BEYOND SENSITIVITY: MATERNAL POSITIVE EMOTION AND ITS RELATION TO CHILD REGULATION

A Thesis in
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by
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ABSTRACT

Although links between positive aspects of parenting and children’s self-regulation are well established, the immediate influence of how mothers communicate (i.e., convey positive emotion) on aspects of toddler’s self-regulation strategy use and emotion expression is unknown. We investigated the role of maternal positive emotion with a sample of 112 24-month-olds (46% female; $M_{age} = 24.40$ months, $SD_{age} = 1.31$) and their mothers during a laboratory-based wait task. Specifically, we investigated the extent to which maternal nonverbal positive emotion expression (i.e., facial and vocal cues) accounted for increases in toddlers’ strategy use, specifically distracting from the demands of waiting, or decreases in their frustration, namely their nonverbal negative emotion expression. Results of multilevel modeling revealed that maternal positive emotion predicted toddler engagement in distraction, but in the opposite direction predicted, and did not predict toddler negative emotion. There was mixed evidence for the role of maternal positive emotion, with some findings suggesting that maternal positive emotion may be worthwhile to study as an isolated component of parental sensitivity.
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Chapter 1. INTRODUCTION

Emotion regulation, broadly defined as processes that monitor, evaluate, and modify emotional reactions (Thompson, 1994), contributes to children’s social competence and healthy outcomes. The ability to regulate emotion has been shown to relate to likability, peer acceptance, and school achievement (Denham, McKinley, Couchoud, & Holt, 1990; Graziano, Reavis, Keane, & Calkins, 2007; Hernandez et al., 2016) while emotional dysregulation is argued to be an underlying aspect of many forms of child psychopathology (Cole, Michel, & Teti, 1994; Keenan, 2000). Given that parental influences are purported to contribute to the successful development of children’s emotion regulation (Kopp, 1982, 1989), understanding how parents support children’s emerging ability to regulate can elucidate ways that parenting is a mechanism to promote healthy child outcomes.

The development of self-regulation begins as early as infancy even when children depend largely on their caregivers to deal with distress (Feldman, 2003; Kochanska & Askan, 2004; Tronick & Cohn, 1989). Although relying on others continues throughout the lifespan, as infants reach toddlerhood they begin to exercise some autonomy. Toddlers learn how to engage in more controlled behavior, as evidenced by their complying with adult directions to stop doing something they should not or engage in activity they do not prefer, e.g., go to bed or clean up toys (Brownell & Kopp, 2010; Kopp, 1982). By age 3 years, Kopp (1982) postulated that most young children begin to initiate self-control, due to both the maturation of cognitive and language skills and their socialization experiences. These experiences provide the opportunity for dyadic exchanges with caregivers that can help children develop regulation of autonomous behavior. For example, toddlers often refuse to comply or attempt to engage in unsafe autonomous behavior, eliciting parent-toddler exchanges that can include parent and/or child
negative emotion. Parent-toddler dyads that are “mutually oriented” in a compliance task are characterized by interactions that include positive emotion expressions (Kochanska, 1997), however other parent-toddler dyads tend to have mutually negative exchanges (Lorber & Egeland, 2011). Although these studies do not investigate emotional expressions specifically, it is possible that a parent’s expressions when toddlers are frustrated and noncompliant may have an effect on their behavior in the moment and ultimately guide the development of toddler self-regulation.

By a young age, toddlers have a small repertoire of regulatory strategies (Cole et al., 2011; Mangelsdorf, Shapiro, & Marzolf, 1995; Stansbury & Sigman, 2000). Although exchanges with caregivers provide socialization experiences, such as teaching these self-regulation skills, parents differ in how they communicate to their toddlers and provide intervention. The literature suggests specific parenting behaviors that are likely to foster self-regulation development in children, however, a gap in the literature is a focus on how a parent communicates in addition to what a parent communicates (Steinberg & Darling, 2017). There are many elements to how a parent communicates, including nonverbal information such as facial/vocal expression. Although what a parent does is important, how they communicate (e.g., explanations, tone of voice, rate of speech) may also convey information. Thus, the way such a message is delivered rather than its verbal content may influence how well toddlers attempt to regulate their own behavior or how negatively they react to the instruction. Evidence indicates that young children perceive variations in the nonverbal emotional expressions of adults, and that nonverbal emotion guides toddlers’ subsequent emotion and behavior (Cummings, Iannotti, & Zahn-Waxler, 1985; Klinnert, Emde, Butterfield, & Campos, 1986; Repacholi & Meltzoff, 2007). This suggests that parents convey important information nonverbally, and thus, the focus of this study was on the
caregiver’s nonverbal expressions. Specifically, the caregiver’s facial expression and tone of voice—negative or positive—may influence what the child does next. One way the child may react is by following the caregiver’s guidance. For example, when a parent offers a suggestion, such as “sing a song while you wait”, their toddler may engage in the distraction. Distraction is considered an optimal strategy in delayed reward tasks (Gilliom et al., 2002; Mischel et al., 2010) and it could be that mother’s positive emotion in the moment creates space for a child to use their own internal resources and engage in a more developmentally mature strategy to tolerate the wait. Alternatively, another toddler may react negatively. For example, when a parent reminds a child of a rule, such as “no, no, you have to wait,” the toddler may protest or whine. Although the literature largely focuses on negative emotion, our study seeks to investigate how nonverbal maternal positive emotion might influence a toddler’s reaction, specifically the extent a toddler engages in a self-regulation strategy or becomes upset.

The Transactional Model of Development

Developmentally, the foundations of self-regulation of emotion emerge from the bidirectional interactions of children and their caregivers. The transactional model (Sameroff, 2009, 2010) emphasizes the bidirectional nature of development—individuals continuously act on their environment and the environment acts on the individuals. Since the family is considered a principal context for development to occur, caregiving relationships are often studied as important elements of children’s environments (Bronfenbrenner, 1986). Development is the result of these ongoing dynamic transactions between parent-child dyads that result in modification of each other’s behaviors. Thus, parental and child behaviors do not occur in isolation but are often responses to each other’s behavior, resulting in a bidirectional moment-to-

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1 The majority of research on caregiver-child interaction focuses on mothers as caregivers. Thus, the remainder of this thesis will refer to mothers.
moment sequence of transactions. The transactional model has been examined in mother-child interactions when examining problem behaviors (Combs-Ronto, Olson, Lunkenheimer, & Sameroff, 2009; Gross, Shaw, Burwell, & Nagin, 2009; Paterson & Sanson, 1999), in teacher-student interactions when examining child competence (Connor et al., 2011; Morrison & Connor, 2009), and more recently extended to caregiver-child interactions transacting with culture (Bornstein, 2009).

