledge. At T4, stereotypical knowledge was the only indicator and error variance was set to 0 for model specification. The three indicators for the externalizing factors were mother-, caregiver-, and father-reported externalizing behavior. The initial unconstrained externalizing model had poor fit to the data, $\chi^2(245) = 390.384$, $p < .05$, CFI = .88, RMSEA = .05 (90% CI [.04, .06]), SRMR = .09. In addition, an error message indicated that the latent covariance matrix was not positive definite and suggested this could be due to a negative residual variance or a correlation among factors greater than one. Examination of model estimates indicated that the correlation between externalizing factors at different ages was greater than one. Modifications indices indicated that estimating the covariance of error terms for adult-reported EC and caregivers' reports of externalizing at T2 and T4 would improve fit, as well as error terms for externalizing within reporters. This revised model was tested and had reasonable

fit to the data, $\chi^2(239) = 326.854$, $p < .05$, CFI = .93, RMSEA = .04 (90% CI [.03, .05]), SRMR = .09. All loadings were significant and in expected directions. There were no other theoretically relevant modifications to be made.

A series of model comparisons were made to assess longitudinal invariance. First, a fully constrained model with equal factor loadings for corresponding indicators of the EC and externalizing factors was estimated. This model did not have adequate fit to the data, $\chi 2\ (246) = 364.581$, $p < .05$, CFI = .90, RMSEA = .05 (90% CI [.04, .06]), SRMR = .11. Results from chi-square difference tests indicated that the constrained model had significantly worse fit compared to the unconstrained model, $\chi^2(7) = 37.73$, $p < .001$. Based on the unstandardized loadings in the unconstrained model, the factor loadings for EC indicators were most different across time, whereas the externalizing indicators appeared similar across time. EC factors loadings were freed one at time and compared to the unconstrained model until there was no longer a significant difference in fit for the unconstrained and partially constrained models. Chi-square difference tests indicated that factor loadings adult-reported EC at all time points, curve score at T2 and T3, dinky restraint at T2 and T4, and mother-, caregiver-, and father-reported externalizing at T2 and T4 could be constrained without decreasing fit significantly,$\chi^2(4) = 2\ .78$. $p > .10$, and had reasonable fit to the data, $\chi 2(243) = 329.632$, $p < .05$, CFI = .93, RMSEA = .04 (90% CI = .03, .05), SRMR = .09. All the loadings for the final model were significant and in expected directions (see Table 12).

Internalizing measurement model. The initial internalizing measurement model estimated included the same EC and EU factors from the externalizing model and two internalizing factors with mothers', caregivers', and fathers' reports for indicators at T2 and T4. This model had reasonable fit to the data, $\chi^2(245) = 325.48$, $p < .05$, CFI = .92, *RMSEA* = .04 (90% CI [.03, .05]), *SRMR* = .07. An error message indicated that the latent covariance matrix was not positive definite and suggested this could be due to a negative residual variance or a correlation among factors greater than one. Examination of model estimates indicated that the correlation between internalizing factors was greater than one. Modification indices indicated that allowing error terms for internalizing to covary within reporters and adult-reported EC with caregivers' reports of internalizing at T2 and T4 would improve fit. The revised model no longer produced an error message and had good fit to the data, $\chi^2(240) = 281.515$, $p < .05$, CFI = .96, RMSEA = .03 (90% CI [.01, .04]), SRMR = .06. All loadings were significant and in expected directions.

To test factorial invariance for the internalizing model the same steps were conducted as when assessing factorial invariance of the externalizing measurement model. Results from chi-square difference tests indicated that factor loadings adult-reported EC at all time points, curve score at T2 and T3, dinky restraint at T2 and T4, and mother-, caregiver-, and father-reported internalizing at T2 and T4 could be constrained without decreasing fit significantly, $\chi^2(4) = .74$, $p > .10$, and had good fit to the data, $\chi^2(244) = 282.253$, $p < .05$, CFI = .96,

RMSEA = .03 (90% CI [.00, .04]), SRMR = .06. All the loadings for the final model were significant and in expected directions (see Table 13).

Social competence measurement model. The initial social competence model included the same EC and EU factors as discussed previously and two social competence factors at T2 and T4. Mother-, caregiver-, and father-reported social competence were indicators. This model had poor fit to the data, $\chi^2(245) = 392.761$, $p < .05$, CFI = .88, *RMSEA* = .05 (90% CI [.04, .06]), SRMR = .08. A similar error message as given for the internalizing and externalizing measurement models was encountered; the correlation between social competence factors was greater than 1. Modification indices indicated that allowing error terms for social competence within reporters to covary, as well as adult-reported EC and caregiver-reported social competence at T2 and T4 and adult-reported EC with mothers' reports at T4 would improve fit. The revised model did not produce an error message and had reasonable fit to the data, χ^2 (239) = 317.383, $p < .05$, CFI = .93, *RMSEA* = .04 (90% CI [.03, .05]), *SRMR* = .07. Modification indices suggested allowing the error terms for caregiver-reported social competence and adult-reported EC at T3 would improve fit. The revised model had adequate fit to the data, χ^2 (239) = 317.383, $p > .10$, CFI = .93, *RMSEA* = .04 (90% CI [.03, .05]), *SRMR* = .07. All loadings were significant and in expected directions.

The same steps as in the previous measurement models were followed to assess factorial invariance for the social competence model. Based on results from a series of chi-square difference tests, factor loadings for adult-reported EC at all time points, curve score at T2 and T3, dinky restraint at T2 and T4, and mother-,

caregiver-, and father-reported social competence at T2 and T4 could be constrained without decreasing fit significantly, $\chi^2(4) = 1.54$, $p > .10$, and had good fit to the data, $\chi^2(243) = 318.927$, $p < .05$, CFI = .94, RMSEA = .04 (90% CI [.02, .05]), SRMR = .08. All the loadings for the final model were significant and in expected directions (see Table 14).

Structural Equation Models

Structural equation modeling was used to test study hypotheses of bidirectional paths between EC and EU and direct relations of children's EC and EU to outcomes separately (i.e., externalizing, internalizing, social competence, and caregiver-child relationship quality) (see Figure 1 for all tested paths). The same error terms that were allowed to covary in the final measurement models were included in all structural equation models, as well as the constrained factor loadings. Autoregressive paths were included to account for stability of factors over time. Factors were allowed to correlate within time. Additionally, SES and language at T2 (see Table 15 for correlations of language to study variables), as well as child sex, were included as covariates in all models with direct paths to EC, EU, and outcome at T2. However, if modification indices indicated that model fit would be improved by adding paths from a covariate to factors at other time points such paths were added and retained in final models if significant or if fit decreased when removed.

Externalizing structural equation model. The initial structural equation model included bidirectional paths among EC and EU factors and direct paths from EC and EU to externalizing. This model had reasonable fit, $\chi^2(321) =$

401.898, $p < .05$, CFI = .94, RMSEA = .03 (90% CI [.02, .04]), SRMR = .08. Modification indices suggested that allowing error terms for gift latency at T3 and T4 and curve score at T3 and T4 to covary would improve model fit. The revised model had similar fit, $\chi^2(319) = 392.362$, $p < .05$, CFI = .94, *RMSEA* = .03 (90% CI [.02, .04]), SRMR = .08, and all loadings were significant and in the expected direction (see Table 16). The autoregressive paths for all constructs were positive and significant (see Figure 2). In this model, the paths from EU at T2 to EC at T3 and EU at T3 to EC at T4 were positive and significant. The path from EC at T3 to EU at T4 was positive and marginally significant. EC was not related to later externalizing.). The EC and EU factors were not significantly correlated at any time point, but EC was negatively correlated with externalizing at T2 and T4. All covariates had significant paths to EC and EU at T2 indicating that higher SES, more language, and being female was related to higher EC and EU. Higher SES also related to high EU at T3 and language was related to low externalizing at T4..

Internalizing structural equation model. The initial structural equation model that had bidirectional paths among EC and EU and direct paths from EC and EU to internalizing and included had good fit to the data, $\chi^2(319) = 365.866$, $p < .05$, CFI = .96, RMSEA = .03 (90% CI [.02, .04], SRMR = .06, and all loadings were significant (see Table 17). The autoregressive paths for all the factors were positive and significant (see Figure 3). The results showed the same significant paths between EC and EU as in the externalizing structural model. EU did not predict internalizing at any time, but T3 EC marginally and negatively predicted internalizing one year later. The EC and EU factors were only

marginally and positively related at T3. The relations of covariates to EC and EU at T2 were the same as in the externalizing model . The only difference was sex, not language, was related to internalizing at T4; girls were more likely to have internalizing problems.

Social competence structural equation model. The social competence structural equation model that had bidirectional paths among EC and EU and direct paths from EC and EU to social competence had good fit to the data, $\chi^2(318) = 392.825$, $p < .05$, CFI = .94, RMSEA = .03 (90% CI [.02, .04], SRMR = .08, and all loadings were significant (see Table 18). The autoregressive paths for all the factors were positive and significant (see Figure 4). Relations among EC and EU were the same as other models. EC was unrelated to social competence. There was a marginal positive relation from EU at T3 to social competence at T4. The EC and EU factors were significantly correlated at T2 and marginally related at T3 in the expected direction. The relations of covariates to EC and EU at T2 were the same as in the externalizing model and higher SES also was associated with more social competence at T2. No covariates were related to social competence at T4.

