MORRIS, NNEKA, Ph.D. Parent-Child Co-regulation Predicting Emotion Regulation in Early Childhood. (2015)
Directed by Dr. Susan P. Keane. 125 pp.

The current study examined the importance of co-regulation, defined as the mutual regulatory parent-child process that consists of coordinated emotional expression (Feldman, Greenbaum, & Yirmiya, 1999), on emotion regulation in children across early childhood. Literature related to co-regulation (e.g. responses to emotions) and individual factors of the parent and child (e.g. reactivity and psychopathology) was reviewed and used to develop a transactional model predicting child emotion regulation. It was hypothesized that co-regulation would have an additive and indirect effect on emotion regulation above and beyond the contribution of the individual factors of the child and parent. Maternal and teacher report of child negative reactivity and emotion regulation was obtained at ages 4 and 5. Laboratory observations of these constructs were also utilized. Mothers self-reported on their levels of psychopathology, as well as their reactions to their child's negative emotions. Co-regulation was also obtained using interval coded data of reciprocated positive affect during parent-child interaction tasks. Four structural equation models (SEM) were analyzed in MPlus, and nested models were compared using a chi-square difference test. Using maternal report and observational data, the primary hypothesis was supported, as co-regulation had an additive effect on concurrent emotion regulation. Using observational data of individual factors, co-regulation also had an indirect effect on emotion regulation over time. Findings are interpreted in terms of highlighting the essential role of parent-child interactions on the development of children's emotion regulation across early childhood.

PARENT-CHILD CO-REGULATION PREDICTING EMOTION REGULATION IN EARLY CHILDHOOD

by

Nneka Morris

A Dissertation Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

Greensboro
2015

Approved by
Susan P. Keane_____
Committee Chair

To all of my family and friends that made completion of this degree possible. It was the love and support of my mother, sister, partner, LNC, graduate school advisor and cohort, as well as countless others that served as my motivation throughout the years. I particularly would like to dedicate this dissertation to my father. Although you are no longer here, your presence is felt every day.

APPROVAL PAGE

This dissertation written by Nneka Morris has been approved by the following committee of the Faculty of The Graduate School at the University of North Carolina at Greensboro.

Committee Chair _____
Susan P. Keane

Committee Members _____
Susan D. Calkins

_____
Gabriela Stein

_____
Julia Mendez-Smith

_____
Date of Acceptance by Committee

_____
Date of Final Oral Examination

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

Since poor emotion regulation, or emotion dysregulation, has been established as a primary contributor to maladaptive behavioral outcomes (Calkins, 1994; Eisenberg, Fabes, Guthrie & Murphy, 1996; Eisenberg, Fabes, Guthrie & Reiser, 2000), researchers have sought to model emotion regulation development. Theories suggest that one salient contributor to emotion regulation development is the individual characteristics of the child (e.g. neurological maturation, reactivity, and gender). These intra-individual factors often interact with interpersonal factors (e.g. parenting practices) (Kochanska, 1997), as interpersonal factors serve as an important context for development. In addition to the individual by context interactions that have been proposed, bidirectional effects between these factors are considered an important component of developmental outcomes. Models emphasizing both contextual interaction and bidirectionality may be beneficial in explaining the development of emotion regulation. This is because regulation can be conceptualized as a fluid process that consists of continuous and mutual interactions between the child and his/ her environment (Evans & Porter, 2009).

Since parents are primary figures in the child's environment across the first few years of life, the impact of parent-child interactions on emotion regulation development has received much attention in the literature. For example, previous research has established that sensitive and responsive parenting, discussing and modeling appropriate

emotional responses, and scaffolding contribute to adaptive emotion regulation in the child (Morris et al, 2007). In addition to examining the presence of these parenting practices, it may be beneficial to further explore the emotional content of parent-child interactions. Thus, the current study investigated emotional exchanges to see if they serve a distinct and vital role in the development of emotion regulation. Considering that parents and children each contribute to these emotional exchanges, the current study also investigated individual factors that might influence both parent-child interactions and emotion regulation across early childhood.

Individual and Interpersonal Factors

Emotion regulation, defined as "those behaviors, skills, and strategies, whether conscious or unconscious, automatic or effortful, that serve to modulate, inhibit, and enhance emotional experiences and expressions" (Calkins & Hill, 2007, p.229), is recognized as the foundation of adaptive social and behavioral functioning. Moreover, deficits in emotion regulation, also known as emotion dysregulation, predict a wide range of negative outcomes including internalizing behavior, externalizing behavior, and poor social competence in early childhood and beyond (Calkins, 1994; Eisenberg et al., 1996; Eisenberg et al., 2000). Given its importance, many theories have been proposed to explain the development of adaptive and maladaptive emotion regulation. A common thread across these theories is a focus on individual factors inherent in the child and contextual or interpersonal factors related to parenting.

Individual factors related to emotion regulation development are apparent very early in life. Particularly, maturation of the attentional networks that occurs between six to twelve months, as well as reactivity levels (the propensity to display positive or negative emotions), which are evident from birth, substantially contribute to a child's ability to regulate his/her emotions starting in infancy (Rothbart & Bates, 1998). The ability to modulate, inhibit, and enhance emotions becomes increasingly coherent over the second year of life, into early childhood, and later becomes a salient personality variable (Rothbart & Bates, 1998). However, by the end of early childhood, emotion regulation is thought to be fairly stable, and many children are able to adequately control their emotions by utilizing the following strategies: shifting and maintaining attention, delaying gratification, modulating vocal volume, and inhibiting dominate responses (Kochanska, Murray & Harlan, 2000). Individual factors, particularly dimensions of the child's temperament, play a vital role in acquiring emotion regulation strategies. For instance, high levels of negative reactivity, which persists throughout toddlerhood and into early childhood, often leads to poor regulatory abilities (Rothbart & Bates, 2006). Furthermore, extreme reactivity can lead to decreased opportunities to learn or practice regulatory skills; thus, disrupting the development of regulatory processes (Lonigan, Vasey, Phillips, & Hazen, 2004).

While the importance of individual factors cannot be contested, contextual or environmental factors are also important (Kochanska, 1997). Thus, interpersonal factors have been examined. Given that parents are often regarded as the primary socialization agents for emotion regulation from infancy to early childhood, there is a rich literature on

parenting behavior and practice as enhancing or delimiting emerging emotion regulation skills (Morris, Silk, Steinberg, Myers & Robinson, 2007). A variety of parenting practices and processes that may contribute to the development of emotion regulation have been examined, including maternal sensitivity and responsiveness, discussion of emotion, modeling, and emotion scaffolding (Calkins, Smith, Gill & Johnson, 1998; Evans & Porter, 2009; Gilliom, Shaw, Beck, Schonberg & Lukon, 2002; Morris et al., 2007; Propper & Moore, 2006). Additionally, models of emotion regulation development have incorporated these factors in a number of ways. Very early work, based upon behaviorism and psychoanalytic theory, emphasized unidirectional effects of either individual or interpersonal factors on child outcomes. For example, previous research on parental socialization of emotion regulation has often conceptualized the child as the product of parenting practices (Lewis & Granic, 2000).

More recently, studies have examined the interaction between individual and interpersonal factors when explaining child development. However, these models typically have not considered how individuals are changed by their experiences with other individuals; thus, transactional models have been proposed (Sameroff, 2000). Transactional models emphasize that development is influenced by interplay of processes in the child's social settings over time. At the core of these models is a focus on bidirectional, interdependent effects of the child and environment (Sameroff, 2000). Most studies of emotion regulation are currently at this stage, meaning individual and interpersonal factors are being investigated within a transactional framework. For example, Morris and colleagues (2007) provided one of the more comprehensive models

to date by incorporating many parenting factors and emphasizing bidirectional influences between parenting, individual factors, and emotion regulation. More specifically, their 'tripartite model of familial influence' suggests that emotion regulation develops through observational learning, modeling and social referencing; specific parenting practices; and the emotional climate of the family (Morris et al., 2007). Furthermore, Morris and colleagues (2007) emphasized the importance of parenting practices that were emotion-related, such as parental encouragement of emotions, teaching about emotion regulation strategies, and parents' reactions to emotions. While it has been established broadly that these emotion-related parenting practices contribute to emotion regulation development, it may be beneficial to increase specificity by exploring particular emotional exchanges during parent-child interactions. In fact, some previous studies have found associations between specific emotions expressed by parents and poor emotion regulation in children (Calkins et al., 1998; Morris et al, 2002). However, few studies consider the specific emotions expressed by *both* members of the dyad and their *combined* contribution to emotion regulation in the child.

Morris and colleague's (2007) model is transactional in nature because it accounts for bidirectionality among constructs; for example, parenting practices influence and are influenced by emotion regulation. However, transactions can also be examined within constructs and may provide rich information concerning the development of emotion regulation. In particular, a specific focus on the exchange of emotion between parent and child could allow for the opportunity to assess mutual regulatory processes. Echoing this idea, theories related to psychobiological regulation, emotion regulation, self-regulation,

socialization, and dynamic systems co-regulation all suggest that children's ability to regulate develops in the context of a mutual regulatory parent-child process that consists of coordinated emotional expression (Feldman, Greenbaum, & Yirmiya, 1999). Thus, examining this mutual process, also known as co-regulation, may serve a critical role in advancing our knowledge of emotion regulation development. In further defining co-regulation, it is grounded in interactions where both the parent and child are believed to mutually create a communication sequence by continuously regulating the emotions of the other (Evans & Porter, 2009). This is accomplished by each individual integrating emotional cues and adjusting their own cues, as well as their expectations for subsequent interactions (Fogel, 1993). For example, a child's expression of anger may be followed by a parent's expression of calmness, which could serve the regulatory function of decreasing the child's emotion based upon the feedback he/she received from the parent. This example reflects one "snapshot" of a feedback loop that could contribute to a longstanding pattern of interacting within the dyad. Furthermore, the interaction in this example is parent-driven, meaning the parent provides feedback that cues the child to regulate his/her emotion.

Co-regulation

Previous researchers have examined co-regulation and concluded that since it is ongoing and involves patterns of aggregated interactions in the moment, as children mature, so does the quality of the emotional interaction between the parent and child (Evans & Porter, 2009). In fact, when co-regulation was assessed developmentally,

significant changes were found in the quality of co-regulated interaction that occurred between mother and child over the first year (Evans & Porter, 2009). Specifically, it was found that the amount of time spent in coordinated, symmetrical, and less unilaterally directed interactions increased by nearly 30% from 6 to 12 months (Evans & Porter, 2009). It may be possible that normative co-regulation becomes increasingly more coordinated and symmetrical, achieving stability by the end of early childhood, quite similar to the developmental trajectory of normative emotion regulation. This underscores the importance of studying co-regulation during early childhood as a stable contributor to the child's emotional functioning.

Co-regulation has been measured using a variety of constructs, with certain constructs being salient at different developmental periods. In infancy, it is most often discussed as synchrony, which is a process characterized by dyadic interactions that demonstrate an observable pattern that is mutually regulated, harmonious, and reciprocal (Reyna & Pickler, 2009). Transitioning into toddlerhood, the matching of emotions is often discussed as mutuality. Mutuality is a very similar concept to synchrony; however it is slightly distinct given that interactions are less parent-driven. Children at this developmental stage are more cognitively mature and able to purposefully express affect; thus making parent and child more equal contributors to co-regulation (Kochanska & Aksan, 2004). A fair amount of literature exist on synchrony in infancy and mutuality in toddlerhood, with findings indicating that greater synchrony that is positive, parent-driven, and quickly timed contributes to better emotion regulation development in infants (Feldman et al., 1999; Tronick & Cohn, 1989), and that mutually expressed positive

emotion typically contributes to better emotion regulation development in toddlers (Martin, Clements, & Crnic, 2002).

In early childhood, co-regulation has been assessed as continuous emotional responses to the emotions expressed by another that serve to modulate future emotional expressions (Martini, Root, & Jenkins, 2004). While this co-regulatory process is thought to begin early in development, it may become more salient in early childhood and beyond. This is because as children enter this developmental period, they become increasingly aware of their social partner's potential responses to their emotions (Zeman & Shipman, 1998). Moreover, considering that during this time children must also prepare for interactions outside of the parent-child dyad, the regulatory skills acquired from responding to other's emotions and anticipating responses to his/her own emotions have been shown to be particularly important (Denham & Grout, 1993). The literature on co-regulation in early childhood is arguably sparse, compared to synchrony and mutuality literature at early developmental points, underscoring a gap in the field's knowledge and a critical point for further inquiry. Response to emotion is a concept fundamentally similar to synchrony and mutuality, the slight difference is the greater emphasis on feedback. Instead of emotion being a shared experience, emotions in one individual continuously fuel varying emotions in another, which informs future interactions (Denham & Grout, 1993). Researchers have conceptualized the anticipation of responses, along with the expressed emotion and subsequent reaction, as a feedback loop (NICHD, 2004). Moreover, these responses are thought to be continuous and transactional. A drawback, however, is that studies often assess a parent's single response to his/her

child's emotion and postulate that such responses represent a stable interaction pattern. Thus, there is a gap between the conceptual understanding of the mutual regulatory process in early childhood and empirical evidence.

Despite this limitation, research has demonstrated that there are patterns of interaction that more typically occur within parent-child dyads. For example, by providing hypothetical vignettes to a diverse sample of mothers with 3 to 6 year old children, Martini and colleagues (2004) showed that parents were more likely to suppress negative emotion in response to a child's fear as opposed to a child's sadness. Also, parents were more likely to suppress negative emotion in response to a child's sadness as opposed to a child's anger. Similar patterns of responding have been identified in more recent research. For example, Louggheed and colleagues (2014) examined maternal regulation of child emotion in a sample of externalizing (i.e. poorly regulated) and typically-developing children. By coding microscopic data of conflict and positive discussions between mother and child, they found that mothers' positive responses to children's negative emotions were less likely to occur within externalizing dyads. Furthermore, children with externalizing problems were less likely to respond positively to maternal support by decreasing their negative affect. These results might suggest that positive responses to negative emotion serve the co-regulatory function of decreasing negative emotion over time.

While these two studies are conceptually similar, meaning they both identify likely emotional exchanges among parent-child dyads, they differ in methodology.

Martini and colleagues (2004) assessed mothers' suppression of negative emotion by using hypothetical situations in which the mother was asked to imagine that she was angry, anxious, or sad. The mothers were then asked to rate the likelihood that they would stop displaying each emotion if the child started to 'cry or look miserable and hurt/look frightened/get angry.' The use of hypothetical vignettes brings into question the authenticity of parents' responses. For example, social desirability could have led to response bias, with parents minimizing their actual expression of negative emotion with their children. Nonetheless, self-report data could represent more content validity, meaning parents report on interactions that are more characteristic of emotional exchanges in their natural environment. It is also possible that the use of observational data of emotion exchanges, as in the Louggheed and colleagues (2014) study, represents more construct validity. Moreover, observational data could better assess transactions; thus, better mapping onto our conceptual understanding of co-regulation. For example, when Kochanska and Aksan (2004) examined changes in parent-child interactions from infancy to toddlerhood, they utilized microscopic (60-s intervals) codes of emotional cues. These codes consisted of cues that the child directed toward the parent, as well as cues the parent directed toward the child, which were then used to determine dyadic mutuality. Taken together, both self-report and observational data likely provide valuable information. Despite its drawbacks, self-reported interactions that occur outside of the laboratory could better represent typical interactions among the parent-child dyad, while observed interactions may have the benefit of capturing enduring, core interaction patterns (Kochanska & Aksan, 2004).

Since it has been postulated that co-regulation is mutually-led during early childhood (Kochanska & Aksan, 2004), there should be an equal emphasis on parent reactions and child reactions as continuous contributors to the feedback loop. As noted, some empirical literature has established typical interaction patterns that are parent-driven (Martini, Root, & Jenkins, 2004; Lougheed, Hollenstein, Lichtwarck-Aschoff, & Granic, 2014). There are additional findings, however, regarding child-driven interactions. For instance, it has been found that when a child responds to a parent's anger with sadness or fear, the parent is then more likely to decrease his/her anger and instead respond with positivity (Denham & Grout, 1992). Conversely, when a child responds to a parent's anger with their own anger, the parent is more likely to respond with increased hostility (Granic & Patterson, 2006). The latter pattern is most consistent with an actual feedback loop and arguably best captures co-regulation in early childhood. Moreover, this pattern serves as the foundation of work on the coercion cycle, which has shown that parent-child interactions based upon negativity tend to become increasingly aversive; thus, leading to the escalation of children's dysregulation (Granic & Patterson, 2006). It is through this negative feedback that the co-regulatory process may become characterized by a pattern of mutual hostility (Granic & Patterson, 2006).

The work of Cole and colleagues (2003) also highlighted the coercion cycle, as they examined mutual regulation in early childhood. A sample of preschoolers and their mothers were observed during waiting and free play tasks. Coding of emotional expression was conducted at 1-s intervals and then composite emotion scores were created to reflect either angry distress or positive emotion. Additionally, emotional cues

were characterized as either self-initiated or contingent for both mother and child. Results showed that positive emotion was mutually regulated and sustained for most dyads; however, this pattern was observed less in children with difficulty regulating their anger. Furthermore, more reciprocity of anger was evident in dyads with a child concurrently rated as having difficulty regulating their anger. Finally, maternal anger that was contingent upon the child's anger led to increases in poor anger regulation over time and predicted stability in this outcome (Cole, Teti, & Zahn-Waxler, 2003).

Considering that a feedback loop of negative responses has been shown to predict emotion dysregulation, there is some evidence to suggest that positive responses lead to better emotion regulation. When parents respond with positive emotion to emotional displays, children are often better able to handle emotional arousal and express emotions appropriately (Morris et al., 2007; Ramsden & Hubbard, 2002). This finding again reflects a "snapshot" of responding, that may or may not characterize a pattern of mutual positivity within the dyad. Since co-regulation requires input from both members of the dyad, positive responses to emotion should be appropriately contingent. For example, in Cole and colleagues' (2003) study, children with no improvement in anger regulation were often members of dyads characterized by emotional mismatches. For instance, a parent may have laughed at the child's frustration or a child may have laughed at the parent's irritation.

Individual Differences in Expressivity

The previously reviewed literature suggests that parent-child co-regulation may have a critical role in the development of emotion regulation or dysregulation. However, it is equally important to consider the factors that each individual brings to the interactions. This assertion is based upon theory, which suggests that during interactions individual factors come together to influence the dyad; the resulting dyad then influences the individuals in an ongoing exchange (Lewis & Granic, 2000). Thus, individual differences are likely to determine the amount of affect expressed during interactions and subsequently the amount of co-regulation present in the dyad.

Child Individual Differences

Focusing on individual factors within the child, high levels of negative reactivity have been shown to disrupt interactions. Specifically in early childhood, the presence of a child with a difficult temperament tends to increase the likelihood of coercive parent–child interactions; when children exhibit intense negative emotional reactions, the risk for hostile, angry parental responses increases (Scaramella, 2004). Although highly reactive children receive more emotional feedback, this feedback is typically characterized by negativity (Scaramella, 2004). Furthermore, this negative feedback loop could fuel expectations for future interactions. In fact, when parents perceive their child to be highly reactive, they have been found more likely to respond negatively to their child's negative emotions (Eisenberg, Cumberland & Spinrad, 1998).

While some evidence indicates that temperamentally difficult children elicit negative responses from parents, others have asserted that parents may respond with positivity; thus, suggesting at a goodness of fit notion between parent and child. Martini and colleagues (2004) examined mothers of 3 to 6 year olds and found that difficult temperament did not influence parents' suppression of negative emotion, meaning maternal regulation of negative emotion was not predicted by child temperament. It was postulated that maternal negativity may be governed more by situationally specific emotional responses in their children, as opposed to enduring temperamental qualities (Martini, Root & Jenkins, 2004). Thus, it is important to clarify these associations. It is likely that either a negative, positive, or neutral response to children's reactivity is dependent on the individual factors of the parent; therefore, highlighting the importance of examining individual factors of the parent along with those of the child, as well as how each contribute to co-regulation.

Parent Individual Differences

Just as individual differences in the child disrupt interactions, similar factors within the parent may affect the dyad. Particularly, high levels of sadness and anger have been shown to affect parent-child interaction. In this regard, it may be important to consider parental psychopathology because the frequency and intensity of sadness and anger may become amplified during parent-child interactions. Furthermore, the effect of these extreme emotions on emotion regulation development in children is likely different

than those for normally occurring parental expressions of emotions (Eisenberg et al., 1998).

Parental depression has been examined extensively as a predictor of poor emotion regulation in children, with a potential mechanism being the emotions expressed during interactions (Tronick, 1989). It has been demonstrated that during early childhood, children of mothers with a history of depression often express less positive emotion during mother-child interaction compared to children of non-depressed mothers (Feng et al., 2008). Thus, it is possible that parental depression predicts a feedback loop of negative emotion within the parent-child dyad. Children have been shown to have different emotional responses to parental depression. For example, in response to parental depression, children could become more emotionally reactive or suppress emotion. Dagne and Snyder (2011) examined the suppression of kindergarteners' emotional displays during mother-child interactions, taking into account maternal self-reported mood states. Results indicated that maternal depressed mood was associated with children more quickly reducing their displays of anger. Dagne and Snyder (2011) argue that children's continued expression of anger during parent-child interactions could exacerbate maternal depressive mood and behavior. Considering that maternal depressed mood is likely aversive to children, children may shorten their expression of anger with the desire of reducing the amount of negative emotion expressed by mothers. Although not articulated by Dagne and Snyder (2011), their argument is consistent with an emotion exchange that could lead to an interaction pattern that characterizes the dyad; parental

depressed mood met with child anger leads to child's anticipation of future negativity and, thus, reduction in expressed emotion.

These processes over time have been shown to influence the development of emotion dysregulation, as children of depressed parents typically use more maladaptive regulatory strategies (Bariola et al., 2011; Hoffman, Crnic, & Baker, 2006; Morris et al., 2007; West & Newman, 2003). For example, maternal depression has been linked to increased use of experiential avoidance (minimizing/avoiding unwanted negative emotions) in 3 to 5 year olds (Coyne & Thompson, 2011). Maughan and colleagues (2007) similarly found differences in emotion regulation among children of depressed verses non-depressed mothers from toddlerhood to early childhood. Specifically, if maternal depression occurred during the first 21 months of the child's life, children were more likely to exhibit dysregulated emotion patterns in response to witnessing anger at age 4. These findings highlight early childhood as a particularly vulnerable period in development for the long term effect of maternal depression on emotion regulation (Maughan, Cicchetti, Toth, & Rogosch, 2007). Coupled with the findings from Campbell et al. (1995), early occurring and chronic parental depression may have the most deleterious effect on the co-regulation and, in turn, emotion regulation development.