The transactional model emphasizes transactions over longer scale time periods, such as months and years, that influence developmental outcomes, and includes the bidirectional nature of parent-child interaction, such as moment-to-moment influences between a mother and child. These moment-to-moment influences have often been studied within the context of rupture and repair in dyads (Benjamin, 1974; Skowron, Kozlowski, & Pincus, 2010). Rupture is defined by interpersonally negative behavior in the course of an interpersonally positive interaction, and repair is defined as a return to interpersonally positive behavior after the rupture. Although ruptures are common, more stable dyads with better long-term outcomes are characterized by successful repairs (Tronick, 1989). This perspective has been used to study adult interactions and caregiver-infant interactions but only once with mothers and non-infant young children (Skowron et al., 2010). Overall, these studies suggest that how one person addresses a dyadic partner influences the partner’s behavior, both in terms of mutual reciprocity but also in terms of making a negative interaction more positive.

We consider the dyadic interaction literature in the context of a task designed to frustrate toddlers and evaluate their capacity to initiate regulatory attempts while in the presence of their mothers who are occupied with another task. In this task, mothers tend to remain busy with their work while toddlers must wait to open a gift with only one boring toy with which to play.
Mothers do not interact much with their toddlers except when their children appear to be trying to touch or open the restricted gift, at which point they usually remind their children to wait. Mothers’ emotional tone as they do so may influence toddler behavior in the moment. Specifically, we investigate whether maternal positive emotion increases the likelihood that toddlers use a self-regulatory strategy, namely distracting themselves with a different activity, and whether maternal positive emotion minimizes the likelihood of toddlers responding negatively to their mothers’ reminders.

Imagine a situation in which a mother tells her child to wait to open a gift until she has finished her work. Mothers may tend to ‘let sleeping dogs lie’; if the toddler is patiently waiting, the mother can attend to her own work. However, if the toddler becomes frustrated or tries to open the gift, a mother may orient away from her work and to the child, saying something like: “No, you have to wait.” If such statements are communicated with positive emotion, it should, as we further discuss, contribute to the toddler’s behavior and dyadic interaction. Thus, the mother’s behavior is changed by the child’s behavior and the way a mother communicates in reaction to the child may change the child’s behavior (e.g., ongoing ability to tolerate the wait).

**Maternal Nonverbal Emotion**

The majority of research on mother-child dyadic interaction focuses on negative emotion, showing that mutual anger, emotional mismatches, and rigidity characterize the exchanges of mothers and their children with behavior problems (Cole, Teti, & Zahn-Waxler, 2003; Hollenstein, Granic, Stoolmiller, & Snyder, 2004; Lunkenheimer, Albrecht, & Kemp, 2013). Although maternal positive emotion has been a focus of many studies, it is often examined in the larger context of parental sensitivity or emotional availability, including terms such as warmth, mutual orientation, and responsiveness (Bell & Ainsworth, 1972; Biringen, Robinson, & Emde,
2000; De Wolff & Van IJzendoorn, 1997; Kochanska, 2017). For example, sensitivity is defined as the ability to perceive and respond to others’ signals while emotional availability considers facial and vocal expressions to determine overall pleasure in an interaction. Global ratings of maternal sensitivity and emotional expressiveness predict more expressions that are positive, more strategy use, and fewer externalizing symptoms in young children (Calkins & Johnson, 1998; Eisenberg et al., 2001; Garner, 1995; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Reuben et al., 2016). Nonverbal expressions of positive emotion are embedded in these overarching constructs but fewer studies investigate the specific contribution of maternal positive emotion on child behavior and emotion. Some evidence suggests that positive emotion may impact young children’s compliance and prosociality. For example, shared positive emotion in mother-child dyads predicts committed compliance, defined as the acceptance of maternal directions, and internalization of compliance (Kochanska, 1997; Kochanska & Askan, 1995). Therefore, maternal positive emotion, such as facial expression, tone of voice, and body language, may help toddlers cope much in the way that a caregiver can ‘repair’ a dyadic interaction, i.e., reducing the likelihood of a toddler’s emotionally negative reaction or increasing the likelihood of the toddler engaging in a self-regulatory effort, even beyond what can be predicted by general parental sensitivity.

Maternal sensitivity and positive parenting have been studied in tasks designed to elicit children’s negative emotion, such as delayed reward tasks. For example, maternal positive guidance (i.e., positive verbal expressions and physical affection) was related to 18-month-olds’ use of distraction and constructive coping (Calkins & Johnson, 1998). Further evidence shows that children from dyads characterized by maternal positive control (i.e., positive involvement, encouragement, and positive emotion) were more likely to engage in regulatory behaviors and
shift their attention during a frustrating wait task at age 3 ½ years (Gilliom et al., 2002). Again, these studies look at global positive parenting and are not designed to understand the specific momentary effects of mother’s positive emotion on young children’s behavior in delayed reward tasks. The degree to which the specific component of positive emotion matters for toddler regulation may also have implications for early intervention, such that positive emotion may be a teachable element to improve child outcomes (e.g., parental use of praise, positive tone of voice). We next discuss the ways that maternal positive emotion may have an independent influence on reducing a toddler’s angry emotion and increasing their attempts at self-regulation.