Caregiver-child relationship quality structural equation model. To examine the direct relations of EC and EU to caregiver-child conflict and closeness, a model with direct paths from EC and EU to conflict and closeness was estimated (see Figure 5 for all tested paths). Autoregressive paths were included for relationship variables from T3 to T4. The initial model had reasonable fit to the data, $\chi^2(261) = 371.45$, $p < .05$, CFI = .91, RMSEA = .04

(90% CI [.03, 05]), SRMR = .07. Modification indices indicated that allowing error terms for the same observed EC measures to covary would increase fit. The error terms for gift latency and curve scores were allowed to covary from T3 to T4. The final model had similar fit to the data, χ^2 (263) = 359.35, $p < .05$, CFI = .92, *RMSEA* = .04 (90% CI [.03, 05]), *SRMR* = .07, and all loadings were significant (see Table 19). In this model (see Figure 6), the path from EU at T2 to EC at T3 was marginally significant ($p = .06$), and the path from EU at T3 to EC at T4 was positive and significant. The path from EC at T3 to EU at T4 was positive and marginally significant ($p = .07$). The hypothesized paths from EC and EU to caregiver-child conflict and closeness were partially supported. T2 EC significantly predicted less conflict and more closeness one year later, and T3 EC significantly predicted lower levels of T4 conflict, but not higher levels of closeness. EU was not related to conflict or closeness at any time. Correlations between factors showed that EC and EU were marginally and positively correlated at T3. EC was significantly and positively correlated with closeness and negatively correlated with conflict at T4. EU at T4 was unexpectedly significantly and positively correlated with conflict. Conflict and closeness were significantly negatively related at T3 and T4. The paths from covariates to EC and EU were the same as in previous models, and none of the covariates were related to conflict or closeness.

Post-hoc EC and EU structural equation model. Because several of the hypothesized relations of EC and EU to the outcomes were not significant and fit was only moderate for these models, a post-hoc model with only EC and EU

factors was conducted to assess bidirectional paths without any outcomes. This model allowed for error terms of adult-reported EC to covary and included the same constraints on factor loadings as previous models (e.g., adult-reported EC and overall restraint). The same covariates also were included.

This model had good fit to the data, χ^2 (189) = 196.71, $p > .10$, CFI = .99, RMSEA = .004 (90% CI[.00, .03]), SRMR = .05, and all factor loadings were significant and in expected directions (see Table 20). In this model (see Figure 7), the paths from EU at T2 to EC at T3 and from EU at T3 to EC at T4 were positive and significant. None of the hypothesized paths from EC to EU were significant. However, the path from EC at T3 to EU at T4 was positive and marginal ($p = 07$). EC and EU were not correlated at any time point, and all autoregressive paths were positive and significant. All covariates had significant paths to EC at T2 and to EU at T2 and T3 indicating that higher SES, more language at T2 and being female predicted higher EC and EU. The model with only EC and EU factors had better fit to the data with the same patterns of relations as models including outcome factors.

In summary, there was some evidence that EC and EU were related over time. Results showed that early EU predicted EC a year later even when taking into account stability of EC over time. Additionally, EC at T3 marginally predicted EU a year later. Findings from this study did not strongly support the hypothesis that EC and EU would be related to externalizing, internalizing and social competence. However, there was some evidence that EC predicted

caregiver-child relationship quality over time. Specifically, high EC predicted lower conflict at T3 and T4 and high closeness at T3.

Moderation Analyses

Moderation of the relations from EC to children's externalizing and internalizing by parenting, and EU to caregiver-child conflict and closeness by child sex was also hypothesized. Before moderation analyses were conducted, a parenting composite was created using observed parenting measures at T2 as described in the methods section. All parenting measures were correlated in expected directions. Absolute values of the *r*s(214) ranged from .24 to .76, all *p*s< .05. The parenting composite was created by reverse scoring maternal intrusiveness, standardizing scores, and computing the average such that higher scores indicated more supportive parenting. A median split was conducted on the parenting composite to create high support/low support groups. The homogeneity of the covariance structures between groups (e.g., boys and girls) was tested using Box's M. If Box's M statistic is significant, the null hypothesis that the covariance structures across groups is equal can be rejected and tests for moderation can then be conducted (Eggum, 2012, personal communication).

Moderation of relations by parenting. Moderation of relations by parenting was examined next. The same number of MANOVAs was conducted as for child sex. None of the Box's M statistics were significant for these analyses, thus no moderation analyses were conducted.

Moderation of relations by child sex. Moderation of relations by sex was examined next. The Box's M statistic was not significant for closeness. Box's M

statistic was significant for conflict at T4, Box's M = 68.63, $F(36, 52{,}201)$, $p < .01$. Given the lack of findings for differences in the covariance structures between boys and girls for most outcomes, only moderation analyses predicting adult-child relationship quality were conducted.

After multigroup models failed to converge in SEM, a series of regression analyses were conducted to test for moderation of EC and EU to conflict and closeness by child sex. For these analyses, composites were created for EC and EU. Based on correlations among variables measuring the same construct within time, EC variables that were correlated at $p < .05$ were standardized and averaged to create an EC composite. At T2, adult-reported EC was significantly related to gift latency, but none of the other measures, and not included in the EC composite for these analyses. All EC variables were significantly correlated at T3 and T4, with the exception of a marginally significant correlation between adult-reported EC and dinky restraint at T3. However, it was consistently related to outcome variables and was included in the composites at T3 and T4. All EU variables were significantly correlated within time and were included in composites for T2 and T3.

Four regressions were conducted. Regressions controlled for stability in variables by including the previous assessment of that variable if available. A total of 4 regressions were conducted for conflict and closeness at T3 and T4: There were no significant changes in R^2 when the interaction terms were included in the regression model indicating no moderated relations.

Summary

Results from the current study indicate that children's EC and EU were positively related over time. More specifically, children's ability to identify and understand emotions predicts higher levels of EC one year later, even after controlling for stability and the effects of covariates. In addition, there was a marginal positive path from T3 EC to T4 EU.. These findings were consistent across models that included different outcome variables. However, it should be noted that in the model including caregiver-child relationship quality, T2 EU only marginally predicted T3 EC . A post-hoc model that included only EC and EU factors was tested to further examine these relations without other variables in the model. These results were consistent with findings from the other models.

There was partial support for direct relations from EC and EU to children's externalizing, internalizing, and caregiver-child conflict and closeness. In structural equation models, EU did not predict any of the outcomes. However, there were some findings for children's EC as a predictor of outcomes. T2 EC was a significant and negative predictor of externalizing. Unexpectedly, there was a marginal and positive path from T3 EC to T4 externalizing, likely indicating suppression given that all the significant correlations among EC measures and reports of externalizing were negative. T2 EC marginally and negatively predicted internalizing one year later. Finally, EC was a significant and negative predictor of caregiver-child conflict. Additionally, T2 EC significantly and positively predicted T3 caregiver-child closeness, but not at T4. There was no

evidence that the aforementioned relations were moderated by either child sex or early parenting.

Chapter 4

DISCUSSION

The goal of this study was to examine the role of individual differences in regulation and EU in the development of children's more general social competence, behavioral adjustment, and interpersonal relationships with nonparental adults. Using data from a larger longitudinal study of children's socioemotional development, the results of the current work point to the importance of emotional competence in early childhood. EC and EU consistently have been associated with less problem behaviors, higher levels of social competence, and greater academic achievement (Blair & Razza, 2007; Trentacosta & Fine, 2010; Valiente, Lemery-Chalfant, & & Castro, 2007). Given the significance of these abilities in equipping children with the resources necessary to be successful in multiple developmental domains, it is important to understand the pathways that lead to optimal levels of each. Few studies have expounded the developmental processes that unfold over time and tested transactional relations. Findings from the current study begin to elucidate these complex processes.

The results from the present study provide some, albeit weak, evidence that from 30 (T2) to 54 months (T4) there are transactional relations between EC and EU over time. Even when covariation of sex, SES, and language abilities, as well as stability of the constructs were taken into account, children who were better at identifying and understanding emotions at T2 and T3 had higher levels of self-regulation a year later. Although only at the trend level, the results support

the transactional nature of the relations, as T3 EC predicted EU a year later. Findings from this study offer unique and important data because the longitudinal design can provide information on direction of effects. Results from this study provide support for theoretical considerations that EC and EU are related and that the association between them is likely to be bidirectional (Eisenberg, Sadovsky, &Spinrad, 2005).

There are good reasons for the prediction of EC from earlier EU. It has been proposed that emotion regulation is the result of successfully utilizing one's knowledge of emotion to manage emotions and behaviors to achieve a goal (Izard, 2002, 2007).EU involves processing social information to learn to identify and construe the causes and consequences of emotions. In turn, this knowledge can influence children's emotional arousal and related behavior, including regulation (Denham, 1998; Graham, Hudley, & Williams, 1992). It is likely that children who are better able to identify emotions can use this knowledge as motivation for behavior and to develop expectations about future emotional experiences. That is, a child who is aware of her own and others' emotions has more opportunities to formulate affect-event links, and use such information to navigate other social interactions (Denham, et al., 2002; Arsenio & Lover, 1995). Children with relatively high-levels of EU also may be able to identify strategies or behaviors that are effective at reducing feelings of anger, sadness, or fear from prior emotional experiences and use this knowledge to improve regulatory abilities in the future. Thus, understanding emotions, and particularly one's own emotional experiences, may be a crucial step in employing regulatory strategies,

such as EC. On the other hand, children who are less in-tuned with others' and their own emotions may be less able to accurately assess social situations and recognize regulatory strategies for coping with these emotions in the future.

Moreover, it is not surprising that EC would be positively (albeit weakly) linked to later EU. Possessing the attentional capacities and ability to inhibit impulsive behaviors likely enable children to attend to and process the complex social information needed to identify the emotions, intentions, and goals of others. Conversely, children low in EC, who likely experience higher levels of arousal, may be less able to utilize cognitive abilities to attend to cues and information necessary to accurately assess the emotions of others. There is some support for these relations in prior work. For example, in a sample of economically-disadvantaged preschoolers, Schultz and colleagues (2001) found that attentional and behavioral control assessed at approximately 4.5 years of age positively predicted emotion expression and situation knowledge in first grade. Because they did not measure EU at the first wave, they could not control for stability of EU, limiting the interpretation regarding direction of effects. It is interesting to note, in the current study, EC did not predict EU from T2 to T3 whereas marginal prediction was found from T3 to T4. This relation may emerge at these ages because as children get older they are better able to mask the expression of some emotion and misleadingly exhibit others, such as expressing happiness when experiencing sadness. (Reichenbach & Masters, 1983; Saarni, 1979). Thus, children high in EC may have the attentional skills to focus on subtle situational cues to assess the emotions of others rather than solely relying on more obvious

expressive cues. These findings, albeit marginal, were consistent across models including different outcome variables. Perhaps, using a larger sample size and/or older children stronger transactional relations between EU and EC would be found.