While much research has been conducted on the effect of depression on children's emotional development, little has been done examining the effect of parental hostility marking a major dearth in the understanding of co-regulation. Considering that high levels of parental negative emotion can influence the child's expression of emotion

and/or lead to poor emotional responses over time, it is possible that a similar outcome may occur specifically for high levels of anger. Maltreated children face a host of adversity, typically including parent-child interactions that are characterized by excessive parental anger. Thus, the maltreatment literature does provide some insight on how high levels of anger within parent-child interactions may disrupt the co-regulation. Such literature should be interpreted with caution, however, given that maltreatment does not always equate to parental anger; neglect, in fact, is the most commonly occurring form of maltreatment. Nonetheless, parent-child interactions among maltreating dyads are often less mutual and positive compared to non-maltreating dyads (Valentino, Cicchetti, Toth, & Rogosch, 2011).

Parents in maltreating dyads are shown to exhibit more negativity and less positivity during interactions with their young children; in turn, these children often exhibit more negativity and less positivity during typical interactions with their parents (Herrenkohl, Herrenkohl, Toedter, & Yanushefski, 1984). In Dagne and Snyder's (2011) study, maternal hostility predicted varied emotional responses in children. Specifically, more anger expressed by the mother during interactions led to children quickly suppressing their displays of sadness or fear. Thus, it is possible that children anticipate further hostility from the parent based upon previous interactions. Additionally, co-regulation interrupted by parental anger may predict emotion dysregulation in children. In fact, maltreated children have been found to generally demonstrate less adaptive emotional responses and poorer emotion regulation over time (Morris et al., 2007; Shipman & Zeman, 2001). To further clarify these associations, future research should

narrow its focus to emotional exchanges between maltreating parent and child (as opposed to physical violence), as well as distinguish between the types of maltreatment experienced.

Taken together, individual differences in the parent, such as levels of depression and hostility, appear to affect parent-child interactions and, subsequently, emotion dysregulation in the child. However, these types of psychopathology have not been shown to serve clear, differentiating roles at the present time. Additional literature suggests that parental psychopathology, in general, often leads to emotion regulation deficits in the child (Suveg, Shaffer, Morelen, & Thomassin, 2011). Thus, it may be beneficial to examine the effect of parental psychopathology more broadly on co-regulation to increase foundational knowledge as to how these constructs relate.

Dyad Characteristics

Differences in child reactivity and parental psychopathology are not the only factors that can contribute to variability in the co-regulation, as a number of demographic variables have been known to affect the dyad. Examined most frequently is the gender of the parent and child, and parent-child interactions have been known to vary depending on gender match. Less attention has been given to ethnicity; however, cultures do differ on the amount of expressed emotion that is typical between parent and child. Other characteristics that could possibly affect co-regulation include parental age, socioeconomic status, parental education, parental and child IQ, and developmental delay of the child. Considering the dearth of research on these characteristics, their association

to co-regulation and emotion regulation development remains to be explored by future research.

Gender

As children mature, gender trends in expressivity become more differential. Girls tend to express more sadness, and boys tend to express more anger (Zeman & Shipman, 1998). Furthermore, parental responses to these emotions are often influenced by child gender. In a sample of preschoolers, Cole and colleagues (2003) found that mothers were more than twice as likely to respond with positive emotion to boys' anger compared to girls. There is evidence to support that such parental responses feed into children's anticipations for future emotional exchanges. In fact, boys have been found to expect less parental negativity if they express anger and more negativity if they express sadness compared to girls (Eisenberg et al., 1998).

Since co-regulation is dependent on both individuals in the dyad, it should be influenced not only by the child's gender but by the parent's gender, as well as to gender matching (Feldman, 2003). Although limited data are available on how fathers contribute to the co-regulation, it has been shown that fathers send less emotional cues and are less responsive to the emotional cues of their children compared to mothers (Kochanska & Aksan, 2004). Additionally, father-child interactions are more often influenced by individual factors of the child, such as gender and temperament (Lunkenheimer et al., 2011). In early childhood, there are differential parental expectations for expressivity in their children; fathers encourage emotional inhibition, while mothers encourage

emotional expression (Bariola et al., 2011). In turn, children anticipate a more negative response from their fathers in reference to their emotional displays, particularly to their expressions of sadness (Zeman & Shipman, 1998). Overall, these findings underscore the importance of including gender in models of co-regulation and emotion regulation development. Particularly, the minimal inclusion of fathers in previous work has limited our knowledge in this area, and solely examining mother-child interactions has likely led to poor assumptions concerning gender differences and co-regulation.

Ethnicity

Another shortcoming within the literature on co-regulation is the neglect of variability between cultures. Most studies include a sample of middle class Caucasians; therefore, our knowledge is limited regarding co-regulation within various cultures (for exceptions see Dagne & Snyder, 2011; Feldman et al., 1999, 2003, 2006, 2007, 2011; Field, Healy, Goldstein, & Guthertz, 1990; NICHD, 2004). Patterns of parent-child interaction are known to reflect cultural values and social hierarchies (Feldman, Masalha, & Alony, 2006). Therefore, different patterns have been identified in individualistic and collectivistic cultures. More specifically, individualistic (Israeli) parent-child dyads were shown to exhibit more face-to-face interaction and affective exchanges compared to collectivistic (Palestinian) dyads (Feldman et al., 2006). Conversely, collectivistic dyads were characterized by continuous contact, which is thought to promote regulation specifically within that culture. No mean differences in regulation were found across cultures (Feldman et al., 2006). These results indicate specificity for the processes

involved in emotion regulation development in children, where the importance of co-regulation may be dependent on the cultural context.

Emotional expressivity has been known to vary among other cultures. For example, African American parents and children tend to be less emotion centered in their interactions compared to Caucasians (Cunningham, Kliewer, & Garner, 2009). Nelson and colleagues (2012) surveyed African American and Caucasian mothers of 5 year olds and found that African American mothers were less accepting of their children's emotional displays, specifically anger. Furthermore, African American mothers were less accepting of displays of sadness and fear in their boys compared to girls. A limitation, similar to other work on co-regulation, is that Nelson and colleagues (2012) did not assess these reactions in real time. Furthermore, none of the reviewed studies reflect actual transactions among parent-child dyads. Nonetheless, some preliminary evidence is provided regarding the importance of examining ethnicity as a factor that contributes to variability in co-regulation.

Summary and Current Study

Previous work on the development of emotion regulation and dysregulation has highlighted a number of important contributing factors. For example, temperament provides a foundation for the expression and suppression of emotional responses, with high levels of reactivity often impeding the development of adaptive emotion regulation (Rothbart & Bates, 2006). Additionally, parents who are sensitive and responsive to their infant's distress, who discuss and model appropriate emotional responses, and who

provide scaffolding as their child enters early childhood typically have children equipped with adaptive emotion regulation strategies as they age (Morris et al, 2007). While these factors are independently important, a review of the literature demonstrates that there may be more value in examining transactions between the child and his/her environment, with a particular focus on the exchange of emotions within parent-child dyads.

A few previous studies have demonstrated the influence parents and children have on each other and the effect of these transactions on emotion regulation. Transitioning into early childhood, responses to emotions within parent-child dyads are thought to become salient, with more stable patterns beginning to emerge (Evans & Porter, 2009). Literature suggests that a parent's positive and appropriate responses to their child's negative emotion contributes to better emotion regulation development (Cole, Teti, & Zahn-Waxler, 2003; Morris et al., 2007; Ramsden & Hubbard, 2002). Since most of the previous literature addresses interactions that are parent-driven, less is known about the contributions of the child. However, children do play a vital role in emotional exchanges, as demonstrated by the work of Granic and Patterson (2006). More specifically, it has been established that the reciprocal anger exemplified in the coercion cycle leads to greater amounts of dysregulation (Denham & Grout, 1992; Granic & Patterson, 2006). In order to best capture co-regulation, which has been conceptualized as a mutual regulatory parent-child process that consists of coordinated emotional expression (Feldman, Greenbaum, & Yirmiya, 1999), studies must take into account both parent and child responses, as well as changes in emotional expression within the dyad based upon feedback.

Considering that theory put forth by Lewis and Granic (2000) suggests that the co-regulation is dependent upon the individual contributions of the parent and child, a review of the literature highlights factors that could contribute to variability in this process. For children, reactivity has been shown to affect the amount of emotion expressed during parent-child interactions and, in turn, co-regulation. For example, coercive parent-child interactions are more likely to occur in the presence of a temperamentally difficult child (Scaramella, 2004). Additionally, parental depression and hostility have been shown to influence co-regulation and development of emotion dysregulation in children. For example, it was shown that mutual negativity during parent-child interactions may lead to children responding to parental depression with suppression of emotion or other maladaptive regulation strategies (Coyne & Thompson, 2011; Dagne & Snyder, 2011; Maughan et al., 2007). In reference to anger, maltreatment literature indicates that there is less positive and more negative expressivity among maltreating parent-child dyads, with these children eventually exhibiting greater emotion dysregulation (Herrenkohl et al., 1984; Morris et al., 2007; Shipman & Zeman, 2001).

Overall, the literature suggests that co-regulation may have some influence on emotion regulation development in children. However, the extent of this influence is not fully understood. This is partly due to variability in methodology, as well as a singular focus in most studies on parent-driven interactions. Furthermore, a feedback loop is rarely captured empirically. Previous conceptual work suggests that to examine this construct, it may be beneficial to adopt a transactional framework, as this framework emphasizes that emotion regulation may result from ongoing exchanges between the

parent, child, and dyadic feedback loop (Lewis & Granic, 2000). Finally, the literature underscores the importance of considering individual factors of the parent and child, which may contribute to variability in co-regulation and its influence on emotion regulation development.

Given previous findings, the current study sought to explore emotion regulation across early childhood by investigating the influence of co-regulation, as well as parent and child individual factors. Thus, previous literature was used to develop a theoretical, transactional model (See Figure 1). The benefit of this model is that it attempts to describe transactional effects between individual factors and co-regulation. This means that the influence of parent and child individual factors on co-regulation is considered, along with the influence of co-regulation on individual factors over time. Furthermore, there is methodological and conceptual emphasis on continuous, moment-to-moment emotional exchanges; thus co-regulation is considered a transactional construct. A review of past measurement and methodology demonstrates the utility of both observational and self-reported data; thus, the current study incorporated both. The use of parent-reported responses to emotion is consistent with previous literature (Martini, Root, & Jenkins, 2004). However, given its limitations, observations of emotional exchanges during parent-child interactions were also used. These observations have the benefit of capturing feedback loops. Co-regulation was conceptualized in the current study as coordinated affect expression of either positive or negative emotion within the parent-child dyad.

An initial aim of the current study was to examine the contribution of individual factors on emotion regulation across early childhood. Given the review of the literature, it was expected that child reactivity and maternal psychopathology would predict emotion regulation, with high levels of child negative reactivity, as well as high levels of maternal psychopathology predicting low levels of emotion regulation in the child. It was further expected that parent and child individual factors would be related, meaning positive correlations would be found among child negative reactivity and maternal psychopathology. These hypotheses are essentially replications of previous findings. The primary aim of the study was to explore co-regulation and establish its importance as a predictor of emotion regulation. It was expected that co-regulation would be related to child negative reactivity and maternal psychopathology. Moreover, its influence on emotion regulation was thought to be vital and distinct, meaning co-regulation would contribute to emotion regulation in early childhood above and beyond the contribution of parent and child individual factors. More specifically, it was hypothesized that co-regulation would have an additive effect on concurrent emotion regulation. Thus, while already taking into account child negative reactivity and maternal psychopathology, co-regulation would significantly predict emotion regulation. It was also hypothesized that co-regulation would have an indirect effect on emotion regulation over time. More specifically, co-regulation was thought to predict child negative reactivity and maternal psychopathology one year later; parent and child individual factors would, in turn, predict concurrent emotion regulation. Although previous literature highlights the importance of

considering gender and ethnicity, the sample size and available data for the current study prevented thorough investigation of these characteristics.

CHAPTER II

METHOD

Recruitment and Attrition

The current sample utilized data from three cohorts of children who are part of an ongoing longitudinal study. The goal for recruitment was to obtain a sample of children who were at risk for developing future externalizing behavior problems, and who were representative of the surrounding community in terms of ethnicity and socioeconomic status (SES). All cohorts were recruited through child day care centers, the County Health Department, and the local Women, Infants, and Children (WIC) program. Potential participants for cohorts 1 and 2 were recruited at 2-years of age (cohort 1: 1994-1996 and cohort 2: 2000-2001) and screened using the Child Behavior Checklist (CBCL 2-3; Achenbach, 1992), completed by the mother, in order to over-sample for externalizing behavior problems. Children were identified as being at-risk for future externalizing behaviors if they received an externalizing T-score of 60 or above. Efforts were made to obtain approximately equal numbers of males and females. A total of 307 children were selected. Cohort 3 was initially recruited when infants were 6-months of age (in 1998) for their level of frustration, based on laboratory observation and parent report, and were followed through the toddler period (see Calkins, Demon, Gill, Lomax, & Johnson, 2002, for more information). Children whose mothers completed the CBCL at 2-years of age were included in the current study (n = 140). Of the entire sample (N = 447), 37% of the children were identified as being at risk for future externalizing

problems and 15% (N = 447) were identified as being at risk for future internalizing problems. There were no significant demographic differences between cohorts with regard to gender, $\chi 2$ (2, N = 447) = .63, p = .73, ethnicity, $\chi 2$ (2, N = 447) = 1.13, p = .57, or 2-year SES, F (2, 444) = .53, p = .59. Cohort 3 had a significantly lower average 2-year externalizing T-score (M = 50.36) compared to cohorts 1 and 2 (M = 54.49), t (445) = -4.32, p < .001.

Of the 447 original screened participants, 6 were dropped because they did not participate in any 2-year data collection. At 4-years of age, 399 families participated. Families lost to attrition included those who could not be located, who moved out of the area, who declined participation, and who did not respond to phone and letter requests to participate. There were no significant differences between families who did and did not participate in terms of gender, $\chi 2$ (1, N = 447) = 3.27, p = .07, ethnicity, $\chi 2$ (1, N = 447) = .70, p = .40, 2-year SES, t (424) = .81, p = .42, or 2-year externalizing T-score, t (445) = -.36, p = .72. At 5-years of age, 365 families participated, including four that did not participate in the 4-year assessment. Again, there were no significant differences between families who did and did not participate in terms of gender, $\chi 2$ (1, N = 447) = .76, p = .38, ethnicity, $\chi 2$ (1, N = 447) = .17, p = .68, 2-year socioeconomic status, t (424) = 1.93, p = .06, and 2-year externalizing T-score, t (445) = -1.73, p = .09.

Participants

The sample for the current study included 392 children (210 girls, 182 boys) who participated in the 4 and 5 year assessments. Children were included in the current study

if they had any data at either time point. In addition, 4 participants were dropped from the current study due to developmental delays. Sixty-eight percent of the sample was European American, 26% African American, 4% biracial, and 2% "other." Families were economically diverse based on Hollingshead (1975) scores at the 4 year assessment, with a range from 14 to 66 (M = 42.51, SD =10.62); thus, representing families from each level of social strata typically captured by this scale. Hollingshead scores that range from 40 to 54 reflect minor professional and technical occupations considered to be representative of middle class.

Procedures

4 year and 5 year Assessment

When the children were 4 years old and approximately one year later when they turned 5, they were asked to come to the laboratory with their mothers for a 2-hour visit examining children's frustration tolerance, emotional regulation, compliance, impulsivity, as well as several tasks involving mother-child interactions. During these visit mothers were also asked to complete several questionnaires. Pertinent to the current study, mother report of child negative reactivity, child emotion regulation, maternal psychopathology, and co-regulation was utilized from these visits. Additionally, coded data of child negative reactivity, child emotion regulation and co-regulation during the course of mother-child interaction tasks was utilized.

Preschool and Kindergarten Assessment

Questionnaires were completed by preschool and kindergarten teachers assessing child functioning in the classroom, school adjustment, and peer relationships. For the present study, teacher report of child negative reactivity and emotion regulation were utilized from these data collection points.

Measures

Reactivity

Reactivity was assessed through maternal report on the Child Behavior Questionnaire at age 4 and 5 (CBQ; Rothbart, Ahmadi, & Hershey, 1994). The CBQ is a 195 item questionnaire, requiring mothers to rate their child's behavior on a 7-point Likert scale ranging from extremely untrue to extremely true. From the CBQ, the Negative Affectivity factor was utilized, which is a composite score comprised of the following subscales: Sadness, Discomfort, Anger/Frustration, Fear, and Soothability (loading negatively).

Reactivity was also assessed through teacher report on the Emotion Regulation Checklist at age 4 and 5 (ERC; Shields A. & Cicchetti D., 1997). The ERC is a 24-item measure that assesses the quality of a child's emotion regulation, or ability to control and modify his or her emotions and emotive expression, as well as overall affect. On the ERC, caregivers are asked to rate the frequency of certain child behaviors on a scale from 1 to 4 (1 = Never, 2 = Sometimes, 3 = Often, 4 = Almost Always). The Lability/Negativity subscale (15 items) was utilized, which assesses inadaptability,

negative affect, intensity of emotions, and dysregulation of emotions. Higher scores on the Lability/Negativity subscale indicate higher levels of dysregulation and negative affect.

Finally, reactivity was assessed using coded data of laboratory frustration tasks at age 4 and 5 (see Laboratory Temperament Assessment Battery; Goldsmith & Rothbart, 1993). These tasks included "Toy in a Box" and "Perfect Circles" at age 4 and "Not Sharing" and "End of Line" at age 5. For the "Toy in a Box" task, the experimenter puts a desirable "Toy in a Box" and places a lock on it. The experimenter then hands keys to the child and explains that the child may play with the toy when he/she unlocks the box. The child then practices with a different lock and is given 4 minutes to unlock the box. Unbeknownst to the child, he/ she is not provided with the correct key. At the end of the task, the experimenter returns to the room and explains that he/ she forgot to give the child the correct key. For the "Perfect Circles" task, the child is asked to draw a perfect green circle. After each attempt, the experimenter says in a neutral voice that the circle is not right and asks the child to draw another one. After 3.5 minutes and after the child returns to a positive baseline, the experimenter states "That one looks really good. Circles are hard to draw, aren't they? Thanks for drawing all of those circles. Would you like to make that one into a smiley?" For the "Not Sharing" task, the experimenter informs the child that a friend was bringing in a surprise. A second experimenter then arrives with a candy bowl and two empty containers and explains to the child that the candy is to be shared equally. The first experiment then gradually divides the candy unequally, placing more candy in his/ her pile compared to the child's pile. Eventually, the experimenter

takes all of the child's candy and asks the child what he/ she thinks about that. Following a pause, the experimenter decides that he/ she is being unfair and should not eat all of the candy. Both the child and experimenter take two pieces of candy and return the rest to the seconder experimenter. During the "End of Line" task, the child's mother simply takes away a toy from the child. The task ends following approximately one minute, when the mother gives the toy back to the child. For all of the aforementioned tasks, reactivity was rated by independent coders based upon the child's global affective response on a scale from 0 to 4 (0 = No emotional response, 1 = Some mild distress, 2 = Mild distress most of the time, 3 = Distress but not consistently, 4 = Extreme distress).

Emotion Regulation

Emotion regulation was assessed through teacher and maternal report on the Emotion Regulation Checklist at age 4 and 5 (ERC; Shields A. & Cicchetti D., 1997). See description above. From the ERC, the Emotion Regulation subscale (8 items) was utilized, which assesses effective and appropriate emotion regulation, emotive expression, insight and comprehension of one's own emotions and empathy. Lower scores indicate higher levels of inappropriate emotional expression, regulation, and self-awareness.

Emotion regulation was also assessed using coded data of laboratory frustration tasks at age 4 and 5. These tasks included "Toy in a Box" and "Perfect Circles" at age 4 and "Not Sharing" and "End of Line" at age 5. See description above. For all of the tasks, regulation was rated by independent coders based upon the child's global regulation on a

scale from 0 to 4 (0 = Unregulated, 1 = Mostly unregulated, 2 = Somewhat regulated, 3 = Mostly regulated, 4 = Well regulated).

Maternal Psychopathology

Maternal psychopathology was assessed using the Symptom Checklist-90-Revised at the 4 year and 5 year visits (SCL-90-R; Derogatis, 1994). The SCL-90-R is a self-report measure that assesses adult psychopathology symptoms. Respondents rate how much distress each of the 90 items caused them over the past 7 days using a 5-point scale (Not at All, A Little Bit, Moderately, Quite a Bit, and Extremely). From the SCL-90-R the Global Severity Index (GSI) was utilized, which indicates the current level of overall psychopathology, combining number of symptoms reported with intensity of perceived psychological distress.

Co-regulation

Co-regulation was assessed through maternal report on the Coping with Children's Negative Emotions Scale at age 4 and 5 (CCNES; Fabes, R. A., Poulin, R. E., Eisenberg, N., & Madden-Derdich, D. A., 2002). The CCNES is a 12-item measure that is designed to assess parent emotion socialization processes, which has been found to be correlated with functioning in the social and emotional realms. Each item presents the parent with a situation (12 situations total) that typically produces negative affect in children, and parents are asked to rate the likelihood that they would react in various ways. For example, in the first situation, the "child becomes angry because s/he is sick or hurt and can't go to a friend's birthday party." Each situation includes six possible

situation-specific reactions for which the parent is asked to rate the likelihood of reacting in that fashion on a scale from 1 to 7. A response of "1" indicates that this reaction is "Very Unlikely," a response of "4" indicates that the likelihood of this reaction is "Medium," and a response of "7" indicates that the response is "Very Likely." Again, in the previous example in which the child is angry about missing the party, the parent is asked to rate the likelihood that they would a) "send my child to his/her room to cool off," b) "get angry at my child," c) "help my child think about ways that s/he can still be with friends (e.g., invite some friends over after the party)," d) "tell my child not to make a big deal out of missing the party," e) "encourage my child to express his/her feelings or anger and frustration," and, finally, f) "soothe my child and do something fun with him/her to make him/her feel better about missing the party." From the CCNES, the Distress Reactions (DR) subscale was utilized, which measures the degree to which parents experience distress when her child expresses negative affect. Positively endorsing answer b ("get angry at my child") in the sample item is an example of a distress reaction. Questionnaire data corresponds to the conceptualization of co-regulation as coordinated/reciprocated negative emotion within the parent-child dyad.