**Benefits of Positive Emotion**

The “broaden and build” theory (Fredrickson, 1998; Fredrickson & Branigan, 2005) asserts that positive emotions broaden individuals’ thought-action repertoires and thus, build enduring physical, intellectual, and social resources. While negative emotions usually function to support adaptation to challenges by narrowing attention and organizing behavior to confront or avoid the challenge (Finucane, 2011; Nobata, Hakoda, & Ninose, 2010), positive emotions broaden the scope of attention, cognition, and action. This in turn leads to behavioral flexibility, persistent problem solving, and enhanced well-being (Fredrickson & Branigan, 2005; Isen, 2008). Broaden and build theory suggests that positive emotion in children enhances their ability to engage in self-regulatory strategies. Evidence for this comes from children ranging from 18-to 26-months-old and 3- to 5-years-old in which children’s positive emotion led to more frequent use of behavioral strategies and greater likelihood of choosing a delayed reward rather than an immediate one (Mischel et al., 2010; Moore, Clyburn, & Underwood, 1976; Roque & Veríssimo, 2011).
Positive emotion tends to enhance cognition and flexibility in thinking (Fredrickson & Branigan, 2005; Isen, 2008). While the “broaden and build” theory is an intrapersonal theory, toddlers are largely dependent on external resources, such as their parents, as they develop self-regulation. It could be that mother’s positive emotion functions as one of these resources to help the child hear and understand what the mother is saying and increase the likelihood of strategy use. Since distraction has often been studied as an optimal strategy to help children delay immediate gratification and achieve a goal (Gilliom et al., 2002; Mischel et al., 2010), and positive emotion may enhance internal resources and facilitate the use of distraction, distraction was chosen as the strategy of interest in this study. No study has addressed how maternal positive emotion in the moment influences toddler behavior in that same moment during a delayed reward task. Possibly, maternal positive emotion enhances toddlers’ behavior in that moment. Maternal positive emotion may help a frustrated toddler be less angry. It may also increase the likelihood of the toddler engaging in a strategy, e.g., taking up a mother’s suggestion to engage in activity that distracts the child from the demands of waiting.

The few studies of mother’s positive emotion and child outcomes in tasks designed to elicit negative emotion during a dyadic interaction investigate dyadic flexibility and its relation to children’s later development. Dyads with few or improved conduct problems show a pattern of mutually regulated and reciprocal positive emotion from preschool to early school age (Cole et al., 2003). The combination of dyadic positive emotion and flexibility – defined by transitions between emotional states, engagement in a range of emotional intensity levels, and dispersion among these levels – in dyadic interactions when children were 3 years of age predicted lower levels of internalizing behaviors when the children were 5 years old (Lunkenheimer, Olsen, Hollenstein, Sameroff, & Winter, 2011). Together, these findings from these studies of preschool
age children highlight an important role of positive emotion on decreased problem behavior. However, they highlight the relative lack of research on the benefits of positive emotion on children’s skills, and their focus on preschool age children does not directly address the gap of mother positive emotion and emotion regulation in the toddler period (i.e., an important period in emotion regulation development). No study to date investigates the direct influence of maternal positive emotion on frustrated toddlers’ emotion and strategy use.

**Current Study**

Although mother-child dyadic flexibility and maternal sensitivity have been studied as influences on aspects of children’s development, it is unknown how maternal positive emotion functions during a task that challenges toddler self-regulation in terms of influencing toddler attempts to self-regulate (i.e., use a strategy). In such a task, mothers tend to orient away from their work and toward their children when the toddler is not tolerating the wait (e.g., tries to open the gift) (LeDonne, 2011, 2015). Thus, mother instruction may elicit varying toddler reactions, ranging from engagement in a strategy to increased negative emotion. To address this gap in knowledge, the current study investigates the contribution of maternal positive emotion on a toddler’s strategy use and emotion based on modeling moment-to-moment time-series data.

This study uses archived, coded observational data from a longitudinal study, focusing on a task in which toddlers (24-month-olds) were told by their mothers to wait to open a gift while their mothers were busy working and toddlers only had one boring toy. We focus on how maternal positive emotion contributes to toddlers’ ability to tolerate a wait. Therefore, we use multilevel models to test associations between maternal positive emotion and (1) toddler strategy use (e.g., distraction) and (2) toddler negative emotion (e.g., anger, sadness, and tension). We predicted that more maternal positive emotion would be: (1) associated with greater likelihood of
toddler strategy use and (2) associated with decreased likelihood of toddler negative emotion expressions. Given that maternal sensitivity may contribute to the frequency of maternal expression of positive emotion, we controlled for maternal sensitivity in the models (Conway et al., 2014; Leerkes, Blankson, & O’Brien, 2009). Toddler temperament, such as their proneness to negative emotion and their ability to shift attention or inhibit their responses, may contribute to toddler expression of emotion and behavior. In addition, since mother-toddler interaction does not occur in isolation, but is rather the response to another’s behavior or emotion, we also accounted for the influence of toddler temperament (i.e., negative affectivity and effortful control) in the models (Calkins, 1994; Rothbart & Bates, 2006).

Chapter 2. METHOD

Participants

Participants in this study were part of a larger longitudinal study on the development of emotion regulation in typically developing children from economically strained, rural and semi-rural families (The Development of Toddlers Study; Cole, Nelson, Crnic, & Blair, 2000). Of the original 124 families, 120 completed most of the eight planned visits that took place between child ages 18 to 48 months. Visits were scheduled at the child’s birthday, such that there was little age variability at any given age point. Families were eligible to participate if their household income (all sources) placed their annual income at the first visit above the poverty threshold (as defined by the United States government) and below the national median income for their family size. Families were not eligible to participate if they indicated that they planned to move from the area during the period of the study, the child had a condition (e.g., disability, medical disorder, or psychological disorder) that would interfere with valid procedure administration, or if guardians had not lived with the child since age 3 months. Over the course
of the study, four of the 124 families withdrew (retention rate = 96.8%) and did not provide enough data for inclusion in longitudinal analyses. Families who withdrew did not differ on any demographic characteristics from families included in the sample. For the present study, we used data collected from a wait task during a laboratory visit when children were 24 months old (+/- 2 weeks). Of the remaining 120 families, eight families were removed from the analyses due to: inability to schedule the 24-month laboratory visit, attending the visit but not completing the wait task (e.g., toddler had become tired and uncooperative), or completing less than half the wait task due to opening the gift too early or becoming too distressed.

The participants included in this study were 112 (61 boys, 51 girls) children at ages 24 months \( (M_{age} = 24.40 \text{ months}, SD = 1.31) \) and their mothers \( (M_{age} = 31.55 \text{ years}, SD = 5.47) \). The children visited the lab within 2 weeks of their 2\(^{nd} \) birthday. Participants were recruited from rural and semi-rural communities in a mid-Atlantic state by distributing letters and posting flyers in census tracts that had higher proportions of families with lower income and with young children. A few families participated after hearing about the study from other participants.