Results of the present study also indicated that several social outcomes were predicted by individual differences in regulation and emotion competence. Findings from the current study are in line with the consistent, but moderate, associations between EU and children's social competence that is found in the literature (see Trentacosta & Fine, 2010 for a review). Results showed that the children's T3 EU was a marginal positive predictor of T4 social competence, even after controlling for earlier levels of social competence. The current study is one of the few to examine the unique relations of EC and EU to social competence longitudinally in a young sample. This path was only at the trend level, and thus, caution must be applied in interpreting results. Nonetheless, it is possible the children adept at reading facial and situational cues utilize such skills within interpersonal contexts. Around this age, children make the transition to preschool classrooms, and often for the first time find themselves in an environment that offers more opportunities to engage in social exchanges with peers. It could be that EU encompasses a set of skills needed to understand the goals and perspectives of others. Such understanding may be an impetus to empathizing with others and engaging in prosocial behaviors, important aspects of social competence. In at least one study, children's EU at approximately three years of age positively predicted prosocial behavior (composite of mothers' reports and

observed behavior) at age four accounting for the effects of age, gender, verbal ability, and previous levels of prosocial behavior (Esnor, et al., 2010).

Next, adult-child relationship quality was predicted by EC. Children with better regulation skills at T2 had relationships with nonparental adults that were characterized by less conflict and more closeness one year later. It has been theorized that the temperamental traits children bring to adult-child, particularly teacher-child, relationships, is influential on the quality of interactions that take place within that relationship (Myers & Pianta, 2008). Current findings provide evidence that even at 30 months of age, child characteristics, specifically EC, are associated with closer, less conflictual adult-child relationships. These patterns of EC to relationship quality also have been found in previous work with an ethnically and socioeconomically diverse preschool sample (Silva, et al., 2010). Well-regulated children are likely perceived as well-behaved and infrequently engage in behavior that would have negative consequences. Additionally, adults likely find interactions with well-regulated children less trying and more enjoyable laying the foundation for a close relationship. Young children with high EC also may have previous interpersonal experiences, in addition to self-regulation skills, that underlie the highest quality adult-child relationships beyond the home.

Interestingly, the relation between EC and 54-month teacher-child conflict held over time, but later EC was unrelated to teacher-child closeness. Perhaps, early EC is more strongly related to closeness to adults when children are young. However, when children are older, low EC is more likely to be related to

problematic behaviors such as aggression that lead to conflictual relationships. Unexpectedly, EU was unrelated to adult-child relationship quality. It was predicted that children who had more advanced understanding of their own and others' emotions would possess the skills to successfully negotiate social interactions with peers, as well as adults. One reason for a lack of findings may be because items that assessed adult-child relationship quality included behaviors that are likely more closely related to children's regulatory skills than EU. Conflict items such as, "This child gets angry at me easily," and "This child whines or cries when s/he wants something from me" are behaviors that children low in EC are more likely to exhibit, as well as behaviors that could lead to adult-child conflict. It is also possible, that at these ages adults recognize that children are still developing EU skills. Adults who perceive a child as acting inappropriately because that child was confused about how others were feeling may be less likely to discipline or get upset with that child. In other words, EU skills may be less important to the formation of close, low conflict relationships than regulation skills. This may be particularly true if the adult is related to the child, which was the case for some of the participants in the current study.

In the externalizing model, results showed there was a marginal negative path from T3 EU to T4 externalizing problems. In a meta-analysis of studies on EU and problem behaviors, EU was consistently, yet modestly, negatively related to externalizing behaviors (Trentacosta & Fine, 2010). Children with the ability to accurately process emotional information and cues may experience less frustration when engaging interactions with others, thus minimizing the

occurrence of aggressive and antisocial acts. Further, children that have difficulty reading emotional cues may misinterpret others emotions and behaviors as hostile or threatening which could also contribute to aggression. .Denham and colleagues (2002) found that children with the most advanced EU at age three exhibited less anger and aggression in kindergarten. This was especially true of boys. Additionally, children low in EU may be less skilled at perspective taking, which could result in a lack of empathy and foster antisocial behaviors.

Interestingly, EC did not predict externalizing over time, which is somewhat unexpected based on previous empirical findings. However correlations showed negative relations within time. Given the relatively low level of reported externalizing problems in this sample, it is likely that after partialing out the variance accounted for stability and within time associations, there was not enough variation left to significantly predict later externalizing problems.

Results from the internalizing model indicated that children's knowledge of emotions did not predict internalizing behaviors. This was unexpected given observed negative relations in the literature. It is thought that children with difficulties understanding emotions may have repeated negative interactions with peers. They may choose to disengage from social interactions to avoid further rejection and become more anxious and depressed. Indeed, children with deficits in EU have been reported by teachers to be socially withdrawn and at a higher risk of social problems (Schultz, et al., 2001), rated as less likable by peers (Cassidy, Parke, Butkovsky, & Braungart 1992; Denham, et al., 1990), had less

positive interactions with peers; Garner & Estep, 2001), and self-reported more victimization and rejection experiences (Miller, et al., 2005).

Regarding EC, better regulated children at T3 had marginally lower levels of internalizing behaviors at T4. Similar findings for EC have been found in the literature and are consistent with theoretical perspectives. Conceptually, it is thought that whereas the attentional components of EC may protect individuals from focusing and ruminating on negative stimuli and thus internalizing behaviors, inhibitory control is not thought to be related to such behaviors (Eisenberg, Eggum, Vaughan, & Edwards, 2010). Indeed, findings regarding the relation between EC and internalizing findings have been less consistent with researchers reporting a negative association (e.g., Eisenberg et al., 2005), some reporting no relation (e.g., Rydell, et al., 2003), and some reporting a positive relation (e.g., Murray & Kochanska, 2002). For this study, the indicators of the latent EC factor included reported measures that assessed both attentional control and inhibitory control. It is possible that if only inhibitory control was used, the negative relation between EC and internalizing would have been stronger.

There was no support for the hypothesized moderators based on results from hierarchical regressions. The relations of EC and EU to hypothesized outcomes did not differ by sex or quality of early parenting. It was hypothesized that the negative relation of EC to behavior problems would be strongest for children who had less sensitive and more controlling mothers. Without responsive mothers attuned to their needs, children likely do not receive the patience and support to learn skills to cope with deficits in regulation and related problems

(e.g., externalizing, internalizing). A lack of findings may have been due to a lack of variation in parenting behaviors. Most mothers were warm and sensitive and exhibited low levels of control. Low-quality parenting may only be a risk factor for children low in EC if it is characterized by more extreme levels of control, as well as low levels of sensitivity.

Strengths

There were several methodological strengths of this study. All models controlled for previous levels of each construct. Doing so is important when examining longitudinal models to more accurately assess meaningful changes over time. Study analyses also were conducted using latent constructs in cross-lagged panel models. This statistical approach was used to consider multiple indices of socioemotional adjustment in the context of each other, as opposed to investigating them in isolation (Cicchetti & Dawson, 2002; Cicchetti & Rogosch, 1996). This approach provides a more representative model of how development occurs outside the context of research and elucidates pathways to both normative and atypical development. Additionally, the research design was a multi-method, multi-reporter approach. Observational and adult-reported measures were included as indicators for children's EC. This method allowed for a more objective assessment of children's behaviors, as well included data on children in different contexts (e.g., home, child-care).

Limitations

Although there were several strengths, as with any research investigation there were limitations that future work could address. As in many developmental

models, some measures differed at assessments. Given that children's skills continue to improve, it is sometimes necessary to change measures as to avoid ceiling effects. Further, a change in measures may be necessary to exclude developmentally inappropriate items on questionnaires as children age. Taking this into consideration, measures that were available at all time points were selected and longitudinal invariance was assessed. Analyses showed that there was partial invariance over time. In particular, adults' reports of children's behavior were constrained to be equal over time, as well as some of the observed EC tasks. The sample for this study was primarily middle-class, Caucasian families. Due to the limited diversity of the sample, findings from this study may not be generalizable to economically at-risk children or different ethnic and cultural groups. However, there is evidence to suggest that several behavioral tasks used to assess EC, all of which were included in the current study, underlie a single EC factor and that this factor operated in similar ways across ethnic groups (e.g., European-American, African-American, and Hispanics; Sulik, et al., 2010).

Several of the findings from this study are consistent with previous research on children's early regulation skills (e.g., Spinrad et al., 2007) and emotion knowledge (e.g., Trentacosta & Fine, 2010), as a predictor of social skills and behavioral problems. This study contributes to the literature by assessing the transactional relations of these constructs over time, as well as examining both as predictors in the same model. By examining the transactional paths, this study begins to elucidate the developmental pathways that promote children's regulation and emotion knowledge, which in turn facilitates positive adjustment

and decreases the likelihood of problem behaviors. The importance of children's early regulation has been recently emphasized and identified as an essential antecedent for success across developmental domains. Findings from the current study are consistent with this view. However, this study is one of the first to empirically test EU as a predictor of early EC. It appears that children's ability to identify emotions and the causes and consequences of emotions is an important precursor to regulation skills.

Implications

Current findings provide support for the view that EU and emotion-related regulation are related, but distinct sets of skills that children utilize to facilitate adaptive behavioral and interpersonal development. Moreover, children's emotion regulation and EU appear to be differentially related to outcomes. This finding has implications for socioemotional intervention with young children. First, interventions that specifically seek to improve children's regulation may do so by creating programs designed to increase children's understanding of emotion. Indeed, many interventions being implemented today aim to increase both children's regulation and EU. For example, the PATHS (Promoting Alternative Thinking Strategies) Curriculum (Kusche & Greenberg, 1994) is an intervention that explicitly promotes both these skills in at-risk children through training teachers on how to interact with children sensitively and responsively and providing curriculums with classroom activities meant to foster these skills. It is also noteworthy that these interventions may be effective even before children enter preschool. Thus, caregivers and day care center staff working with toddlers

should be encouraged to participate in emotion socialization practices that promote basic EU skills.

