Published in final edited form as:
Parent Sci Pract. 2013 April 1; 13(2): 113–132. doi:10.1080/15295192.2012.709152.

A Longitudinal Examination of Maternal Emotions in Relation to Young Children's Developing Self-Regulation

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SYNOPSIS

Objective—This study examines how young children's emotion and behavior relate to maternal emotions concurrently and as a function of children's developmental changes in self-regulation.

Design—Mothers and their children ($N = 120$) participated in an 8 min waiting task at children's ages 18, 24, 36, and 48 months. Children's emotion expressions, misbehavior, and regulatory efforts were observed, and mothers rated their own emotions during the wait.

Results—Children's emotion and behavior and maternal emotions related in expected directions at most time points. Over time, maternal positive emotion increased more if children were less angry, more content, or more engaged in regulatory efforts relative to age mates. Maternal negative emotion decreased more if children engaged more in regulatory efforts but less if children were angrier relative to age mates.

Conclusions—Individual differences in children's emotions may influence parental emotions. Over time, only the intra-individual decline in children's anger, not the decrease in their misbehavior or the increase in their regulatory efforts, predicted improvements in maternal emotions.

INTRODUCTION

Parenting is an evocative enterprise (Dix, 1991). Most parents care deeply about their children; they have feelings about how their children behave in a given moment as well as in the broader context of how their children progress in their development. Research has emphasized the role of parental emotions in children's development. Parental emotion expressions model behavior and give feedback to children (Eisenberg, Cumberland, & Spinrad, 1998; Morris, Silk, Steinberg, Myers, & Robinson, 2007). When parents express negative emotion in response to children's negativity, children's behavior problems can worsen (Cole, Teti, & Zahn-Waxler, 2003; Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Dumas, LaFreniere, & Serketich, 1995). Even when parental emotions are not expressed, they influence children's development because emotions organize parental behavior (Dix, 1991). Given this evidence, it is necessary to understand which aspects of children's immediate behavior as well as how their behavior changes over the course of development *predict* parental emotions. In short, children influence parental behavior (Bell, 1979; Lytton, 1982), but we have limited information about how children influence their parents' emotions.

Parents of newborns describe strong negative emotions when their infants cry (e.g., Swain et al., 2008), yet even less intense infant distress predicts mothers' negative feelings (Leerkes & Crockenberg, 2006). Parental emotions in response to infant distress also change over time, underscoring the need for a developmental perspective (Swain, Kim, Feldman, Mayes, & Leckman, 2011). Beyond infancy, children's misbehavior evokes emotions in parents (Davidov & Grusec, 2006; Fabes, Leonard, Kupanoff, & Martin, 2001; Gentzler, Contreras-Grau, Kerns, & Weimer, 2005; Valiente et al., 2006) and in adults who are not their parents (Anderson, Lytton, & Romney, 1986). Because parental emotions are implicated in preschool age children's self-regulation problems (e.g., Cole et al., 2003), it is useful to understand the effects of developmental changes in children's coping with a self-regulation challenge on maternal emotion during an age period when children's negativity declines and their ability to self-regulate begins to emerge.

Temper tantrums and resistance to parental directives and prohibitions peak in toddlerhood, when young children have not developed the complement of skills that support compliance and self-regulation (Brownell & Kopp, 2007; Potegal & Davidson, 2003). Mothers report feeling negative emotions in response to vignettes depicting hypothetical toddler misbehavior and noncompliance (Bryan & Dix, 2008; Coplan, Hastings, Lagacé-Séquin, & Moulton, 2002) and when reviewing video records of their interactions with toddlers required to tolerate waiting (Lorber & Slep, 2005; Martin, Clements, & Crnic, 2002). Careful observational analyses of toddlers' difficulties waiting show that their emotion, more than their misbehavior, predicted increased maternal negative emotion and diminished positive emotion (Lorber & Slep, 2005; Martin et al., 2002). Moreover, mothers' emotions in the moment were affected by their views of their toddlers over time (Bryan & Dix, 2008), and the immediacy of mother's negative emotions predicted how harsh or lax they had been during the task (Lorber & Slep, 2005).

The present study adds to this literature in three ways. First, we examined the degree to which specific aspects of children's desirable and undesirable emotions and behaviors when their self-regulation was taxed are related to mothers' experience of positive and negative emotions. Whereas Martin and colleagues (2002) used a single global rating of toddler affect, and Lorber and Slep (2005) focused on toddlers' negative affect and misbehavior, we assessed dynamic aspects of children's positive and negative emotions (latency, intensity, and duration of anger and contentment) and behavior (time spent misbehaving, i.e., disruptiveness and focusing on a restricted gift; child-initiated regulatory efforts, i.e., calm support-seeking and distraction). Although no study has directly tested the following prediction, it is logical that, just as mothers' negative emotions may increase, or positive emotions diminish, as a function of problematic child behavior, mothers' emotional experience may improve as a function of their young children's growth in self-regulation. Self-reports of parental emotions in hypothetical situations suggest that mothers experience positive emotions when their children are socially appropriate (e.g., Cheah & Rubin, 2004).

A second way that the present study contributed to research on parental emotions was by having mothers report their emotions during the task, while children were still coping with waiting, rather than following the task as in previous studies (Bryan & Dix, 2008; Lorber & Slep, 2005; Martin et al., 2002). That is, we examined mothers' *in vivo* emotions. Assessing emotions during an experience should provide an even more accurate self-report than recall does (Robinson & Clore, 2002).

Third, we took a longitudinal approach, examining change over time in maternal emotions as a function of changes in children's self-regulation. Between toddlerhood and kindergarten age, there is a normative decline in negative affectivity (MacFarlane, Allen, & Honzik, 1954; Potegal & Davidson, 2003) and growth in the ability to self-initiate behaviors that

help forestall or regulate frustration (Cole et al., 2011; Kopp, 1982). Mothers' emotions may be more negative or less positive to the degree their children have difficulty handling frustration at any age (individual differences or between-person effects). Moreover, mothers' negative emotions may persist over time, and their positive emotions diminish, if their children continue to have difficulty tolerating waiting and do not improve (intra-individual change or within-person effects). Similarly, maternal positive emotions may increase and negative emotions decrease over time as children gain the ability to be content more quickly and for longer periods, and to engage in regulatory efforts and not misbehave, while coping with waiting. Examining the degree to which developmental changes in children's abilities to tolerate waiting are associated with improvements in mothers' emotional experience during the wait extends the literature on relations between maternal and child emotion which largely focus on concurrent associations. Finally, given the implications of prior studies of children's behaviors that predict maternal emotion, we expected that greater toddler anger would predict maternal emotion (more negative and less positive) and that children's misbehavior would predict maternal emotion but not until children reached 36 months of age.

