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Maternal Emotion, Motivation, and Regulation during Real-World Parenting Challenges

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Abstract

Parenting is emotionally evocative, and parental emotions have implications for parenting behavior. We used experience sampling methodology to capture mothers' experiences and emotions in the context of real-world, day-to-day parenting challenges. Mothers ($N = 55$) of 14- to 24-month-olds participated in 4 phone interviews per day for 6 days in which they reported on their momentary emotions, motivational states (i.e., desire to approach/engage and avoid/disengage), and behaviors (i.e., actual engagement and disengagement). Aims involved examination of (1) whether asking mothers to report on motivational states, in addition to reporting on their actual behaviors, would result in information that could inform the study of emotion regulation, (2) how mothers' self-reported motivational states and behaviors were associated with reports of emotions during parenting challenges, and (3) whether it would be possible to identify patterns of co-occurring motivational states and behaviors that may reflect emotion regulation processes. Results indicated that specific emotions were more consistently associated with reports of motivational states than behavior. Multilevel latent class analysis of motivational state and behavior variables identified 4 distinct classes, some of which indicated maintenance of motivational state, while others suggested modulation. The relation of self-reported specific emotions with motivational states and patterns of emotion regulation were also examined, and findings for anger/irritation and concern/worry underscore the importance of studying parental emotions in context. The findings are discussed within the context of the growing literature on parental emotion, including how this body of work has the potential to inform prevention and intervention strategies for high-risk families.

Keywords

Emotion; Emotion regulation; Parents; Early childhood; Families

Introduction

Recent work on maternal emotion and the neurobiological mechanisms of parenting support the contention that caring for young children involves both approach- and withdrawal-oriented motivational states (Leerkes et al., 2015; Swain et al., 2012). This is consistent with the perspective that parental emotions are complex, involve goals for both parent and child well-being, and must often be regulated (Dix, 1991; Teti & Cole, 2011). It is particularly important to study parental emotion during challenging parenting situations, because parenting behavior in the context of children's actual or anticipated distress (as opposed to non-distress) is uniquely associated with child outcomes (Leerkes, Weaver, & O'Brien, 2012). Because child distress may lead to parent distress (which may then disorganize parenting behavior), parents' sensitive and effective responses to children's negative emotions often require parental emotion regulation.

This study of parental emotion is unique given that parents are responsible for managing their own emotions *and* their children's emotions, while also holding in mind children's long-term well-being, including supporting the development of self-regulation (Teti & Cole, 2011). Functional perspectives (e.g., Frijda, 1988) have been invoked in the study of parental emotion (Dix, 1991; Leerkes, Su, Calkins, Supple, & O'Brien, 2016; Lorber & O'Leary, 2005; Teti & Cole, 2011), likely due to the functionalist view's inherent conceptualization of discrete emotions as often co-occurring (Mesquita & Frijda, 2011), as well as its previous application to developmental models of emotion (Barrett & Campos, 1987). Emotions are *functional* in that they set the stage for behavior that serves an individual's goals for well-being (and in the case of parenting, for the child's well-being, as well), and are defined by two components: *appraisal* of an event in relation to one's goals for well-being (e.g., perception that goal is lost, blocked, attained, or within reach) and *action readiness* (physiological readiness to engage with or disengage from the environment, or, motivational state). Discrete emotions are differentiated from one another based on patterns of appraisal and action readiness. For example, sadness is composed of the appraisal that a goal is lost and motivation to withdraw from a stimulus, which ultimately preserves energy to be expended on other, more attainable goals. Happiness, in contrast, is defined by an individual's appraisal of a goal as attained or within reach, along with a motivation to approach a stimulus, which serves to help attain or maintain the goal state. Importantly, although the link between the components of emotion and behavior are clear (e.g., motivation to withdraw and actual withdrawal), any specific emotion may or may not lead to *actual* behavior (Frijda, 2010). In some cases, emotions are regulated to facilitate behavior that is appropriate to the context or to achieve multiple or competing tasks. Regulation is conceptualized as a complex process that may be deliberate, but at times is automatic and outside of awareness (Frijda, 2010; Thompson, 1994). Further, a single situation may evoke a variety of different emotions, some of which rise to precedence while others are down-regulated (Mesquita & Frijda, 2011); as noted, this is particularly applicable in the context of

parenting, as parents must regulate not only themselves but also their children (Teti & Cole, 2011). For example, a child's crying may elicit multiple parental emotions that are related to both withdrawal motivation (e.g., sadness that the child feels sad) and approach motivation (e.g., irritation at the loud crying, worry that the child is ill, compassion that leads to caregiving); the degree to which each of these emotions are expressed or modulated has implications for parenting behavior.