Participating mothers identified their children as follows: 93% Caucasian, 7% biracial. Of the participating mothers, 34% had not attended college and 64% had completed some college courses or earned a college degree. The average household annual income at child age 24 months was $40,230 (\( SD = $14,513 \)). The income-to-needs ratio (INR) measures a family’s ability to meet basic needs based on income relative to national standards (United States Census Bureau, 2001-2003). An INR of < 1 indicates poverty while > 3 indicates average income. Average INR \( (M = 2.32, SD = 0.91) \) for the 112 included families indicated economic strain. During the first home visit at 18 months, parents provided informed consent for themselves and their children to
complete four in-home visits and four lab visits. This research was approved by the Institutional Review Board at The Pennsylvania State University.

**Procedures**

The Development of Toddlers Study (D.O.T.S.) research team conducted 2.5 to 3 hour-long laboratory visits at the Child Study Center at the university. Trained research assistants (RA) administered challenging (e.g., wait task, clean up) and non-challenging (e.g., free play, reading) tasks to participating mother-child dyads. After the visit, mothers were compensated for their time and children received small toys as gifts.

The present study focused on the wait task, first introduced by Block and Block (1980) and adapted by Vaughn et al. (1986). This task and its variations all involve requiring children to wait for something they want and measuring how children handle the frustration of waiting. The D.O.T.S. version of the wait task required mothers to tell their children that they had to wait to open a wrapped gift until mothers had completed a set of questionnaires. The wait was eight minutes long. Earlier in the visit, mothers were told that we wished to observe their children waiting, and were instructed to do whatever they would typically do if they required the child to wait. Mothers were given a clipboard with written instructions for the task and a set of questionnaires to complete. Before leaving the room, the research assistant placed a wrapped gift on the child’s table and said “This is a surprise for you.” They also handed the child a boring toy, adding “Here is something for you to play with. I will be back in a few minutes.” At 24-months, the boring toy was a cloth cymbal. As instructed, the mothers told their children, “That is a surprise for you, but you can’t open it until I finish my work.” After eight minutes, the research assistant returned and the mothers allowed their children to open the wrapped gift.
Observational Coding

The entire laboratory visit was video recorded. Toddler and mother emotion were coded second-by-second for eight minutes of the wait task (i.e., 480 seconds of data), each independently using nonverbal facial, vocal, gestural, and postural indicators of anger, sadness, tension, and joy and were rated for intensity on a 1-3 (minimal to strong) ranking (Cole et al., 2003). The emotion variables were collapsed into dichotomous variables, 1 (they displayed the emotion) and 0 (they did not display the emotion). Toddler strategy use and desire for the gift were also coded on a second-by-second basis by a third team. Strategies include focusing on the gift, self-soothing, bids about task demands, bids involving information seeking, and distraction. Due to high incidence of zeros in strategy variables, they were also collapsed into dichotomous variables, 1 (they engaged in the strategy) and 0 (they did not engage in the strategy).

Variables of Interest. For the purposes of this study, we were interested in child negative emotion (i.e., anger, sadness, and tension), mother positive emotion (i.e., happiness), and child strategy (i.e., distraction). Although the wait task was specifically designed to elicit anger by blocking a child’s goal to open the gift, many prior studies have combined anger, sad, and tension codes into an overall negativity score (e.g., Lorber & Slep, 2005). Thus, we combined the child anger, sadness, and tension scores into one child negative emotion variable. This study also focused on distraction as the child strategy of interest, as it is considered a more mature behavioral strategy (Cole, Bendezú, Ram, & Chow, 2017) and has been examined in prior studies (Gilliom et al., 2002; Mischel et al., 2010; Moore et al., 1976; Roque & Veríssimo, 2011). Coders differentiated between toddler focused and unfocused forms of distraction. Unfocused distraction involved the toddler not being absorbed in activity, usually appearing as aimless redirection of attention. Focused distraction involved the toddler becoming absorbed by
an activity. For the purposes of this study, we collapsed across focused and unfocused distraction to create a general distraction variable.

**Covariates.** To rule out alternative explanations for significant associations between toddler emotion, toddler strategy use, and mother emotion, we controlled for a number of dyad factors (i.e., child temperament and maternal sensitivity at child age of 18-months).

*Child Temperament.* Mothers completed the Toddler Behavior Assessment Questionnaire-Revised (TBAQ-R; Goldsmith, 1996; adapted by Rothbart, 1996) at child age 18 months. This 105-item parental report measure is designed to assess temperament-related behavior in children 16 to 36 months of age by asking parents to report on their child’s reaction to a number of situations. Mothers rated their children’s actions in the past two weeks on a scale from one (extremely untrue) to seven (extremely true). We included the Negative Affectivity (NA) scale and Effortful Control (EC) scale from the TBAQ-R. We derived a NA scale based on the mean of scaled anger, sadness, social fearfulness, and soothability (reverse-scored) scores ($\alpha = 0.81, M = 3.45, SD = 0.54$). We derived an EC scale based on the mean of scaled attentional focusing, attentional shifting, and inhibitory control scores ($\alpha = 0.81, M = 4.51, SD = 0.56$). Since NA is closely related to reactivity (e.g., expression of negative emotion), we controlled for NA in our models predicting toddler expression of negative emotion. Since EC may be more closely related to regulation (e.g., the engagement of strategy), we controlled for EC in our models predicting toddler engagement in distraction.

*Maternal Sensitivity.* Maternal sensitivity was assessed during the 18-month home visit using the Parent-Child Interaction Rating System (Belsky, Crnic, & Woodworth, 1995). In this procedure, the observer (i.e., research assistants) watches the family for ten minutes and makes ratings during the following five minutes. These rating periods characterize the quality of
parenting on a 5-point scale, 1 being less sensitive and 5 being more sensitive. This rating pattern was repeated six times, yielding 60 minutes of ratings. Reliability criteria for training the research assistants were defined as a minimum of 70% exact agreement and 95% agreement within one scale point (against a master coder) on the 5-point sensitivity rating scales. To ensure cross-rater reliability and to avoid any observer drift, consensus ratings were regularly conducted on the home observation videotapes. Reliability was calculated from 7% of the home visits; 70% of the ratings were an exact match and 98% of the ratings were within one-point. This study used a global maternal sensitivity score assessed during the 18-month home visit as a control variable. We derived these scores by averaging across the six epochs of data to obtain an overall maternal sensitivity score ($M = 3.33$, $SD = 0.80$).