METHOD

Overview

The present study was part of a larger longitudinal study of children's development of emotion regulation between ages 18 and 48 months. Eligible families (1) had a child who was 18 months old at the start of data collection and whom they had reared since at least 3 months of age and (2) met income criteria for economic strain (household income above the U.S. government defined poverty level but below the national median income). These families dwelled in rural and semi-rural communities in the northeastern United States and were of interest because children from lower income rural communities are underrepresented in the research literature. Additional exclusionary criteria included parent-reported or staff-identified indications of childhood conditions that would interfere with completing study procedures.

To recruit families, graduate students and the principal investigator contacted community leaders (e.g. clergy, daycare and preschool directors), distributed flyers at their locations and at community events (e.g. health fairs, Head Start fairs), sent letters to families who had published birth announcements in local newspapers, and accepted referrals from participating families. Children were seen eight times between ages 18 and 48 months. Data were collected at home at children's ages 18, 30, 36, and 42 months and in the laboratory at ages 18, 24, 36, and 48 months. Only laboratory visit procedures that contributed to the present study are detailed.

Participants

Initially 128 families enrolled, but 4 did not meet income criteria and 4 withdrew from the study. Analyses were conducted with data from 120 families. Withdrawn families did not differ from those who completed on any demographic characteristic. The retention rate was 96.8%, due in part to retention efforts (small gifts; a graduated rate of financial compensation that could total $450 for 8 visits; project newsletters; annual feedback from standardized tests). The families also expressed commitment to completing visits to which they had agreed during the initial consent process.

Of the 120 children, 65 were male. Visits were scheduled within 2 weeks of children's half or full birthday for each wave, yielding mean ages 18.44 (SD = .57), 24.39 (SD = 1.3), 36.44 (SD = .80), and 48.33 months (SD = .67). Mothers identified 112 children as European

American and eight as biracial (6.7%), 51 as first-born (42%) and the rest as second- (49, 41%) or later-born (20, 17%). For 37 families (31%), the target child was the only child at Time 1; 54 families (45%) had two children, and 29 (24%) had three or more children. Most were two-parent families (91%) with at least one employed parent (99%). Of the 120 mothers, 113 (94%) identified as European American and seven as African American, Latin, or Asian (5.8%). Their mean age was 30.45 years (*SD* = 5.29) at Time 1. Twenty-three mothers (19%) had achieved a high school degree, 19 (15.7%) attended vocational school, and 76 (63%) had taken some college courses or completed college. In terms of employment, 34 mothers were homemakers (28%), 39 worked part-time (32%), and 47 worked full-time (39%). Average household income (all sources of income) was $40,656 (*SD* = $14,997). Mean income-to-needs (INR) ratio, a measure of a family's ability to meet basic needs relative to U.S. poverty standards, was 2.32 (*SD* = .87), indicating families were economically strained.

Procedures

Mothers and children participated in 2.5- to 3-hr laboratory based assessments at each time point at the University's Child Study Center.

Wait Task Procedure—The wait task (Cole et al., 2003) is designed to frustrate young children by requiring them to wait to open a gift until their mothers completed questionnaires. Earlier in the visit, mothers were told that we wished to observe their children waiting, shown the materials (wrapped gift, boring toy, and clipboard), and told to do whatever they would do if they required their child to wait. Immediately before the task, the RA cleared the room of all play and food items. Mothers were given a clipboard with (1) written instructions reminding them of the procedure steps and (2) a packet of questions to complete. Before leaving the room, the RA placed a gift wrapped in shiny paper on the child-sized table, saying "this is a surprise for you" and handed each child a boring toy, adding, "And here is something for you to play with. I'll be back in a few minutes." The boring toys were a rubber lily pad (18 months), one of a pair of cloth cymbals (24 months), a horse with a broken leg (36 months), and a car without wheels (48 months). As instructed, mothers told their children, "That surprise is for you, but you can't open it until I finish my work." After 8 min, the RA returned, and mothers allowed children to open the gift.

Measures

Maternal self-reported emotion during wait—The questions mothers were asked were designed to engage their attention for the length of the wait task. First, they were asked how their children typically handled waiting, whether children's behavior during the laboratory wait was similar or different from usual, and what they usually did when their children had to wait until their mothers were free. These questions occupied mothers for at least the first half of the wait. Next, mothers rated the degree to which they felt 9 negative and 6 positive emotions, each on a 1 (*not at all*) to 5 (*strongly*) scale. The 9 negative emotion ratings (annoyed, anxious, disappointed, discouraged, impatient, irritated, nervous, sad, and tense) were summed to create a negative emotion score (possible range 9–45), and the 6 positive emotions (content, delighted, happy, pleased, relaxed, and relieved) were summed to create a positive emotion score (possible range 6–30). The reliability and validity of in-task emotion ratings does not necessarily distract participants from their experience (Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005) and may reduce recall biases (Nisbett & Wilson, 1977). Internal consistency of the positive and negative emotion composites was high, α = .91 and .90.

Children's emotion coding—Children's emotional expressions were video recorded through a one-way window, using a coding system in which emotions are inferred from

facial activity (brow and mouth movements), vocal quality, and select postural and gestural cues (Cole, Zahn-Waxler, & Smith, 1994). Coders judged whether children were happy and/or angry every 15 s. Content emotion was defined by happy or neutral expressions. If children displayed anger or joy, intensity was rated on a scale from 1 (*mild*) to 3 (*intense*). Coders were first trained to code through readings on nonverbal emotion, team coding sessions, and independent practice coding of master-coded videos. Once they achieved accuracy, defined as at least 85% agreement with a master-coded video (calculated as number of sec in which codes agreed with master coder divided by the total number of sec in task), coders met weekly as a team with a master coder. Inter-rater reliability was excellent based on 10% of cases that were double-coded; across ages, mean κs for emotions ranged from .81 to .94.

From the 15-s epoch data, several dynamic (temporal and intensive) variables were created for angry and content (happy or neutral) emotion expressions. Specifically, latency (number of epochs until the emotion first appeared), duration (average number of contiguous epochs in which the emotion appeared), and, for anger, average intensity were calculated. The means and standard deviation are presented in Table 1. These components were used to create composite scores representing the quality of children's emotional expressions. For the anger composite, the latency, duration, and intensity scores were standardized (z-scored; latency was reverse-scored) and summed. For the content composite, latency and duration of happy and neutral epochs were standardized (z-scored; latency was reverse-scored) and summed.