Previous research has examined relations between parenting behavior and various measures of specific emotions (e.g., happiness, anger) as well as components of emotion (i.e., appraisals, motivational states). For example, parenting behavior is associated with self-reported and observed mood and emotions (Lovejoy, Graczyk, O'Hare, & Neuman, 2000; Rueger, Katz, Risser, & Lovejoy, 2011), self-reported and neural indicators of motivational states (Diego, Field, & Hernandez-Reif, 2001; Killeen & Teti, 2012), and appraisal-related constructs, such as locus of control (Bugental, Blue, & Lewis, 1990) and parenting self-efficacy (Hajal, Cole, & Teti, 2017; Jones & Prinz, 2005). A growing body of research shows links between parents' self-regulation and behaviors, including reported and observed measures of emotional and cognitive control (Crandall, Deater-Deckard, & Riley, 2015) and physiological indicators of regulation (Leerkes et al., 2016; Moore et al., 2009). Yet, no studies have approached the study of parental emotion regulation with an emphasis on the maintenance or modulation of *motivational states*, despite these states being an inherent part of emotion and having clear implications for behavior. Thus, we have a limited understanding of mechanisms by which maternal motivational states (and thus emotions in general) are uncoupled from actual behavior (Teti & Cole, 2011). The present study examined relations among mothers' reported emotions, motivational states, and behaviors in the context of day-to-day stressors with their young children.

Parental Emotions and Parenting Behaviors

A substantive literature shows that parents' behavior is associated with emotion-related characteristics, such as psychopathology (Lovejoy et al., 2000) and temperamental indices of negative and positive affectivity (Prinz, Stams, Dekker, Reijntjes, & Belsky, 2009). An emerging literature shows that parents' specific emotional *states* are also related to parenting behaviors; generally, negative parental emotions predict maladaptive parenting behaviors and positive emotions predict adaptive, supportive parenting (Rueger et al., 2011). Furthermore, different negative emotions are associated with different parenting behaviors. Anger is associated with harsh or over-reactive parenting (Ateah & Durrant, 2005; Leung & Slep, 2006), worry with restrictiveness, and sadness with non-controlling, detached behavior (Dix et al., 2004).

The clear link between an approach/avoidance conceptualization of motivation and behavior has prompted work that specifically examines the motivational nature of parental emotions. Mothers' general tendencies to approach or avoid, as indexed by self-report and resting neurophysiology, are associated, respectively, with intrusive (e.g., rough tickling) and withdrawn (e.g., flat affect, rare touching and vocalizing) behavior in both healthy dyads and dyads with a depressed mother (Diego et al., 2001; Field, Diego, Hernandez-Reif, Schanberg, & Kuhn, 2003). Neurophysiological research shows that brain regions and

networks associated with motivational approach and withdrawal are activated by exposure to a variety of positive and negative child-related cues; studies examining parental brain responses to child *distress* cues specifically have shown evidence for *both* approach- and withdrawal-related activation (Swain, Lorberbaum, Kose, & Strathearn, 2007). These mixed findings could reflect the multiple motivational states that may arise during complex caregiving demands, including changes in motivational states as a result of ongoing parental regulation. Indeed, child distress and consequent parental responding unfolds over time, and different study methods may capture different time points over the course of parental responding. For example, one study showed that increased withdrawal motivation (indexed by frontal cortical asymmetry) averaged over the course of 10-second videos of infant distress was associated with maternal report of sadness, irritability, and concern for her infant, as well as with greater observed sensitive parenting (Killeen & Teti, 2012). This pattern of findings suggested that maternal withdrawal motivation may be associated with empathic identification with infant distress, which is consistent with non-parenting research linking the same neural indicator (right frontal cortical asymmetry during a resting period) with self-reported empathic concern and sadness (Tullett, Harmon-Jones, & Inzlicht, 2012). Yet, a study of school-aged children that used the same indicator of motivation (frontal cortical asymmetry) but analyzed data on a second-by-second level over the course of a social task (as opposed to averaged across a resting period or stimulus presentation) showed that dynamic *change* in hemispheric asymmetry (greater withdrawal motivation followed by increasing approach motivation) was associated with observed empathic concern during a separate task (Light et al., 2009). Taken together, these findings suggest that empathic responding, which often takes place during complex interpersonal interactions, elicits multiple motivational states; this may include withdrawal motivation (perhaps reflecting empathic identification with the distressed interaction partner) which may be then down-regulated in favor of approach motivation (which would support help-giving). This interpretation is consistent with parenting research that measured psychophysiological indicators of maternal motivation and regulation *during* parent-child interaction. Specifically, maternal arousal and inhibition (measured by electrodermal activity) during infant-parent interaction was associated with maternal responses that supported positive parenting (Leerkes et al., 2016), but *only* when withdrawal motivation was accompanied by physiological regulation (measured by vagal suppression). All together, the findings of these studies suggest that maternal withdrawal motivation (not necessarily withdrawal *behavior*) to infant distress, when followed by increases in approach motivation, may be associated with processes that promote sensitive parenting and child adjustment. Although time-course research is needed to support this particular temporal sequencing, when taken together, the research and theory support the notion that empathy and adaptive parenting in response to infant distress require the capacity for negative affect matching (which may be reflected by withdrawal motivation) *as well as* increases in approach motivation. Ultimately, this underscores the ubiquity of the *modulation* of motivational states in parenting.