**Data Analytic Plan**

We screened all data files for entry errors and merged files to combine all variables into one long time-series dataset. The original dataset included 53,760 seconds of data nested within 112 children. There is no standard on the optimal time unit for capturing micro-coded behavioral information or the optimal lag time for capturing moment-to-moment transactions. Some studies suggest concurrent and delayed effects that range anywhere between 1- to 15-seconds lag time (Ekas et al., 2011; Morris et al., 2011; Ravindran et al., 2017). For the purposes of this study, 10-seconds was chosen as the appropriate interval length from mother positive emotion to toddler distraction and negative emotion, as descriptive data showed that the variables of interest were captured within this time frame. Thus, the data was binned into 48 10-second intervals to create a final dataset containing toddler emotion scores, toddler strategy scores, and maternal emotion scores for 5,376 intervals of data nested within 112 children.
To test the study hypotheses, we focus on three variables of interest. The predictor variable is the occurrence of maternal nonverbal (facial and/or vocal) positive emotion in each time interval. The outcome variables are: occurrence of toddler engagement in distraction and occurrence of toddler negative emotion in each time interval. Inspection of the distribution for maternal positive emotion indicated that 22% of mothers did not display any positive emotion during the task. All variables of interest are dichotomous, representing whether or not the mother displayed positive emotion and whether or not the toddler used distraction or displayed negative emotion.

Three covariates were also considered in the analyses: child negative affectivity, child effortful control, and maternal sensitivity. Because maternal positive emotion is often a component of maternal sensitivity and more sensitive mothers may express more positive emotion, we included maternal sensitivity as a covariate in the analyses (Conway et al., 2014; Leerkes et al., 2009). In addition, temperament characteristics may impact a toddler’s expression of negative emotion and engagement in self-regulation strategies. Mothers’ responses are often a result of toddler characteristics and some behaviors may pull for different parental responses. Therefore, toddler temperament (e.g., proneness to negative emotion and use of inhibitory control) was also considered as a potential covariate (Calkins, 1994; Rothbart & Bates, 2006).

Given that the data were time nested within cases, we used a two-level model to test repeated measures. Multilevel modeling is a mixed-effects approach that produces more efficient estimates than general linear regression as it accounts for the non-independence of repeated measures within participants (e.g., repeated ratings of toddler negative emotion and distraction across multiple intervals). This approach also considers mother-toddler interaction as a series of bidirectional moment-to-moment transactions, where one partner’s behavior/emotion influences
the other partner’s behavior/emotion as well as accounts for any potential autoregressive influences of each partner’s behavior/emotion across time.

**Model Specification.** Two 2-level models tested repeated measure associations between occurrence of maternal positive emotion and occurrence of toddler distraction (Model 1) and between occurrence of maternal positive emotion and occurrence of toddler negative emotion (Model 2). Because effects of maternal positive emotion on toddler behavior may be due more generally to overall parenting sensitivity, the global rating of maternal sensitivity was a Level 2 predictor in both models. Because the occurrence of distraction as a strategy for tolerating a delayed reward can be attributable to children’s temperamental level of effortful control, the toddler effortful control score was also included as a Level 2 predictor in Model 1. Similarly, because the occurrence of negative emotion can be attributable to children’s temperamental level of emotional reactivity, the toddler negative affectivity score was the second Level 2 predictor in Model 2. These predictors were mean centered to represent average toddler negative affectivity, average toddler effortful control, and average maternal sensitivity as measured at child 18-months of age. The models were specified as follows:

**Model 1:** Association between maternal positive emotion and toddler distraction

- **Level 1:**

  \[
  \text{Toddler Distraction}_{ti} = \pi_{0i} + \pi_{1i} (\text{Interval}_{ti}) + \pi_{2i} (\text{Mom Positive Emotion}_{ti}) + e_{ti}
  \]

- **Level 2:**

  \[
  \pi_{0i} = y_{00} + y_{01} (\text{Effortful Control}_{0i}) + y_{02} (\text{Maternal Sensitivity}_{0i}) + u_{0i}
  \]

  \[
  \pi_{1i} = y_{10} + y_{11} (\text{Effortful Control}_{1i}) + y_{12} (\text{Maternal Sensitivity}_{1i}) + u_{1i}
  \]

  \[
  \pi_{2i} = y_{20} + y_{21} (\text{Effortful Control}_{2i}) + y_{22} (\text{Maternal Sensitivity}_{2i}) + u_{2i}
  \]

**Model 2:** Association between maternal positive emotion and toddler negative emotion
Level 1:

\[ Toddler\ Negative\ Emotion_{tl} = \pi_{0l} + \pi_{1l}(Interval_{tl}) + \pi_{2l}(Mom\ Positive\ Emotion_{tl}) + e_{tl} \]

Level 2:

\[ \pi_{0l} = y_{00} + y_{01}(Negative\ Affectivity_{0l}) + y_{02}(Maternal\ Sensitivity_{0l}) + u_{0l} \]
\[ \pi_{1l} = y_{10} + y_{11}(Negative\ Affectivity_{1l}) + y_{12}(Maternal\ Sensitivity_{1l}) + u_{1l} \]
\[ \pi_{2l} = y_{20} + y_{21}(Negative\ Affectivity_{2l}) + y_{22}(Maternal\ Sensitivity_{2l}) + u_{2l} \]

The models were estimated using SAS 9.4 PROC GLIMMIX (SAS Institute Inc., 2015).

The glimmix procedure is better suited than the standard PROC MIXED to transform our outcome variables, toddler distraction and toddler negative emotion, since they are dichotomous variables (the target behavior either did or did not occur). The glimmix procedure produces data in terms of odds ratios where numbers >1 indicate that the probability of the behavior of interest increases while numbers <1 indicate that the probability decreases.