Children's misbehavior and regulatory efforts—Using the same 15-s epochs, an independent team coded a set of children's behaviors typically examined in studies of early childhood emotion regulation. Four of these behaviors were selected as predictors of maternal emotions for the present study. The two misbehavior codes were focusing on the gift (i.e., speaking about, looking at, touching, or trying to open the gift after being told to wait) and any behavior that was classified as disruptive (i.e., behavior an adult would typically try to stop such as touching outlets, which were child-proofed). The two regulatory effort codes were: calm bids for support with the demands of the wait (e.g., seeking help to open the gift, asking if mother was done) and distraction (i.e., child shifted attention away from the gift and became absorbed in appropriate play). The average kappa across ages was .82 (range = .73–.91). The number of epochs in which the child returned attention to the gift after being told to wait or engaged in disruptive activity comprised misbehavior.

RESULTS

Overview of Analysis Strategy

First, descriptive statistics for all variables at each age were inspected for outliers (see Table 1). Then, change in the mean level of each variable was examined as a function of children's age. Next, we examined relations among variables within and across time and with potential covariates. Finally, we used multilevel modeling (MLM; SAS version 9.1 PROC MIXED) to estimate four models testing children's emotion and behavior during the wait as predictors of maternal emotions during the wait. Specifically, two models predicted changes in maternal negative emotion; Model 1 used children's anger, disruptive behavior, and focus on the gift as predictors, and Model 2 used children's content emotion, support-seeking, and distraction as predictors. The next two models examined maternal positive emotion; Model 3 used children's anger, disruptive behavior, and focus on the gift as predictors, and Model 4 used children's content emotion, support-seeking, and distraction as predictors. The magnitude of the correlation between children's joy and anger required that they be

examined in separate models (Tabachnik & Fidell, 2007). Details of model-building steps are provided below.

Effects of Children's Age on Maternal Emotion, and Children's Emotion and Behavior

A two-way multivariate repeated-measures analysis of variance (GLM PROFILE; SAS 9.2) was used to examine the main and interaction effects of children's age (18, 24, 36, and 48 months) on maternal emotion (negative and positive). Omnibus *F* statistics are reported, followed by the results of planned contrasts between adjacent ages. Maternal negative emotion decreased with children's age, $F(3, 476) = 8.01$, $p < .05$, $\eta^2_p = .05$, but only between ages 24 and 36 months, $t(1, 119) = 4.89$, $p < .05$. In contrast, maternal positive emotions increased with children's age, $F(3, 476) = 5.29$, $p < .05$, $\eta^2_p = .03$, with significant increases between 18 and 24 months and 24 and 36 months, *ts*(1, 119) = 2.37 and 3.78 respectively, both *p*s < .05. Finally, a significant Children's age by Maternal emotion interaction, $F(3, 714) = 15.55$, $p < .05$, $\eta^2_p = .22$, revealed that maternal negative and positive emotion did not differ at children's ages 18 and 24 months, *ts*(1, 119) = 1.99 and 0.88 respectively, both *ns*. However, by children's ages 36 and 48 months, mothers reported significantly more positive than negative emotion during the wait, *ts*(1, 199) = 4.61 and 3.73 respectively, both *p*s < .05 (see Figure 1). Repeated-measures analyses of variance examining effects of age on children's emotion and behavior have been reported (Cole et al., 2011); children's anger and disruptive behavior (but not focus on the gift) decreased and their contentment, distraction, and calm support-seeking increased.

Correlations among Study Variables

Zero-order correlations between self-reported maternal emotion and children's observed emotion and behavior, within and across ages, are provided in Tables 2 and 3. Given the number of relations examined, only those that were $p < .005$ were interpreted.

Mothers' and children's emotion—Maternal negative and positive emotion ratings were inversely related at each time point (range = −.45 to −.61). Maternal emotions were modestly stable over time from children's age 24 months (Table 2). Children's anger and content emotion composites were inversely related at each age (range = −.58 to −.77). Children's anger was moderately stable between ages 24 and 36 months (Table 2).

Maternal negative emotion with children's emotion and behavior—Maternal negative emotion was related to children's anger at ages 18, 36, and 48 months and inversely related to children's content emotion at age 36 months (Table 2). Maternal negative emotion was not related to children's focus on the gift at any age, but was linked to children's disruptive behavior at age 36 months and inversely related to their support-seeking at 24 and 36 months and to children's distraction at 36 months (Table 3).

Maternal positive emotion with children's emotion and behavior—Maternal positive emotion was associated with children's contentment, and inversely to their anger, at each time point (Table 2). Maternal positive emotion was correlated with children's support seeking at 18, 24, and 36 months, with their distraction at 36 and 48 months, and inversely with their disruptive behavior at 48 months. Maternal positive emotion was unrelated to children's focus on the gift at all ages (Table 3).

Potential covariates of maternal emotion—Family income to needs ratio, maternal age, ethnicity, and education, number of children, and children's ethnicity and birth order were not related to maternal emotion. Children's gender was unrelated to maternal negative emotion but was related to maternal positive emotion. Mothers reported more positive

emotion at 36 and 48 months for girls, *M*s (*SD*s) = 18.65 (6.87), 18.34 (6.90), than boys, *M*s (*SD*s) = 15.13 (7.12), 15.77 (5.58). Children's gender was included as a covariate.

Multilevel Models

Model building procedures—We used multilevel modeling to estimate four models. Multilevel modeling with longitudinal data is able to handle cases at multiple time points and cases are not excluded if data are missing at a few time points (Tabachnik & Fidell, 2007). In our dataset at 18 months, 6 cases were missing due to experimenter error (wrong materials given to mother) and in 5 cases the task ended early due to children's distress. At 24 months, 2 mothers failed to complete the questionnaire, and 1 child became too distressed. To assess whether these data were missing at random, Little's MCAR test was used. No detectable pattern was found for missing values, χ^2 (22) = 13.33, $p > .05$. Therefore, we proceeded with multilevel modeling, which relies on maximum likelihood (ML) estimation procedures that provide robust estimates of data missing at random (Hedeker & Gibbons, 1997).

Children's age was centered at 18 months for each model. Model parameter and significance test reporting was based on ML, degrees of freedom were calculated using the Satterthwaite method (Singer & Willett, 2003), and models were compared using Akaike and Bayesian Information Criterion (AIC/BIC). A standard bottom-up approach to model building was used. First, the effects of time were examined (Unconditional Time models in Tables). Then, main effects of Level 1 and 2 child predictors were examined with the effects of time (Combined Main Effects models). Next, significant predictors and their interactions were combined in final models. Non-significant main effects were removed before testing interactions between time and child predictors. The estimates reported reflect the amount of increase (or decrease) in a dependent variable's trajectory for every unit of change in the independent variable.