Experience Sampling Method

We aimed to extend the study of parental regulation of motivational states as it unfolded in real-world interactions between mothers and their 14 to 24 month old infants, making use of experience sampling methodology (ESM; Hektner, Schmidt, & Csikszentmihalyi, 2007), an

approach that prioritizes ecological validity by assessing individuals in their natural environments (but see Ram, Brinberg, Pincus, & Conroy, 2017). ESM and related approaches are characterized by: (1) *repeated assessments* of (2) *current or very recent* states, (3) in the context of individual participants' *natural environments* (Trull & Ebner-Priemer, 2009). The present study assessed maternal activities, emotions, motivational states, and behaviors 4 times a day for 6 days (*repeated assessments*) by phoning mothers during their daily activities (*natural environments*) and targeting questions toward whatever situation was happening just before the call (*current state*) and during two points in the past hour (*very recent states*).

In the present study, emotions, motivational states, and behaviors during every day parenting challenges were assessed by ESM phone interviews. Specific emotions, motivational states, and behaviors were assessed by asking mothers to rate their levels of each. Assessment of motivational states was differentiated by assessment of actual behavior by asking about what mothers *wanted* to do as well as what they *actually* did. For example, withdrawal *behavior* was assessed with the question: "How much did you avoid, withdraw, or disengage from the situation?" while *motivation* to withdraw was assessed by asking, "How much did you *want* to avoid, withdraw, or disengage from the situation, *whether or not you actually did*?"

Although self-report is limited in its ability to capture processes that occur outside of awareness, and unable to obtain fine-grained time-course information made possible by the psychophysiological methods reviewed above, it is helpful in contextualizing emotion regulation processes in the actual lives of mothers and children. Furthermore, it allows us to precisely measure the constructs in which we are interested (i.e., asking specifically about approach/engagement and withdrawal/disengagement) as opposed to inferring these constructs based on associated biological or behavioral patterns. ESM is a particularly useful way to collect self-report data, as it reduces memory biases that are problematic in studies that utilize single self-report measures. ESM is considered more ecologically valid than laboratory observations because: it is more likely to obtain assessments in contexts that elicit the full range of behavior; it does not rely on situations that may seem artificially contrived; and it allows states to be examined beyond a relatively short time frame (Trull & Ebner-Priemer, 2009). ESM research on parental emotion is limited, but the few studies that do exist demonstrate promise for the method to elucidate patterns of parental emotion and coping in daily life (e.g., Pottie & Ingram, 2008).

Aims and Hypotheses

Aim 1.—The first aim explored whether asking mothers to report on motivational states as well as actual behaviors would result in information that could inform the study of emotion regulation. For example, would mothers differentiate between these two types of questions? How would motivational state relate to specific emotions (of which it is a critical component) versus actual behavior (with which it has a clear connection in terms of face validity)?

Aim 2.—The second aim was to examine how mothers' self-reported specific emotions in response to parenting challenges would relate to their reported motivational states and

behaviors during those challenges. In line with functional emotion theory, it was hypothesized that higher levels of emotions characterized by approach (happiness, confidence, anger/irritation, and concern/worry) would be associated with higher levels of engagement and lower levels of disengagement (both motivation and actual behavior). Conversely, it was hypothesized that sadness, which is characterized by withdrawal, would be associated with higher levels of disengagement and lower levels of engagement (both motivation and actual behavior).

Aim 3.—The third aim was to explore whether it would be possible to identify combinations of co-occurring motivational states and actual behaviors that may reflect emotion regulation processes. For example, modulation of motivational state could be inferred if a mother reported that she engaged in a challenging parenting situation despite feeling an urge to disengage from it. Further, if identified, we aimed to explore how these systematic emotion regulation patterns related to self-reports of specific emotions (e.g., happy, sad, irritated/angry).

Method

Participants

This study recruited 55 mothers of young children from a larger study of maternal emotion ($N = 101$). The initial study enrolled a community sample of right-handed, English-speaking mothers living with their young children in a semi-rural area of Pennsylvania, and excluded mothers who reported that their infants were born earlier than 32 weeks gestational age, had low birth weight, or had chromosomal abnormalities or significant perinatal complications. For those with more than one child, the “target” child was the child who was 6- to 8-months-old. Mothers who completed the initial study and were willing to be notified of future studies were contacted again when their infants were 14 to 24 months old regarding a supplemental ESM protocol. Both studies were reviewed and approved by the Penn State University IRB.

On average, the 55 mothers who completed the EMA protocol were 31.7 years old ($SD = 4.45$; Range = 23 to 41). On the first day of ESM, target children (31; 56% female) were, on average, 19.47 months ($SD = 3.47$; Range = 14 – 25). The majority of mothers (69.1%) had more than one child ($M = 2.18$; $SD = 1.07$; Range = 2 - 6), and 60% had more than one child under the age of 6 ($M = 1.85$; $SD = .85$; Range = 1 - 4). Mothers were married or cohabitating with a partner ($n = 53$), widowed ($n = 1$), or legally separated ($n = 1$), and were ethnically homogeneous (98% Caucasian, 2% Asian), but socioeconomically diverse (M annual income = \$73,169; $SD = \$36,522$; Range = \$5,000 to \$200,000). Most (78%) had earned at least a bachelor’s degree and over half (62%) were employed (21 full-time and 13 part-time).