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Table 1

Means and Standard Deviations of Study Variables

	Total *n*		Boys		Girls	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
T2 Regulation						
A EC	4.40	.61	4.34	.63	4.48	.58
Lat	1.84	.90	1.72	.93	1.98	.85
Crv	2.55	3.00	2.49	2.92	2.61	3.11
Res	2.29	.63	2.27	.61	2.31	.65
T2 Emotion Understanding						
Rec	1.13	1.13	1.03	1.08	1.27	1.19
Exp	.30	.67	.25	.59	.35	.75
St	1.47	1.92	1.18	1.84	1.84	1.96
T2 Externalizing						
Mother	1.47	.27	1.48	.28	1.45	.25
Caregiver	1.39	.34	1.42	.39	1.36	.25
Father	1.42	.25	1.45	.25	1.38	.25
T2 Internalizing						
Mother	1.46	.18	1.46	.18	1.47	.17
Caregiver	1.37	.20	1.34	.21	1.41	.19
Father	1.45	.17	1.46	.18	1.45	.17
T2 Social Competence						
Mother	2.42	.24	2.38	.25	2.46	.22
Caregiver	2.34	.28	2.32	.29	2.37	.27
Father	2.42	.25	2.37	.24	2.47	.24
T3 Regulation						
A EC	4.44	.53	4.37	.52	4.51	.54
Lat	1.23	.58	1.11	0.58	1.36	.56
Crv	10.01	3.23	9.55	3.66	10.57	3.31
Res	2.44	1.05	2.38	1.03	2.52	1.08
T3 Emotion Understanding						
Exp	2.00	1.37	1.77	1.37	2.26	1.25

St	5.38	2.39	5.21	1.95	5.57	1.90
NST	7.53	3.67	7.54	3.86	7.51	3.47
T3 Caregiver-Child Relationship						
Confl	1.58	.65	1.60	0.69	1.56	.61
Close	4.19	.77	4.13	0.72	4.27	.82
T4 Regulation						
A EC	4.59	.56	4.52	0.55	4.67	0.57
Lat	1.66	.42	1.56	0.44	1.77	0.35
Crv	10.65	2.20	10.36	2.20	10.99	2.16
Res	3.55	.80	3.47	.84	3.65	0.73
T4 Emotion Understanding						
Stereotypical	6.86	1.35	6.74	1.49	7.00	1.17
T4 Externalizing						
Mother	1.40	.28	1.41	.31	1.40	.23
Caregiver	1.37	.34	1.39	.37	1.34	.29
Father	1.35	.22	1.37	.22	1.33	.23
T4 Internalizing						
Mother	1.37	.19	1.35	0.18	1.40	.19
Caregiver	1.33	.21	1.31	0.21	1.35	.21
Father	1.38	.19	1.36	0.17	1.39	.19
T4 Social Competence						
Mother	2.53	.24	2.52	.25	2.55	.24
Caregiver	2.38	.29	2.34	.29	2.43	.27
Father	2.48	.27	2.41	.27	2.56	.24
T4 Adult-Child Relationship						
Confl	1.63	.65	1.64	.61	1.61	.69
Close	4.21	.63	4.16	.61	4.27	.64

Note. A EC = Adult-reported effortful control; Lat = Gift latency composite; Crv = Rabbit-turtle mean curve score; Res = Overall restraint during dinky toy task.

Table 2

Correlations of EC Measures Within Time

	AEC	Lat	Crv	Res
Time 2				
A EC	-	.28**	.14*	.12+
Lat		-	.22**	.29**
Crv			-	.13+
Res				-
Time 3				
A EC	-	.38***	.16*	.13+
Lat		-	.39***	.45**
Crv			-	.32**
Res				-
Time 4				
A EC	-	.29***	.21**	.26*
Lat		-	.23**	.30***
Crv			-	.18*
Res				-

Note. A EC = Adult-reported effortful control; Lat = Gift latency composite; Crv = Rabbit-turtle mean curve score; Res = Overall restraint during dinky toy task.
+ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$

Table 3

Correlations of EU Measures Within Time

	Time 2			
	Rec	Exp	St	NSt
Rec T2	-	.37 ***	.35 ***	-
Exp T2		-	.30 ***	-
St T2			-	-
	Time 3			
Exp T3	-	-	.53 ***	.28 ***
ST T3				.64 ***
NSt T3			-	

Note. Rec = Receptive; Exp = Expressive; St = Stereotypical Situational; NSt = Non-stereotypical situational.
$^{+}$ p <.10. * p < .05. ** p < .01. *** p < .001.

Table 4

Correlations of Externalizing, Internalizing, and Social Competence Within Time at T2 and Adult-child Relationship Quality Within Time at T3

	1	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. M Ext	-	.32 ***	.35 ***	.35 ***	.04	.10	-.09	-.14	-.08		
2. C Ext		-	.24 *	.11	.33 ***	-.07	.04	-.35 ***	-.03		
3. F Ext			-	.20 *	-.05	.33 ***	-.11	-.24 *	-.26 **		
4. M Int				-	.25 **	.41 ***	.12 +	.04	.09		
5. C Int					-	.19 +	-.03	-.04	-.08		
6. F Int						-	.02	-.07	-.08		
7. M SC							-	.17 *	.41 ***		
8. C SC								-	.22 *		
9. F SC									-		
10. Confl T3										-	-.48 ***
11. Close T3											-

Note. M = Mother-reported; C = Caregiver-reported; F = Father-reported; Ext = Externalizing; Int = Internalizing; SC = Social Competence; Con = Conflict; Close = Closeness.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 5

Correlations of Externalizing, Internalizing, Social Competence, and Adult-Child Relationship Quality Within Time 4

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. M Ext	-	.39 ***	.55 ***	.32 ***	.01	.11	-.27 ***	-.04	-.28 **	.23 **	.09 **
2. C Ext		-	.38 ***	.10	.36 ***	.13	-.33 ***	-.41 ***	-.35 **	.64 ***	-.20 *
3. F Ext			-	-.05	-.04	.22 *	-.26 **	-.17	-.32 ***	.36 ***	-.10 **
4. M Int				-	.20 *	.30 **	-.07	.05	-.03	.06	.03
5. C Int					-	.19 +	-.22 *	-.25 **	-.18 +	.45 ***	-.30 ***
6. F Int						-	-.04	.09	-.10	.12	.00
7. M SC							-	.24 ***	.36 ***	-.24 **	.11
8. C SC								-	.35 **	-.42 ***	.52 ***
9. F SC									-	-.19 +	.06
10. Con										-	-.35 ***
11. Close											-

M = Mother-reported; C = Caregiver-reported; F = Father-reported; Ext = Externalizing; Int = Internalizing; SC = Social Competence; Con = Conflict; Close = Closeness.

$^{+}$ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6

Correlations of EC Variables Across Time

	Time 2			
	A EC	Lat	Crv	Res
Time 3				
A EC	.63***	.30***	.10	.19**
Lat	.25**	.45***	.15*	.16*
Crv	.12+	.22**	.27**	.13+
Res	.08	.27***	.11	.15*
Time 4				
AEC	.55***	.26**	.13+	.09
Lat	.13+	.20*	.02*	.14+
Crv	.13+	.16*	.14+	.15+
Res	.09+	.18*	.05	-.05
	Time 3			
	A EC	Lat	Crv	Res
Time 4				
A EC	.67***	.37***	.28***	.20*
Lat	.16*	.41***	.29***	.22**
Crv	.15+	.18*	.21**	.10
Res	.11	.25**	.24**	.26**

Note. A EC = Adult-reported effortful control; Lat = Gift latency composite; Crv = Rabbit-turtle mean curve score; Res = Overall restraint during dinky toy task.
+ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7

Correlations of EU Variables Across Time

	Exp T3	St T3	NSt T3	ST T4
Rec T2	.34 ***	.35 ***	.27 ***	.23 **
Exp T2	.16 *	.25 **	.18 *	.16 *
St T2	.33 ***	.29 **	.16 *	.21 **
Exp T3	-	-	-	.37 ***
St T3		-		.46 ***
NSt T3			-	.32 ***

Note. Rec = Receptive; Exp = Expressive; St = Stereotypical Situational; NSt = Non-stereotypical situational.
$^{+}$ p <.10. * p < .05. ** p < .01. *** p < .001.

Table 8

Correlations Among Externalizing, Internalizing, Social Competence, and Adult-Child Relationship Quality Across Time

		Ext T4		
		M	C	F
Ext T2	M	.57 ***	.25 **	.25 **
	C	.40 ***	.34 ***	.28 **
	F	.31 ***	.15 **	.44 ***

		Int T4		
		M	C	F
Int T2	M	.53 ***	.18 **	.29 **
	C	.18 *	.24 *	.38 ***
	F	.28 **	.20 +	.63 ***

		SC T4		
		M	C	F
SC T2	M	.65 ***	.28 **	.29 **
	C	.18 **	.17 +	.07
	F	.25 **	.32 **	.56 ***

	Close T4	Conf T4
Close T3	.23 *	-.07
Conf T3	-.13	.45 ***

M = Mother; C = Caregiver; F = Father; Ext = Externalizing; Int = Internalizing; SC = Social competence; Con = Conflict; Close = Closeness.
+ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 9

Correlations Among EC and EU Within and Across Time

	Rec T2	Exp T2	St T2	Exp T3	St T3	NSt T3	St T4
A EC T2	.15*	.12+	.08	.04	.08	.18*	.08
RT T2	.17*	.11	.07	.05	.18*	.07	.15+
Lat Pk T2	.20**	.16*	.18**	.20**	.11	.13+	.15*
Dinky T2	-.01	.13+	.03	-.07	-.06	-.11	-.01
A EC T3	.22**	.23**	.05	.11	.13+	.18*	.10
RT T3	.17*	.15*	.06	.19**	.33***	.26**	.27***
Lat Pk T3	.28***	.20**	.24**	.29**	.29***	.32***	.24**
Dinky T3	.27***	.17*	.20**	.26***	.18*	.19*	.19*
A EC T4	.25**	.21**	.16*	.24**	.32***	.33***	.21**
RT T4	-.04	.03	.06	.00	.04	.12	.18*
Lat Pk T4	.14+	.18*	.22**	.16*	.18*	.11	.19*
Dinky T4	.16*	.16*	.10	.15+	.21**	.19*	.21**