The model for predicting change in maternal negative emotion as a function of children's anger and misbehavior was as follows:

Level 1:

$$MatNeg_{ij} = \beta_{oij} + \beta_{1i} time_{ij} + \beta_{2i} (time_{ij})^2 + \beta_{3i} WP\_ChAnger_{ij} + \beta_{4i} WP\_ChDisruptiveBehaviors_{ij} + \beta_{5i} WP\_ChFocusGift_{ij} + e_{ij}$$

Level 2:

$$\beta_{oi} = \gamma_{00} + \gamma_{01} BP\_ChAnger_i + \gamma_{02} BP\_ChDisruptiveBehaviors_i + \gamma_{03} BP\_ChFocusGift_i + \mu_{0i}$$

The subscript *j* indexes participants, and *i* indexes observations within participants in variable names. Terms with subscript *ij* are at Level 1 of the growth curve model and those with subscript *i* are at Level 2. In addition, "MatNeg" refers to maternal negative emotion, "Ch" denotes to child variables, "WP" refers to between-person variables, denoting time-varying covariates (i.e., children's emotion and behavior variables) centered at 18 months, and "BP" refers to between-person variables, denoting time-invariant covariates centered at the sample mean. That is, within- and between-person effects of children's emotion and behavior were examined by modeling covariates as (1) time-varying variables centered at the start of the study, age 18 months (Level 1), and (2) time-invariant variables centered at the grand (sample) mean (Level 2). Thus, Level 1 variables represent within-person change over time relative to self at age 18 months, whereas Level 2 variables represent change relative to other children.

As depicted in the equation for Level 1, coefficients β_{1i} and β_{2i} indicate the linear and quadratic rate of change in maternal negative emotion; β_{oi} represents the regression coefficient for the model. Level 1 also included B_{3i}, B_{4i}, and B_{5i} denoting the fixed effects of within-person changes in children's anger and disruptive behaviors (e.g., age-related changes in anger relative to self) on maternal negative emotion. Between-person effects, specifically, each child's mean level of anger and misbehavior, centered at the sample or grand mean (e.g., average anger level relative to others), are included in Level 2. The grand mean for the sample (e.g., the average level of maternal negative emotion) is indicated by the term γ_{00}.

The Level 1 and Level 2 equations for testing the within- and between-person effects of children's contentment and regulatory efforts on maternal negative emotion were identical except that the predictors were replaced with children's anger, focus on the gift, and disruptive behavior. Last, these two models were repeated for predicting maternal positive emotion.

Longitudinal change in maternal negative emotion as a function of children's anger and misbehavior—The unconditional time model, combined main effects model, and best-fitting final model are presented in Table 4. Time and children's anger predicted a decrease in maternal negative emotion over time, but children's misbehavior did not (see Combined Main Effects Model). The model was then streamlined to include only children's anger and significant interaction terms. The best-fitting final model yielded a significant quadratic effect of time, estimate = .008, explained by a decrease in maternal negative emotion between child age 24 and 36 months. In addition, a significant between-person effect of anger indicated that mothers whose children were higher in anger at the grand mean (i.e., average of anger measures for all children at each age) reported more negative emotion than mothers whose children were lower in anger than their peers, estimate = 1.052. However, these main and two significant two-way interactions (Within-person anger X Time and Between-person anger X Time) were qualified by a significant three-way interaction of Time, Within-person child anger, and Between-person child anger, estimate = .004. Specifically, there was a steeper decline in maternal negative emotion for mothers whose children were higher in anger than other children at 18 months of age but whose anger decreased relative to their age 18 month levels. In contrast, for children who were higher in anger and whose anger increased or was stable over time, there was no significant decline in maternal negative emotion (Figure 2).

Longitudinal changes in maternal negative emotion as a function of children's content emotion and regulatory behavior—The combined main effects and best-fitting final models are presented in Table 5. Time and each regulatory behavior (children's support-seeking and distraction) predicted change in maternal negative emotion over time, but children's content emotion did not (Combined Main Effects model). Content emotion was therefore removed. In addition to the significant decrease in maternal negative emotion between ages 24 and 36 (quadratic effect of time), there were significant between-person effects of children's support-seeking and distraction. Relative to other children (i.e., relative to the grand mean across ages), the more time children engaged in support seeking, estimate = −.377, and distraction, estimate = −.249, compared to other children, the less negative emotion mothers reported. Within-person effects (change relative to child at 18 months) were not significant. That is, increases in children's support-seeking or distraction did not predict decreases in maternal negative emotion ratings, but the more children engaged in regulatory efforts relative to other children the more maternal negative emotion decreased over time.

Longitudinal changes in maternal positive emotion as a function of children's anger and misbehavior—Time and anger predicted change in maternal positive emotion over time, but disruptive behavior and focus on the gift did not (Combined Main Effects model; see Table 6). Thus, the best-fitting model was streamlined to include only time and children's anger. This model indicated a significant linear effect of time, estimate = .093. Moreover, there was a significant between-person effect of children's anger. Mothers whose children were higher in anger (averaged over all age points) reported less increase in positive emotion than mothers whose children were lower in anger, estimate = −.205. The within-person effect of children's anger (change relative to initial level at age 18 months) was not significant. In sum, increases in maternal positive emotion were predicted by children's anger relative to other children and not by within-person changes in children's anger over time.

Longitudinal changes in maternal positive emotion as a function of children's content emotion and regulatory behavior—Children's content emotion and regulatory efforts were significant predictors of maternal positive emotion. In this model, the time related increase in maternal positive emotion only approached significance, estimate = −.061, $p = .055$ (Table 7). Between-person effects of content emotion, estimate = .856, support-seeking, estimate = .595, and distraction, estimate = .248, however, all predicted increases in maternal positive emotion. Mothers reported steeper increases in positive emotion if their children were more content or spent more time engaged in calm support-seeking or distraction relative to other children. However, there was a significant Support-seeking by Time interaction, estimate = −.016. Support-seeking predicted maternal positive emotion at ages 18, 24, and 36 months but not by 48 months. Within-person changes did not predict maternal positive emotion.

DISCUSSION

This study of specific aspects of young children's emotion and behavior in the context of self-regulation as predictors of maternal emotion contributes to a growing literature on children's effects on their parenting (Crouter & Booth, 2003). Mothers experienced similar levels of positive and negative emotion as their children dealt with the challenge of waiting in their toddler years. By the time children reached 36 months, however, mothers felt more positively than negatively, showing that maternal emotions changed over time.

The few studies that are comparable to the present study appeared to report less maternal negative emotion, which may be due to the use of different procedures to assess maternal emotion. We did not use existing emotion rating scales because they include items that may not be readily endorsed in the context of normative parenting of young children, such as revulsion and contempt (Differential Emotions Scale; Cole et al., 2003) and hostility and shame (Positive and Negative Affect Scale; Martin et al., 2002). Our scale used terms such as *irritated, disappointed, annoyed,* and *tense* that mothers used to describe their parenting emotions in an open-ended interview (LeDonne et al., 2011). Also, mothers reported their emotions as children were dealing with the long wait and not afterward as in previous studies (Lorber & Slep, 2005; Martin et al., 2002). Having more common terms to endorse, and considering them as children were coping with the wait, may influence the amount of negative emotion reported. These procedural details require empirical assessment in future research.