Procedure

Participants were scheduled for 2 home visits (approximately 10 days apart) and for 6 weekdays of repeated phone interviews. At the first home visit mothers completed consent

procedures, questionnaires (see Measures section for further detail), and were provided a cell phone. At the second home visit mothers returned the cell phone and received compensation.

ESM Procedure.—Following the home visit, a trained research assistant (RA) called the mothers and conducted short interviews 4 times daily for 6 days. With one or two exceptions, all calls were made by the same RA who completed the home visit. RAs' training included listening to recorded phone interviews conducted by the lead ESM interviewer. Additionally, the first several calls completed by RAs were recorded and reviewed by the lead interviewer. Calls occurred on Wednesday, Thursday, and Friday, with a break over the weekend, and Monday, Tuesday and Wednesday. This sampling of days thus likely spanned the range of weekday situations that a family might encounter. To avoid call anticipation, mothers were told only that calls would occur between 8:00 am and 8:00 pm. Call times were randomly generated and differed each day within specified time periods (one between 8:00 am and noon, one between noon and 4:00 pm; and two between 4:00 pm and 8:00 pm). The reason for the times of the last two calls stem from a pilot study in which mothers reported the most stress during these hours. If a call was not answered, three more attempts were made at random intervals over the next 20 minutes. If a mother stated that it was inconvenient to talk, the RA asked for a better time but did not specify the exact time of the next call. Call duration ranged from 5 to 20 minutes.

Interview structure was informed by ESM research with adolescents (Silk, Steinberg, & Morris, 2003) and a pilot ESM parenting study (Hajal, Cole, & Robinson, 2011). During each call, mothers were asked about 3 different occasions: (1) the moments immediately before the call, and the self-identified (2) lowest and (3) highest points in the past hour. For each occasion, mothers described what was happening, who was present, and the intensity of different emotions, motivational states, and behaviors (see Measures). Mothers reported the time of the lowest and highest points, allowing chronological placement of each emotion occasion within the hour.

Measures

Demographics.—Mothers' age, race and ethnicity, education, work, family composition, and income were assessed by questionnaire.

Momentary emotions.—For each occasion, mothers rated the intensity of 8 emotions (happy, content, pleased, confident, sad/discouraged, angry/irritated, concerned/worried, and upset) on a 0 (*Not at all*) to 5 (*Extremely*) Likert scale. The first question of each call was: "How happy were you feeling in the moments just before the phone rang?" For the lowest and highest points of the past hour, mothers were asked: "During the low/high point, when [*mother's description repeated*], how sad or discouraged [*and other emotions*] did you feel?" The present analysis focuses specifically on the 5 emotions that clearly map onto approach/withdrawal motivational orientations (happy, confident, sad/discouraged, irritated/angry, and concerned/worried), thus excluding content, pleased, and upset (Barlow, 1991; Barrett & Campos, 1987; Frijda, Kuipers, & ter Schure, 1989). Mothers were also asked to describe any other emotions not captured by the questions, which were then rated on the same scale

and later coded by emotion “family” (i.e., happy, sad, angry) and integrated into each emotion family’s final score.

Momentary motivational states and behaviors.—When a mother reported experiencing any negative emotion, she was asked to rate, on a 0 (*not at all*) to 5 (*extremely*) Likert scale, the extent to which she was engaged/disengaged in the situation (behavior), as well as the degree to which she *wanted* to be engaged/disengaged (motivational state). To promote understanding of the concept of approach versus withdrawal orientation, multiple words falling into each motivation/behavior “family” were used (i.e., active and engaged for approach, and avoidance, withdrawal, and disengagement for withdrawal). The following questions were asked verbatim:

1. “How much did you avoid, withdraw, or disengage from the situation?” (Actual Disengagement)
2. “How much did you feel you *wanted* to avoid, withdraw, or disengage from the situation, whether or not you actually did?” (Motivation to Disengage)
3. “How active or engaged in the situation were you?” (Actual Engagement)
4. “How much did you feel you *wanted* to be active or engaged in the situation, whether or not you actually were?” (Motivation to Engage)

Data Analysis

The nested nature of the data (emotion occasions within individuals) was accommodated using a multi-level modeling approach. Aims 1 and 2 (regarding *associations among emotions, motivational states, and behaviors*) were tested using multilevel regression models. After splitting the time-varying predictors into person-level (“trait,” intraindividual mean) and occasion-level (“state,” occasion-specific deviations from the intraindividual mean) components (Bolger & Laurenceau, 2013), models were constructed to examine associations among emotion, motivation, and behavior variables. Models were fit using SPSS 24.0 and included the possibility of additional autocorrelation in the residual structure.