Co-regulation was also assessed using coded data of a mother-child interaction tasks at age 4. During the free play task, the mother is instructed to play with her child as she typically would at home. Following approximately 5 minutes, the dyad is signaled with a bell ringing/knock at the door, indicating that it is time to clean-up. The dyad is then given 3 minutes to complete the clean-up task. Coders were trained to reliability to rate the occurrence of child negative affect (e.g. fussing, whining, cries, etc.) and mother

negative affect (e.g. negative tone of voice, angry or sad facial expressions, etc.) separately and independently at 10-second intervals. Ratings of positive affect (e.g. smiling, displays of affection, positive tone, and laughing) were also obtained. Cohen's kappa coefficients were calculated to assess inter-rater agreement and were $\kappa = .81$ to .99 for mother and child negative and positive affect.

CHAPTER III

RESULTS

Data Analytic Plan

Prior to conducting the main analyses, preliminary analyses were conducted in SPSS. These analyses included descriptive statistics for all study and relevant demographic variables (e.g. gender, ethnicity, and SES). Further, intercorrelations for all study and demographic variables were computed. After the preliminary analyses were completed, data were imported into MPlus (Muthén & Muthén, 1998-2007). Data were analyzed using a maximum likelihood (ML) estimation procedure, and missing data were accounted for by using a full information maximum likelihood (FIML) procedure. Nested models were compared using a chi-square difference test to determine the best fitting model.

Four models were tested. The first model, the **Stability Model**, examined the continuous paths of maternal psychopathology, child negative reactivity, and child emotion regulation were assessed (See Figure 2). For example, emotion regulation at age 5 was predicted by emotion regulation at age 4; the same pattern followed for maternal psychopathology, child negative reactivity, as these variables were assessed at the same ages.

The second model, the **Individual Factor Model**, examined the independent effects of maternal psychopathology and child negative reactivity on emotion regulation

(See Figure 3). All paths from the Stability model, as well as the concurrent and longitudinal effects of the individual factors on emotion regulation were included. Furthermore, variables at each time point were expected to correlate, meaning maternal psychopathology would correlate with child negative reactivity both at age 4 and at age 5.

The third model, the **Co-regulation Model**, examined the effect of co-regulation on the model (See Figure 4). The association between maternal psychopathology and co-regulation, as well as between reactivity and co-regulation were assessed. Furthermore, co-regulation was expected to correlate with these variables.

The fourth and final model, the **Co-regulation Over Time Model** tested the additive and indirect effect of co-regulation on emotion regulation above and beyond the contribution of the individual factors (See Figure 5). The addition of direct paths between co-regulation and maternal psychopathology and negative reactivity at 5 year, as well as emotion regulation at 4 year was assessed.

Models were analyzed separately based upon reporter. Latent variables were not created due to high levels of multicolinearity between the same reporters across years. For example, mother report of child emotion regulation at age 4 was too highly correlated to mother report of child emotion regulation at age 5. Therefore, mother report of child emotion regulation at age 4 would not load onto a latent variable with teacher report and laboratory observation of emotion regulation at age 4. A total of 7 manifest variables and 14 associations were assessed in the final model, which requires a sample size of at least 210. Each model was discussed in terms of overall model fit based on Hu and Bentler's

(1999) criteria for samples including less than 500 participants. It is recommended that the Root Mean Error of Approximation (RMSEA) should be less than .06, the Comparative Fit Index (CFI) should be greater than .96, and the standardized Root Mean Square Residual (SRMR) should be less than .06. The chi-square test of model fit was also assessed and should be statistically non-significant to indicate good model fit.

Descriptives

Tables 1 through 6 display the descriptive statistics of all study variables. Skewness and kurtosis values indicated normal distribution for all study variables; therefore, no transformations were performed. Examination of mean values revealed that most children exhibited low levels of negative reactivity and high levels of regulation, particularly during laboratory tasks. During the mother-child interaction tasks, the mean proportion of intervals that children exhibited negative affect on the free-play task was M = .01 and on the clean-up task was M = .05. Similarly, mothers exhibited low levels of negative affect on the free play (M = .00) and clean-up (M = .00) tasks. Therefore, ratings of negative affect were excluded from further analyses. Children exhibited slightly more positive affect during free play (M = .08) and clean-up (M = .03) tasks. A similar pattern was observed for mothers during free play (M = .10) and clean-up (M = .06) tasks.

Computation of Co-regulation Variable

Ratings for positive affect were subsequently used to create the co-regulation variable. More specifically, a log-linear analysis was performed on the coded data to compute parameter estimates for actor, partner, and interaction effects using the

technique described by Kenny, Kashy, and Cook (2006). A logit model was utilized, which treated mothers' positive affect at time *t* as the dependent variable. The odds that mothers would express positive affect were computed taking into account the previous positive affect of each member of the dyad. Using a two-way ANOVA, the value of each cell was modeled to be a function of the grand mean of the logits. The actor effect represented the deviation of the row mean from the grand mean or the degree to which a mother express positive affect, more or less, after she has expressed positive affect in the past. A positive value for the actor effect would indicate temporal stability. The partner effect represented the deviation of the column mean from the grand mean or the degree to which a mother expresses positive affect, more or less, after her child expressed positive affect in the past. Furthermore, a larger value for the partner effect would indicate a higher likelihood that a mother reciprocates her child's positive affect. Finally, the interaction effect represented the unique effect of the combination of both mother and child's past expression of positive affect. More specifically, it measured how likely a mother is to express positive affect when both members of the dyad previously expressed positive affect; therefore, this parameter best assessed for a pattern of reciprocated affect over time. The interaction effect would be positive if expression of positive affect from any member of the dyad increases the likelihood of a mother expressing positive affect.

Correlations

Table 7 displays the correlation coefficients between parent and teacher reports, as well as laboratory observations on all study variables at 4 year. Maternal report of

negative reactivity on the CBQ was positively correlated with frustration response on the "Toy in a Box" task. Teacher report of reactivity was also positively correlated with both coded tasks. Mother and teacher report of negative reactivity were uncorrelated. Finally, frustration response on the "Toy in a Box" and "Perfect Circles" tasks was positively correlated. In reference to regulation, maternal report of regulation on the ERC was positively correlated with teacher report on the ERC. Regulation on the "Perfect Circles" task was positively correlated with maternal report on the ERC, teacher report on the ERC, and regulation on the "Toy in a Box" task. In reference to co-regulation, distress reactions on the CCNES was not correlated with the interaction effect coded from mother-child free play and clean up tasks.

In reference to correlations *across* study variables at 4 year, maternal report of negative reactivity on the CBQ was negatively correlated with maternal report of regulation on the ERC, teacher report of regulation on the ERC, and regulation on the "Toy in a Box" task. Teacher report of negative reactivity on the ERC was negatively correlated with teacher report of regulation on the ERC and regulation on both coded tasks. Frustration response on the "Toy in a Box" task was negatively correlated with regulation on both coded tasks. Similarly frustration response on the "Perfect Circles" task was negatively correlated with regulation on both coded tasks, as well as teacher report of regulation on the ERC. These correlations indicate that a higher propensity to display negative emotion is associated with poorer emotion regulation in 4 year old children. Self-reported maternal psychopathology on the GSI of the SCL-90 was positively correlated with maternal report of negative reactivity on the CBQ, as well as

negatively correlated with teacher report of regulation on the ERC. This indicates that mothers with more mental health concerns tend to have children who exhibit more negative emotion and are perceived by their preschool teachers as less regulated. Distress reactions on the CCNES was positively correlated with maternal report of negative reactivity on the CBQ, as well as frustration response on the "Perfect Circles" task. Distress reactions was also negatively correlated with maternal report of regulation on the ERC and regulation on both coded tasks. Self-reported maternal psychopathology on the GSI of the SCL-90 was positively correlated with distress reactions on the CCNES. These correlations suggest that reciprocated negative emotion during parent-child interactions is related to more negative reactivity and less emotion regulation in the child, as well as higher mental health concerns among mothers. The interaction effect coded from mother-child free play and clean up tasks was not significantly correlated to any study variables.

Sex was correlated at a small magnitude with most ratings of negative reactivity, as well as maternal reported and coded regulation. Mothers rated girls as significantly more reactive compared to boys; however, teachers rated boys as significantly more reactive in preschool. Additionally, boys were rated as more reactive during a laboratory frustration task. Mothers rated girls as being better regulated compared to boys, and the same pattern was observed during a laboratory frustration task. Ethnicity was only correlated to maternal report of negative reactivity on the CBQ. An ANOVA and post-hoc analysis revealed that that mothers rated Caucasian children as having significantly lower levels of negative reactivity compared to African American children. All of the

significant correlations represented in Table 7 were in the expected direction, excluding the correlation between maternal reported negative reactivity and sex. Tables 8 and 9 display correlation coefficients between reporters on all study variables at 4 year separated by sex. Generally, larger correlations were found between reports of negative reactivity and regulation for girls compared to boys, suggesting that there is more agreement between mothers, teachers, and laboratory observed behaviors for girls. Negative reactivity was negatively correlated with regulation for both boys and girls. Furthermore, distress reactions was correlated with negative reactivity, emotion regulation, and maternal psychopathology in the expected directions for both boys and girls.

Table 10 displays the correlation coefficients between reporters on all study variables at 5 year. Maternal report of negative reactivity on the CBQ was positively correlated with teacher report on the ERC and frustration response on the "End of Line" task. Teacher report of reactivity was positively correlated with frustration response on the "Not Sharing" task. Finally, frustration response on the "Not Sharing" and "End of Line" tasks was positively correlated. In reference to regulation, maternal report of regulation on the ERC was positively correlated with teacher report on the ERC. Regulation on the "End of Line" task was positively correlated with maternal report on the ERC, teacher report on the ERC, and regulation on the "Not Sharing" task.

In reference to correlations *across* study variables at 5 year, maternal report of negative reactivity on the CBQ was negatively correlated with maternal report of

regulation on the ERC and teacher report of regulation on the ERC. Teacher report of negative reactivity on the ERC was negatively correlated with maternal report of regulation on the ERC, teacher report of regulation on the ERC, and regulation on both coded tasks. Frustration response on the "Not Sharing" task was negatively correlated with regulation on both coded tasks. Similarly, frustration response on the "End of Line" task was negatively correlated with regulation on both coded tasks, as well as teacher report of regulation on the ERC. These correlations indicate that a higher propensity to display negative emotion is associated with poorer emotion regulation in 5 year old children. Self-reported maternal psychopathology on the GSI of the SCL-90 was positively correlated with maternal report of negative reactivity on the CBQ, as well as teacher report of negative reactivity on the ERC. Maternal psychopathology was also negatively correlated with maternal report of regulation on the ERC. This indicates that mothers with more mental health concerns tend to have children who exhibit more negative emotion and are perceived by mothers as less regulated.

Sex was correlated at a small magnitude with maternal and teacher reported negative reactivity, as well as teacher reported and coded regulation. Mothers rated girls as significantly more reactive compared to boys; however, teachers rated boys as significantly more reactive in kindergarten. Teachers rated girls as being better regulated compared to boys, and the same pattern was observed during laboratory frustration tasks .Ethnicity was correlated to maternal report of negative reactivity on the CBQ and regulation on the "End of Line" task. An ANOVA and post-hoc analysis revealed that that mothers rated Caucasian children as having significantly lower levels of negative

reactivity compared to African American children. No significant group differences in regard to ethnicity were found for coded regulation. All of the significant correlations represented in Table 10 were in the expected direction, excluding the correlation between maternal reported negative reactivity and sex. Tables 11 and 12 display correlation coefficients between reporters on all study variables at 5 year separated by sex. Overall, reactivity was negatively correlated with regulation for both boys and girls. Furthermore, maternal psychopathology was correlated with negative reactivity and emotion regulation in the expected directions for both boys and girls.

Tables 13 through 16 display the correlation coefficients for all study variables by each reporter across 4 and 5 year. Using maternal report, child negative reactivity and emotion regulation were significantly and negatively correlated across years. Mother and child individual factors, as well as distress reactions were also all correlated in the expected direction. In particular, moderate correlations were found between distress reactions and maternal psychopathology. Using teacher report, child negative reactivity and emotion regulation were significantly and negatively correlated across years. Maternal psychopathology was correlated to kindergarten reactivity and preschool regulation in the expected direction; however, the correlations were small. Using laboratory observations of the "Toy in a Box" and "Not Sharing" tasks, child negative reactivity and emotion regulation were significantly and negatively correlated across years. Maternal psychopathology was not correlated to child individual factors, and distress reactions were only negatively correlated to regulation on the "Toy in a Box" task. Using laboratory observations of the "Perfect Circles" and "End of Line" tasks,

large negative correlations were found between negative reactivity and emotion regulation; however, these associations were not found across tasks and years. Distress reactions were significantly correlated with negative reactivity and emotion regulation in the expected directions.

SEM Model Using Maternal Report

Mothers self-reported on their levels of distress and their reactions to their child's negative emotions using the global severity index of the SCL-90-R and the distress reactions subscale of the CCNES, respectively. Mothers also reported on their child's levels of regulation and negative reactivity using the negative affectivity subscale of the CBQ and the emotion regulation subscale of the ERC. Four nested models were tested based upon the hypotheses and theoretical model. The initial model, the Stability Model, assessed the stability paths of maternal psychopathology, negative reactivity, emotion regulation from age 4 to age 5. Specifically, maternal psychopathology at age 5 was to be predicted by maternal psychopathology at age 4; the same pattern followed for negative reactivity and emotion regulation. This model evidenced mediocre model fit, χ^2 (6) = 26.04, $p < .01$, RMSEA = .12, CFI = .96, SRMR = .07. Maternal psychopathology was significantly and positively predictive of itself from age 4 to 5 ($B = .62$, $p < .01$); negative reactivity was significantly and positively predictive of itself from age 4 to 5 ($B = .77$, $p < .01$); and emotion regulation was significantly and positively predictive of itself from age 4 to 5 ($B = .60$, $p < .01$). These results indicate that maternal psychopathology, as well as

child negative reactivity and emotion regulation are relatively stable across early childhood.

In a subsequent model, the Individual Factor Model, emotion regulation was to be predicted by maternal psychopathology and negative reactivity at ages 4 and 5. Additionally, it was specified that maternal psychopathology and negative reactivity would correlate at ages 4 and 5. This model evidenced adequate model fit, χ^2 (6) = 23.15, p < .01, RMSEA = .09, CFI = .97, SRMR = .04. At age 4, negative reactivity significantly and negatively predicted emotion regulation (*B* = -.14, p < .01), and there was a trend for this relation at age 5 (*B* = -.08, p =.06). Maternal psychopathology did not predict emotion regulation at age 4 (*B* = .05, p = ns) or age 5 (*B* = -.01, p = ns). Maternal psychopathology and negative reactivity were significantly and positively correlated at age 4 (r = .33, p < .01) but not at age 5 (*r* = .04, p = ns). Results from this model suggest that a higher propensity to display negative emotion contributes to poorer emotion regulation in children at ages 4 and 5. However, children's emotion regulation is not directly influenced by their mother's mental health.

In the third model, the Co-regulation Model, distress reactions was specified to correlate with maternal psychopathology and negative reactivity at age 4. This model also demonstrated mediocre model fit, χ^2 (10) = 48.76, p < .01, RMSEA = .10, CFI = .94, SRMR = .06, as distress reactions was significantly and positively correlated with maternal psychopathology (r = .26, p < .01) and negative reactivity (r = .22, p < .01) at age 4. These findings indicate that reciprocated negative emotion during parent-child

interactions is related to more mental health concerns in mothers and emotional displays in children.

In the final model, the Co-regulation Over Time Model, distress reactions was specified to predict maternal psychopathology, negative reactivity, and emotion regulation at age 5 (see Figure 6). This model evidenced adequate model fit, χ^2 (7) = 19.20, $p < .01$, RMSEA = .07, CFI = .98, SRMR = .03, and it fit significantly better than the previous model $\chi 2\Delta$ (3) = 29.56, $p < .01$. Distress reactions at age 4 significantly and positively predicted maternal psychopathology at age 5 (*B* = .22, $p < .01$) and also significantly and negatively predicted emotion regulation at age 4 (*B* = -.17 $p < .01$). Distress reactions did not significantly predict negative reactivity at age 5 (*B* = .07, p = ns). Results from the final model suggest that more reciprocated negative emotion within the dyad contributes to poorer emotion regulation in 4 year old children. Furthermore, reciprocated negative emotion is vital and distinct, as it contributes to poorer emotion regulation while already taking into account individual factors of the mother and child. The model also suggests that more reciprocated negative emotion within the dyad leads to higher levels of maternal psychopathology one year later. However, there was no indirect effect for co-regulation, as maternal psychopathology did not significantly predict emotion regulation at 5 year.

In subsequent analyses, the interaction effect from mother-child interactions during free play and cleanup tasks was used as the co-regulation variable. The Co-regulation Model was the best fitting model, and it demonstrated adequate model fit, χ^2

(10) = 28.34, p < .01, RMSEA = .07, CFI = .97, SRMR = .04. However, the interaction effect was not significantly correlated with maternal psychopathology at age 4 (r = -.04, p = ns) or negative reactivity at age 4 (r = -.05, p = ns).

SEM Model Using Teacher Report

Mothers self-reported on their levels of distress and their reactions to their child's negative emotions using the global severity index of the SCL-90-R and the distress reactions subscale of the CCNES, respectively. Teachers reported on children's levels of regulation and negative reactivity using the emotion regulation and the lability/negativity subscales of the ERC. Four nested models were tested based upon the hypotheses and theoretical model. The initial model, the Stability Model, assessed the stability paths of maternal psychopathology, negative reactivity, emotion regulation from age 4 to age 5. Specifically, maternal psychopathology at age 5 was to be predicted by maternal psychopathology at age 4; the same pattern followed for negative reactivity and emotion regulation. This model evidenced adequate model fit, χ^2 (6) = 4.59, p >.05, RMSEA = .00, CFI = 1.00, SRMR = .04. Maternal psychopathology was significantly and positively predictive of itself from age 4 to 5 (B = .62, p < .01); negative reactivity was significantly and positively predictive of itself from age 4 to 5 (B = .42, p < .01); and emotion regulation was significantly and positively predictive of itself from age 4 to 5 (B = .18, p < .01). These results indicate that maternal psychopathology, as well as child negative reactivity and emotion regulation are relatively stable across early childhood.

In the following model, the Individual Factor Model, emotion regulation was to be predicted by maternal psychopathology and negative reactivity at ages 4 and 5. Additionally, it was specified that maternal psychopathology and negative reactivity would correlate at ages 4 and 5. This model evidenced adequate model fit, χ^2 (6) = 8.75, p > .05, RMSEA = .04, CFI = .99, SRMR = .04. At age 4, negative reactivity significantly and negatively predicted emotion regulation (*B* = -.45, p < .01), and this relation was significant at age 5 (*B* = -.48, p < .01). Maternal psychopathology did not predict emotion regulation at age 5 (*B* = -.03, p = ns), but this relation was significant at age 4 (*B* = -.17, p < .01). Maternal psychopathology and negative reactivity were not significantly correlated at age 4 (*r* = .06, p = ns) or at age 5 (*r* = .07, p = ns). Results from this model suggest that a higher propensity to display negative emotion contributes to poorer emotion regulation in children at ages 4 and 5. Higher levels of maternal psychopathology also led to poorer emotion regulation displayed by children in their preschool classrooms.

In the third model, the Co-regulation Model, distress reactions was specified to correlate with maternal psychopathology and negative reactivity at age 4. This model also demonstrated mediocre model fit, χ^2 (10) = 29.99, p < .01, RMSEA = .07, CFI = .95, SRMR = .05, as distress reactions was significantly and positively correlated with maternal psychopathology at age 4 (r = .26, p < .01), and there was a trend with negative reactivity at age 4 (r = .12, p = .06). These findings indicate that reciprocated negative emotion during parent-child interactions is related to more mental health concerns in mothers and slightly more emotional displays in children.

In the final model, the Co-regulation Over Time Model, distress reactions predicted maternal psychopathology, negative reactivity, and emotion regulation at age 5 (See Figure 7). This model evidenced adequate model fit, χ^2 (7) = 8.31, p < .05, RMSEA = .02, CFI = 1.00, SRMR = .03, and it fit significantly better than the previous model $\chi^2\Delta$ (3) = 21.68, p < .01. Distress reactions at age 4 significantly and positively predicted maternal psychopathology at age 5 (*B* = .22, p < .01). However, distress reactions did not significantly predict emotion regulation at age 4 (*B* = -.01, p = ns) and negative reactivity at age 5 (*B* = .10, p = ns). Results from the final model suggest that more reciprocated negative emotion within the dyad leads to higher levels of maternal psychopathology one year later. However, there was no indirect effect for co-regulation, as maternal psychopathology did not significantly predict emotion regulation at 5 year.

In subsequent analyses, the interaction effect from mother-child interactions during free play and cleanup tasks was used as the co-regulation variable. The Co-regulation Model was the best fitting model, as it demonstrated adequate model fit, χ^2 (10) = 14.60, p >.05, RMSEA = .03, CFI = .99, SRMR = .05. However, the interaction effect was not significantly correlated with maternal psychopathology at age 4 (*r* = -.03, p = ns) or negative reactivity at age 4 (*r* = -.02, p = ns).

SEM Model Using "Toy in a Box" and "Not Sharing" Tasks

Mothers self-reported on their levels of distress and their reactions to their child's negative emotions using the global severity index of the SCL-90-R and the distress reactions subscale of the CCNES, respectively. Ratings of reactivity and regulation were

obtained using coded data from the "Toy in a Box" and "Not Sharing" tasks. These tasks were included in the model together based upon preliminary examination of associations between laboratory tasks. Four nested models were tested based upon the hypotheses and theoretical model. The initial model, the Stability Model, assessed the stability paths of maternal psychopathology, child negative reactivity, and child emotion regulation from age 4 to age 5. Specifically, maternal psychopathology at age 5 was predicted by maternal psychopathology at age 4; the same pattern followed for negative reactivity and emotion regulation. This model evidenced adequate model fit, χ^2 (6) = 7.73, p >.05, RMSEA = .04, CFI = 1.00, SRMR = .05. Maternal psychopathology was significantly and positively predictive of itself from age 4 to 5 (B = .62, p < .01); negative reactivity was significantly and positively predictive of itself from age 4 to 5 (B = .16, p < .01). However, emotion regulation was not significantly predictive of itself from age 4 to 5 (B = .06, p = ns). These results indicate that maternal psychopathology and child negative reactivity are relatively stable across early childhood; however, emotion regulation is not stable when assessed in the laboratory setting.