The emotions of children and their mothers were concurrently related at each time point, as others have reported (Cole et al., 2003; Coplan et al., 2002; Lorber & Slep, 2003; Martin et al., 2002). In addition, some behaviors of children were also concurrently related to maternal emotion. Although persistence at trying to open the restricted gift did not predict maternal

negative emotion, children's disruptive behavior did once children reached preschool age. These findings suggest that until the child reaches an age at which appropriate behavior is expected, children's anger reliably predicts maternal emotions but their misbehavior does not (Bryan & Dix, 2009; Davidov & Grusec, 2006; Fabes et al., 2001; Gentzler et al., 2005; Lorber & Slep, 2005; Valiente et al., 2006). The findings add to the literature by showing that children's efforts to self-regulate, namely to calmly seek maternal support and to distract oneself, also predicted maternal emotions. Calm bids predicted more positive and less negative maternal emotion until children's reached 48 months of age; by age 4, mothers may expect children to tolerate waiting, such that turning to mother is no longer regarded as positive. Children's self-initiated distractions predicted mothers' greater positive and lesser negative emotion by age 36 months; toddlers have limited ability to engage in distraction but preschoolers' efforts to distract themselves occur quickly and last longer than at earlier ages (Cole et al., 2011).

Relations within a given age point, however, cannot address the question of whether a normative changes in children's coping with the wait, specifically the decline in children's anger and misbehavior and improvement in their self-regulation (Cole et al., 2011; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Putnam, Spritz, & Stifter, 2002) contribute to mothers feeling better more positive and less negative over time, and whether these improvements in their emotions are more attributable to individual differences between children or intra-individual changes in children.

The findings largely revealed individual-difference effects, except that the effects of children's anger on maternal negative emotions involved both individual differences and intra-individual change. Mothers' positive emotions increased more over time if their children, relative to other children, were more content and initiated more regulatory efforts, regardless of whether those behaviors reflected developmental improvements for children. That is, contrary to expectation, within-child age-related improvements in coping with waiting did not contribute to the increase in maternal positive emotions over time. It may be that maternal *in vivo* positive emotions are only influenced by how well-regulated the child is at the time. However, we cannot discount the possibility that controlling first for individual differences may overpower the ability to detect intra-individual change, a debated issue (Hoffman & Stawski, 2009; Nesselroade & Molenaar, 2010). Future research could address whether maternal positive emotions reflect satisfaction that their prior parenting contributed to the child's self-regulation and this in turn predicted mothers' positive emotions.

One aspect of intra-individual change in children was associated with change in maternal emotion. Children's anger relative to other children, and change in their anger over time relative to their starting points, predicted the degree to which mothers' negative emotions declined over time. Whereas most mothers' emotion improved over time, maternal negative emotion remained stable if children were both relatively angrier than their age-mates and their anger did not decline over time. The lack of decline in children's anger may interfere with the decline in maternal negative emotions. This observation is noteworthy because children's misbehavior did not show this effect. When mothers are working, they may be less likely to notice children's misbehavior, but hear their children's whining and protesting. Children's anger may then interfere with mothers' concentration on their work and tax them in a way that minor misbehaviors do not. These findings can be also considered in light of a literature on maternal expressed negative emotion. If mothers' negative feelings persist over a developmental period when most children are improving in self-regulation, there is increased probability they will express negative emotion to their children, which undermines parenting quality (Dumas et al., 1995; Lorber & Slep, 2005) and to the exacerbation of behavior problems (Cole et al., 2003). The findings point to the importance of understanding

emotions in both their immediate and historical contexts. Future research could investigate whether actual changes in children's behavior predict maternal *in vivo* emotion over and above a mother's general perception of her child.

Finally, individual differences in children's calm support-seeking ceased to account for maternal positive emotion by the time children reached the fourth birthday. This result and patterns in the simple correlations suggest a developmental change around age 48 months. By this age, mothers may expect children to handle waiting more independently and not feel positively about an interruption of their work. Moreover, although not supported by the longitudinal analyses, the simple correlations hint that by this age children's misbehavior may be more unacceptable. Future research should place maternal emotions in the context of expectations of, attributions about, and goals for children's behavior (Bugental & Happaney, 2002; Hane, Fox, Polak-Toste, Ghera & Guner, 2006; Kiel & Buss, 2010). As one example, a particular emotional experience may reflect mothers' concerns for their own needs or concerns about their children (Dix, Gershoff, Meunier, & Miller, 2004; Leerkes, Crockenberg, & Burrous, 2004; Leerkes, Parade, & Gudmundson, 2011). Experience sampling evidence suggests that maternal self-focused emotions (anger that the child is interfering with a mother's goals) produce greater negative emotion than maternal child-focused emotions (anger that someone upset the child; LeDonne et al., 2011). In addition, future research should study conjoint influences of maternal and child predictors on maternal emotion, considering bidirectional influences in samples with the power to test complex models.

A limitation of our study was that the degree of association between children's positive and negative emotion precluded including them in the same model. Also, we relied on self-report of maternal emotions, which may be biased by task instructions or maternal personality characteristics. Coherence between self-reported and observed emotion in adult females (not parents) has been shown (e.g., Mauss et al., 2005) although these relations are less robust in studies of mothers (Cole et al., 2003; Martin et al., 2002). Adults may regulate emotion expressions more when parenting, a subject also in need of systematic investigation (Cole & Teti, 2011).

Another limitation was the use of a single, repeated laboratory procedure. Familiarity with procedure may have contributed to the decline in maternal negative emotion and increase in positive emotion. Nonetheless, children's anger and self-regulatory efforts predicted changes in maternal emotion. Our coders witnessed mothers' high degree of engagement with completing the questionnaires and mothers anecdotally reported that the task provided a meaningful glimpse into their children's behavior. Finally, the findings may be limited to economically strained families from semi-rural and rural communities, although they may be useful as research progresses on studying groups that are under-represented in the parenting literature.