$$H1a: Behavior_{ti} = \beta_{00} + \beta_{01} * TraitMotivation_i + \beta_{10} * TimeElapsed_{ti} + \beta_{20} * StateMotivation_{ti} + r_{0i} + r_{1i} * TimeElapsed_{ti} + r_{2i} * StateMotivation_{ti} + e_{ti}$$

$$H1b\&2: Motivation/Behavior_{ti} = \beta_{00} + \beta_{01} * TraitEmotion_i + \beta_{10} * TimeElapsed_{ti} + \beta_{20} * StateEmotion_{ti} + r_{0i} + r_{1i} * TimeElapsed_{ti} + r_{2i} * StateEmotion_{ti} + e_{ti}$$

For Aim 3, patterns of co-occurring motivational states and behaviors during parenting challenge occasions were identified using multi-level latent class analysis (MLCA; Henry & Muthén, 2010). The intention was to recast the two motivational state and two behavior variables used in Aim 1 and 2 analyses into a single categorical outcome that might reflect regulation. MLCA models were estimated and the likely class membership of each occasion

extracted using Mplus 7.2. Then, generalized linear mixed models to examine whether the mean level of specific emotions differed across classes identified by the MLCA.

Results

Individuals could provide data on up to 72 occasions (3 occasions*4 calls a day*6 days). Due to either missed calls or times for which mothers had no low or high point within the hour, we collected data for a total of 3,151 of 3,960 possible occasions (79.5%). Of these, at least one negative emotion was endorsed during $n = 1,823$ (58%) occasions; these occasions were considered “challenges.” Of these 1,823 challenges, mothers reported that the negative emotions were specifically related to parenting their young children (including children not identified as the target child for the larger study but who were <7 years old) in $n = 806$ occasions, which we call “young child parenting challenges” (44% of challenges, 26% of all occasions). Analyses focused on these 806 occasions. On average, each mother reported 15 young child parenting challenges ($SD = 9.10$; Median = 12; Mode = 12; Min = 1, Max = 39).

Table 1 shows descriptive statistics for emotion, motivation, and behavior variables. Means and standard deviations are presented in two ways: (1) “Emotion Occasions as Cases,” which are statistics across all 806 emotion occasions that involved young child parenting challenges, ignoring the nesting of moments within mothers, and (2) “Individuals as Cases,” which is the range of intra-individual statistics (i.e., within-person means and standard deviations). “Emotion occasions as cases” columns show that, on average, self-reported levels of emotion intensity and disengagement during parenting challenges were relatively low (<2.70), while engagement was moderate ($M_{motivation} = 3.17$; $M_{actual} = 3.94$). “Individuals as cases” columns indicate substantial between- and within-person variability. *Between*-person variability in emotion, motivation, and behavior was indicated by the large range of intra-individual means (Range up to 3.88). Additionally, intra-class correlations, calculated by examining the proportion of total variance attributable to between-person differences, were between .11 and .26, indicating substantial *within*-person variability in these variables.

Results by Aim

Aim 1.—The first aim of this study was to explore relations among reports of specific emotions, motivational states, and behaviors, to explore the usefulness of asking mothers to report on these constructs. Associations between motivation to engage and actual engagement ($\beta_{20} = .30$, $SE = .05$, $p < .001$), and between motivation to disengage and actual disengagement ($\beta_{20} = .36$, $SE = .04$, $p < .001$) were statistically significant, but weak-to-moderate in strength, suggesting that mothers differentiated between these two concepts. Reports of specific emotions generally related more strongly to motivational states than to actual behaviors (Table 2). Happiness, confidence, sadness/discouragement, and irritation/anger (but not concern/worry) were more consistently associated with motivational states (90% of estimates $p < .05$, max $\beta_{20} = .60$) than actual behavior (50% of estimates $p < .05$, max $\beta_{20} = .13$). Dissimilarly, concern/worry was only associated with actual engagement (not disengagement or either motivational state).

Aim 2.—The hypothesis that specific emotions would be related to self-reported motivational states and behaviors in terms of approach/engagement vs. withdrawal/disengagement in a manner consistent with functional emotion theory was partially supported. Findings for happiness, confidence, sadness/discouragement, and concern/worry were generally as hypothesized: greater happiness and confidence were associated with greater desired engagement and lower desired and actual disengagement, and sadness/discouragement showed the opposite direction of relations (Table 2). As anticipated, concern/worry was associated with greater actual engagement. Notably, concern/worry was the only emotion examined that was associated with actual engagement; whereas all other emotions were associated with actual disengagement and/or motivational states (both engagement and disengagement).

The direction in which irritation/anger was associated with motivational states and behavior were opposite of what had been hypothesized: greater irritation/anger was associated with greater desired and actual disengagement, and lower desired engagement.

Aim 3a.—A multilevel latent class analysis (MLCA) was used to explore whether the current, occasion-level data could be understood in terms of motivational and behavioral classes. Results suggested that the $n = 801$ occasions with complete reports of motivational state and behavior were better described by a 4-class model than by a 3-class model, VLRT $p < .05$, Adj. LRT = 260.46, $p < .05$, BIC = 9216.13 (which was a reduction from 3-class model, BIC = 9466.83). Although the BIC for the 5-class model, BIC = 8855.11, was lower than the BIC for the 4-class model, other tests suggested that the 5-class model may not be viable (i.e., not fully converged), did not provide improvement over the 4-class model (VLRT $p = .15$, Adj. LRT = 367.57, $p = .15$), and, although differentiation among classes in the 5-class model was good (entropy = .96), the purported fifth class was descriptively very similar to the fourth class. Thus, further analyses were conducted based on the 4-class solution.