In the following model, the Individual Factor Model, emotion regulation was to be predicted by maternal psychopathology and negative reactivity at ages 4 and 5. Additionally, it was specified that maternal psychopathology and negative reactivity would correlate at ages 4 and 5. This model evidenced adequate model fit, χ^2 (6) = 1.61, p > .05, RMSEA = .00, CFI = 1.00, SRMR = .01. At age 4, negative reactivity significantly and negatively predicted emotion regulation (B = -.59, p < .01), and this relation was significant at age 5 (B = -.72, p < .01). Maternal psychopathology did not predict emotion

regulation at age 4 (*B* = -.03, p = ns) or age 5 (*B* = .06, p = ns). Additionally, maternal psychopathology and negative reactivity were not significantly correlated at age 4 (*r* = .06, p = ns) or at age 5 (*r* = .05, p = ns). Results from this model suggest that a higher propensity to display negative emotion contributes to poorer emotion regulation in children at ages 4 and 5. However, children's emotion regulation is not directly influenced by their mother's mental health.

In the third model, the Co-regulation Model, distress reactions was specified to correlate with maternal psychopathology and negative reactivity at age 4. This model also demonstrated adequate model fit, χ^2 (10) = 25.67, p < .01, RMSEA = .06, CFI = .97, SRMR = .04, as distress reactions was significantly and positively correlated with maternal psychopathology (r = .26, p < .01) at age 4. However, distress reactions was not significantly correlated with negative reactivity at age 4 (*r* = .10, p = ns). These findings indicate that reciprocated negative emotion during parent-child interactions is related to more emotional displays in children but not mental health concerns in mothers.

In the final model, the Co-regulation Over Time Model, distress reactions predicted maternal psychopathology, negative reactivity, and emotion regulation at age 5 (see Figure 8). This model evidenced adequate model fit, χ^2 (7) = 1.28, p > .05, RMSEA = .00, CFI = 1.00, SRMR = .00, and it fit significantly better than the previous model $\chi^2\Delta$ (3) = 24.39, p < .01. Distress reactions at age 4 significantly and positively predicted maternal psychopathology at age 5 (*B* = .21, p < .01) and also significantly and negatively predicted emotion regulation at age 4 (*B* = -.12 p < .05). Distress reactions did

not significantly predict negative reactivity at age 5 (B = .07, p = ns). Results from the final model suggest that more reciprocated negative emotion within the dyad contributes to poorer emotion regulation in 4 year old children. Furthermore, reciprocated negative emotion is vital and distinct, as it contributes to poorer emotion regulation while already taking into account individual factors of the mother and child. The model also suggests that more reciprocated negative emotion within the dyad leads to higher levels of maternal psychopathology one year later. However, there was no indirect effect for co-regulation, as maternal psychopathology did not significantly predict emotion regulation at 5 year.

In subsequent analyses, the interaction effect from mother-child interactions during free play and cleanup tasks was used as the co-regulation variable. The Co-regulation Model was the best fitting model, and it demonstrated adequate model fit, χ^2 (10) = 7.89, p >.05, RMSEA = .00, CFI = 1.00, SRMR = .03. However, the interaction effect was not significantly correlated with maternal psychopathology at age 4 (r = -.03, p = ns) or negative reactivity at age 4 (r = .06, p = ns).

SEM Model Using "Perfect Circles" and "End of Line" Tasks

Mothers self-reported on their levels of distress and their reactions to their child's negative emotions using the global severity index of the SCL-90-R and the distress reactions subscale of the CCNES, respectively. Ratings of reactivity and regulation were obtained using coded data from the "Perfect Circles" and "End of Line" tasks. These tasks were included in the model together based upon preliminary examination of

associations between laboratory tasks. The initial model, the Stability Model, assessed the stability paths of maternal psychopathology, negative reactivity, emotion regulation from age 4 to age 5. Specifically, maternal psychopathology at age 5 was predicted by maternal psychopathology at age 4; the same pattern followed for negative reactivity and emotion regulation. This model evidenced poor model fit, χ^2 (6) = 42.00, p <.01, RMSEA = .12, CFI = .91, SRMR = .07. Maternal psychopathology was significantly and positively predictive of itself from age 4 to 5 (*B* = .63, p < .01); emotion regulation was significantly and positively predictive of itself from age 4 to 5 (*B* = .07, p < .05). However, negative reactivity was not significantly predictive of itself from age 4 to 5 (*B* = .05, p = ns). These results indicate that maternal psychopathology and child emotion regulation are relatively stable across early childhood; however, negative reactivity is not stable when assessed in the laboratory setting.

In the following model, the Individual Factor Model, emotion regulation was predicted by maternal psychopathology and negative reactivity at ages 4 and 5. Additionally, it was specified that maternal psychopathology and negative reactivity would correlate at ages 4 and 5. This model evidenced poor model fit, χ^2 (12) = 99.55, p < .01, RMSEA = .14, CFI = .83, SRMR = .11. At age 4, negative reactivity significantly and negatively predicted emotion regulation (*B* = -.21, p < .01), and this relation was significant at age 5 (*B* = -.77, p < .01). Maternal psychopathology did not predict emotion regulation at age 4 (*B* = -.04, p = ns) or age 5 (*B* = -.01, p = ns). Additionally, maternal psychopathology and negative reactivity were significantly correlated at age 5 (r = -.19, p < .01) but not at age 4 (*r* = .05, p = ns). Results from this model suggest that a higher

propensity to display negative emotion contributes to poorer emotion regulation in children at ages 4 and 5. However, children's emotion regulation is not directly influenced by their mother's mental health. Notably, maternal psychopathology and negative reactivity were associated in an unexpected direction, where higher levels of maternal psychopathology were related to lower levels of negative reactivity.

In the third model, the Co-regulation Model, distress reactions was specified to correlate with maternal psychopathology and negative reactivity at age 4. This model also demonstrated poor model fit, χ^2 (10) = 72.03, p < .01, RMSEA = .13, CFI = .88, SRMR = .08. However, distress reactions was significantly and positively correlated with maternal psychopathology (r = .26, p < .01) at age 4 and with negative reactivity at age 4 (r = .16, p < 01). These findings indicate that reciprocated negative emotion during parent-child interactions is related to more mental health concerns in mothers and emotional displays in children.

In the final model, the Co-regulation Over Time Model, distress reactions predicted maternal psychopathology, negative reactivity, and emotion regulation at age 5 (see Figure 9). This model evidenced mediocre model fit, χ^2 (7) = 44.92, p < .01, RMSEA = .12, CFI = .92, SRMR = .05, and it fit significantly better than the previous model $\chi^2\Delta$ (3) = 32.10, p < .01. Distress reactions at age 4 significantly and positively predicted maternal psychopathology at age 5 (*B* = .21, p < .01) and negative reactivity at age 5 (*B* = .13 p < .05). Distress reactions did not significantly predict emotion regulation at age 4 (*B* = -.05, p = ns). Results from the final model suggest that more reciprocated

negative emotion within the dyad leads to higher levels of maternal psychopathology and child negative reactivity one year later. Furthermore, there was an indirect effect for co-regulation, as negative reactivity significantly predicted emotion regulation at 5 year.

In subsequent analyses, the interaction effect from mother-child interactions during free play and cleanup tasks was used as the co-regulation variable. The Individual Factor Model was the best fitting model and produced the same results as presented above.

CHAPTER IV

DISCUSSION

The current study sought to investigate the additive and indirect effect of co-regulation on emotion regulation in children across early childhood. To accomplish this aim, individual factors of the parent and child (i.e., negative reactivity and maternal psychopathology) were examined, along with self-reported and laboratory observed co-regulation. These constructs were used to test portions of a transactional model predicting emotion regulation. Furthermore, models were analyzed separately by reporter at age 4 and 5 due to high levels of multicolinearity between the same reporters across years. It was hypothesized that high levels of child negative reactivity, as well as high levels of maternal psychopathology would predict low levels of emotion regulation in the child. Furthermore, positive correlations were expected among child negative reactivity and maternal psychopathology. Conversely, negative correlations were expected between co-regulation and child negative reactivity, as well as co-regulation and maternal psychopathology when using mother report of distress reactions. Positive correlations were expected between these constructs when using laboratory observed co-regulation of positive affect. The primary hypothesis was that that co-regulation would have an additive effect on concurrent emotion regulation. Thus, while already taking into account child negative reactivity and maternal psychopathology, co-regulation would significantly predict emotion regulation. It was also hypothesized that co-regulation would have an indirect effect on emotion regulation over time. More specifically, co-

regulation would predict child negative reactivity and maternal psychopathology one year later; parent and child individual factors would, in turn, predict concurrent emotion regulation.

The first model was the Stability Model, which examined continuous paths of maternal psychopathology, child negative reactivity, and child emotion regulation. Using mother and teacher report, these constructs positively predicted themselves over time. However, emotion regulation and negative reactivity did not consistently predict themselves when using laboratory observation data. These results indicate that mothers and teachers view children's negative reactivity and emotion regulation to be stable across early childhood. Mothers also view their levels of psychopathology as stable during this time period. However, there is significant variation in how children present in a laboratory setting at ages 4 and 5. This might mean that state versus trait characteristics were captured by these variables.

The second model was the Individual Factor Model, which examined the independent effects of maternal psychopathology and child negative reactivity on emotion regulation. Across reporters, child negative reactivity significantly and negatively predicted emotion regulation. This suggests that children with a lower propensity to display negative emotion are more likely to be well regulated. Maternal psychopathology was not a consistent predictor of emotion regulation across reporters. More maternal psychopathology only predicted teacher reported emotion regulation. Furthermore, maternal psychopathology and negative reactivity were positively

correlated only when using mother report. Notably when using laboratory observation data, maternal psychopathology and negative reactivity were negatively correlated. These results indicate that maternal psychopathology may not be a primary contributor to child emotion regulation and reactivity across settings.

The third model, the Co-regulation Model, examined the association between co-regulation and mother and child individual factors. Across reporters, co-regulation was significantly and positively correlated with maternal psychopathology, as well as with negative reactivity. However, these associations were only found when using maternal reported distress reactions as a measure of co-regulation. The interaction effect from mother-child interactions during free play and cleanup tasks was not significantly correlated with mother and child individual factors. These overall results suggest that a mother frequently responding to her child's negative emotion with her own negative emotion is related to more negativity in the child and higher levels of psychopathology in the mother. However, these conclusions are limited to mothers' perception of reciprocated negative emotion within the dyad, as these associations were not found when using observational data of reciprocated positive emotion.

Using maternal report of child individual factors and co-regulation, the Co-regulation Over Time model adequately fit the data and was a significant improvement over the previous model. This model suggests that children with high levels of negative reactivity have low levels of emotion regulation. Co-regulation, maternal psychopathology, and negative reactivity were found to be significantly and positively

related. More specifically, high levels of maternal psychopathology were related to mothers' greater expression of negative affect in response to their children's negative affect. This pattern of reciprocated negative affect was also related to a greater propensity for the child to display negative emotion. Consistent with a portion of the primary hypothesis, co-regulation of negative affect had an additive effect on emotion regulation, as it negatively predicted emotion regulation above and beyond the significant contribution of negative reactivity. This suggests that a pattern of reciprocated negative affect contributes to decreased use of adaptive regulation strategies in the child. Furthermore, this pattern is at least equally important to emotion regulation as the child's propensity to display negative emotion. Co-regulation also significantly predicted maternal psychopathology over time, suggesting that a pattern of negativity within the dyad contributes to higher mental health concerns one year later. However, there was no significant indirect effect for co-regulation on emotion regulation over time, as maternal psychopathology did not predict emotion regulation at age 5. It is possible that a similar pattern would have been observed at age 5, where concurrent co-regulation, but not maternal psychopathology, predicted child emotion regulation.

Using teacher report of child individual factors and maternal report of co-regulation, the Co-regulation Over Time model adequately fit the data and was a significant improvement over the previous model. This model similarly suggests that children with high levels of teacher-reported negative reactivity have low levels of teacher reported emotion regulation, both concurrently and over time. Maternal psychopathology also significantly and negatively predicted emotion regulation. Maternal

psychopathology was positively related to co-regulation. This suggests that mothers with higher levels of mental health concerns tend to reciprocate the negative affect expressed by their children. Based upon teacher report, the primary hypothesis was not supported. Co-regulation did not predict emotion regulation above and beyond the significant contribution of negative reactivity and maternal psychopathology. Furthermore, there was not a significant indirect effect for co-regulation on emotion regulation over time.

Using observational data from the "Toy in a Box" and "Not Sharing" tasks of child individual factors and maternal report of co-regulation, the Co-regulation Over Time model adequately fit the data and was a significant improvement over the previous model. This model suggests that children with high levels of negative reactivity have low levels of emotion regulation, both concurrently and over time. However, unlike the model using teacher report, maternal psychopathology did not significantly predict emotion regulation. Maternal psychopathology was positively related to co-regulation. This similarly suggests that mothers with higher levels of psychopathology concerns tend to reciprocate the negative affect expressed by their children. Based upon observational data from the "Toy in a Box" and "Not Sharing" tasks, a portion of the primary hypothesis was supported. Co-regulation had an additive effect on emotion regulation, as it negatively predicted emotion regulation above and beyond the significant contribution of negative reactivity. This suggests that a pattern of reciprocated negative affect contributes to poor emotion regulation. Furthermore, this pattern is at least equally important to a child's emotion regulation as the child's propensity to display negative emotions. These conclusions, however, are limited to laboratory observed emotion regulation and

reactivity. Inconsistent with the primary hypothesis, there was no significant indirect effect for co-regulation on emotion regulation over time

Using observational data from the "Perfect Circles" and "End of Line" tasks of child individual factors and maternal report of co-regulation, the Co-regulation Over Time model adequately fit the data and was a significant improvement over the previous model. This model suggests that children with high levels of negative reactivity have low levels of emotion regulation, both concurrently and over time. However, unlike the models using maternal and teacher report, maternal psychopathology did not significantly predict emotion regulation. Also in contrast to other models, negative reactivity and maternal psychopathology were negatively correlated at 5 year. This finding might reflect a tendency for children to withdraw or inhibit their negative emotion when in the presence of a mother with high levels of psychopathology. Considering that this association was observed at 5 year but not 4 year, this tendency might also reflect a learned response over time. For example, a 5-year-old child may have experienced a pattern of negative interaction with a highly irritable or depressed parent in early childhood. Thus, in order to limit further negative interactions, the child avoids displaying any anger or sadness. It is reasonable to assert that 5-year-old children possess the capacity to anticipate negative reactions from parents given their stage of cognitive and social development. This assertion is consistent with Kochanska and Aksan's (2004) developmental view of the changing dynamics between parents and their preschool age children. More specifically, they state that children become more active and influential participants in dyadic interactions with their parents past their second year given the

achievement of several milestones, such as communicational competence and the developing theory of mind and intersubjectivity (Kochanska & Aksan, 2004). Maternal reported co-regulation was positively related to maternal psychopathology and negative reactivity. This suggests that mothers with higher levels of psychopathology concerns tend to reciprocate the negative affect expressed by their children. Furthermore, more reciprocated negative affect is apparent among dyads where the child tends to express negative emotion in response to novel stimuli. Based upon observational data from the "Perfect Circles" and "End of Line" tasks, a portion of the primary hypothesis was supported, as co-regulation had an indirect effect on emotion regulation over time. More specifically, co-regulation significantly and positively predicted negative reactivity and maternal psychopathology one year later. This suggests that a pattern of reciprocated negative affect leads to high psychopathology concerns in the mother and a greater propensity to display negative affect in the child. In turn, negative reactivity served as a mediator and predicted emotion regulation. This finding suggests that reciprocated negative affect during mother-child interactions contributing to higher levels of emotional displays by the child over time and across situations, which then impedes the use of adaptive regulation strategies. Inconsistent with the primary hypothesis, co-regulation did not have an additive effect on emotion regulation, as it did not predict emotion regulation above and beyond the significant contribution of negative reactivity and maternal psychopathology.

The Co-regulation Over Time model tended to adequately fit the data, which provides support for the presented theoretical model. Negative reactivity predicted

emotion regulation across reporters suggesting that a child's high propensity to display negative emotion consistently leads to poorer emotion regulation across settings. Maternal psychopathology only predicted emotion regulation when using teacher report. This may indicate that children of mothers with mental health concerns only exhibit poor emotional control when out of the home. Furthermore, these children might avoid expressions of negative affect at home for fear of exacerbating the situation. Co-regulation (assessed using maternal reported distress reactions) was consistently related to maternal psychopathology and was related to negative reactivity when using maternal report and observational data. Also using maternal report and observational data, the primary hypothesis was supported, as co-regulation had an additive effect on concurrent emotion regulation. Co-regulation had an indirect effect on emotion regulation over time when using observational data. Notably, the indirect effect was found for the "End of Line" task, which was the only frustration task that included the mother (i.e., the mother took the toy away from the child). This suggests that reciprocated negative emotion indirectly contributes to poorer emotion regulation over time through increased negative reactivity observed in the presence of the mother.

Co-regulation has been conceptualized as a mutual regulatory parent-child process that consists of coordinated emotional expression (Feldman, Greenbaum, & Yirmiya, 1999). The current study evaluated this construct through mother report of negative emotional exchanges and laboratory observed positive emotional exchanges. Given the research of Evans and Porter (2009), co-regulation was sought to represent a communication sequence that consisted of integrating and adjusting emotional cues.

Overall results from the current study indicate that reciprocated negative emotion during parent-child interactions contributes to children being less able to regulate their emotions. Results also suggest that emotional exchanges have a vital and distinct effect on child emotion regulation, as reciprocated negative emotion within the parent-child dyad contributes to poor emotion regulation above and beyond the child's propensity to display negative emotion and the mother's psychopathology. It is reasonable to assert that reciprocated negative emotion during parent-child interactions serves a regulatory function, as it significantly impacts children's ability to control their emotions, particularly in the presence of a parent. For instance, fewer expressions of negative emotions by a mother in response to her child's negative emotion increases the likelihood of adaptive emotional functioning in the child, such as being able to recover quickly from a setback, transition easily, delay gratification, and effectively verbalize emotions. Thus, it can be concluded from the results of current study and previous research (Fogel, 1993) that children learn about emotional expression from parent-child interactions and adjust their future emotional displays, as well as their expectations for subsequent interactions. Given the importance of emotional exchanges, consideration should be given to the reconceptualization of emotion regulation as a relational construct. Findings suggest that the modulation of emotional expression does not occur solely within the child but is the result of a dyadic process. Moreover, it is likely that the strategic regulation of emotions develops in the context of a feedback loop in early childhood, as during this period children are capable of interpreting and modifying the emotional cues of others. Results from the current study, based upon observed behavior, also indicate that more

reciprocated negative emotion within the dyad leads to more negative emotional displays by the child over time, which, in turn, leads to poorer emotion regulation in the child. This finding further underscores the importance of considering interactions as a predictor of child development, as early patterns of negativity can lead to longstanding effects on emotional functioning. The patterns established at age 4 are particularly salient, as children are in the process of navigating their environment outside of the home. Thus, negative emotional exchanges within the parent-child dyad could translate to negative interactions with teachers and peers during school entry.

As noted, these patterns regarding co-regulation were found using maternal report and laboratory observed variables but not teacher report variables. This discrepancy may reflect variability in the child's presentation across contexts. More specifically, the child's expression of affect may be particularly dependent on the presence or absence of the mother. It is likely that parent-child interactions, therefore, are more related to child emotion regulation outside of the school setting, where parental responses have greater influence. While within the school setting, distal and dispositional factors (i.e., paternal psychopathology and negative reactivity) may have a greater impact on child emotion regulation.

Many of these results are consistent with the literature. For example, prior research has established that child individual factors predict emotion regulation development. More specifically, Rothbart and Bates (2006) have determined that high levels of negative reactivity in early childhood lead to poor emotion regulation. This

could be due to decreased opportunities to learn or practice regulatory skills (Lonigan et al., 2004). Also consistent with the literature were the relations found between co-regulation and individual factors of the parent and child. Overall, these results strengthen the theoretical argument that it is important to consider which factors each member of the dyad brings to interactions, as a higher propensity to display negative emotion and higher levels of psychopathology were both related to more reciprocated negative affect within the dyad. Concerning child individual differences, results were consistent with previous findings that the presence of a highly reactive child increases the likelihood of coercive parent–child interactions (Scaramella, 2004). Interestingly, co-regulation was related to negative reactivity when using maternal report but not teacher report. This may highlight the impact of parental perception of their child's negative emotion, as it has previously been found that parents respond more negatively during interactions when they perceive their child to be highly reactive (Eisenberg, Cumberland & Spinrad, 1998).

Results were also consistent with the limited literature regarding parent individual differences, as maternal psychopathology was related to a pattern negative interaction within the parent-child dyad. However, most of the previous literature has examined interactions among children with depressed and maltreating parents (Dagne & Snyder, 2011; Herrenkohl et al., 1984). Thus, the current study contributed to the literature by establishing foundational knowledge regarding how parental psychopathology, in general, relates to co-regulation. Consistent with previous literature, co-regulation was found to predict emotion regulation. This finding was in line with Cole and colleague's (2003) finding that more reciprocity of anger occurs in dyads with

children concurrently rated as having difficulty regulating their anger. However, findings from the current study build upon this known association by underscoring the vital role of co-regulation, given its significant additive and indirect effect on emotion regulation. Findings from the current study also highlight how any reciprocated negative emotion contributes to poorer emotional functioning in the child, meaning that this association is not exclusive to reciprocated anger. While the coercion cycle has been clearly established (Denham & Grout, 1992; Granic & Patterson, 2006), it will be beneficial to further examine exchanges of other specific negative emotions, such as sadness and fear, within the parent-child dyad. Given these results, it is expected that frequent exchanges of sadness or fear would operate similar to the coercion cycle and lead to poorer emotion regulation in the child.