Chapter 3. RESULTS

Descriptive Statistics

Table 1a reports means, standard deviations, and ranges for all dyadic interaction variables at both the participant level (average across the 112 participants) and interval level (across all intervals of data per participant). Table 1b reports the means, standard deviations, and ranges for all covariates at the participant level. Table 2 reports the correlations for all study variables. We hypothesized that more maternal positive emotion would be correlated with greater toddlers’ use of distraction. Contrary to our hypothesis, Spearman bivariate correlations revealed that maternal positive emotion was inversely related with toddler engagement in distraction. We also predicted that the expression of maternal positive emotion would be
inversely related to toddler negative emotional expression. Contrary to prediction, maternal positive emotion was not correlated with toddler negative emotion. The control variables related significantly, in expected ways, to the target variables. More frequent maternal positive emotion was related to less toddler negative affectivity, more toddler effortful control, and more maternal sensitivity. Additionally, greater toddler effortful control was related to greater toddler negative emotion during the wait task; toddler negative affectivity, however, was not related to observed toddler negative emotion. Moreover, neither aspect of toddler temperament was related to the occurrence of distraction as a strategy. The control variables were therefore retained as covariates in the present analyses.

**Predicting Association between Maternal Positive Emotion and Toddler Distraction**

Model 1 estimated the relation between maternal positive emotion and toddler distraction. After accounting for toddler effortful control and maternal sensitivity, the intercept was significant; toddlers tended to display no distraction at the start of the task ($b = 0.45$, $SE = 0.12$, $p < 0.00$). Maternal positive emotion was significantly related to toddler distraction. However, contrary to our prediction, maternal positive emotion was inversely related to toddlers’ use of distraction. The odds that a toddler engaged in distraction was 0.60 lower during the occurrence of maternal positive emotion, given that all other variables were held constant ($odds\ ratio\ estimate = 0.60$, $p < 0.00$).

Although not predicted, the complete model revealed a significant interaction between maternal positive emotion and maternal sensitivity, such that the negative relation between maternal positive emotion and toddler distraction was stronger for more sensitive mothers ($b = 0.30$, $SE = 0.15$, $p = 0.04$). No other main effects or interactions in Model 1 were significant.
Table 1a. *Means, standard deviations, and ranges among major study variables at both participant and 10-s interval level.*

<table>
<thead>
<tr>
<th></th>
<th>N&lt;sub&gt;par&lt;/sub&gt;</th>
<th>Mean&lt;sub&gt;par&lt;/sub&gt;</th>
<th>SD&lt;sub&gt;par&lt;/sub&gt;</th>
<th>Range&lt;sub&gt;par&lt;/sub&gt;</th>
<th>N&lt;sub&gt;int&lt;/sub&gt;</th>
<th>Mean&lt;sub&gt;int&lt;/sub&gt;</th>
<th>SD&lt;sub&gt;int&lt;/sub&gt;</th>
<th>Range&lt;sub&gt;int&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toddler Negative Emotion</td>
<td>112</td>
<td>25.60</td>
<td>12.74</td>
<td>45</td>
<td>5307</td>
<td>0.54</td>
<td>0.50</td>
<td>1</td>
</tr>
<tr>
<td>Toddler Distraction</td>
<td>112</td>
<td>27.86</td>
<td>10.36</td>
<td>46</td>
<td>5218</td>
<td>0.60</td>
<td>0.50</td>
<td>1</td>
</tr>
<tr>
<td>Mother Positive Emotion</td>
<td>112</td>
<td>4.36</td>
<td>4.54</td>
<td>17</td>
<td>5375</td>
<td>0.09</td>
<td>0.29</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note.* Participant level indicates the number of seconds across the 48 intervals per participant (N=112). Interval level indicates data across the 10-s intervals (N=5,376).
Table 1b. *Means, standard deviations, and ranges among covariates at the participant level.*

<table>
<thead>
<tr>
<th>Covariate</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toddler Negative Affectivity</td>
<td>110</td>
<td>3.45</td>
<td>0.54</td>
<td>1-7</td>
</tr>
<tr>
<td>Toddler Effortful Control</td>
<td>110</td>
<td>4.51</td>
<td>0.56</td>
<td>1-7</td>
</tr>
<tr>
<td>Maternal Sensitivity</td>
<td>112</td>
<td>3.33</td>
<td>0.80</td>
<td>1-5</td>
</tr>
</tbody>
</table>

*Note.* Participant level indicates data across the 112 dyads.
Table 2. Correlations among major study variables across 10-s intervals.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Covariates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Toddler Negative Affectivity</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Toddler Effortful Control</td>
<td>-.41**</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Maternal Sensitivity</td>
<td>-.14**</td>
<td>.12**</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Main Variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Toddler Negative Emotion</td>
<td>-.03</td>
<td>.10**</td>
<td>-.06**</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>5. Toddler Distraction</td>
<td>-.01</td>
<td>-.02</td>
<td>.04**</td>
<td>-.22**</td>
<td>--</td>
</tr>
<tr>
<td>6. Mother Positive Emotion</td>
<td>-.04**</td>
<td>.08**</td>
<td>.09**</td>
<td>.02</td>
<td>-.06**</td>
</tr>
</tbody>
</table>

*Note. Spearman correlations for nonnormally distributed 10-s interval data. **p < .05. *p < .01
Parameter estimates for Model 1 are shown in Table 3.

**Predicting Association between Maternal Positive Emotion and Toddler Negative Emotion**

Model 2 estimated the relation between maternal positive emotion and toddler negative emotion (i.e., anger, sadness, and tension). Contrary to prediction, maternal positive emotion was not related to toddler negative emotion. However, maternal sensitivity significantly predicted toddler negative emotion, such that maternal sensitivity was inversely related to toddler expression of negative emotion. The odds that a toddler displayed negative emotion at 24-months was 0.65 lower with greater maternal sensitivity measured at 18-months (odds ratio estimate = 0.65, p = 0.01). All other main effects and interactions in the model were nonsignificant.

Parameter estimates for Model 2 are shown in Table 4.

**Chapter 4. DISCUSSION**

The purpose of this thesis was to investigate whether maternal nonverbal positive emotion predicted greater toddler use of distraction and fewer expressions of negative emotion during a frustrating wait task. Links between generally warm, sensitive parenting and desirable child outcomes are well-established (Calkins & Johnson, 1998; Eisenberg et al., 2001; Garner, 1995; Gilliom et al., 2002; Reuben et al., 2016). However, fewer studies analyze the specific aspects of *how* a mother communicates with her toddler, such as her use of nonverbal positive emotion, and the extent to which how she communicates contributes to specific aspects of toddler’s emerging emotion regulation. Toddlerhood is an important period in the development of regulation, during which children are capable of initiating behaviors that can autonomously modulate their emotion and behavior without adult direction; specific instances of maternal positive emotion, above and beyond a generally positive relationship, may play a role in moment-to-moment interactions that contribute to the development of self-regulation. Analysis
Table 3. Generalized linear mixed model with mother positive emotion predicting toddler distraction across 10-s intervals.