As indicated by ease of classification (4-class entropy = .92) and the differences in class-specific means, all four classes were descriptively distinct and easily named. As shown in Figure 1, most occasions (52.19%, $n = 418$) were moments in which mothers' motivational states and actual behaviors were both highly *Engaged* (disengagement $M_s < 0.5$, engagement $M_s > 4$). In contrast, there was a small portion of occasions (3.87%, $n = 31$) that were distinguished as *Disengaged* (disengagement $M_s > 4$, engagement $M_s < 2.2$). Mothers indicated being *Ambivalent* in 19.48% ($n = 156$) of occasions, wherein they reported a moderate desire to disengage, $M = 3.12$, and slightly lower desire to engage, $M = 2.39$, but actually disengaging only slightly, $M = 2.47$ and engaging moderately, $M = 3.26$. Finally, about a quarter of occasions (24.47%, $n = 196$) were when mothers had *Regulated Disengagement*; specifically, these occasions were characterized by moderate desire to disengage, $M = 3.12$, little desire to engage, $M = 2.31$, but low actual disengagement, $M = .43$, and high actual engagement, $M = 4.06$. Table 3 provides excerpts of mothers' open ended responses during calls to illustrate each class.

Aim 3b.—Finally, generalized linear mixed-effects models were conducted to examine whether emotion regulation classes were differentiated by specific emotion intensities from

the same occasion. Results indicated significant class effects for happiness, $F(3,796) = 16.25, p < .001$, confidence, $F(3,796) = 22.72, p < .001$, sadness, $F(3,796) = 21.73, p < .001$, and irritation, $F(3,796) = 31.34, p < .001$. Follow-up pairwise contrast tests (Figure 2) indicated that during *Engaged* occasions, happy and confident intensities were higher and sad/discouraged and irritated/angry intensities were lower than during all other types of occasions (*Disengaged, Ambivalent, or Regulated Disengagement*), and that these differences were statistically significant ($p < .05$). Results also indicated a trend-level overall effect for concern $F(3,796) = 2.54, p = .055$. Pairwise contrast tests showed that concern/worry was significantly higher (significant at $p < .05$) during *Regulated Disengagement* occasions than during *Engaged* and *Disengaged* occasions. The difference between concern/worry during *Regulated Disengagement* and *Ambivalent* occasions was not statistically significant.

Discussion

This investigation captured mothers' emotions and emotion regulation in the context of real-world, day-to-day parenting. Its aims were threefold: (1) to examine whether asking mothers to report on motivational states, in addition to reporting on their actual behaviors, would result in information that could inform the study of emotion regulation, (2) to examine how mothers' self-reported motivational states and behaviors were associated with reports of specific emotions during parenting challenges, particularly in regard to functional emotion theory, and (3) to explore whether it would be possible to identify patterns of co-occurring motivational states and behaviors that may reflect emotion regulation processes during parenting challenges. ESM provided the opportunity to study these aims within the context of mothers' everyday lives with their 14 to 24 month old children. The intensive assessment characteristic of ESM allowed us to precisely word interview questions such that we could measure associations among simultaneously occurring maternal emotions, motivational states, and behaviors during discrete parenting situations that occurred in daily life.

This study demonstrated the utility of asking mothers to report on motivational states as well as their actual behaviors. Weak-to-moderate relations between maternal reports of their actual and desired engagement/disengagement, as well as variations in how each related to specific emotions, suggested that mothers differentiated between these two concepts. Although most relations between specific emotions and motivational/behavioral orientation (i.e., approach/engagement versus withdrawal/disengagement) were as hypothesized based on functional emotion studies in non-parent populations (Frijda et al., 1989), the findings for irritation/anger were contrary to prediction (Carver & Harmon-Jones, 2009). Another unexpected finding was that concern/worry was the only emotion that was associated with the degree of mothers' actual engagement in challenging parenting situations. Although unexpected, these findings may reflect unique aspects of emotion regulation processes that arise specifically in the context of parenting.

Irritation/anger.—In previous theoretical and empirical work (including studies using self-report of emotions) anger has been established as an approach, engagement-oriented emotion (Carver & Harmon-Jones, 2009), yet in the present study, it was strongly related to

self-reported motivation to *disengage*. Previous research has shown that maternal anger is a risk factor for harsh discipline and child abuse (Ateah & Durrant, 2005; Leung & Slep, 2006). It may be that for healthy parents of typically developing young children, anger-motivated urges to approach are often quickly and automatically down-regulated such that mothers are not even aware of it (and thus cannot report on it, even if asked immediately after it occurs). Thus, the relation between anger and disengagement in the current analysis may reflect an *automatic*, as opposed to deliberate, emotion regulation process. This possibility is consistent with work indicating that the relation between maternal anger and harsh discipline is strongest for mothers who are more impulsive, and thus may be less able to regulate (Rhoades, Grice, & Vecchio, 2017). Future work is needed to test this hypothesis, and would benefit from multi-method assessment that includes physiological or observational measures of motivational state and/or regulation alongside self-report of actual and desired motivational states.