Note. A EC = Adult-reported effortful control; Lat Pk = Latency to peek composite; RT = Rabbit-turtle mean curve score; Dinky = Overall restraint during dinky toy task; Rec = Receptive Knowledge; Exp = Expressive Knowledge; St = Stereotypical Knowledge; NSt = Non-stereotypical knowledge. + $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 10
Table 10

Correlations of EC With Outcomes Within and Across Time

	Time 2										
	M Ext	C Ext	F Ext	M Int	C Int	F Int	M SC	C SC	F SC		
Time 2											
A EC	**-.36**	**-.52**	**-.25**	-.07	-.**22**	-.02	.**38**	.**44**	.**22**		
Lat	***-.19***	*-.15*	-.**19**	.00	-.01	-.13	.**29**	.**28**	.**35**		
Crv	-.12	-.08	-.11	-.03	-.12	-.10	.06	.00	.01		
Res	-.08	-.13	-.06	-.09	.05	-.11	-.10	.11	*-.14*		
	Time 4										
	M Ext	C Ext	F Ext	M Int	C Int	F Int	M SC	C SC	F SC	C Con	C Close
Time 3											
A EC	-.**33**	-.**34**	-.**27**	-.06	-.**19**	.06	.**34**	.**19**	.06	-.**31**	.04
Lat	-.07	-.11	.08	-.11	-.03	-.02	.**22**	.11	*.18*	-.**23**	.02
Crv	-.11	-.**25**	.02	-.**18**	-.**19**	-.11	.**21**	.**24**	.13	-.**24**	.16
Res	-.08	-.13	-.11	-.02	-.08	-.15	.10	.14	.12	-.**23**	.06
Time 4											
A EC	-.**44**	-.**61**	-.**34**	-.05	-.**31**	-.06	.**46**	.**45**	.**28**	-.**59**	.**19**
Lat	-.08	-.07	-.06	-.09	.11	-.05	.12	.05	.12	-.01	.03
Crv	.06	-.**21**	.06	-.01	-.13	.04	.00	.16	.07	-.**22**	.14
Res	03	-.13	-.06	-.04	-.01	.09	.**20**	.**28**	*.19*	-.03	.07

Note. A EC = Adult-reported effortful control; Lat = Gift latency composite; Crv = Rabbit-turtle mean curve score; Res = Overall restraint during dinky toy task. M = Mother; C = Caregiver; F = Father; Ext = Externalizing; Int = Internalizing; SC = Social competence; Con = Conflict; Close = Closeness. **Bold** indicates $p < .05$. *Italics* indicates $p < .10$

Table 11

Correlations of EU with Outcomes Within and One Year Later

	Time 2										
	M Ext	C Ext	F Ext	M Int	C Int	F Int	M SC	C SC	F SC		
Time 2											
Rec	-.10	-.*14*	-.11	-.01	.00	-.*15*	.**22**	.**20**	.13		
Exp	-.01	-.01	.01	.00	.13	.06	.*13*	.*14*	.11		
St	-.05	-.*14*	-.12	-.08	-.02	.05	.07	.*14*	.**16**		
	Time 4										
	M Ext	C Ext	F Ext	M Int	C Int	F Int	M SC	C SC	F SC	C Con	C Clos
Time 3											
Exp	-.11	-.**28**	-.15	-.01	-.**18**	-.03	.**21**	.**22**	.**25**	-.13	.12
St	-.*14*	-.18	-.14	.01	-.03	-.12	.**18**	.**21**	.**22**	-.13	-.02
NSt	-.**16**	-.**23**	-.05	-.03	-.14	-.17	.**23**	.**20**	.**24**	-.**23**	-.09
Time 4											
St	-.*14*	-.01	-.10	-.07	-.03	-.12	.10	.06	.18	.01	-.10

Note. Rec = Receptive Knowledge; Exp = Expressive Knowledge; St = Stereotypical Knowledge; NSt = NonStereotypical Knowledge. M = Mother; C = Caregiver; F = Father; Ext = Externalizing; Int = Internalizing; SC = Social competence; Con = Conflict; Close = Closeness. **Bold** indicates $p < .05$. *Italics* indicates $p < .10$

Table 12

Factor Loadings for Externalizing CFA

	T2		T3		T4	
	Unstd	Std	Unstd	Std	Unstd	Std
Regulation						
A EC	1.00	.42	1.00	.48	1.00	.67
Gift	2.48	.68	1.81	.80	.62	.54
Crv	.53 [a]	.36	.53 [a]	.46	.13	.34
Res	.92 [b]	.36	2.19	.54	.92 [b]	.43
Emotion Understanding						
Stereotypcial	1.00	.55	1.00	.91	-	-
Expressive	.08	.54	.07	.55	-	-
Receptive	.74	.68	1.48	.79	-	-
Nonstererotypical	-				1.00	-
Externalizing						
Mother	1.00	.66			1.00	.79
Caregiver	.74 [c]	.41			.74 [c]	.48
Father	.75 [d]	.54			.75 [d]	.71

Note. All estimates are significant at $p < .01$.
[a, b, c, d] Factor loadings constrained to be equal over time.

Table 13

F*actor Loadings for Internalizing CFA*

	T2		T3		T4	
	Unstd	Std	Unstd	Std	Unstd	Std
Regulation						
A EC	1.00	.36	1.00	.43	1.00	.61
Gift	2.80	.68	1.98	.79	.70	.56
Crv	.63 [a]	.37	.63 [a]	.50	.17	.43
Res	1.10[b]	.37	2.47	.55	1.10[b]	.48
Emotion Understanding						
Stereotypcial	1.00	.56	1.00	.90	-	-
Expressive	.08	.55	.07	.55	-	-
Receptive	.71	.66	-		-	-
Nonstererotypical	-		1.49	.80	1.00	-
Internalizing						
Mother	1.00	.42			1.00	.32
Caregiver	.75 [c]	.49			.75 [c]	.78
Father	.95[d]	.61			.95[d]	.49

Note. All estimates are significant at $p < .01$.
[a, b, c, d] Factor loadings constrained to be equal over time.

Table 14

Factor Loadings for Social Competence CFA

	T2		T3		T4	
	Unstd	Std	Unstd	Std	Unstd	Std
Regulation						
A EC	1.00	.36	1.00	.45	1.00	.65
Gift	3.08	.72	1.93	.79	.63	.54
Crv	.59 [a]	.35	.59 [a]	.48	.15	.39
Res	1.04[b]	.35	2.39	.55	1.04[b]	.47
R^2						
Emotion Understanding						
Stereotypcial	1.00	.54	1.00	.89	-	-
Expressive	.08	.54	.07	.56	-	-
Receptive	.77	.70	-		-	-
Nonstererotypical	-		1.53	.80	1.00	-
R^2						
Social Competence						
Mother	1.00	.59			1.00	.58
Caregiver	.85 [c]	.41			.85 [c]	.43
Father	1.10[d]	.62			1.10[d]	.59
R^2						

Note. All estimates are significant at $p < .01$.
[a, b, c, d] Factor loadings constrained to be equal over time.

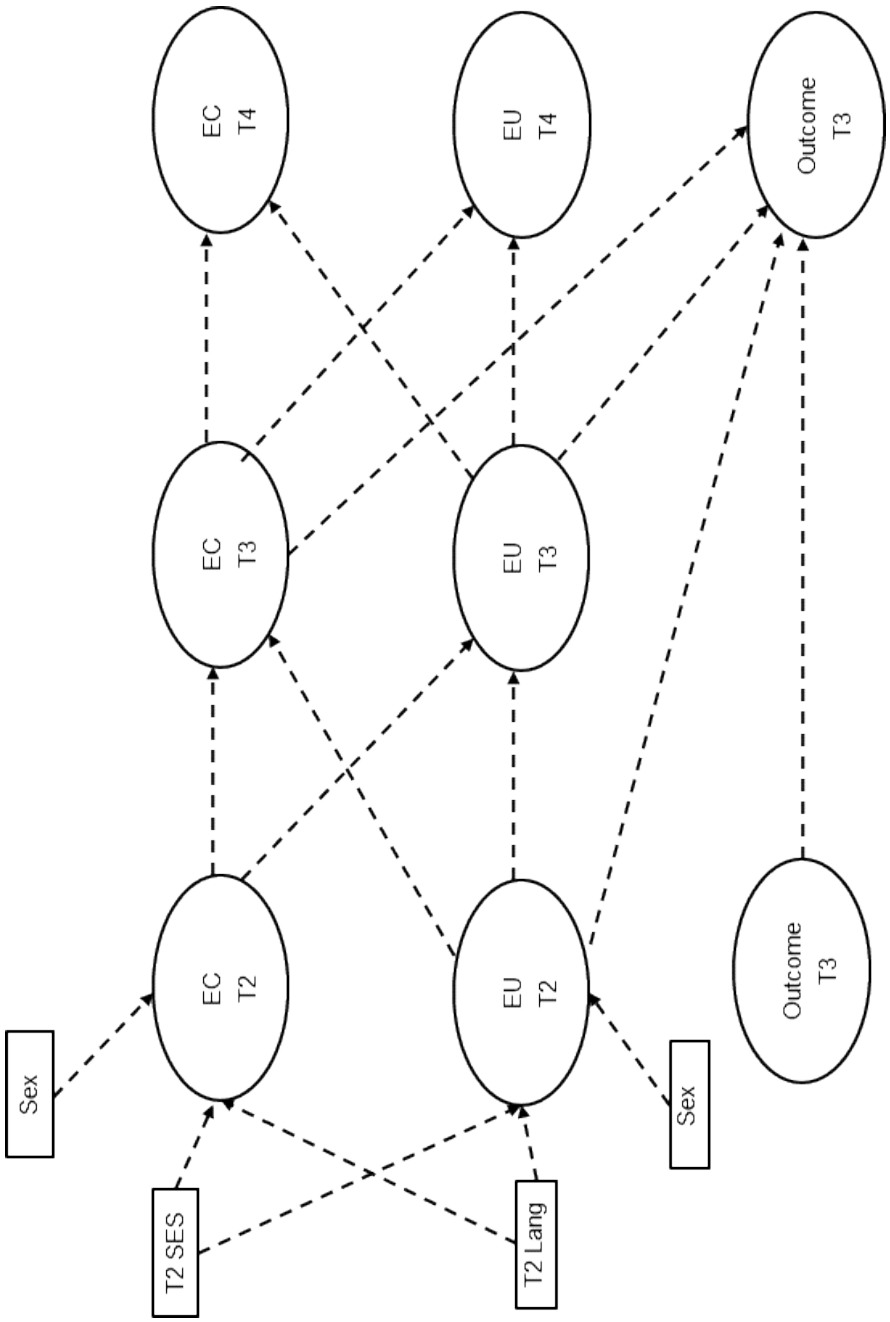

Figure 1 Hypothesized model for externalizing and internalizing SEMs. Dotted lines indicated tested paths. All factors were allowed to correlate with in time.