Some of the current results were inconsistent with the literature. For example, maternal psychopathology typically did not predict emotion regulation despite a fairly robust literature finding significant, direct associations between maternal psychopathology (i.e., depression, maltreatment, and general psychopathology) and child emotion regulation (Campbell et al. 1995; Coyne & Thompson, 2011; Maughan et al., 2007; Morris et al., 2007; Suveg et al., 2011; Shipman & Zeman, 2001). This inconsistency may suggest that parent-child interactions matter more than the presence or absence of psychopathology alone. For example, having a depressed parent may not have a significant impact on emotion regulation development if the parent is able suppress negative emotion during parent-child interactions. This argument is supported by the current study's finding of a more consistent, direct association between co-regulation and

emotion regulation compared to the association between maternal psychopathology and emotion regulation.

Although the use of laboratory measures is a significant strength of the current study, there were limitations regarding measurement, particularly of the co-regulation variable. Some literature has demonstrated the merit of self-reported co-regulation (Martini, Root & Jenkins, 2004); however, additional literature has underscored the importance of observational data, as well as the use of both microscopic and global codes (Kochanska and Aksan 2004). Arguably microscopic data may best capture co-regulation since the construct has been conceptualized as a fluid process consisting of moment to moment exchanges. While the current study sought to capture such dynamic exchanges of negative affect using data coded at 10 second intervals, the parent and child behavior in the lab lacked variability. This lack of variability is reasonable, as parents typically refrain from expressions of negative affect toward their children when being observed. As discussed, the interaction effect used in the model measured a pattern of reciprocated positive affect within the parent-child dyad. There is some evidence in the literature for positive exchanges being related to individual factors and emotion regulation (Feng et al., 2008; Morris et al., 2007; Ramsden & Hubbard, 2002). However, this body of literature is less robust compared to literature regarding negative exchanges. Therefore, results using laboratory observed co-regulation likely would have improved had reciprocated negative affect been better captured. Additionally, the lack of variability in expressed negative affect restricted the ability to explore whether positive affect occurred in response to negative affect. This may have been important to investigate given that there

is some evidence in the literature suggesting that emotional mismatches contribute to child emotion regulation (Cole, Teti, & Zahn-Waxler, 2003).

There are additional limitations concerning the study's use of reciprocated positive affect. Although there was greater variability in positive versus negative affect during parent-child interactions, the mean proportion of intervals that parents and children exhibited positive affect was still arguably low. This presents issues with restricted range, which likely contributed to insignificant findings with this variable. There was a similar limitation with restricted range for the maternal psychopathology variable. Since it was assessed in a non-clinical sample, most mothers rated low levels of psychopathology. Also, most children exhibited low levels of negative reactivity and high levels of regulation, particularly during laboratory tasks. An additional limitation was the study's inability to create latent variables for the child negative reactivity and emotion regulation constructs, which led to running many different models based upon reporters. Moreover, running many models introduces multiple comparisons problems and increases the likelihood of making errors in inference.

It is important to note that the current study's conclusions regarding the importance of co-regulation are made based upon maternal reported responses to emotion. This is not ideal considering that this methodology has the drawback of only considering the mother's single response to her child's emotion. Thus, similar to previous studies (e.g., Martini, Root & Jenkins, 2004), a feedback loop was not captured. A feedback loop was more accurately captured by the current study's observational data.

However, making substantial conclusions using this methodology was prevented due to the previously noted limitations. It is possible that maternal reported co-regulation actually captured the emotional climate of the dyad. Thus, a climate that is generally hostile contributes poorer emotion regulation in the child. If this assertion is correct, it may be beneficial to globally assess emotional functioning within the dyad and focus less on moment-to-moment exchanges.

Further investigation of the measurement and conceptualization of co-regulation is a critical next step for the literature. It will important for researchers to incorporate laboratory tasks that elicit variability in negative affect. For example, Herbers and colleagues (2014) utilized a variety of parent-child tasks when assessing co-regulation (e.g. free play, clean-up, problem solving, puzzle, safety planning, and guessing game) and found significant associations between co-regulation and executive functioning in a sample of mother-child dyads experiencing homelessness. While their codes encompassed positive and negative affect, the researchers also included other parent and child behaviors (i.e., positive control, nondirective responsiveness, disengaged/distracted, negative control, on-task, signals/bids, withdrawn, and defiant/disobedient) (Herbers et al., 2014). Another notable future direction regarding measurement is a more thorough examination of convergence among self-reported and observed co-regulation given the little overlap of these constructs found in the current study. It might also be beneficial for future research to examine the various conceptualizations of co-regulation. While the current study focused on responses to emotion, co-regulation has also been conceptualized with an emphasis on goals. For example, Lougheed and colleagues (2014)

utilized 11 categories (e.g. Negative Emotional Directive, Positive Emotional Directive, Invalidation, Validation, Avoidance, Reappraisal, Negative Emotion Talk, Positive Emotion Talk, Problem Definition, Solution-Focused Problem Solving, and No Co-Regulation) and conceptualized co-regulation as mothers' regulatory attempts during interactions. Further regarding conceptualization, there may be utility in focusing on transitions between emotional states, as Lougheed and colleagues (2014) found group differences (externalizing versus typically developing) in children's ability to transition out of negative affect.

Another notable future direction is the examination of dyadic characteristic that could influence the model. For example, along with individual differences in expressivity, the literature indicates that demographic characteristics, such as gender and ethnicity, can also affect parent-child interactions. In early childhood, parents have been shown to respond differentially to boys and girls based upon the expressed emotion; sadness is more positively accepted in girls and anger more in boys (Cole et al., 2003; Eisenberg et al., 1998). There are also potential differential influences on co-regulation based upon the gender match (Feldman, 2003). It may be particularly important to examine gender match considering that mother's rated girls as more reactive in the current study. Given these higher ratings, more exchanges of negative emotion might be expected between mothers and girls, which could lead to poorer emotion regulation. However, examination of interactions with fathers could reveal a different pattern, as father-child interactions are more often influenced by gender (Lunkenheimer et al., 2011). Concerning ethnicity, it is indicated that co-regulation may be culturally

dependent, as the exchange of emotional cues during face-to-face interactions has been found to be most characteristic of individualistic cultures (Feldman, 2006). Additionally, emotional expressivity has been shown to differ based upon cultural background. For example, African American dyads tend to express less emotion during parent-child interactions, and African American parents are less excepting of emotional displays compared to Caucasian parents (Cunningham et al., 2009; Nelson, Leerkes, O'Brien, Calkins, & Marcovitch, 2012). Interestingly, neither gender nor ethnicity was correlated with co-regulation in the current study. Finally, it may beneficial to test the presented theoretical model within different populations. More specifically, greater clarity is needed regarding parent psychopathology; therefore, examination of the model within a clinical population is an ideal future direction. It is possible that psychopathology may be more distinct within a clinical population, and researchers could better determine if depression and hostility serve clear, differentiating roles.

In summary, both previous literature and the current results illustrate the effect of child individual factors on emotion regulation development, as well as the relation between co-regulation and individual factors of both the parent and child. However, the current study extended the literature by demonstrating the vital role that such patterns of negativity have on emotion regulation concurrently and over time. Despite the limitations, the current study also provides important implications. For example, these findings highlight the importance of identification of at-risk dyads, meaning those where the parent and child independently display higher levels of negative emotion. At-risk dyads may especially benefit from interventions that place heightened emphasis on

emotional exchanges during interactions. Furthermore, findings from the current study suggest that interventions in early childhood may have the greatest impact on emotional functioning, as they occur during a development period where interaction patterns are being established outside of the home.

REFERENCES

Ackerman, Brian P., Kogos, Jen, Youngstrom, Eric, Schoff, Kristen, & Izard, Carroll. (1999). Family instability and the problem behaviors of children from economically disadvantaged families. *Developmental Psychology, 35*(1), 258-268. doi: 10.1037/0012-1649.35.1.258

Aureli, Tiziana, & Presaghi, Fabio. (2010). Developmental trajectories for mother-infant coregulation in the second year of life. *Infancy, 15*(6), 557-585. doi: 10.1111/j.1532-7078.2010.00034.x

Bariola, Emily, Gullone, Eleonora, & Hughes, Elizabeth K. (2011). Child and adolescent emotion regulation: The role of parental emotion regulation and expression. *Clinical Child and Family Psychology Review, 14*(2), 198-212. doi: 10.1007/s10567-011-0092-5

Bell, Richard Q., & Chapman, Michael. (1986). Child effects in studies using experimental or brief longitudinal approaches to socialization. *Developmental Psychology, 22*(5), 595-603. doi: 10.1037/0012-1649.22.5.595

Biringen, Zeynep, Emde, Robert N., Brown, David, Lowe, Lara, Myers, Sara, & Nelson, Danielle. (1999). Emotional availability and emotional communication in

naturalistic mother–infant interactions: Evidence for gender relations. *Journal of Social Behavior & Personality, 14*(4), 463-478.

Blandon, Alysia Y., Calkins, Susan D., & Keane, Susan P. (2010). Predicting emotional and social competence during early childhood from toddler risk and maternal behavior. *Development and Psychopathology, 22*(1), 119-132. doi: 10.1017/S0954579409990307

Butler, Emily A. (2011). Temporal interpersonal emotion systems: The "TIES" that form relationships. *Personality and Social Psychology Review, 15*(4), 367-393. doi: 10.1177/1088868311411164

Calkins, Susan D. (1994). Origins and outcomes of individual differences in emotion regulation. *Monographs of the Society for Research in Child Development, 59*(2-3), 53-72, 250-283. doi: 10.2307/1166138

Calkins, Susan D. (2010). Commentary: Conceptual and methodological challenges to the study of emotion regulation and psychopathology. *Journal of Psychopathology and Behavioral Assessment, 32*(1), 92-95. doi: 10.1007/s10862-009-9169-6

Calkins, S. D., & Hill, A. (2007). Caregiver Influences on Emerging Emotion Regulation: Biological and Environmental Transactions in Early Development. In J. J. Gross (Ed.) , Handbook of emotion regulation (pp. 229-248). New York, NY US: Guilford Press.

Calkins, Susan D., Smith, Cynthia L., Gill, Kathryn L., & Johnson, Mary C. (1998). Maternal interactive style across contexts: Relations to emotional, behavioral, and physiological regulation during toddlerhood. *Social Development, 7*(3), 350-369. doi: 10.1111/1467-9507.00072

Campbell, Susan B., Cohn, Jeffrey F., & Meyers, Teri. (1995). Depression in first-time mothers: Mother-infant interaction and depression chronicity. *Developmental Psychology, 31*(3), 349-357. doi: 10.1037/0012-1649.31.3.349

Camras, Linda A., & Witherington, David C. (2005). Dynamical systems approaches to emotional development. *Developmental Review, 25*(3-4), 328-350. doi: 10.1016/j.dr.2005.10.002

Carson, James L., & Parke, Ross D. (1996). Reciprocal negative affect in parent–child interactions and children's peer competency. *Child Development, 67*(5), 2217-2226. doi: 10.2307/1131619

Cohn, Jeffrey F., Matias, Reinaldo, Tronick, Edward Z., & Connell, David. (1986). Face-to-face interactions of depressed mothers and their infants. *New Directions for Child Development, 34*, 31-45. doi: 10.1002/cd.23219863405

Cohn, Jeffrey F., & Tronick, Edward Z. (1988). Mother-infant face-to-face interaction: Influence is bidirectional and unrelated to periodic cycles in either partner's behavior. *Developmental Psychology, 24*(3), 386-392. doi: 10.1037/0012-1649.24.3.386

Cole, P. M., Michel, M. K., & Teti, L. O. D. (1994). The development of emotion regulation and dysregulation: A clinical perspective. Monographs of the Society for Research in Child Development, 59(2-3), 73-100, 250-283. doi: 10.2307/1166139

Cole, Pamela M., Teti, Laureen O., & Zahn-Waxler, Carolyn. (2003). Mutual emotion regulation and the stability of conduct problems between preschool and early school age. *Development and Psychopathology, 15*(1), 1-18. doi: 10.1017/S0954579403000014

Coyne, Lisa W., & Thompson, Alysha D. (2011). Maternal depression, locus of control, and emotion regulatory strategy as predictors of preschoolers' internalizing problems. *Journal of Child and Family Studies, 20*(6), 873-883. doi: 10.1007/s10826-011-9455-2

Cumberland-Li, Amanda, Eisenberg, Nancy, Champion, Claire, Gershoff, Elizabeth, & Fabes, Richard A. (2003). The relation of parental emotionality and related dispositional traits to parental expression of emotion and children's social functioning. *Motivation and Emotion, 27*(1), 27-56. doi: 10.1023/A:1023674308969

Cunningham, Jera Nelson, Kliewer, Wendy, & Garner, Pamela W. (2009). Emotion socialization, child emotion understanding and regulation, and adjustment in urban African American families: Differential associations across child gender.

Development and Psychopathology, *21*(1), 261-283. doi: 10.1017/s0954579409000157

Dagne, Getachew A., & Snyder, James. (2011). Relationship of maternal negative moods to child emotion regulation during family interaction. *Development and Psychopathology*, *23*(1), 211-223. doi: 10.1017/s095457941000074x

Davenport, Emily, Yap, Marie B. H., Simmons, Julian G., Sheeber, Lisa B., & Allen, Nicholas B. (2011). Maternal and adolescent temperament as predictors of maternal affective behavior during mother–adolescent interactions. *Journal of Adolescence*, *34*(5), 829-839. doi: 10.1016/j.adolescence.2011.02.003

Denham, Susanne A., & Grout, Leslie. (1992). Mothers' emotional expressiveness and coping: Relations with preschoolers' social-emotional competence. *Genetic, Social, and General Psychology Monographs*, *118*(1), 73-101.

Denham, Susanne A., & Grout, Leslie. (1993). Socialization of emotion: Pathway to preschoolers' emotional and social competence. *Journal of Nonverbal Behavior*, *17*(3), 205-227. doi: 10.1007/BF00986120

Dix, Theodore, Meunier, Leah N., Lusk, Kathryn, & Perfect, Michelle M. (2012). Mothers' depressive symptoms and children's facial emotions: Examining the depression–inhibition hypothesis. *Development and Psychopathology*, *24*(1), 195-210. doi: 10.1017/s0954579411000770

Dodge, Kenneth A. (1989). Coordinating responses to aversive stimuli: Introduction to a special section on the development of emotion regulation. *Developmental Psychology, 25*(3), 339-342. doi: 10.1037/0012-1649.25.3.339

Eisenberg, Nancy, Cumberland, Amanda, & Spinrad, Tracy L. (1998). Parental socialization of emotion. *Psychological Inquiry, 9*(4), 241-273. doi: 10.1207/s15327965pli0904_1

Eisenberg, Nancy, & Fabes, Richard A. (1995). The relation of young children's vicarious emotional responding to social competence, regulation, and emotionality. *Cognition and Emotion, 9*(2-3), 203-228. doi: 10.1080/02699939508409009

Eisenberg, Nancy, Fabes, Richard A., Guthrie, Ivanna K., & Murphy, Bridget C. (1996). The relations of regulation and emotionality to problem behavior in elementary school children. *Development and Psychopathology, 8*(1), 141-162. doi: 10.1017/s095457940000701x

Eisenberg, Nancy, Fabes, Richard A., Guthrie, Ivanna K., & Reiser, Mark. (2000). Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*(1), 136-157. doi: 10.1037/0022-3514.78.1.136

Eisenberg, Nancy, Fabes, Richard A., Schaller, Mark, & Carlo, Gustavo. (1991). The relations of parental characteristics and practices to children's vicarious emotional responding. *Child Development, 62*(6), 1393-1408. doi: 10.2307/1130814

Eisenberg, Nancy, Losoya, Sandra, Fabes, Richard A., Guthrie, Ivanna K., Reiser, Mark, Murphy, Bridget, . . . Padgett, Sarah J. (2001). Parental socialization of children's dysregulated expression of emotion and externalizing problems. *Journal of Family Psychology, 15*(2), 183-205. doi: 10.1037/0893-3200.15.2.183

Eisenberg, Nancy, & Morris, Amanda Sheffield. (2002). Children's emotion-related regulation. In R. V. Kail (Ed.), *Advances in child development and behavior, Vol. 30.* (pp. 189-229). San Diego, CA US: Academic Press.

Eisenberg, Nancy, Spinrad, Tracy L., & Eggum, Natalie D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology, 6*, 495-525. doi: 10.1146/annurev.clinpsy.121208.131208

Eisenberg, Nancy, & Valiente, Carlos. (2004). Elaborations on a Theme: Beyond Main Effects in Relations of Parenting to Children's Coping and Regulation. *Parenting: Science and Practice, 4*(4), 319-323. doi: 10.1207/s15327922par0404_2

Eisenberg, Nancy, Valiente, Carlos, Spinrad, Tracy L., Cumberland, Amanda, Liew, Jeffrey, Reiser, Mark, . . . Losoya, Sandra H. (2009). Longitudinal relations of children's effortful control, impulsivity, and negative emotionality to their externalizing, internalizing, and co-occurring behavior problems. *Developmental Psychology, 45*(4), 988-1008. doi: 10.1037/a0016213

Enlow, Michelle Bosquet, Kitts, Robert L., Blood, Emily, Bizarro, Andrea, Hofmeister, Michelle, & Wright, Rosalind J. (2011). Maternal posttraumatic stress symptoms

and infant emotional reactivity and emotion regulation. *Infant Behavior & Development, 34*(4), 487-503. doi: 10.1016/j.infbeh.2011.07.007

Evans, Cortney A., & Porter, Christin L. (2009). The emergence of mother-infant co-regulation during the first year: Links to infants' developmental status and attachment. *Infant Behavior & Development, 32*(2), 147-158. doi: 10.1016/j.infbeh.2008.12.005

Feldman, Ruth. (2003). Infant-mother and infant-father synchrony: The coregulation of positive arousal. *Infant Mental Health Journal, 24*(1), 1-23. doi: 10.1002/imhj.10041

Feldman, Ruth. (2007). Parent-infant synchrony: Biological foundations and developmental outcomes. *Current Directions in Psychological Science, 16*(6), 340-345. doi: 10.1111/j.1467-8721.2007.00532.x

Feldman, Ruth, Dollberg, Daphna, & Nadam, Roni. (2011). The expression and regulation of anger in toddlers: Relations to maternal behavior and mental representations. *Infant Behavior & Development, 34*(2), 310-320. doi: 10.1016/j.infbeh.2011.02.001

Feldman, Ruth, Greenbaum, Charles W., & Yirmiya, Nurit. (1999). Mother–infant affect synchrony as an antecedent of the emergence of self-control. *Developmental Psychology, 35*(1), 223-231. doi: 10.1037/0012-1649.35.1.223

Feldman, Ruth, Masalha, Shafiq, & Alony, Dalia. (2006). Microregulatory patterns of family interactions: Cultural pathways to toddlers' self-regulation. *Journal of Family Psychology, 20*(4), 614-623. doi: 10.1037/0893-3200.20.4.614

Feng, Xin, Shaw, Daniel S., Kovacs, Maria, Lane, Tonya, O'Rourke, Flannery E., & Alarcon, Joseph H. (2008). Emotion regulation in preschoolers: The roles of behavioral inhibition, maternal affective behavior, and maternal depression. *Journal of Child Psychology and Psychiatry, 49*(2), 132-141.

Field, Tiffany, Healy, Brian T., Goldstein, Sheri, & Guthertz, Moshe. (1990). Behavior-state matching and synchrony in mother-infant interactions of nondepressed versus depressed dyads. *Developmental Psychology, 26*(1), 7-14. doi: 10.1037/0012-1649.26.1.7

Fitness, Julie, & Duffield, Jill. (2004). Emotion and communication in families. In A. L. Vangelisti (Ed.), *Handbook of family communication.* (pp. 473-494). Mahwah, NJ US: Lawrence Erlbaum Associates Publishers.

Flouri, Eirini, Tzavidis, Nikos, & Kallis, Constantinos. (2010). Adverse life events, area socioeconomic disadvantage, and psychopathology and resilience in young children: The importance of risk factors' accumulation and protective factors' specificity. *European Child & Adolescent Psychiatry, 19*(6), 535-546. doi: 10.1007/s00787-009-0068-x

Fogel, Alan. (1993). *Developing through relationships: Origins of communication, self, and culture*. Chicago, IL US: University of Chicago Press.

Fogel, Alan, Nwokah, Evangeline, Dedo, Jae Y., & Messinger, Daniel. (1992). Social process theory of emotion: A dynamic systems approach. *Social Development, 1*(2), 122-142. doi: 10.1111/j.1467-9507.1992.tb00116.x

Gaensbauer, Theodore J. (1982). Regulation of emotional expression in infants from two contrasting caretaking environments. *Journal of the American Academy of Child Psychiatry, 21*(2), 163-170. doi: 10.1016/S0002-7138(09)60915-8

Garner, Pamela W. (1995). Toddlers' emotion regulation behaviors: The roles of social context and family expressiveness. *The Journal of Genetic Psychology: Research and Theory on Human Development, 156*(4), 417-430. doi: 10.1080/00221325.1995.9914834

Garner, Pamela W. (2006). Prediction of prosocial and emotional competence from maternal behavior in African American preschoolers. *Cultural Diversity and Ethnic Minority Psychology, 12*(2), 179-198. doi: 10.1037/1099-9809.12.2.179

Garner, Pamela W., & Power, Thomas G. (1996). Preschoolers' emotional control in the disappointment paradigm and its relation to temperament, emotional knowledge, and family expressiveness. *Child Development, 67*(4), 1406-1419. doi: 10.2307/1131708

Goldsmith, H. H., & Rothbart, M. K. (1993). The Laboratory Temperament Assessment Battery: Locomotor version 2.02 (LAB-TAB).Madison: University of Wisconsin.

Gottman, John Mordechai, Guralnick, Michael J., Wilson, Beverly, & Swanson, Catherine C. (1997). What should the focus of emotion regulation in children? A nonlinear dynamic mathematical model of children's peer interaction in groups. *Development and Psychopathology*, *9*(2), 421-452. doi: 10.1017/S0954579497002113

Granic, Isabela, & Patterson, Gerald R. (2006). Toward a comprehensive model of antisocial development: A dynamic systems approach. *Psychological Review, 113*(1), 101-131. doi: 10.1037/0033-295X.113.1.101

Guastello, Stephen J., Koopmans, Matthijs, & Pincus, David. (2009). *Chaos and complexity in psychology: The theory of nonlinear dynamical systems*. New York, NY US: Cambridge University Press.