IMPLICATIONS FOR PRACTICE, APPLICATION, AND POLICY

The study of how children's behavior predicts maternal emotions and of changes in their behavior over time may stimulate and inform future research, ultimately guiding interventions for parents of young children. Detailing how young children may influence their parents' emotions when their self-regulation is challenged should be relevant to the parenting problems seen clinically, which are likely influenced by parental emotion (Lorber & Slep, 2005). Being able to draw on evidence to discuss parental emotions may help interventionists modify problematic reactions and emotion expressions, in turn improving parenting and child outcomes. Because toddlers tend to be disobedient, even defiant, there is potential for parent-toddler dyads to develop interaction patterns characterized by escalating,

angry exchanges that contribute to child behavior problems (Granic & Patterson, 2006). Children's anger appears most salient to mothers, which underscores the need to help parents notice and encourage young children who manage to be content and to engage in regulatory efforts when their self-regulation is taxed. Yet more evidence is needed to help clinicians target and prevent the development of negative parent-child interactions in the toddler years.

Acknowledgments

The authors are deeply grateful to the families who contributed to this research and to the support of an award from the National Institute of Mental Health (R01MH61388). The authors appreciate the input of reviewers and colleagues to this manuscript, and the many undergraduates who assisted in data collection and reduction.

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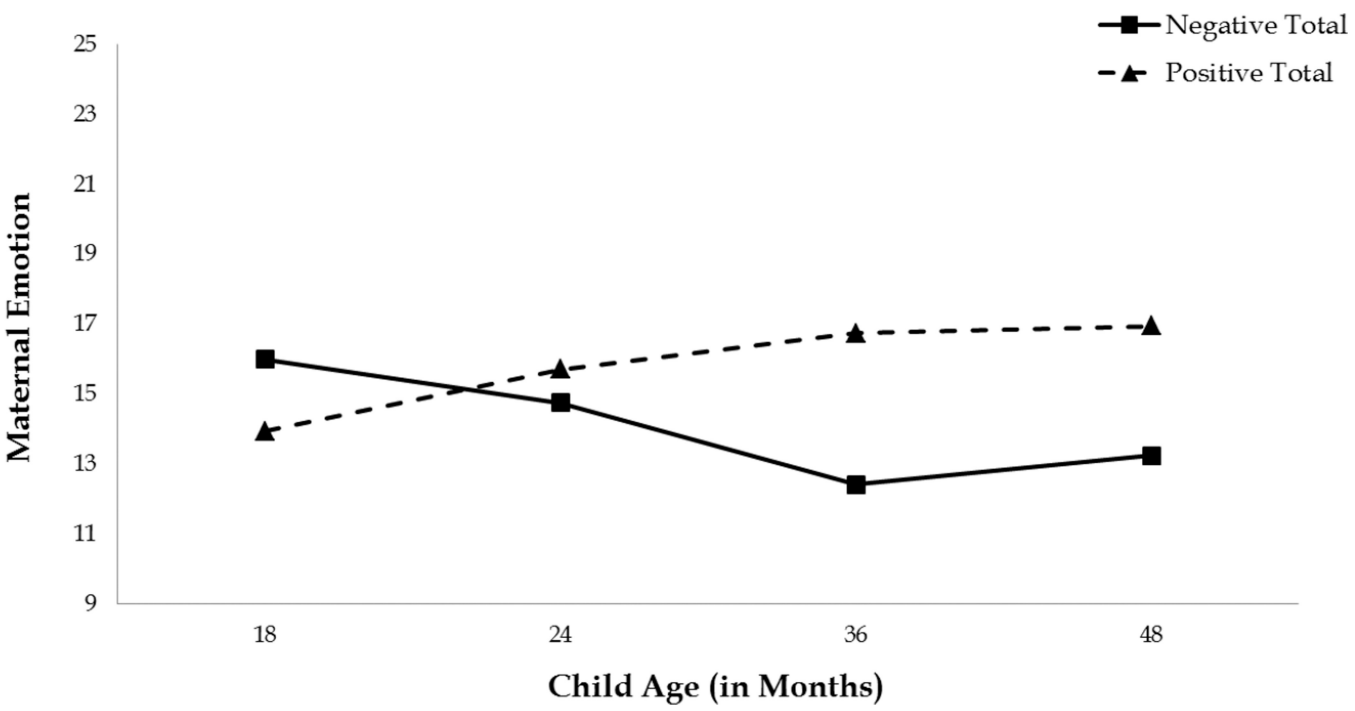

Figure 1.
Raw maternal emotion scores at each child age. Maternal emotion is sum of ratings for 9 negative and 6 positive emotions on a 1–5 scale.