Table 15

Correlations of T2 Language with Study Variables at T2, T3, and T4

	T2	T3	T4
Regulation			
A EC	.21***	.23**	.14+
Gift	.24***	.17*	.02
Crv	.12	.09	-.01
Res	.07	.05	.07
Emotion Understanding			
St	.06	.09	.16*
Exp	.22**	.13+	-
Rec	.14*	-	-
NSt	-	.01	-
Externalizing			
Mother	-.04	-	-.12
Caregiver	-.07	-	-.09
Father	-.08	-	.12
Internalizing			
Mother	-.04	-	-.10
Caregiver	-.04	-	-.10
Father	-.14+	-	-.04
Social Competence			
Mother	.32***	-	.19*
Caregiver	.20*	-	.08
Father	.19*	-	.03
Adult-child Relationship			
Confict	-	-.11	-.06
Coseness	-	.05	.13

Note. A EC = Adult-reported effortful control; Lat = Gift latency composite; Crv = Rabbit-turtle mean curve score; Res = Overall restraint during dinky toy task.Rec = Receptive; Exp = Expressive; St = Stereotypical Situational; NSt = Non-stereotypical situational.+ p <.10. * p < .05. ** p < .01. *** p < .001.

Table 16

Factor Loadings for Externalizing SEM

	T2		T3		T4	
	Unstd	Std	Unstd	Std	Unstd	Std
Regulation						
A EC	1.00	.41	1.00	.48	1.00	.67
Gift	2.60	.69	1.69	.75	.59	.53
Rbt Tur	.54 [a]	.37	.54 [a]	.48	.13	.35
Res	.91[b]	.34	2.06	.51	.91[b]	.43
Emotion Understanding						
Stereotypcial	1.00	.53	1.00	.91	-	-
Expressive	.09	.55	.07	.55	-	-
Receptive	.75	.68	1.47	.79	-	-
Nonstererotypical	-				1.00	-
Externalzing						
Mother	1.00	.66			1.00	.77
Caregiver	.75 [c]	.41			.75 [c]	.47
Father	.76[d]	.55			.76[d]	.71

Note. All estimates are significant at $p < .01$.
[a, b, c, d] Factor loadings constrained to be equal over time.

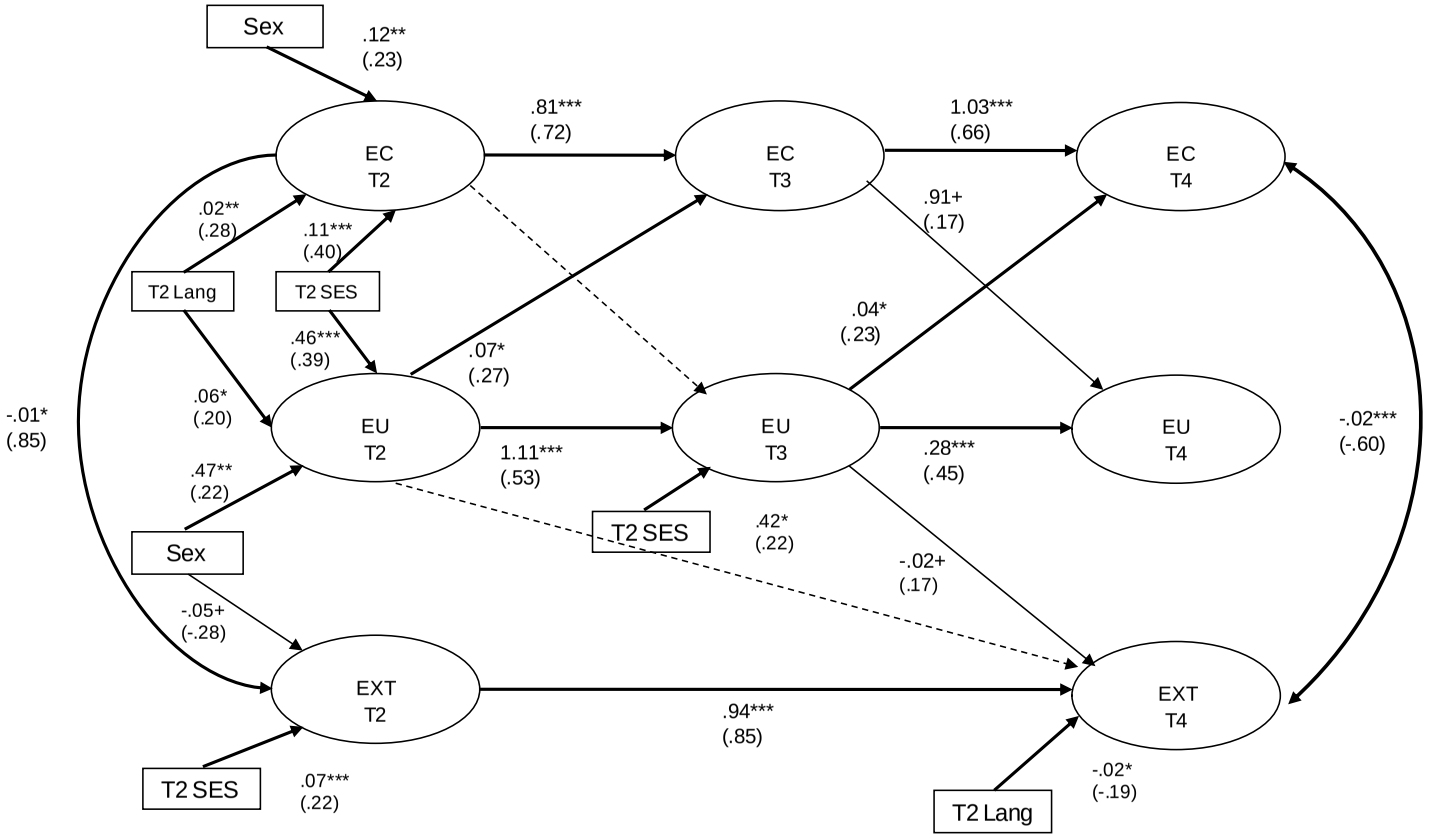

Figure 2. Final structural equation model for externalizing. standardized and unstandardized (in parentheses) parameter estimates are presented. Bolded lines indicate significant estimates.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 17

Factor Loadings for Internalizing SEM

	T2		T3		T4	
	Unstd	Std	Unstd	Std	Unstd	Std
Regulation						
A EC	1.00	.35	1.00	.44	1.00	.63
Gift	2.89	.71	2.04	.77	.69	.55
Crv	.58	.38	.66	.50	.17	.39
Res	1.05[a]	.36	2.49	.55	1.05 [a]	.48
Emotion Understanding						
Stereotypcial	1.00	.54	1.00	.91	-	-
Expressive	.09	.56	.07	.55	-	-
Receptive	.73	.67	-		-	-
Nonstererotypical	-		1.48	.79	1.00	-
Internalizing						
Mother	1.00	.58			1.00	.52
Caregiver	.91 [c]	.46			.91 [c]	.43
Father	1.15[d]	.68			1.15[d]	.62

Note: All estimates significant at the $p < .01$ level.
[a, b] Factor loadings constrained to be equal over time.