<table>
<thead>
<tr>
<th></th>
<th>Coefficient (SE)</th>
<th>Model 1</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.45 (0.12)</td>
<td>&lt;0.00</td>
<td>--</td>
</tr>
<tr>
<td>Interval</td>
<td>&lt;0.00 (&lt;0.00)</td>
<td>0.22</td>
<td>1.00 (1.00, 1.00)</td>
</tr>
<tr>
<td>Mother Positive Emotion</td>
<td>-0.52 (0.12)</td>
<td>&lt;0.00</td>
<td>0.60 (0.47, 0.75)</td>
</tr>
<tr>
<td>Toddler Effortful Control</td>
<td>0.08 (0.22)</td>
<td>0.72</td>
<td>1.08 (0.70, 1.65)</td>
</tr>
<tr>
<td>Maternal Sensitivity</td>
<td>0.22 (0.15)</td>
<td>0.14</td>
<td>1.29 (0.96, 1.73)</td>
</tr>
<tr>
<td><strong>Interactions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother Positive Emotion x Toddler Effortful Control</td>
<td>-0.06 (0.23)</td>
<td>0.80</td>
<td>--</td>
</tr>
<tr>
<td>Mother Positive Emotion x Maternal Sensitivity</td>
<td>0.30 (0.15)</td>
<td>0.04</td>
<td>--</td>
</tr>
<tr>
<td><strong>Random Effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>1.22 (0.23)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Interval</td>
<td>&lt;0.00 (&lt;0.00)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Model Statistics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2LL</td>
<td>23460.35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Interval time is in 10-s intervals.
Table 4. *Generalized linear mixed model with mother positive emotion predicting toddler negative emotion across 10-s intervals.*

<table>
<thead>
<tr>
<th></th>
<th>Coefficient (SE)</th>
<th>p</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed Effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.25 (0.15)</td>
<td>0.14</td>
<td>--</td>
</tr>
<tr>
<td>Interval</td>
<td>&lt;0.00 (&lt;0.00)</td>
<td>0.28</td>
<td>1.00 (1.00, 1.00)</td>
</tr>
<tr>
<td>Mother Positive Emotion</td>
<td>0.14 (0.12)</td>
<td>0.24</td>
<td>1.16 (0.91, 1.47)</td>
</tr>
<tr>
<td>Toddler Negative Affectivity</td>
<td>-0.08 (0.27)</td>
<td>0.77</td>
<td>0.92 (0.55, 1.55)</td>
</tr>
<tr>
<td>Maternal Sensitivity</td>
<td>-0.46 (0.18)</td>
<td>0.01</td>
<td>0.65 (0.45, 0.92)</td>
</tr>
<tr>
<td><strong>Interactions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother Positive Emotion x Toddler Negative Affectivity</td>
<td>-0.05 (0.24)</td>
<td>0.83</td>
<td>--</td>
</tr>
<tr>
<td>Mother Positive Emotion x Maternal Sensitivity</td>
<td>0.25 (0.15)</td>
<td>0.10</td>
<td>--</td>
</tr>
<tr>
<td><strong>Random Effects</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>1.78 (0.32)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Interval</td>
<td>&lt;0.00 (&lt;0.00)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Model Statistics</strong></td>
<td></td>
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<tr>
<td>-2LL</td>
<td>24404.62</td>
<td></td>
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</tbody>
</table>

*Note. Interval time is in 10-s intervals.*
of moment-to-moment interactions may be valuable in identifying teachable behaviors in parenting interventions and improving child outcomes. Given links between maternal positive parenting and adaptive child regulatory behaviors (Calkins & Johnson, 1998; Gilliom et al., 2002; Kochanska, 1997; Kochanska & Askan, 1995), we posited that maternal nonverbal positive emotion, often a component of sensitive parenting, may enhance a toddler’s ability to tolerate a wait. Support for the benefit of positive emotions comes from Fredrickson’s broaden and build theory (1998), where positive emotions broaden thought-action repertoires and build attention and cognition resources (Mischel et al., 2010; Moore et al., 1976; Roque & Veríssimo, 2011). Thus, a mother’s positive emotion may enhance a toddler’s capacity to “broaden and build” as they tolerate a frustrating wait by engaging in a regulatory strategy, distraction, or reducing the expression of negative emotion.

We used archival data to investigate the extent mother’s nonverbal expressions of positive emotion contribute to their toddler’s engagement in distraction and expression of negative emotion at 24 months. Since measures are repeated among members of the dyad (i.e., repeated sampling of emotion and strategy), we used a multilevel modeling framework to test two predictions: 1) mother’s positive emotion will predict increased toddler distraction and 2) mother’s positive emotion will predict decreased toddler negative emotion. Although it has been argued that maternal positive emotion may contribute to preschool age children’s regulatory behaviors (Cole et al., 2003; Lunkenheimer et al., 2011), there are no documented links between in-the-moment maternal positive emotion expressions during tasks that elicit toddler frustration. Contrary to prediction, maternal positive emotion predicted a lower, rather than higher, probability of toddler engagement in distraction. This failure to support the hypothesis, however, may be a result of the study design. It may not have approached the question in a way that fully
tests the prediction. Specifically, studies of moment-to-moment exchanges face an important problem—which behaviors to choose in which sequence in which time frames.

First, we consider the behavioral sequence. When mothers, who have been working, turn their attention to their toddlers, the toddlers may be more likely to engage in interaction with their mothers rather than immediately engage in distracting themselves. Further testing should examine the role of maternal positive emotion in predicting a range of toddler behaviors, including how toddlers interact with their mothers in these moments. Evidence for the role of bids in anger expression reveals that there are age-related changes in types of bids (e.g., angry or calm) and that calm bids predict shorter anger expression (Cole et al., 2011). It is possible that nonverbal maternal positive emotion may help a child engage in a calm (positive or non-emotional) bid rather than an angry bid. For example, a future study may explore whether it is less likely for toddlers’ bids to express frustration if the mother communicates with positive emotion.