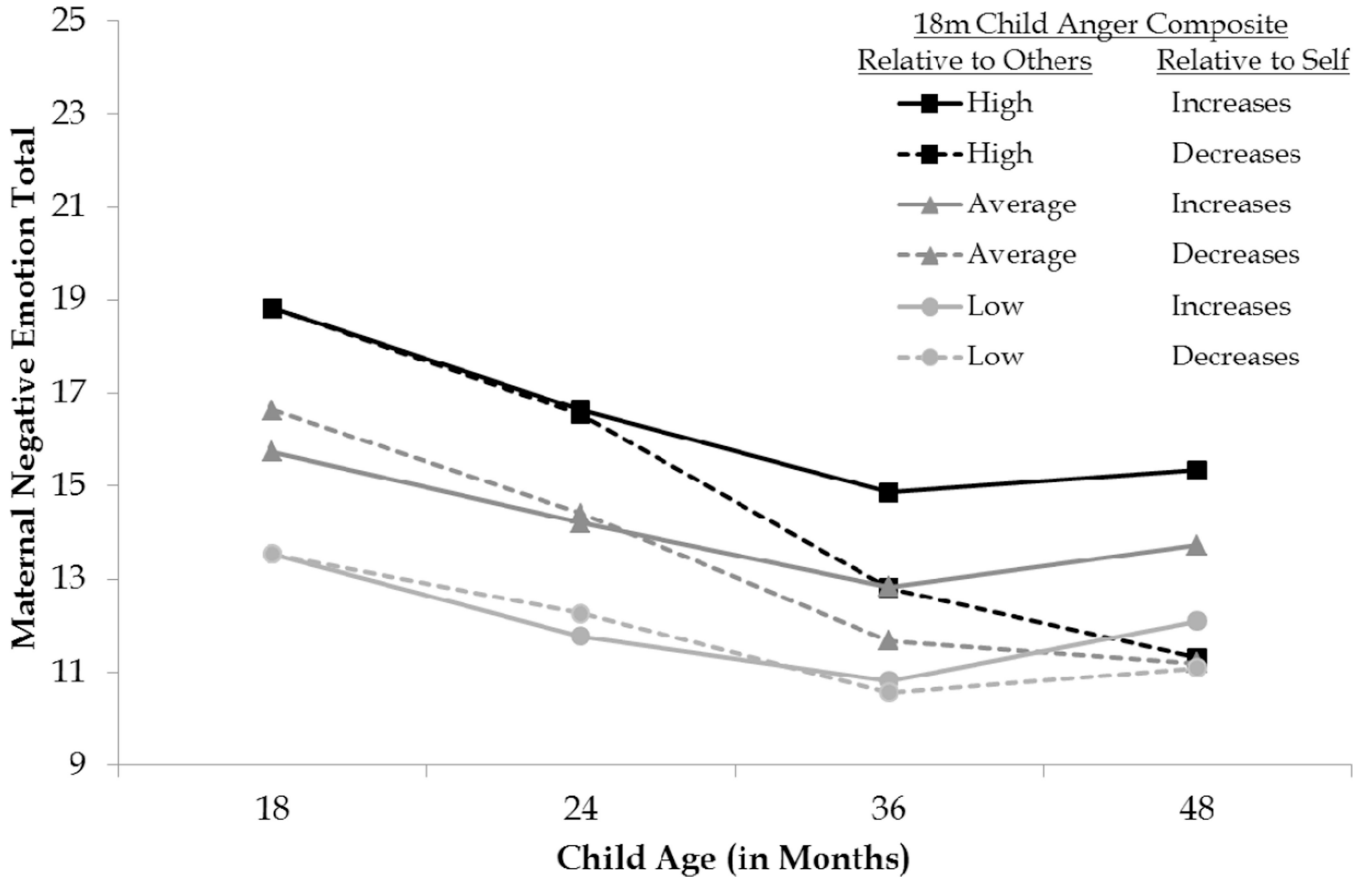

Figure 2.

Depiction of three-way interaction of time, within-person child anger, and between-person child anger in predicting maternal negative emotion. Lines represent change over time for children whose anger at 18 months was higher, lower, or equal to the group average, and whose anger increased or decreased relative to their levels at 18 months. Maternal negative emotion total is sum of ratings for 9 negative emotions on a 1–5 scale. Child anger composite is the sum of standardized (z-scored) intensity, duration, and latency (reverse-scored) anger scores.

TABLE 1

Descriptive Statistics for Maternal Emotions and Child Emotion and Behavior

	Age of Child (in months)							
	18		24		36		48	
	M	*(SD)*	*M*	*(SD)*	*M*	*(SD)*	*M*	*(SD)*
Maternal emotion								
Negative total	15.99	(7.24)	14.76	(6.63)	12.41	(4.35)	13.24	(6.06)
Positive total	13.94	(5.99)	15.71	(6.60)	16.74	(7.20)	16.95	(6.33)
Child emotion								
Anger								
Latency	4.05	(6.53)	4.11	(7.51)	10.08	(11.47)	18.04	(12.56)
Duration	7.35	(8.10)	6.01	(8.36)	1.87	(1.91)	1.21	(1.47)
Intensity	2.41	(.73)	2.22	(.78)	1.53	(.92)	0.95	(.85)
Contentment								
Latency	4.08	(8.09)	2.82	(7.24)	0.74	(2.13)	0.36	(1.52)
Duration	6.31	(6.63)	6.16	(6.55)	10.72	(9.39)	17.33	(11.17)
Child misbehavior								
Disruptive epochs	5.88	(4.54)	6.38	(5.11)	5.27	(5.71)	3.19	(4.16)
Focus on gift epochs	3.22	(3.17)	3.77	(3.11)	3.56	(3.34)	2.83	(3.10)
Child regulatory behavior								
Support-seeking epochs	1.60	(2.22)	2.69	(3.11)	7.37	(4.76)	10.98	(6.67)
Distraction epochs	6.21	(5.09)	6.70	(5.76)	8.40	(5.48)	12.19	(7.36)

Note. Maternal emotion is sum of ratings for 9 negative and 6 positive emotions on a 1–5 scale. Child misbehavior and regulatory behaviors were quantified as the number of 15-s epochs in which the behavior was observed.

TABLE 2

Correlations between Maternal and Child Emotion at Each Child Age (in Months)

	Maternal Emotion							Child Emotion							
	Negative Total			Positive Total				Anger Composite				Contentment Composite			
	24	36	48	18	24	36	48	18	24	36	48	18	24	36	48
Maternal emotion															
Negative total															
18	.16	.11	.16	−.45*	−.14	−.03	−.06	.39*	.12	−.07	.01	−.22	−.13	−.03	−.04
24	-	.39*	.27*	−.03	−.61*	−.19	−.16	.03	.23	.15	.21	.07	−.14	−.12	.01
36	-	-	.33*	−.09	−.23	−.57*	−.32*	−.02	.01	.48*	.22	.00	.05	−.32*	−.14
48	-	-	-	.08	−.16	−.09	−.55*	−.12	.02	.08	.43*	.20	−.02	−.14	−.24
Positive total															
18	-	-	-	-	.16	.25	.07	−.42*	−.08	−.09	−.04	.35*	.10	.09	−.03
24	-	-	-	-	-	.36*	.26	−.02	−.37*	−.27	−.20	−.08	.30*	.21	.08
36	-	-	-	-	-	-	.48*	.03	.00	−.48*	−.14	−.03	−.01	.36*	.15
48	-	-	-	-	-	-	-	.08	.00	−.23	−.38*	−.13	.02	.17	.34*
Child emotion															
Anger composite															
18	-	-	-	-	-	-	-	-	.24	.08	.11	−.76*	−.27*	−.09	−.11
24	-	-	-	-	-	-	-	-	-	.34*	.10	−.04	−.77*	−.25	.01
36	-	-	-	-	-	-	-	-	-	-	.00	.03	−.26	−.71*	−.28*
48	-	-	-	-	-	-	-	-	-	-	-	−.02	−.12	−.38*	−.58*
Content composite															
18	-	-	-	-	-	-	-	-	-	-	-	-	.11	−.03	.00
24	-	-	-	-	-	-	-	-	-	-	-	-	-	.21	−.02
36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.25

Note. Maternal emotion is sum of ratings for 9 negative and 6 positive emotions on a 1–5 scale. To create child emotion composites, standardized scores for latency (reverse-scored), duration, and intensity (for anger only) were summed.

* $p < .005$.