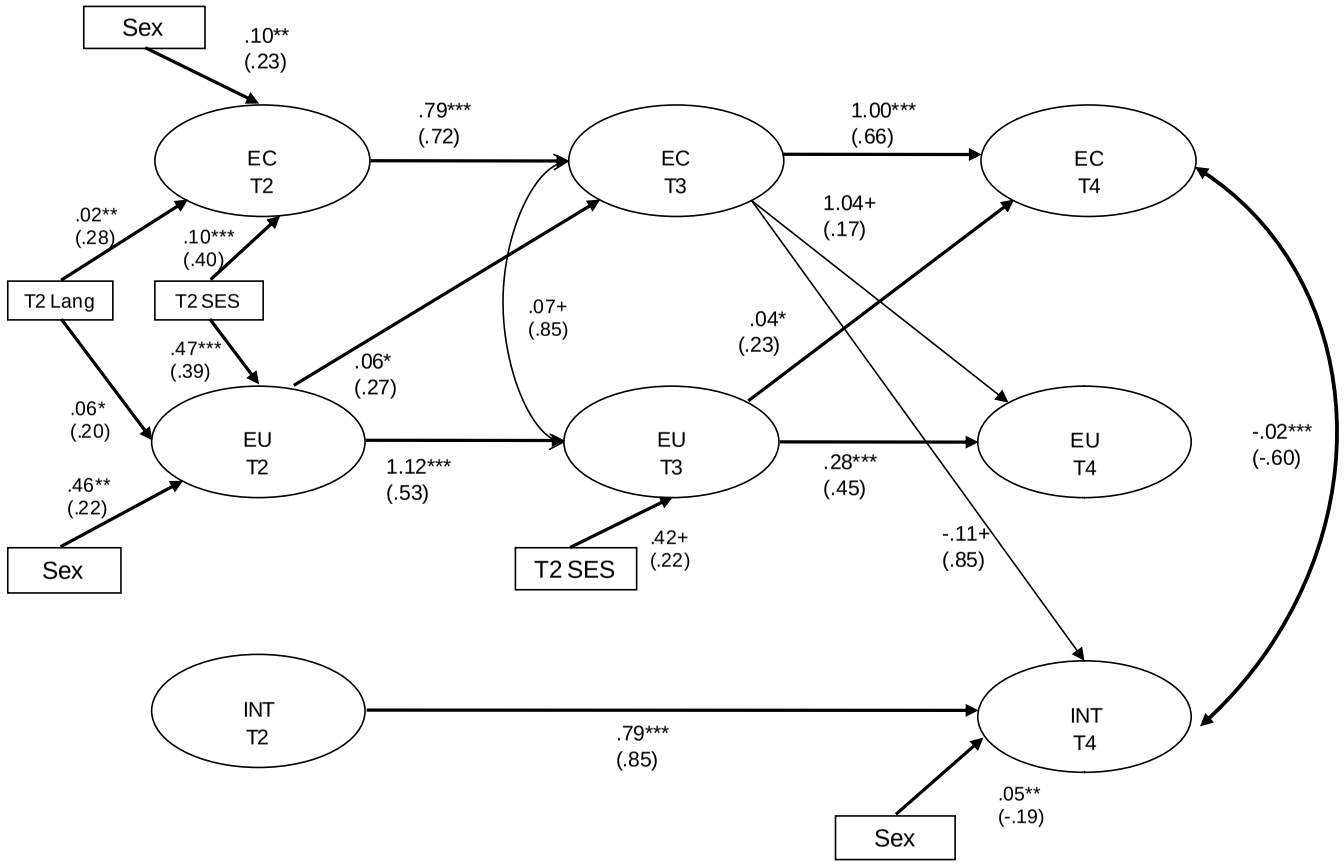

Figure 3. Final structural equation model for internalizing. Standardized and unstandardized (in parentheses) parameter estimates are presented. Bolded lines indicate significant estimates.

$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 18

Factor Loadings for Social Competence SEM

	T2		T3		T4	
	Unstd	Std	Unstd	Std	Unstd	Std
Regulation						
A EC	1.00	.36	1.00	.43	1.00	.61
Gift	2.89	.69	2.04	.79	.69	.57
Crv	.58	.36	.66	.51	.17	.43
Res	1.05[a]	.36	2.49	.54	1.05[a]	.46
Emotion Understanding						
Stereotypcial	1.00	.54	1.00	.91	-	-
Expressive	.09	.56	.07	.55	-	-
Receptive	.73	.67	-		-	-
Nonstererotypical	-		1.48	.79	1.00	-
Social Competence						
Mother	1.00	.58			1.00	.52
Caregiver	.85[c]	.46			.85[c]	.43
Father	1.04[d]	.68			1.04[d]	.62

Note: All estimates significant at the $p < .01$ level.
[a, b] Factor loadings constrained to be equal over time.

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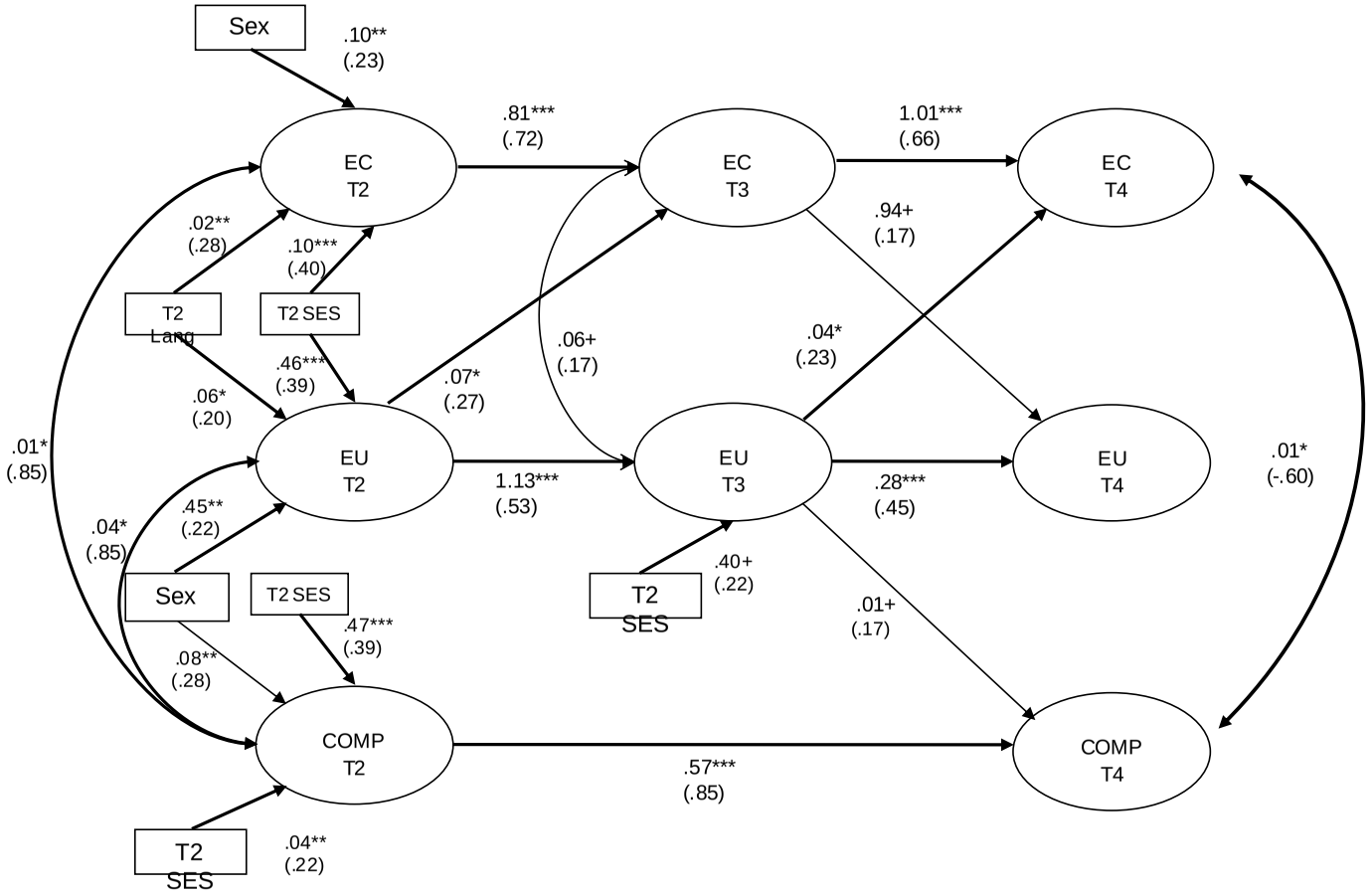

Figure 4. Final structural equation model for social competence. Standardized and unstandardized (in parentheses) parameter estimates are presented. Bolded lines indicate significant estimates.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. *** $p < .001$.

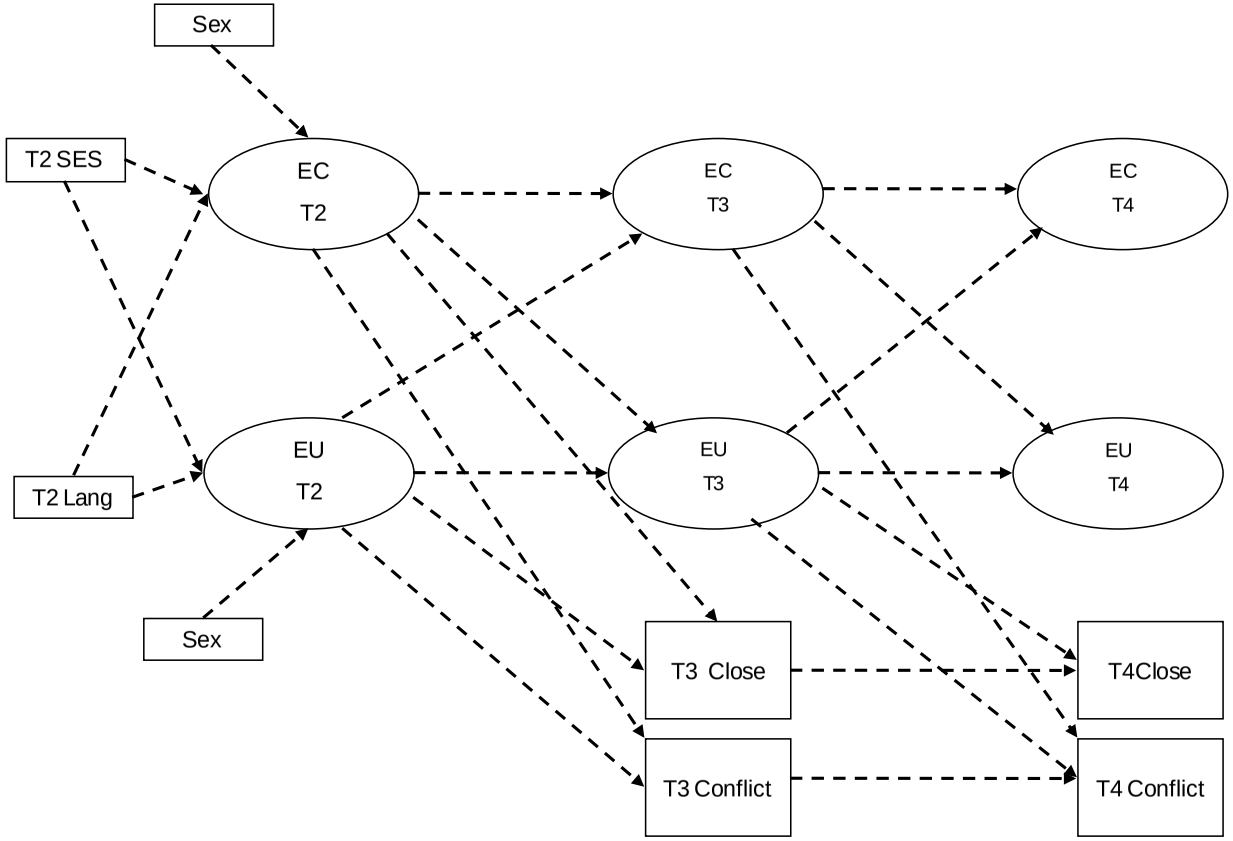

Figure 5. Hypothesized model for adult-child relationship SEM. Dotted lines indicated tested paths. All correlations among withing time variables were estimated unless noted in text.