Halberstadt, Amy G., Crisp, Valerie W., & Eaton, Kimberly L. (1999). Family expressiveness: A retrospective and new directions for research. In P. Philippot, R. S. Feldman & E. J. Coats (Eds.), *The social context of nonverbal behavior.* (pp. 109-155). New York, NY Paris USFrance: Cambridge University Press

Halberstadt, Amy G., & Parker, Alison E. (2007). Function, structure, and process as independent dimensions in research on emotion. *Clinical Psychology: Science and Practice, 14*(4), 402-406. doi: 10.1111/j.1468-2850.2007.00099.x

Hankin, Benjamin L., Stone, Lindsey, & Wright, Patricia Ann. (2010). Corumination, interpersonal stress generation, and internalizing symptoms: Accumulating effects and transactional influences in a multiwave study of adolescents. *Development and Psychopathology, 22*(1), 217-235. doi: 10.1017/S0954579409990368

Herbers, J. E., Cutuli, J. J., Supkoff, L. M., Narayan, A. J., & Masten, A. S. (2014). Parenting and coregulation: Adaptive systems for competence in children experiencing homelessness. American Journal Of Orthopsychiatry, 84(4), 420-430. doi:10.1037/h0099843

Herrenkohl, Ellen C., Herrenkohl, Roy C., Toedter, Lori, & Yanushefski, Ann M. (1984). Parent–child interactions in abusive and nonabusive families. *Journal of the American Academy of Child Psychiatry, 23*(6), 641-648. doi: 10.1016/S0002-7138(09)60530-6

Hinde, Robert A., & Stevenson-Hinde, Joan. (1987). Interpersonal relationships and child development. *Developmental Review, 7*(1), 1-21. doi: 10.1016/0273-2297(87)90002-5

Hoffman, Casey, Crnic, Keith A., & Baker, Jason K. (2006). Maternal Depression and Parenting: Implications for Children's Emergent Emotion Regulation and Behavioral Functioning. *Parenting: Science and Practice, 6*(4), 271-295. doi: 10.1207/s15327922par0604_1

Hollingshead, A. B. (1975). Four-factor index of social status. Unpublished manuscript: Department of Sociology, Yale University, New Haven, CT.

Howerter, Amy. (2011). *A dynamic system perspective on interpersonal emotion regulation.* (71), ProQuest Information & Learning, US. Retrieved from https://libproxy.uncg.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2011-99060-531&site=ehost-live Available from EBSCOhost psyh database.

Jackson, Yo, & Frick, Paul J. (1998). Negative life events and the adjustment of school-age children: Testing protective models. *Journal of Clinical Child Psychology, 27*(4), 370-380. doi: 10.1207/s15374424jccp2704_1

Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). Dyadic data analysis. New York, NY, US: Guilford Press.

Kochanska, Grazyna. (1997a). Multiple pathways to conscience for children with different temperaments: From toddlerhood to age 5. *Developmental Psychology, 33*(2), 228-240. doi: 10.1037/0012-1649.33.2.228

Kochanska, Grazyna. (1997b). Mutually responsive orientation between mothers and their young children: Implications for early socialization. *Child Development, 68*(1), 94-112. doi: 10.2307/1131928

Kochanska, Grazyna, & Aksan, Nazan. (2004). Development of Mutual Responsiveness Between Parents and Their Young Children. *Child Development, 75*(6), 1657-1676. doi: 10.1111/j.1467-8624.2004.00808.x

Kochanska, Grazyna, Murray, Kathleen T., & Harlan, Elena T. (2000). Effortful control in early childhood: Continuity and change, antecedents, and implications for social development. *Developmental Psychology, 36*(2), 220-232. doi: 10.1037/0012-1649.36.2.220

Kot, LeeAnn, & Shoemaker, Holly M. (1999). Children of divorce: An investigation of the developmental effects from infancy through adulthood. *Journal of Divorce & Remarriage, 31*(1-2), 161-178. doi: 10.1300/J087v31n01_09

Lehman, Darrin R., Lang, Eric L., Wortman, Camille B., & Sorenson, Susan B. (1989). Long-term effects of sudden bereavement: Marital and parent-child relationships and children's reactions. *Journal of Family Psychology, 2*(3), 344-367. doi: 10.1037/h0080505

Lewis, M. D., & Granic, I. (Eds.). (2002). *Emotion, development, and self-organization: Dynamic systems approaches to emotional development*. Cambridge University Press.

Lonigan, Christopher J., Vasey, Michael W., Phillips, Beth M., & Hazen, Rebecca A. (2004). Temperament, Anxiety, and the Processing of Threat-Relevant Stimuli.

Journal of Clinical Child and Adolescent Psychology, 33(1), 8-20. doi: 10.1207/s15374424jccp3301_2

Lougheed, J. P., Hollenstein, T., Lichtwarck-Aschoff, A., & Granic, I. (2014). Maternal Regulation of Child Affect in Externalizing and Typically-Developing Children. Journal Of Family Psychology, doi:10.1037/a0038429

Lunkenheimer, Erika S., & Dishion, Thomas J. (2009). Developmental psychopathology: Maladaptive and adaptive attractors in children's close relationships. In S. J. Guastello, M. Koopmans & D. Pincus (Eds.), *Chaos and complexity in psychology: The theory of nonlinear dynamical systems.* (pp. 282-306). New York, NY US: Cambridge University Press.

Lunkenheimer, Erika S., Olson, Sheryl L., Hollenstein, Tom, Sameroff, Arnold J., & Winter, Charlotte. (2011). Dyadic flexibility and positive affect in parent–child coregulation and the development of child behavior problems. *Development and Psychopathology, 23*(2), 577-591. doi: 10.1017/S095457941100006X

Lunkenheimer, Erika Sell. (2007). *Parent-child co-regulation of affect in early childhood pathways to children's externalizing behavior problems.* (67), ProQuest Information & Learning, US. Retrieved from https://libproxy.uncg.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2007-99008-297&site=ehost-live Available from EBSCOhost psyh database.

Malatesta, Carol Z., & Haviland, Jeannette M. (1982). Learning display rules: The socialization of emotion expression in infancy. *Child Development, 53*(4), 991-1003. doi: 10.2307/1129139

Manian, Nanmathi, & Bornstein, Marc H. (2009). Dynamics of emotion regulation in infants of clinically depressed and nondepressed mothers. *Journal of Child Psychology and Psychiatry, 50*(11), 1410-1418. doi: 10.1111/j.1469-7610.2009.02166.x

Martin, Sarah E., Clements, Mari L., & Crnic, Keith A. (2002). Maternal emotions during mother-toddler interaction: Parenting in an affective context. *Parenting: Science and Practice, 2*(2), 105-126. doi: 10.1207/S15327922PAR0202_02

Martini, Tanya S., Root, Carol A., & Jenkins, Jennifer M. (2004). Low and Middle Income Mothers' Regulation of Negative Emotion: Effects of Children's Temperament and Situational Emotional Responses. *Social Development, 13*(4), 515-530. doi: 10.1111/j.1467-9507.2004.00281.x

Maughan, Angeline, Cicchetti, Dante, Toth, Sheree L., & Rogosch, Fred A. (2007). Early-occurring maternal depression and maternal negativity in predicting young children's emotion regulation and socioemotional difficulties. *Journal of Abnormal Child Psychology: An official publication of the International Society for Research in Child and Adolescent Psychopathology, 35*(5), 685-703. doi: 10.1007/s10802-007-9129-0

McCartney, Kathleen, & Phillips, Deborah. (2006). *Blackwell handbook of early childhood development*. Malden: Blackwell Publishing.

McLoyd, Vonnie C. (1989). Socialization and development in a changing economy: The effects of paternal job and income loss on children. *American Psychologist, 44*(2), 293-302. doi: 10.1037/0003-066X.44.2.293

Morris, Amanda Sheffield, Silk, Jennifer S., Morris, Michael D. S., Steinberg, Laurence, Aucoin, Katherine J., & Keyes, Angela W. (2011). The influence of mother–child emotion regulation strategies on children's expression of anger and sadness. *Developmental Psychology, 47*(1), 213-225. doi: 10.1037/a0021021

Morris, Amanda Sheffield, Silk, Jennifer S., Steinberg, Laurence, Myers, Sonya S., & Robinson, Lara Rachel. (2007). The role of the family context in the development of emotion regulation. *Social Development, 16*(2), 361-388. doi: 10.1111/j.1467-9507.2007.00389.x

Morris, A. S., Steinberg, L., Sessa, F. M., Avenevoli, S., Silk, J. S., & Essex, M. J. (2002). Measuring children's perceptions of psychological control: Developmental and conceptual considerations. In B. K. Barber (Ed.), *Intrusive parenting: How psychological control affects children and adolescents* (pp. 125–159). Washington, DC: American Psychological Association Press.

Nelson, Jackie A., Leerkes, Esther M., O'Brien, Marion, Calkins, Susan D., & Marcovitch, Stuart. (2012). African American and European American mothers'

beliefs about negative emotions and emotion socialization practices. *Parenting: Science and Practice, 12*(1), 22-41. doi: 10.1080/15295192.2012.638871

NICHD. (2004). Affect dysregulation in the mother-child relationship in the toddler years: Antecedents and consequences. *Development and Psychopathology, 16*(1), 43-68. doi: 10.1017/S0954579404044402

Patterson, G. R., DeBaryshe, Barbara D., & Ramsey, Elizabeth. (1989). A developmental perspective on antisocial behavior. *American Psychologist, 44*(2), 329-335. doi: 10.1037/0003-066X.44.2.329

Pett, Marjorie A., Wampold, Bruce E., Turner, Charles W., & Vaughan-Cole, Beth. (1999). Paths of influence of divorce on preschool children's psychosocial adjustment. *Journal of Family Psychology, 13*(2), 145-164. doi: 10.1037/0893-3200.13.2.145

Power, Thomas G. (2004). Stress and Coping in Childhood: The Parents' Role. *Parenting: Science and Practice, 4*(4), 271-317. doi: 10.1207/s15327922par0404_1

Propper, Cathi, & Moore, Ginger A. (2006). The influence of parenting on infant emotionality: A multi-level psychobiological perspective. *Developmental Review, 26*(4), 427-460. doi: 10.1016/j.dr.2006.06.003

Ramsden, Sally R., & Hubbard, Julie A. (2002). Family expressiveness and parental emotion coaching: Their role in children's emotion regulation and aggression. *Journal of Abnormal Child Psychology, 30*(6), 657-667. doi: 10.1023/A:1020819915881

Reyna, Barbara A., & Pickler, Rita H. (2009). Mother-infant synchrony. *Journal of Obstetric, Gynecologic, & Neonatal Nursing: Clinical Scholarship for the Care of Women, Childbearing Families, & Newborns, 38*(4), 470-477. doi: 10.1111/j.1552-6909.2009.01044.x

Rothbart, Mary K., & Bates, John E. (1998). Temperament. In N. Eisenberg & W. Damon (Eds.), *Handbook of child psychology, 5th ed.: Vol 3. Social, emotional, and personality development.* (pp. 105-176). Hoboken, NJ US: John Wiley & Sons Inc.

Rothbart, Mary K., & Bates, John E. (2006). Temperament. In N. Eisenberg, W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Vol. 3, Social, emotional, and personality development (6th ed.).* (pp. 99-166). Hoboken, NJ US: John Wiley & Sons Inc.

Rothbart, Mary Klevjord. (1989). Temperament and development. In G. A. Kohnstamm, J. E. Bates & M. K. Rothbart (Eds.), *Temperament in childhood.* (pp. 187-247). Oxford England: John Wiley & Sons.

Salisch, Maria von. (2001). Children's emotional development: Challenges in their relationships to parents, peers, and friends. *International Journal of Behavioral Development, 25*(4), 310-319. doi: 10.1080/01650250143000058

Sameroff, Arnold. (2009). *The transactional model of development: How children and contexts shape each other*. Washington, DC US: American Psychological Association.

Sameroff, Arnold J., & MacKenzie, Michael J. (2003). Research strategies for capturing transactional models of development: The limits of the possible. *Development and Psychopathology, 15*(3), 613-640. doi: 10.1017/S0954579403000312

Sarason, Irwin G., Johnson, James H., & Siegel, Judith M. (1978). Assessing the impact of life changes: Development of the Life Experiences Survey. *Journal of Consulting and Clinical Psychology, 46*(5), 932-946. doi: 10.1037/0022-006X.46.5.932

Scaramella, Laura V., & Leve, Leslie D. (2004). Clarifying Parent-Child Reciprocities During Early Childhood: The Early Childhood Coercion Model. *Clinical Child and Family Psychology Review, 7*(2), 89-107. doi: 10.1023/B:CCFP.0000030287.13160.a3

Shipman, Kimberly L., & Zeman, Janice. (2001). Socialization of children's emotion regulation in mother–child dyads: A developmental psychopathology perspective.

Development and Psychopathology, 13(2), 317-336. doi: 10.1017/s0954579401002073

Snyder, Douglas K., Simpson, Jeffry, & Hughes, Jan N. (2006). *Emotion regulation in couples and families: Pathways to dysfunction and health*. Washington, DC US: American Psychological Association.

Suveg, Cynthia, Shaffer, Anne, Morelen, Diana, & Thomassin, Kristel. (2011). Links between maternal and child psychopathology symptoms: Mediation through child emotion regulation and moderation through maternal behavior. *Child Psychiatry and Human Development, 42*(5), 507-520. doi: 10.1007/s10578-011-0223-8

Teti, Douglas M., & Cole, Pamela M. (2011). Parenting at risk: New perspectives, new approaches. *Journal of Family Psychology, 25*(5), 625-634. doi: 10.1037/a0025287

Thompson, Ross A. (1991). Emotional regulation and emotional development. *Educational Psychology Review, 3*(4), 269-307. doi: 10.1007/BF01319934

Tronick, Edward Z. (1989). Emotions and emotional communication in infants. *American Psychologist, 44*(2), 112-119. doi: 10.1037/0003-066X.44.2.112

Tronick, Edward Z., & Cohn, Jeffery F. (1989). Infant-mother face-to-face interaction: Age and gender differences in coordination and the occurrence of miscoordination. *Child Development, 60*(1), 85-92. doi: 10.2307/1131074

Valentino, Kristin, Cicchetti, Dante, Toth, Sheree L., & Rogosch, Fred A. (2011). Mother–child play and maltreatment: A longitudinal analysis of emerging social behavior from infancy to toddlerhood. *Developmental Psychology, 47*(5), 1280-1294. doi: 10.1037/a0024459

Valiente, Carlos, Eisenberg, Nancy, Shepard, Stephanie A., Fabes, Richard A., Cumberland, Amanda J., Losoya, Sandra H., & Spinrad, Tracy L. (2004). The relations of mothers' negative expressivity to children's experience and expression of negative emotion. *Journal of Applied Developmental Psychology, 25*(2), 215-235. doi: 10.1016/j.appdev.2004.02.006

van den Bloom, Dymphna C., & Hoeksma, Jan B. (1994). The effect of infant irritability on mother-infant interaction: A growth-curve analysis. *Developmental Psychology, 30*(4), 581-590. doi: 10.1037/0012-1649.30.4.581

West, Amy E., & Newman, Denise L. (2003). Worried and blue: Mild parental anxiety and depression in relation to the development of young children's temperament and behavior problems. *Parenting: Science and Practice, 3*(2), 133-154. doi: 10.1207/s15327922par0302_02

Wilson, Katherine R., Havighurst, Sophie S., & Harley, Ann E. (2012). Tuning in to Kids: An effectiveness trial of a parenting program targeting emotion socialization of preschoolers. *Journal of Family Psychology, 26*(1), 56-65. doi: 10.1037/a0026480

Wolff, Peter H. (1993). Behavioral and emotional states in infancy: A dynamic perspective. In L. B. Smith & E. Thelen (Eds.), *A dynamic systems approach to development: Applications.* (pp. 189-208). Cambridge, MA US: The MIT Press.

Yates, Tuppett M., Obradović, Jelena, & Egeland, Byron. (2010). Transactional relations across contextual strain, parenting quality, and early childhood regulation and adaptation in a high-risk sample. *Development and Psychopathology*, *22*(3), 539-555. doi: 10.1017/S095457941000026X

Zeman, Janice, & Shipman, Kimberly. (1998). Influence of social context on children's affect regulation: A functionalist perspective. *Journal of Nonverbal Behavior, 22*(3), 141-165. doi: 10.1023/A:1022900704563

Zlochower, Adena J., & Cohn, Jeffrey F. (1996). Vocal timing in face-to-face interaction of clinically depressed and nondepressed mothers and their 4-month-old infants. *Infant Behavior & Development*, *19*(3), 371-374. doi: 10.1016/S0163-6383(96)90035-1

APPENDIX A

CODING MANUAL

Interval Coding of Mother-Child Interaction

- Episodes are coded in 10 second intervals
- These are **occurrence** codes, meaning if any affect occurs within the 10-second interval, place a check in the interval
    - Positive affect encompasses Joy (as described below)
    - Negative affect encompasses Sadness, Fear, and Anger (as described below)
    - Affect should be coded for the mother and child separately
- Vocal cues should be coded based upon tone and NOT content
- Unclear behaviors and inaudible statements are NOT coded
- If the mother or child is speaking to the experimenter, do NOT code
- Do NOT code affect in the context of pretend play
- Detail reasons for tapes being uncodable in the notes section of the coding sheet
- Free play and cleanup tasks are coded. Use separate coding sheet for each task. Task are done back to back during visit and after the walk-a-line task
- Start time for free play task is when experimenter leaves room/ family begins to play. Experimenter knocking on door and instructing family to clean up indicate the end time for free play task and start time for cleanup task. If family does not hear the knock or does not respond to it, continue to code freeplay until the family begins to clean up (look for the first gesture of cleaning up). End time for cleanup task is indicated by all toys being put away and/or experimenter returning to room. Be sure to draw a line through the last interval coded. All start/end times may not be clear. Use best judgment to determine when the task is completed
- Use the timer located on the Window's Media Player NOT the one located on the tape
- Interval timer is located online (http://www.online-stopwatch.com/full-screen-interval-timer/?c=sqxi743gzs). Kappa calculator is located online (http://vassarstats.net/kappa.html)

(From Cole, 2003 who based their codes on Ekman & Friesen, 1978; Izard, 1979)

Emotion	Facial and Vocal Cues (i.e. affective tone and behaviors)
Positive:	
Joy	Smiling (characterized by lip corners pulled up, cheeks raised, crinkling around eyes), Displays of affection (spontaneous hugs/kisses) Positive tone (characterized by lilting voice), laughing, giggling
Negative:	
Anger	Frowning or angry facial expressions (characterized by eyelids tightened or narrowed, mouth or jaw thrust or set, lips pressed or tightened, open mouth is squarish, teeth clenched) Negative tone (characterized by voice harsh and louder, explosive quality to speech

	Sadness	Sad facial expressions (characterized by lip corners turned down, lower lip depressed, inner brows in oblique (v) shape, eyelids drooped), crying (or whining in children) Negative tone (characterized by voice soft without intention to whisper, dropping off at end of utterance)
	Fear/ Tension/ Worry	Worried facial expressions (characterized by lip corners retracted, eyes widened with brows raised and furrowed, brows lowered without any other cue of a specific emotion), frequent eye movement (rapid glancing) Negative tone (characterized by strained voice without harshness)
Neutral		No codable facial or vocal activity

ID: **Coder:** **Date:** **Task: Free play/ Cleanup**

Start Time:			**End Time:**															
	0:10	0:20	0:30	0:40	0:50	1:00	1:10	1:20	1:30	1:40	1:50	2:00	2:10	2:20	2:30	2:40	2:50	3:00
MOM																		
Positive																		
Negative																		
CHILD																		
Positive																		
Negative																		

	3:10	3:20	3:30	3:40	3:50	4:00	4:10	4:20	4:30	4:40	4:50	5:00	5:10	5:20	5:30	5:40	5:50	6:00	6:10
MOM																			
Positive																			
Negative																			
CHILD																			
Positive																			
Negative																			

	6:20	6:30	6:40	6:50	7:00	7:10	7:20	7:30	7:40	7:50	8:00
MOM											
Positive											
Negative											
CHILD											
Positive											
Negative											

NOTES:

APPENDIX B

TABLES AND FIGURES

Figure 1. Theoretical Model

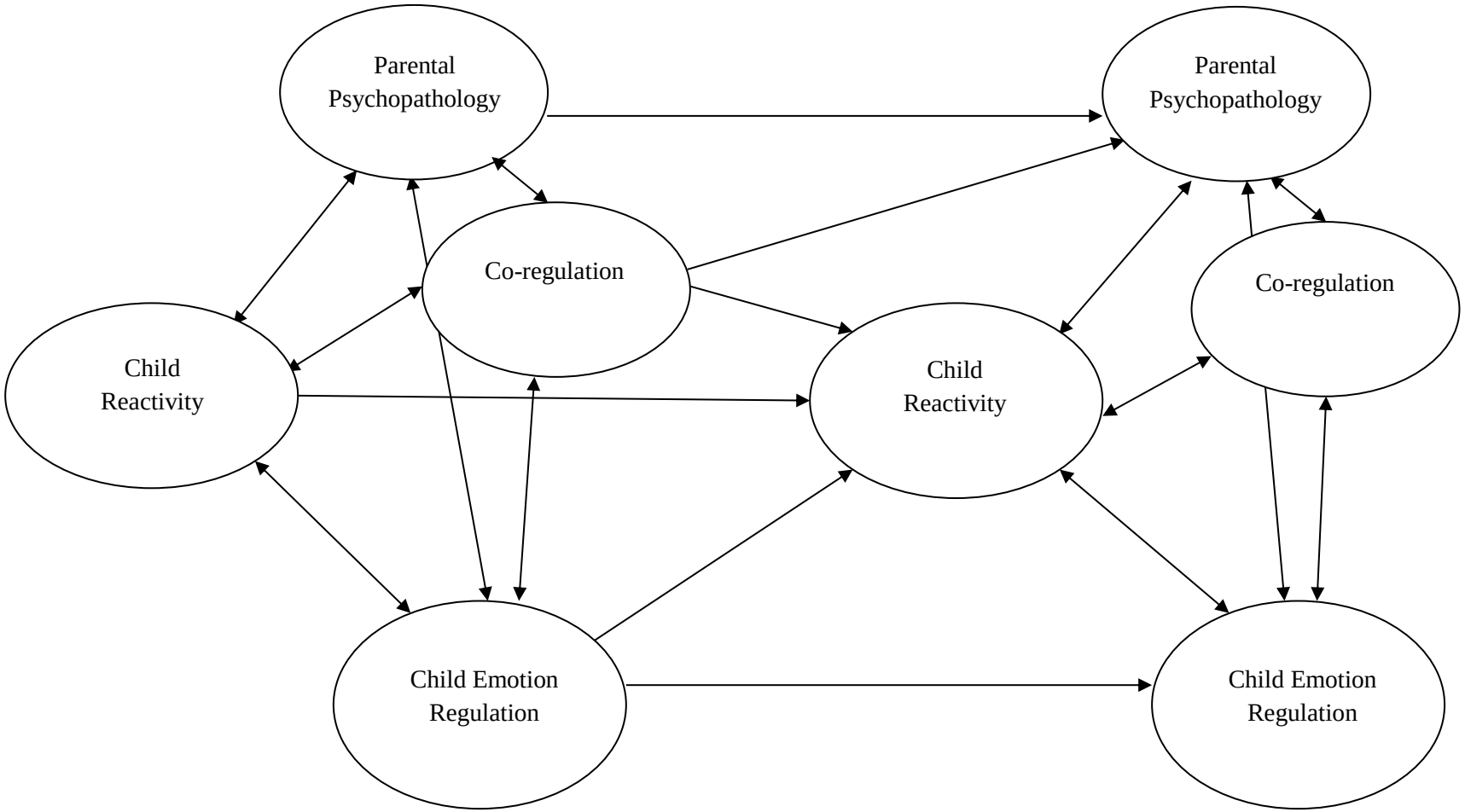


Figure 2. Stability Model

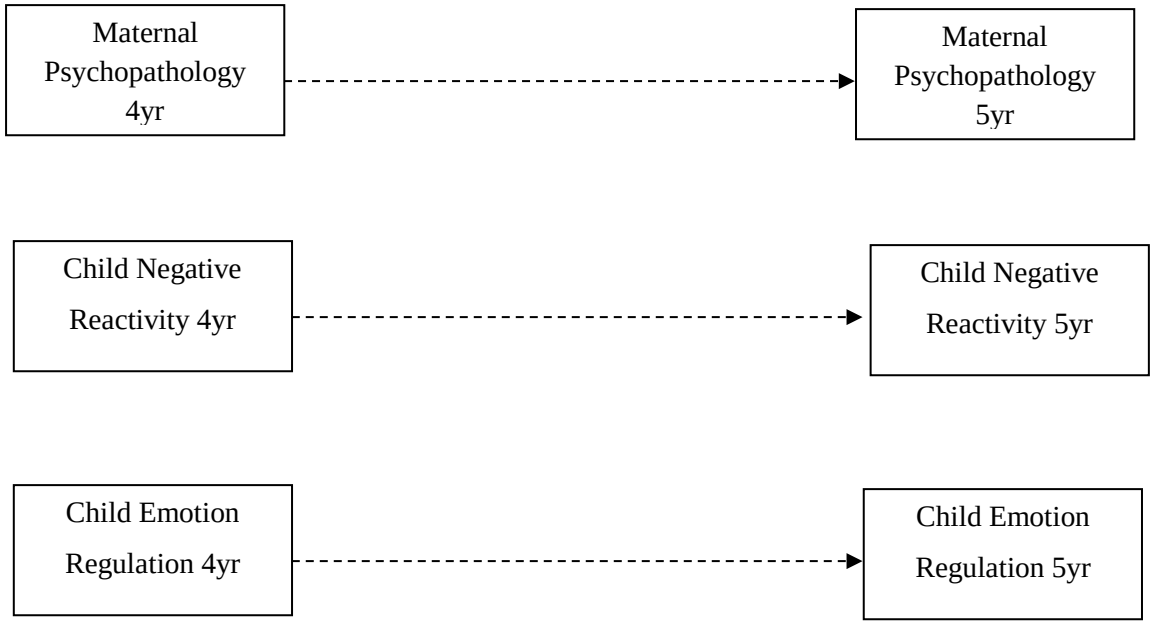


Figure 3. Individual Factor Model

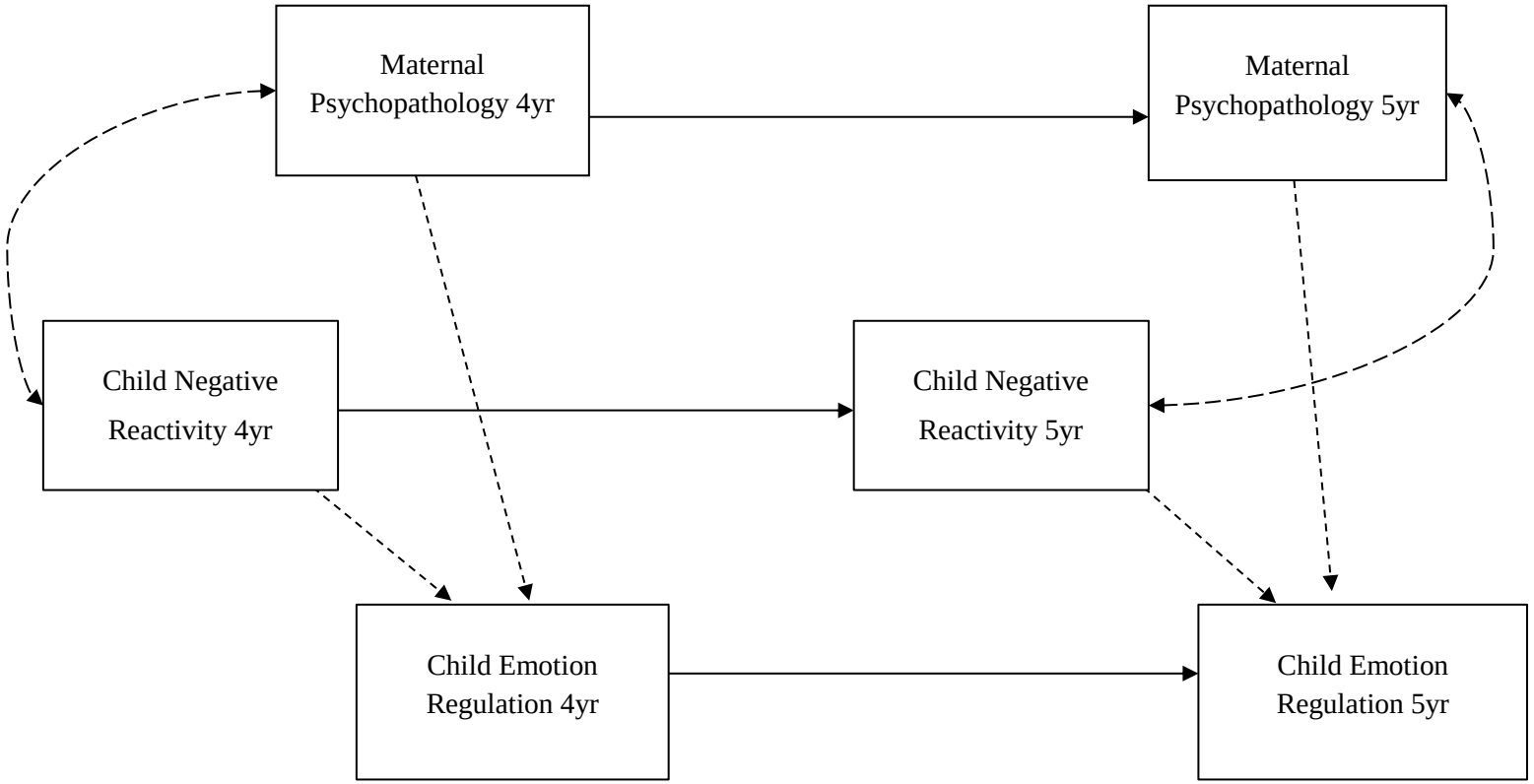


Figure 4. Co-regulation Model

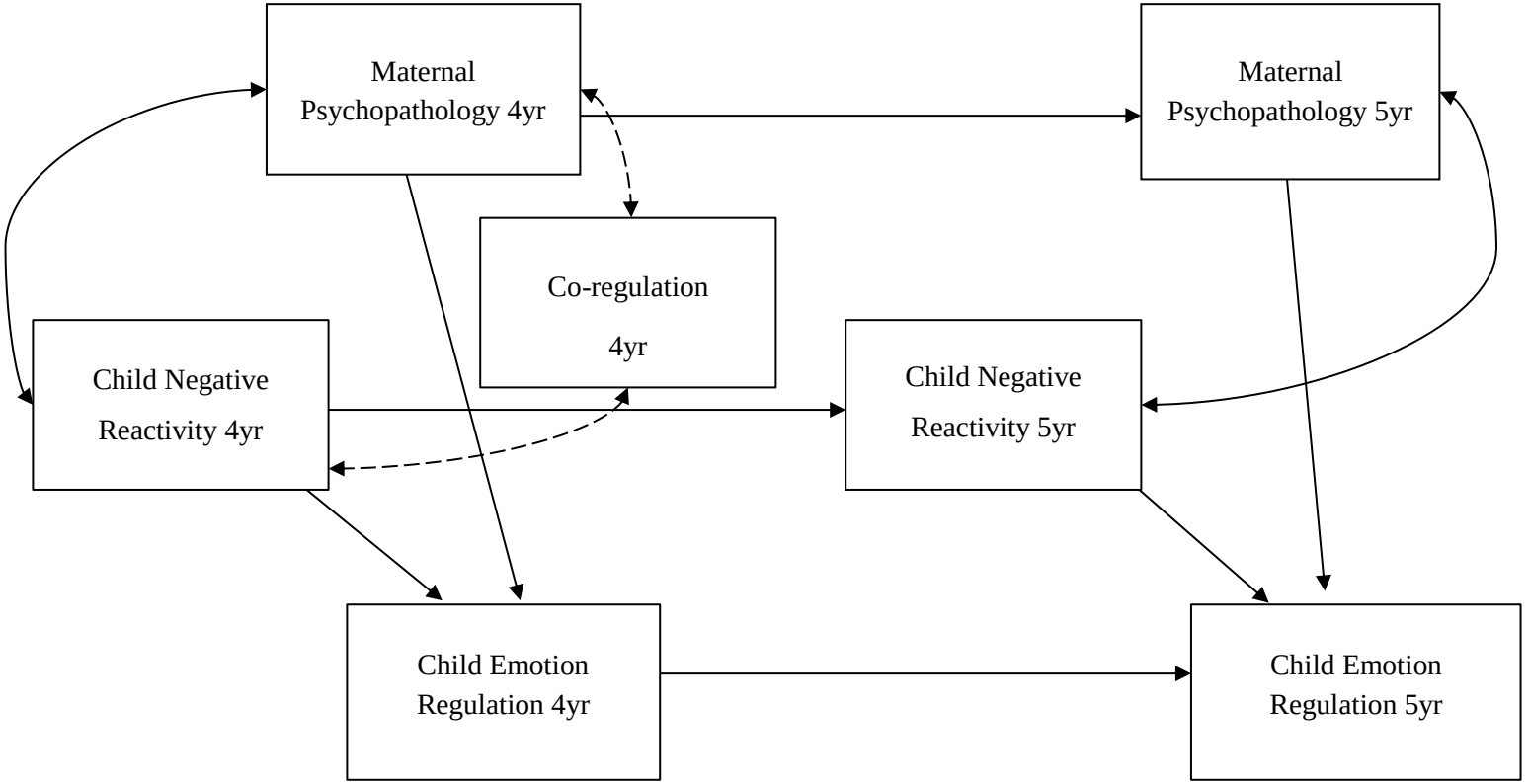


Figure 5. Co-regulation Over Time Model

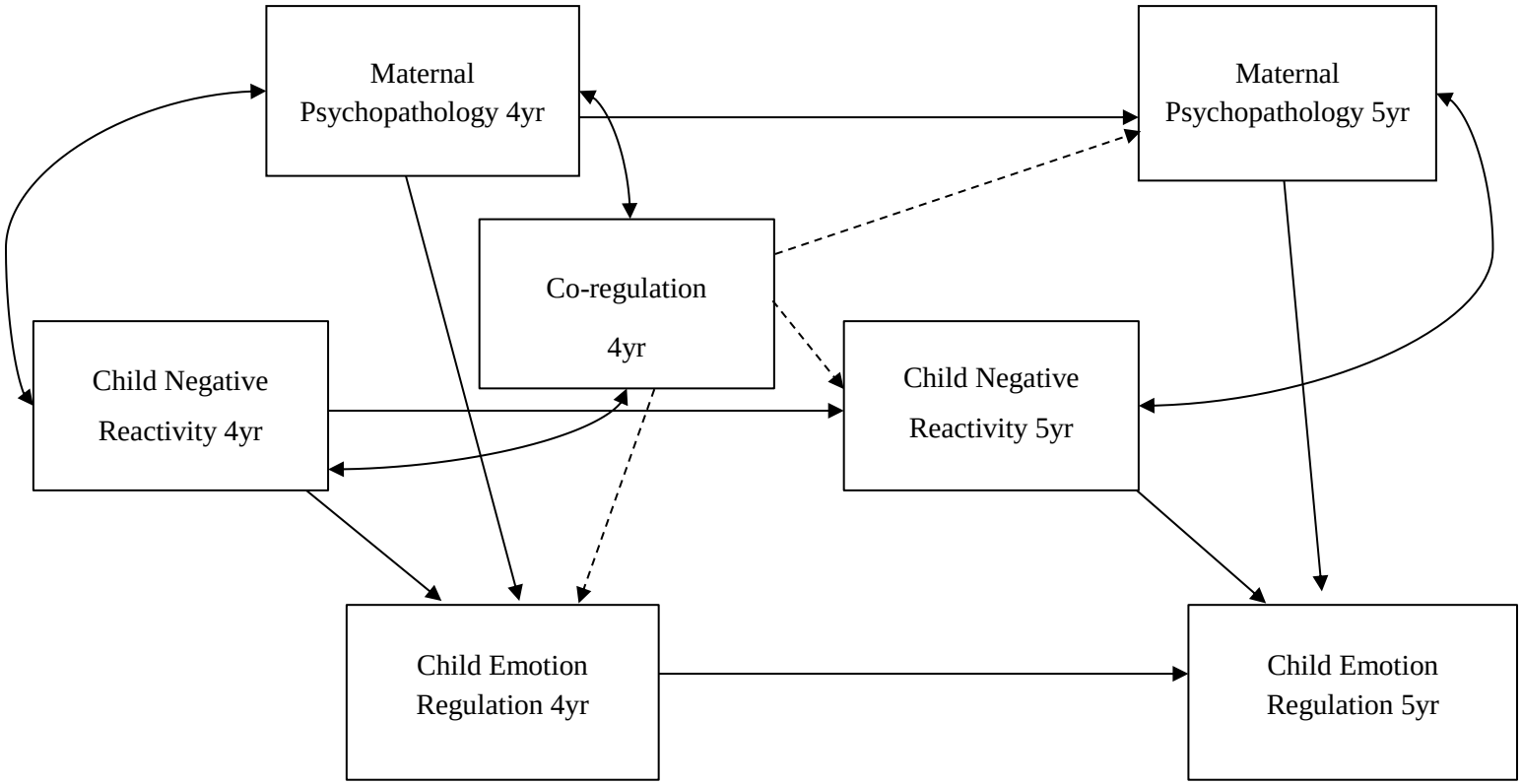


Table 1

Negative Reactivity at 4 Year

Measure	Mean	Standard Deviation	Min.	Max.	Variance	Kurtosis	Skewness
CBQ Negative Affect	4.07	.54	2.51	5.70	.30	.15	-.04
ERC Lability/Negativity Teacher	1.68	.49	1.00	3.07	.24	-.15	.74
Frustration Response "Toy in a Box" Task	1.22	.97	.00	4.00	.94	-.33	.47
Frustration Response "Perfect Circles" Task	.50	.72	.00	3.00	.52	1.21	1.34

Table 2

Negative Reactivity at 5 Year

Measure	Mean	Standard Deviation	Min.	Max.	Variance	Kurtosis	Skewness
CBQ Negative Affect	4.07	.59	2.34	5.86	.35	.10	.07
ERC Lability/Negativity Teacher	1.61	.48	1.00	3.33	.23	1.05	1.17
Frustration Response "Not Sharing" Task	1.43	1.05	.00	4.00	1.11	-.54	.41
Frustration Response "End of Line" Task	1.44	1.11	.00	4.00	1.23	-.42	.49

Table 3

Regulation at 4 Year

Measure	Mean	Standard Deviation	Min.	Max.	Variance	Kurtosis	Skewness
ERC Regulation Parent	3.31	.32	2.13	4.00	.10	.21	-.23
ERC Regulation Teacher	3.19	.47	1.50	4.00	.22	.50	-.82
Global Regulation "Toy in a Box" Task	2.78	.91	.00	4.00	.84	.27	-.65
Global Regulation Perfect Circles Task	3.35	.65	1.00	4.00	.43	.25	-.70

Table 4

Regulation at 5 Year

Measure	Mean	Standard Deviation	Min.	Max.	Variance	Kurtosis	Skewness
ERC Regulation Parent	3.32	.32	2.38	4.00	.10	-.49	-.16
ERC Regulation Teacher	3.19	.43	1.75	4.00	.19	.12	-.42
Global Regulation "Not Sharing" Task	2.86	.91	1.00	4.00	.83	-.86	-.27
Global Regulation "End of Line" Task	2.90	.96	.00	4.00	.92	-.01	-.65

Table 5

Maternal Psychopathology

Measure	Mean	Standard Deviation	Min.	Max.	Variance	Kurtosis	Skewness
4 year SCL-90 General Severity Index	49.53	11.33	30.00	81.00	128.39	-.56	-.13
5 year SCL-90 General Severity Index	49.36	11.17	30.00	73.00	124.83	-.76	-.18

Table 6

Co-regulation

Measure	Mean	Standard Deviation	Min.	Max.	Variance	Kurtosis	Skewness
CCNES Distress Reactions	2.57	.72	1.00	4.58	.52	-.32	.17
Interaction Effect	-1.14	1.74	-4.96	2.94	3.02	-.58	-.13

Table 7

Correlation Coefficients for Independent and Dependent Variables at 4 year

Measure	1	2	3	4	5	6	7	8	9	10	11
1. CBQ Negative Affect	--										
2. ERC Lability/Negativity Teacher	.08	--									
3. Frustration Response "Toy in a Box" Task	.11*	.16**	--								
4. Frustration Response "Perfect Circles" Task	.04	.18**	.14**	--							
5. ERC Regulation Parent	- .16**	-.05	.06	.06	--						
6. ERC Regulation Teacher	-.16**	-.49**	-.01	-.17**	.20**	--					
7. Global Regulation "Toy in a Box" Task	- .19**	-.12*	-.60**	-.27**	.08	.11	--				
8. Global Regulation "Perfect Circles" Task	-.03	-.16**	-.15**	-.53**	.12*	.13*	.28**	--			
9. Co-Regulation: CCNES Distress Reactions	.22**	.12	.07	.18**	-.23**	-.13	-.17**	-.17**	--		
10. Co-Regulation: Interaction Effect	-.01	-.01	.06	-.05	-.04	-.02	.01	.02	-.07	--	
11. SCL-90 GSI	.32**	.04	.03	.05	-.11	-.18*	-.11	-.12	.30**	-.05	--
12. Sex	.12*	-.20**	-.05	-.11*	.14**	.11	.03	.12*	-.06	-.01	-.07
13. Ethnicity	.21**	.08	-.09	-.03	-.03	-.11	-.02	-.06	-.09	-.04	.00

*Note. **p<.01,*p<.05*

Table 8

Correlation Coefficients for Independent and Dependent Variables at 4 year for Boys

Measure	1	2	3	4	5	6	7	8	9	10
1. CBQ Negative Affect	--									
2. ERC Lability/Negativity Teacher	-.02	--								
3. Frustration Response "Toy in a Box" Task	.11	.09	--							
4. Frustration Response "Perfect Circles" Task	.01	.18*	.13	--						
5. ERC Regulation Parent	- .15*	-.11	.10	-.19*	--					
6. ERC Regulation Teacher	-.13	-.54**	.03	-.08	.21*	--				
7. Global Regulation "Toy in a Box" Task	- .19*	-.12	-.55**	-.23**	.01	.05	--			
8. Global Regulation "Perfect Circles" Task	-.03	-.08	-.11	-.50**	-.01	.01	.31**	--		
9. Co-Regulation: CCNES Distress Reactions	.27**	.11	.13	.15	-.25**	-.09	-.24**	-.11	--	
10. Co-Regulation: Interaction Effect	-.01	.07	.04	-.02	-.02	-.02	.13	.06	.02	--
11. SCL-90 GSI	.38**	-.10	-.01	.11	-.10	-.16	-.19*	-.06	.29**	-.02

*Note. **p<.01,*p<.05*

Table 9

Correlation Coefficients for Independent and Dependent Variables at 4 year for Girls

Measure	1	2	3	4	5	6	7	8	9	10
1. CBQ Negative Affect	--									
2. ERC Lability/Negativity Teacher	.23**	--								
3. Frustration Response "Toy in a Box" Task	.12	.21**	--							
4. Frustration Response "Perfect Circles" Task	.09	.17*	.14	--						
5. ERC Regulation Parent	- .20**	.07	.04	-.04	--					
6. ERC Regulation Teacher	-.22**	-.42**	-.03	-.24**	.16*	--				
7. Global Regulation "Toy in a Box" Task	- .20**	-.11	-.64**	-.30**	.14^{+}	.16*	--			
8. Global Regulation "Perfect Circles" Task	-.05	-.20*	-.17*	-.54**	.19**	.23**	.27**	--		
9. Co-Regulation: CCNES Distress Reactions	.19*	.12	.03	.21*	-.20*	-.15	-.12	-.20*	--	
10. Co-Regulation Interaction Effect	-.02	-.11	.08	-.08	-.05	-.02	-.08	.00	-.15	--
11. SCL-90 GSI	.27*	.19*	-.06	-.00	-.11	-.20*	-.04	-.17*	.30**	-.07