Concern/worry.—Overall, this sample of mothers reported moderate to high mean levels of actual engagement during parenting challenges. Yet, four of the five specific emotions assessed were *not* significantly associated with maternal engagement. These findings suggest that caring for young children requires a high level of engagement and that parents must often engage no matter what their emotional state is. In other words, even if a mother's emotion and motivational state might have prepared her to disengage, she ultimately self-regulates and engages. Maternal concern/worry was the only emotion examined that was associated with engagement. The motivational component of worry and anxiety has been described as approach- or engagement-oriented in terms of an individual's being "ready or prepared to attempt to cope with upcoming negative events" (Barlow, 1991) and to engage in problem-solving (Mauss & Robinson, 2009). This may be particularly salient in the context of parenting because young children are essentially reliant on adults to cope with events that negatively affect them. Furthermore, this finding is consistent with empirical work showing that attachment, bonding, and caregiving systems are activated by danger and anxiety-provoking events, mobilizing parents to protect and care for their children (Feldman, Weller, Leckman, Kuint, & Eidelman, 1999).

Identifying Patterns of Maternal Emotion Regulation

The present study also explored whether it would be possible to identify patterns of co-occurring motivational states and actual behaviors that may be indicative of emotion regulation processes. Latent class analysis of over 800 occasions identified four distinct classes of maternal motivation and behavior during challenging parenting situations, including two that indicated maintenance of motivational state (of either engagement or disengagement), one that reflected modulation (down-regulation of motivation to disengage), and one that suggested ambivalence.

Maintenance of motivation to engage.—For half of the occasions assessed, mothers felt motivated to engage, and did engage. During these *Engaged* occasions, mothers reported being more happy and confident, and less sad and irritated, than all other types of occasions identified. Thus, even when specifically selecting for occasions during which mothers experienced some level of negative emotion regarding parenting their young children, the

majority of occasions were still relatively positive and promoted parents' engagement in the situation. This finding may be particular to the relatively healthy community sample represented in the present study.

Maintenance versus modulation of motivation to disengage.—Slightly more than one quarter of all occasions were characterized by at least a moderate level of motivation to disengage. During most of these occasions, however, mothers regulated their desired to disengage. In fact, mothers reported acting on their motivation to disengage during only 4% of all occasions assessed. To understand correlates of maternal modulation of motivational state, these *Regulated Disengagement* occasions (which occurred approximately one quarter of the time) can be compared to *Disengaged* occasions. These two types of occasions were differentiated from one another by maternal concern/worry, which was higher for *Regulated Disengagement*. In other words, mothers appeared more likely to suppress their desire to disengage when their concern/worry was more intense. It may be that when mothers were worried about a negative outcome related to their young child, they were compelled to act even if at some level they wanted to withdraw from the stressful situation. This interpretation is in line with the finding that concern/worry was the only emotion variable associated with actual engagement, as well as the broader emotion literature suggesting that worry is associated with preparedness to act to solve a problem (Barlow, 1991; Mauss & Robinson, 2009) and attachment-related work linking anxiety and caregiving (Feldman et al., 1999; Leckman, Feldman, Swain, & Mayes, 2007). Given the dependency of young children on their parents, it may be that concern/worry is a particularly potent approach-related motivator in parenting.

Ambivalence.—It was unclear what characterized *Ambivalent* moments, comprised of moderate levels of both engagement and disengagement, neither of which were up- or down-regulated. It may be that mothers were *Ambivalent* at times that they were experiencing multiple demands, leading to multiple emotions and thus multiple types of action readiness (Mesquita & Frijda, 2011), none of which rose to predominance. Indeed, mothers sometimes reported multi-tasking during *Ambivalent* moments (Table 3). In future research, it will be important to examine contextual factors that may be associated with mothers' motivational ambivalence during parenting challenges, and to understand how this might impact parenting and child adjustment.

It is also possible that the *Ambivalent* class captured occasions in which mothers down-regulated an urge to engage (Table 3). Based on the previous emotion literature, we surmised that we might see a class that clearly represented down-regulation of approach motivation during times that mothers felt irritated with their children or anxious that their child would behave undesirably, but consciously pulled back so as not to be harsh or intrusive. Interestingly, although the quantitative analyses did not bear out this notion, some mothers alluded to this type of regulatory process in the open-ended descriptions of their thoughts and behaviors, linking anger and purposeful disengagement: "I think you have to [disengage] in order to not take it personally and get overly frustrated about it," and, "I had to pull back because I was starting to get a little angry. I don't want to be angry with him." The lack of a clear down-regulation of engagement class may be related to greater anger

being associated with lower engagement in the current sample of mothers (unlike in previous, non-parent samples; Carver & Harmon-Jones, 2009); it may be worthwhile to explore the presence of the down-regulation of engagement in other populations of mothers, including those at higher-risk than the current community sample.