Next, we discuss the issue of appropriate methodology in studies of moment-to-moment exchanges. Our contradictory finding regarding maternal positive emotion and child distraction raises a critical issue of whether examining concurrent relations adequately tests the effects of maternal displays of positive emotion on child toddler behavior. The literature guiding optimal time units for capturing these processes is sparse. Potential lag times range anywhere from 1 to 5 seconds (Ekas et al., 2011) to 10 to 15 seconds (Morris et al., 2017; Ravindran et al., 2017). One study suggests that there may be delayed effects in mother-toddler transactional patterns; toddler disruptive behavior predicted lower maternal support in a subsequent interval, but not in the concurrent one (Ravindran et al., 2017). Thus, further testing should use a sequential study
design that examines different sequences of emotion and behavior and considers both concurrent and subsequent effects.

Another finding that emerged was an interaction between maternal positive emotion and maternal sensitivity on the likelihood of toddler engagement in distraction. More sensitive mothers who also showed more positive emotion than other sensitive mothers had toddlers who engaged less often in immediate distraction. As noted, positive emotion is generally one feature of operational definitions of sensitive parenting (Biringen et al., 2000; Mesman & Emmen, 2013). Sensitivity is often defined by pleasant facial expressions and tone of voice (e.g., smiles, giggles), such that it is expected that more sensitive mothers communicate with more positive emotion than less sensitive mothers. It is interesting, then, in this case that immediate displays of positive emotion appeared to contribute further, moderating effects of maternal sensitivity. Thus, maternal positive emotion may contribute to toddler behavior independently of general sensitivity. Although the finding was in the opposite direction predicted, this supports the idea that in the moment behaviors, such as maternal positive emotion, should be looked at in addition to global sensitivity composites. It could be that global composites and moment-to-moment behavior have different underlying processes, such that moment-to-moment processes may contribute to maternal sensitivity over time. Interventions tend to focus on how parents respond in the moment rather than these global instances (e.g., Parent-Child Interaction Therapy). However, there is less basic research on the micromomentary dynamics of parent-child interactions, and this study attempted to fill in the gap between how dynamics have the potential to promote self-regulation, prevent problem behavior, and treat problem behavior. It is these moments that may be modifiable to help impact overall parent-child interaction (e.g., teaching praise, positive tone of voice, etc.).
We also hypothesized that maternal positive emotion would predict decreased toddler negative emotion. However, contrary to our prediction, maternal positive emotion was not associated with toddler negative emotion. However, maternal sensitivity significantly predicted toddler negative emotion, such that more sensitive mothers predicted less toddler negative emotion. As previously stated, the link between maternal sensitivity and better child outcomes is well-documented (Calkins & Johnson, 1998; De Wolff & Van IJzendoorn, 1997; Gilliom et al., 2002; Kochanska, 1997; Kochanska & Askan, 1995). More sensitive mothers foster warm and positive environments which may allow for enhanced positive mother-toddler interactions. These results suggest that maternal positive emotion may not contribute over and above the influence that maternal sensitivity has on toddler emotion. However, the multilevel modeling approach does not allow us to look at specific sequences of emotion and behavior. How the mother responds to toddler frustration and anger, with positive or negative emotion, may then contribute to subsequent toddler expression. Analyses that take an event based approach could explore the impact of positive emotion across moment-to-moment interactions in the task, in an attempt to separate the specific function of positive emotion from more global maternal sensitivity.

**Limitations and Future Directions**

First, the task was designed to elicit toddler negative emotion and mothers were asked to handle their child waiting as they would typically do at home (i.e., not explicitly told to interact with their child). Therefore, the structure of the task is not designed to elicit a high level of dyadic interaction; mothers spent the majority of the task time working and their expressions were emotionally neutral. This design truncates the frequency with which mothers engage and therefore the frequency of their nonverbal expressions of positive emotion. On the one hand, our interest was to observe maternal positive emotion in a task in which a child is confronted with
the demands of waiting for something desirable as the parent is busy working. These situations often elicit behavior problems in young children and the design of most studies does not identify the extent to which the parental tone of voice and facial expression matters in helping the child cope with the situation. Future investigations should consider alternative tasks that still elicit toddler negative emotion and strategy use, but also increase the likelihood for dyadic interactions. An example of such a task could include a problem-solving task like putting together difficult puzzles.

Second, the present study focused on distraction as the toddler behavior of interest and did not investigate the other toddler behaviors that occur within the wait task. While maternal positive emotion was associated with less toddler distraction, perhaps because the toddler is now engaging with the mother and no longer needs to distract themselves, maternal positive emotion may be linked to other toddler strategies, such as bids. Future analyses should include whether maternal positive emotion predicts different types of toddler bids (i.e., angry or calm bid). This would lend further support for the benefit of positive emotion and how it functions across the task.

Third, while multilevel modeling accounts for nestedness in the study design (e.g., repeated measures of emotion and strategy), investigating how mothers’ emotion functions in a task may be better suited to an event-based approach rather than a time-series analysis. Future work may look at the occurrence of sequences within the task to examine patterns involving maternal positive emotion. If a toddler is not tolerating the wait (i.e., complaining about the wait, crying, etc.) and the mother engages with emotion (i.e., uses either a positive or negative tone), then what occurs next with the toddler? Does a mother’s emotion in this sequence predict
different toddler behavior and emotional expression? Thus, an event-based approach may better test how a mother’s response to their toddler’s negative emotion shapes a toddler’s response.

Lastly, although the study sample was representative of the sub-population intended (i.e., rural and semirural families), it was not representative of the diversity of the population of toddlers in the United States. Future directions should consider studying these variables across diverse populations to test the generalizability of the findings. The significance of maternal positive emotion on toddler strategy and emotion expression may vary by cultural context.

Conclusion

In sum, the present thesis examined the contribution of maternal positive emotion on toddler use of distraction and negative emotion expression during a frustrating wait task at 24 months. The findings indicate that maternal positive emotion was associated with less occurrences of toddler distraction, but was not significantly related to toddler negative emotion. Although the findings are mixed, there is some evidence to support that how a mother communicates and her use of positive emotion may matter for 24-month-olds behavior and emotion.
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