*Note. **p<.01,*p<.05, $^{+}$p=.06*

Table 10

Correlation Coefficients for Independent and Dependent Variables at 5 year

Measure	1	2	3	4	5	6	7	8	9
1. CBQ Negative Affect	--								
2. ERC Lability/Negativity Teacher	.12**	--							
3. Frustration Response "Not Sharing" Task	.04	.27**	--						
4. Frustration Response "End of Line" Task	.11*	.09	.23**	--					
5. ERC Regulation Parent	-.18**	-.16*	-.03	-.07	--				
6. ERC Regulation Teacher	-.23**	-.50**	-.10	-.14*	.23**	--			
7. Global Regulation "Not Sharing" Task	- .00	-.26*	-.72**	-.18**	.01	.14	--		
8. Global Regulation "End of Line" Task	-.10	-.21**	-.13*	-.81**	.12*	.23**	.21**	--	
9. SCL-90 GSI	.28**	.15*	.08	.06	-.18**	-.12	.02	.04	--
10. Sex	.11*	-.19**	-.11	-.05	.19**	.16*	.12*	.09	-.07
11. Ethnicity	.15**	.11	.06	-.10	.04	-.04	.02	.12*	.00

*Note. **p<.01,*p<.05*

Table 11

Correlation Coefficients for Independent and Dependent Variables at 5 year for Boys

Measure	1	2	3	4	5	6	7	8
1. CBQ Negative Affect	--							
2. ERC Lability/Negativity Teacher	.21*	--						
3. Frustration Response "Toy in a Box" Task	.01	.22*	--					
4. Frustration Response "Perfect Circles" Task	.11	.01	.18*	--				
5. ERC Regulation Parent	- .15	-.24*	-.03	-.04	--			
6. ERC Regulation Teacher	-.31**	-.54**	.03	-.03	.23*	--		
7. Global Regulation "Toy in a Box" Task	.03	-.19	-.73**	-.16^{+}	-.02	.05	--	
8. Global Regulation "Perfect Circles" Task	-.11	-.20^{+}	-.10	-.80**	-.09	.16	.23**	--
10. SCL-90 GSI	.38**	.19	-.07	.04	-.17*	-.11	-.10	-.06

*Note. **p<.01,*p<.05, $^{+}$p=.06*

Table 12

Correlation Coefficients for Independent and Dependent Variables at 5 year for Girls

Measure	1	2	3	4	5	6	7	8
1. CBQ Negative Affect	--							
2. ERC Lability/Negativity Teacher	.23*	--						
3. Frustration Response "Toy in a Box" Task	.11	.32**	--					
4. Frustration Response "Perfect Circles" Task	.13	.12	.27**	--				
5. ERC Regulation Parent	- .26**	.04	.00	-.08	--			
6. ERC Regulation Teacher	-.19*	-.41**	-.14	-.22*	.20*	--		
7. Global Regulation "Toy in a Box" Task	- .06	-.28**	-.71**	-.19*	.01	.18^{+}	--	
8. Global Regulation "Perfect Circles" Task	-.10	-.18	-.14	-.82**	.12	.27**	.17*	--
10. SCL-90 GSI	.19*	.09	.22**	.07	-.17*	-.10	-.02	.04

*Note. **p<.01,*p<.05*

Table 13

Correlation Coefficients for Maternal Reported Variables across 4 and 5 year

Measure	1	2	3	4	5	6	7
1. CBQ Negative Affect 4 year	--						
2. CBQ Negative Affect 5 year	.79**	--					
3. ERC Regulation 4 year	-.16**	-.12*	--				
4. ERC Regulation 5 year	-.14*	-.18**	.62**	--			
5. SCL-90 GSI 4 year	.32**	.38**	-.11	-.18**	--		
6. SCL-90 GSI 5 year	.22**	.28**	-.12*	-.18**	.76**	--	
7. Co-Regulation: CCNES Distress Reactions	.22**	.24**	-.23**	-.15*	.30**	.27**	--
8. Co-Regulation: Interaction Effect	-.01	.00	-.04	-.07	-.05	.01	-.07

*Note. **p<.01,*p<.05*

Table 14

Correlation Coefficients for Teacher Reported Variables across 4 and 5 year

Measure	1	2	3	4	5	6	7
1. ERC Reactivity Pre-K	--						
2. ERC Reactivity K	.44**	--					
3. ERC Regulation Pre-K	-.49**	-.28**	--				
4. ERC Regulation K	-.15*	-.50**	.29**	--			
5. SCL-90 GSI 4 year	.04	.17*	-.18**	-.14	--		
6. SCL-90 GSI 5 year	-.00	.15*	-.15*	-.12	.76**	--	
7. Co-Regulation: CCNES Distress Reactions	.12	.14	-.13	-.04	.30**	.27**	--
8.Co-Regulation: Interaction Effect	-.01	-.08	-.02	.11	-.05	.01	-.07

*Note. **p<.01,*p<.05*

Table 15

Correlation Coefficients for Laboratory Observed Variables across 4 and 5 year

Measure	1	2	3	4	5	6	7
1. Frustration Response "Toy in a Box" Task	--						
2. Frustration Response "Not Sharing" Task	.18**	--					
3. Global Regulation "Toy in a Box" Task	-.60**	-.11*	--				
4. Global Regulation "Not Sharing" Task	-.15*	-.72**	.15**	--			
5. SCL-90 GSI 4 year	.03	.01	-.11	.02	--		
6. SCL-90 GSI 5 year	.05	.08	-.05	.03	.76**	--	
7. Co-Regulation: CCNES Distress Reactions	.07	.09	-.17**	-.08	.30**	.27**	--
8. Co-Regulation: Interaction Effect	.06	-.07	.01	.06	-.05	.01	-.07

*Note. **p<.01,*p<.05*

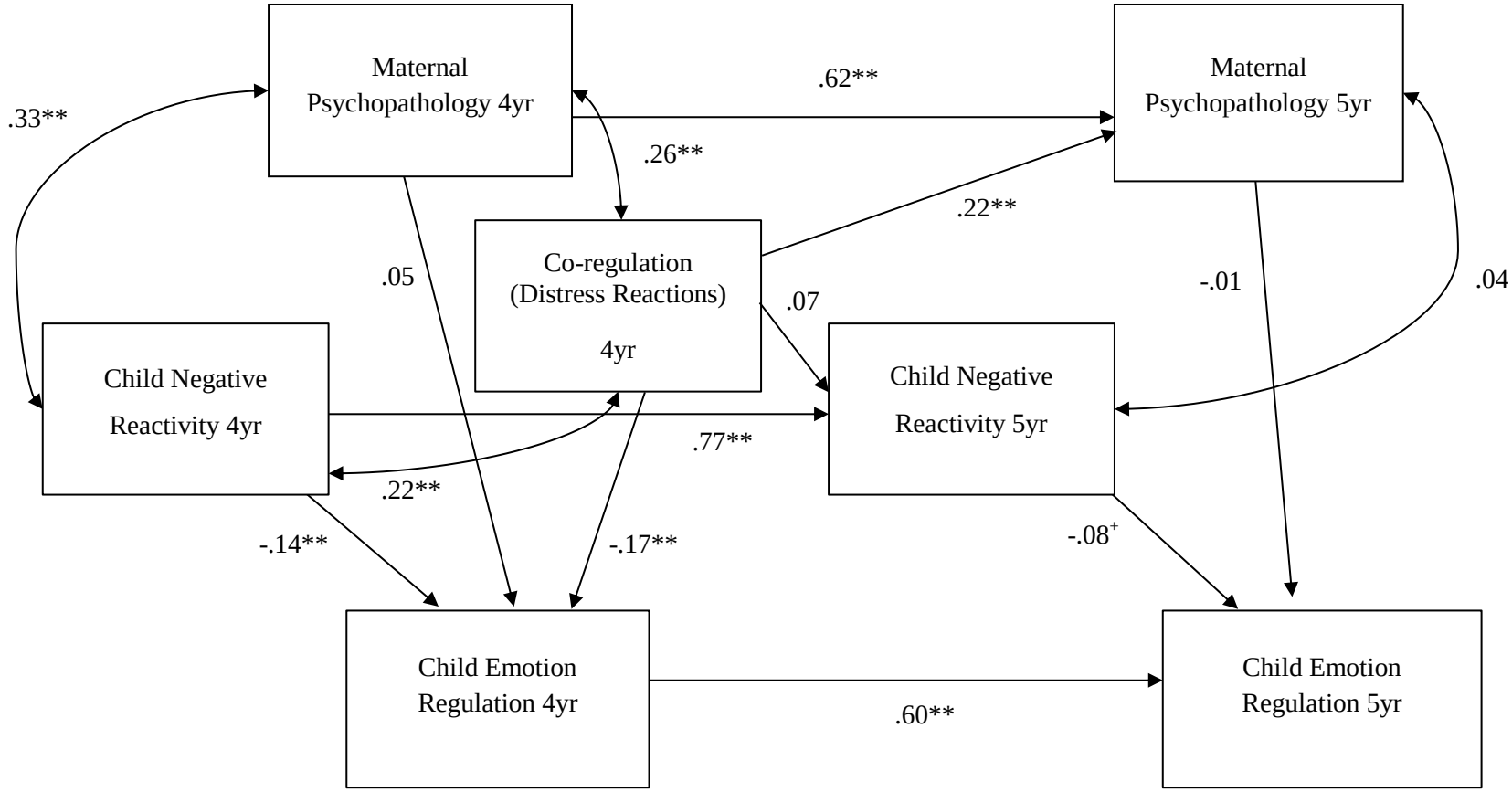
Table 16

Correlation Coefficients for Laboratory Observed Variables across 4 and 5 year cont.

Measure	1	2	3	4	5	6	7
1. Frustration Response "Perfect Circles" Task	--						
2. Frustration Response "End of Line" Task	.10	--					
3. Global Regulation "Perfect Circles" Task	-.53**	-.03	--				
4. Global Regulation "End of Line" Task	-.08	-.81**	.04	--			
5. SCL-90 GSI 4 year	.05	.14*	-.12	-.10	--		
6. SCL-90 GSI 5 year	-.00	.06	-.07	.04	.76**	--	
7. Co-Regulation: CCNES Distress Reactions	.18**	.23**	-.17**	-.23**	.30**	.27**	--
8. Co-Regulation: Interaction Effect	-.05	-.01	-.02	-.08	-.05	.01	-.07

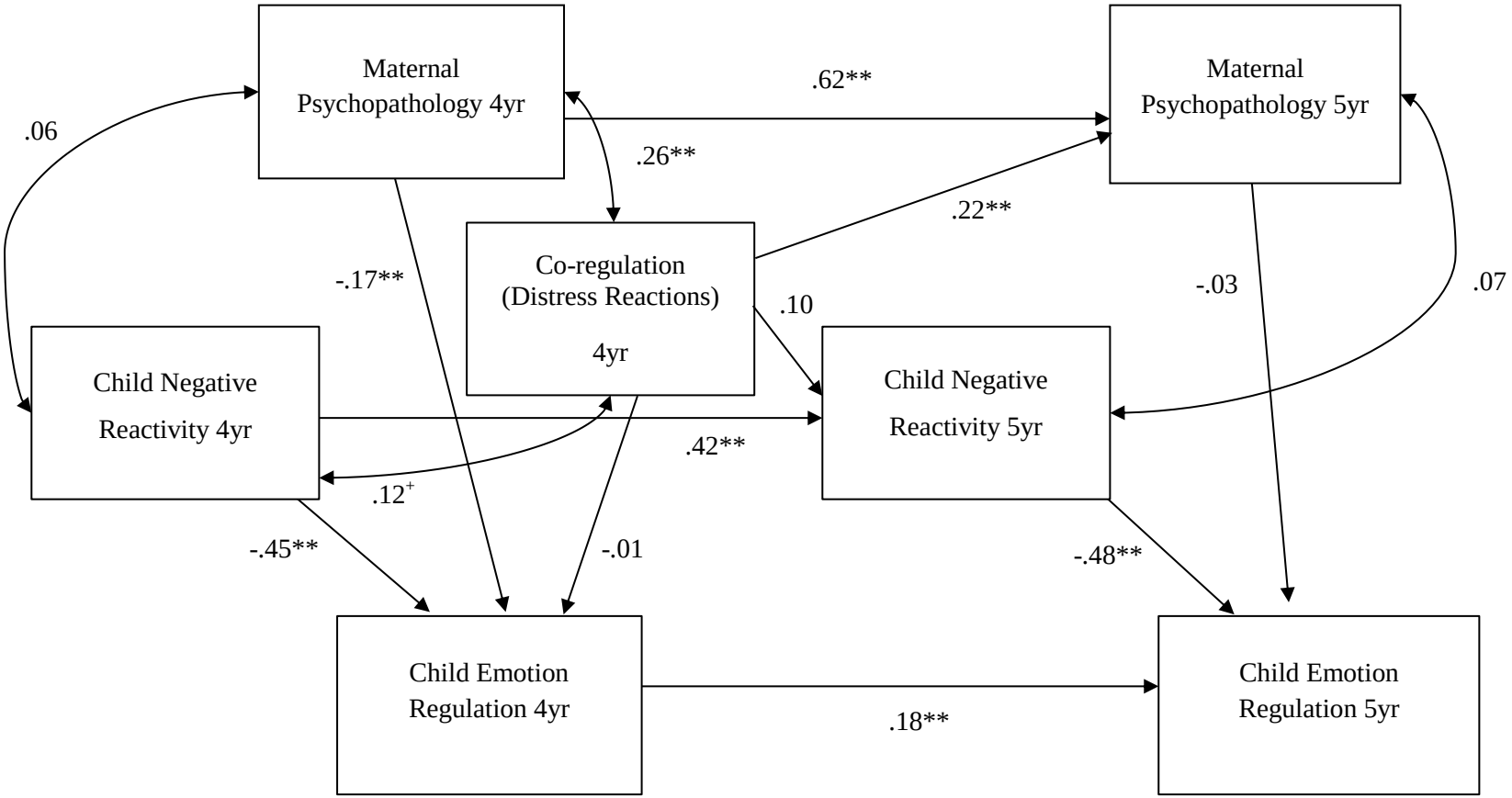
*Note. **p<.01,*p<.05*

Figure 6. Co-regulation Over Time Model using Maternal Report of Reactivity and Regulation



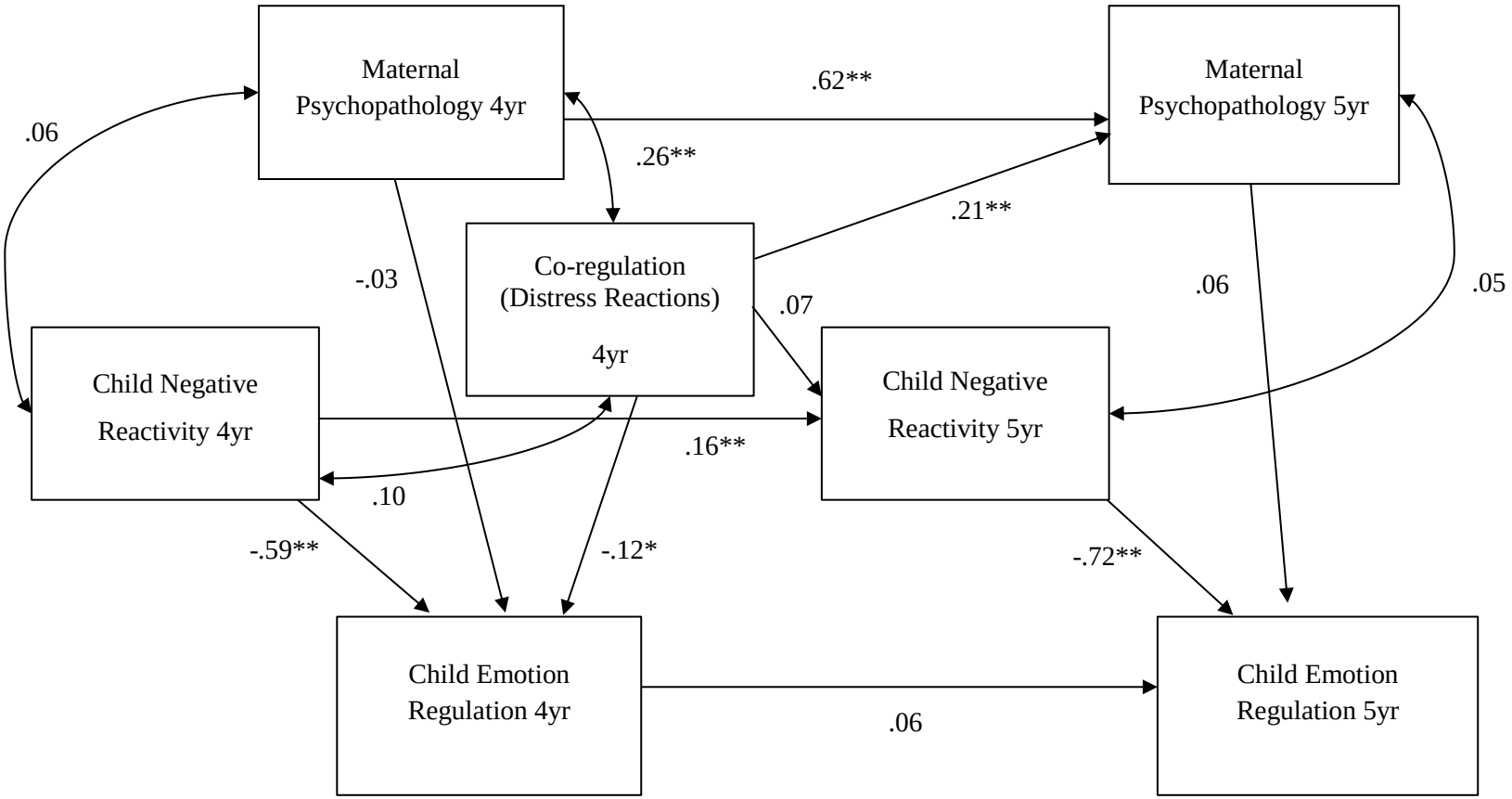
Note. ***p*<.01, +*p*=.06

Figure 7. Co-regulation Over Time Model with Teacher Report of Reactivity and Regulation



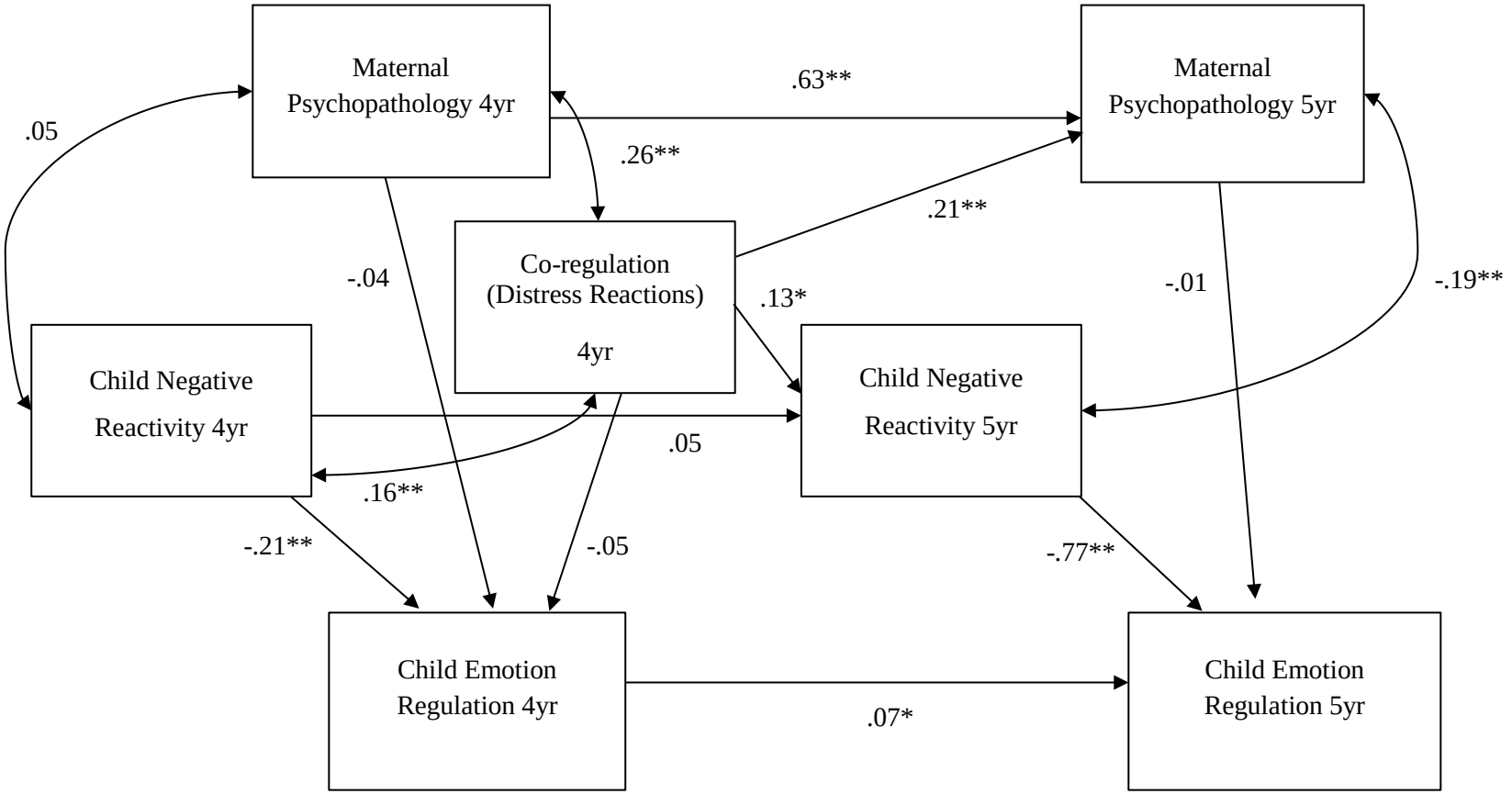
Note. ***p*<.01, +*p*=.06

Figure 8. Co-regulation Over Time Model with Laboratory Observed Reactivity and Regulation



*Note. **p<.01,*p<.05*

Figure 9. Co-regulation Over Time Model with Additional Laboratory Observed Reactivity and Regulation



*Note. **p<.01,*p<.05*