Table 19

Factor Loadings for Adult-Child Relationship SEM

	T2		T3		T4	
	Unstd	Std	Unstd	Std	Unstd	Std
Regulation						
A EC	1.00	.43	1.00	.52	1.00	.77
Gift	2.30	.67	1.55	.74	.38	.40
Crv	.48	.36	.53	.50	.11	.35
Res	.72[a]	.30	2.01	.53	.72[a]	.41
Emotion Understanding						
Stereotypcial	1.00	.53	1.00	.90	-	-
Expressive	.09	.55	.07	.56	-	-
Receptive	.76	.68	-		-	-
Nonstererotypical	-		1.48	.79	1.00	-

Note: All estimates significant at the p<.01 level.
[a] Factor loadings constrained to be equal over time.

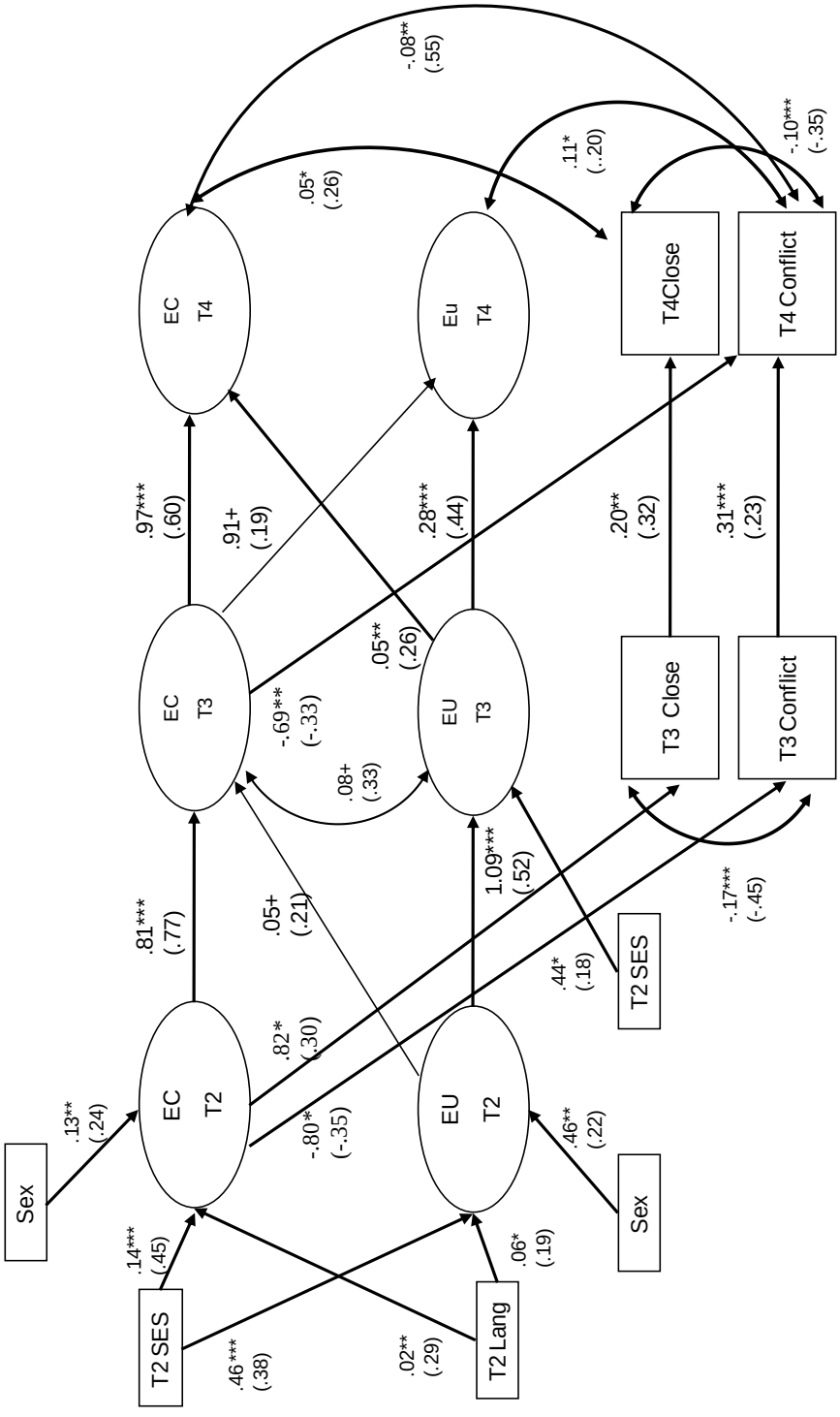

Figure 6. Final structural equation model for adult-child conflict and closeness. Standardized and unstandardized (in parentheses) parameter estimates are presented. Bolded lines indicate significant estimates.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$..

Table 20

Factor Loadings for Post-Hoc EC and EU SEM

	T2		T3		T4	
	Unstd	Std	Unstd	Std	Unstd	Std
Regulation						
A EC	1.00	.35	1.00	.42	1.00	.59
Gift	3.10	.71	2.06	.79	.71	.58
Crv	.58	.34	.68	.51	.18	.43
Res	1.10[a]	.36	2.54	.54	1.10[a]	.47
Emotion Understanding						
Stereotypcial	1.00	.54	-		-	-
Expressive	.09	.55	1.00	.91	-	-
Receptive	.75	.68	.07	.55	-	-
Nonstererotypical	-		1.48	.79	1.00	-

Note: All estimates significant at the p<.01 level.
[a] Factor loadings constrained to be equal over time.

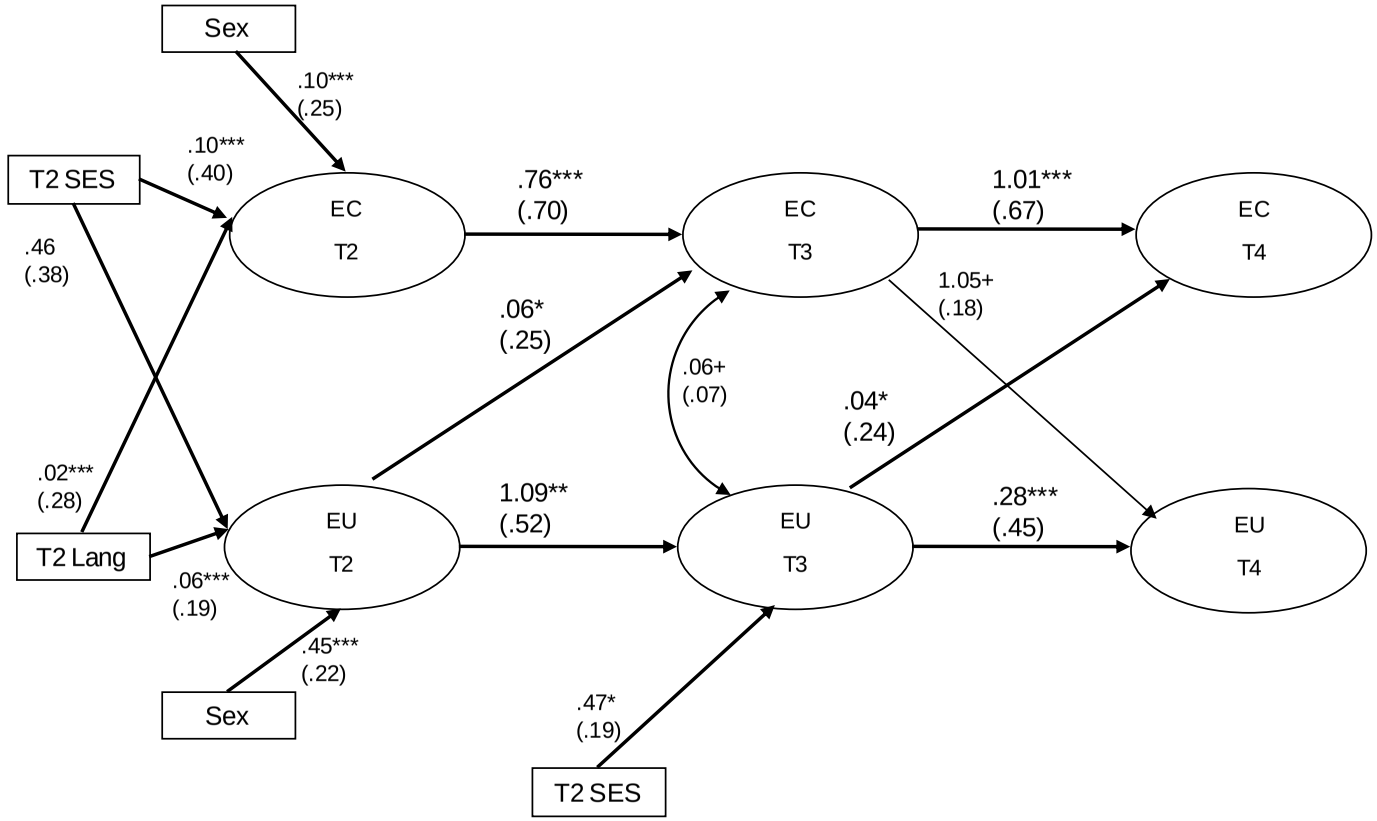

Figure 7. Post-hoc structural equation model with bi-directional paths between EC and EU. Standardized and unstandardized (in parentheses) parameter estimates are presented. Bolded lines indicate significant estimates.
$^{+}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.