TABLE 3

Correlations between Maternal Emotion and Child Behavior at Each Child Age (in Months)

	Number of Epochs of Misbehavior								Number of Epochs of Regulatory Efforts							
	Disruptive				Focus on Gift				Support-Seeking				Distraction			
	18	24	36	48	18	24	36	48	18	24	36	48	18	24	36	48
Maternal emotion																
Negative total																
18	−.03	.10	−.09	−.08	.01	−.03	.13	−.07	−.24	−.11	.01	−.07	−.14	.04	.02	.11
24	.10	.22	.13	.07	.07	.03	−.05	−.10	−.06	−.31*	−.13	.03	−.17	−.10	−.17	.03
36	.12	.15	.30*	−.01	−.01	.03	−.03	−.16	−.07	−.10	−.32*	.09	−.09	−.05	−.32*	−.15
48	.04	.08	.04	.24	−.05	.09	−.12	.06	.10	−.11	−.20	−.11	−.01	−.01	.08	−.24
Positive total																
18	.22	.05	.05	.13	.00	−.06	.02	.00	.31*	−.03	.06	−.17	.19	.12	.17	−.01
24	.12	.10	.06	−.09	.11	−.05	−.03	.04	.14	.34*	.21	−.03	.08	.25	.15	.02
36	.04	.15	.03	−.10	−.16	.06	−.01	.09	.12	.14	.30*	.01	−.05	.06	.39*	.11
48	−.22	.06	.18	−.38*	.08	.04	.00	−.02	.10	.07	.21	.07	.07	.07	.12	.37*

Note. Maternal emotion is sum of ratings for 9 negative and 6 positive emotions on a 1–5 scale. Child misbehavior and regulatory behaviors were quantified as the number of 15s epochs in which the behavior was observed.

* $p < .005$.

TABLE 4

Steps in Model-Building to Predict Maternal Negative Emotion Total with Child Anger Composite and Number of Epochs of Misbehavior

Effect	Estimate	Error	*t*	*df*	*p*<
Unconditional time model (*AIC* = 3059.4; *BIC* = 3073.3)					
Intercept	16.175	.53	30.69	376	.01
Time	−.342	.08	−4.08	355	.01
Time^2	.008	.00	3.00	355	.01
Combined main effects model (*AIC* = 2988.1; *BIC* = 3013.2)					
Intercept	16.081	.49	32.69	362	.01
Time	−.348	.08	−4.55	356	.01
Time^2	.008	.00	3.51	357	.01
WP anger	.091	.15	.62	134	*ns*
BP anger	.816	.16	5.15	167	.01
WP disruptive behavior	.001	.08	.00	144	*ns*
BP disruptive behavior	.113	.08	1.37	156	*ns*
Final model (*AIC* = 2982.6; *BIC* = 3010.4)					
Intercept	16.182	.48	3.48	368	.01
Time	−.359	.08	−.47	356	.01
Time^2	.008	.00	3.22	355	.01
WP anger	−.160	.23	−.70	414	*ns*
BP anger	1.052	.19	5.53	318	.01
Time * WP anger	.020	.01	2.00	379	.05
Time * BP anger	−.023	.01	−2.34	388	.01
Time * WP anger * BP anger	.004	.00	2.66	447	.01

Note. WP = within-person; BP = between-person; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; *df* = degrees of freedom. Focus on the gift is not included here because it was not significant when included in a model with time and within-and between-person focus on the gift. It was dropped and only main effects for child anger and disruptive behavior were included in subsequent models.

TABLE 5

Steps in Model-Building to Predict Maternal Negative Emotion Total with Child Content Composite and Number of Epochs of Regulatory Efforts

Effect	Estimate	Error	*t*	*df*	*p*<
Combined main effects model (*AIC* = 3022.3; *BIC* = 3052.4)					
Intercept	14.238	.86	16.57	200	.01
Time	−.267	.08	−3.25	361	.01
Time^2	.009	.00	3.26	356	.01
WP contentment	−.280	.25	−1.14	131	*ns*
BP contentment	−.208	.28	−.75	196	*ns*
WP support-seeking	.11	.16	.69	121	*ns*
BP support-seeking	−.346	.17	−2.04	135	.05
WP distraction	.044	.07	.60	132	*ns*
BP distraction	−.22	.08	−2.82	162	.01
Final model (*AIC* = 3024.7; *BIC* = 3049.8)					
Intercept	14.044	.84	16.80	200	.01
Time	−.250	.08	−3.03	361	.01
Time^2	.009	.00	3.72	356	.01
WP support-seeking	.089	.16	.55	121	*ns*
BP support-seeking	−.377	.17	−2.27	132	.05
WP distraction	.028	.07	.39	130	*ns*
BP distraction	−.249	.08	−3.26	156	.01

Note. WP = within-person; BP = between-person; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; *df* = degrees of freedom. See Table 4 for the Unconditional Time Model.

TABLE 6

Steps in Model-Building to Predict Maternal Positive Emotion Total with Child Anger Composite and Number of Epochs of Misbehavior

Effect	Estimate	Error	*t*	*df*	*p*<
Unconditional time model (*AIC* = 3102.8; *BIC* = 3113.9)					
Intercept	14.589	.50	28.95	257	.01
Time	.094	.02	4.19	356	.01
Combined main effects model (*AIC* = 3010.2; *BIC* = 3032.5)					
Intercept	14.768	.46	32.16	260	.01
Time	.079	.02	3.80	362	.01
WP anger	−.183	.16	−1.17	131	*ns*
BP anger	−.876	.17	−5.24	162	.01
WP disruptive behavior	−.004	.08	−.05	140	*ns*
BP disruptive behavior	−.135	.09	−1.55	151	*ns*
Final model (*AIC* = 3012.4; *BIC* = 3029.1)					
Intercept	14.592	.46	31.87	256	.01
Time	.093	.02	4.58	357	.01
WP anger	−.205	.16	−1.29	131	*ns*
BP anger	−.907	.17	−5.37	160	.01

Note. WP = within-person; BP = between-person; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; *df* = degrees of freedom. Focus on the gift is not included here because it was not significant when included in a model with time and within-and between-person focus on the gift. It was dropped and only main effects for child anger and disruptive behavior were included in subsequent models.

TABLE 7

Steps in Model-Building to Predict Maternal Positive Emotion Total with Child Content Composite and Number of Epochs of Regulatory Efforts

Effect	Estimate	Error	*t*	*df*	*p*<
Combined main effects model (*AIC* = 3014.9; *BIC* = 3042.8)					
Intercept	17.176	.86	19.98	169	.01
Time	−.037	.03	−1.15	407	*ns*
WP contentment	.213	.26	.83	129	*ns*
BP contentment	.715	.28	2.51	187	.05
WP support-seeking	−.262	.17	−1.52	119	*ns*
BP support-seeking	.494	.18	2.79	131	.01
WP distraction	.099	.08	1.28	129	*ns*
BP distraction	.171	.08	2.10	156	.05
Final model (*AIC* = 3003.3; *BIC* = 3025.6)					
Intercept	17.364	.63	27.60	424	.01
Time	−.061	.03	−1.92	419	*ns*
BP contentment	.856	.18	4.71	451	.01
BP support-seeking	.595	.12	4.93	435	.01
BP distraction	.248	.05	5.42	453	.01
Time * support-seeking	−.016	.00	−3.45	418	.01

Note. WP = within-person; BP = between-person; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; *df* = degrees of freedom. See Table 6 for the Unconditional Time Model.