Limitations

There were several limitations of the present study. While the study makes an important contribution to the literature by examining the motivational component of momentary emotions in the context of specific parenting situations, it did not examine the other core feature of emotions: appraisals. According to functional perspectives, emotion is not defined by either appraisals or motivational states, but by the combination of the two. Including examination of momentary appraisals would benefit future research on parenting research by providing a more comprehensive picture of parental emotion and regulation processes.

Despite the many benefits of ESM, one drawback of the method as employed in this study was reliance on self-report. Although self-report is useful in understanding mothers' subjective experiences and behavior, it requires mothers to be keenly aware of their emotional states. Paradoxically, the field would likely benefit most from a better understanding of those mothers who are less aware of their emotions, particularly given the relations between alexithymia and lower empathic responding (Feldman Hall, Dalgleish, & Mobbs, 2013). Furthermore, even for non-alexithymic individuals, a portion of emotional and motivational processing happens extremely quickly and outside of awareness. Simultaneous ambulatory assessment of physiology (e.g., Ebner-Priemer et al., 2008) within multiple time-scale designs (see Ram & Diehl, 2015) may provide for additional specificity and temporal resolution.

Given the documented importance of situational demands on parenting (Miller, Shim, & Holden, 1998; Rhoades et al., 2017), another limitation of this particular analysis is the exclusion of potentially important situational factors in predicting mothers' emotion regulation. In explaining their feelings, thoughts, and actions, mothers also spontaneously provided information about whether or not they were receiving help, whether they were dealing with multiple demands at once (e.g., a temper tantrum while on a work-related phone call while also trying to empty the dishwasher), whether someone in the family was sick, or whether they had had an argument with their spouse, to name just a few. There can be little doubt that these situational forces have an impact on mothers' emotions, motivational states, and behaviors. Additionally, research on emotion in interpersonal contexts, such as parenting (Dix, 1991; Leerkes et al., 2015), have further emphasized the importance of *locus* of the emotion in. For example, parental emotions evoked by child distress may be child-focused (i.e., experienced *on behalf of* the child, such as being angry at oneself for not attending to the child's needs appropriately) or they may be parent-focused (e.g., on behalf of the parent, such as being angry *at* the child for fussing). For example, parental anger during a free-play task was associated with supportive parenting if it was *on behalf of* the child (e.g., angry at self for not preventing child distress) versus directed *at* the child (e.g., angry *at* the child for whining; Dix et al., 2004). Understanding child- versus parent-orientation could be particularly informative in better understanding the current

results regarding the roles of anger, irritation, concern, and worry in parent motivation and behavior. Future analyses with these data will consider environmental variables, maternal individual characteristics, and emotion orientation.

Study participants were recruited from the community, and standardized measures of psychiatric symptoms (not reported here) indicated that the sample was largely non-distressed. It is quite possible that some of the current findings—such as the high proportion of *Engaged* occasions and very low proportion of *Disengaged* occasions—would differ in a clinically-referred or higher-risk sample. While the field can certainly benefit from a greater understanding of parent emotional processes in typically developing families, replication of findings in clinical samples is needed before findings can inform intervention.

Finally, this work is based on the premise that parents' effective emotion regulation should facilitate effective parenting, but did not assess parenting itself. Future work should integrate mothers' ESM reports with observation of parenting behaviors.

Conclusions

This study contributes new knowledge to the field of parent emotion by delineating a fine-grained picture of how parents experience and regulate emotion and motivational states in the context of a relationship in which they are responsible for their own well-being, as well as that of their young child. Use of ESM allowed us to tightly link maternal emotions, motivation, and emotion regulation to specific parenting situations, moving beyond much of the previous parental emotion research (both self-report and observational), which often averages emotions and behaviors over longer time periods that may encompass multiple discrete parenting challenges.

Application of functional emotion theory to assessment of real-world parenting provided support to the assertion that emotion and its regulation must be considered *in context*. A new method of assessing maternal motivation, behavior, and emotion regulation was developed and initially validated. Phenomenological aspects of parents' emotion regulation in response to challenging situations with their children were documented, and indicated the centrality of concern and worry in regulating motivation and behavior in parenting young children. Further pursuit of this type of work has the potential to uncover further predictors of adaptive parent emotion regulation and to inform prevention and intervention strategies for families in need.

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Figure 1.
Results of multilevel latent class analysis of maternal self-reported motivational states and behaviors

Figure 2.

Mean levels of specific emotions by motivational state/behavior class.

Note: Values 1-4 on the figure indicate which groups of occasions differed in emotion level.

Table 1.

Descriptive statistics

	Emotion Occasions as Cases		Individuals as Cases		
	Mean across all occasions	SD across all occasions	Range of intra-individual means	Range of intra-individual SDs	Intra-class correlation
Happy	2.31	1.54	0.40 – 3.38	0.35 – 2.89	0.11
Confident	2.63	1.38	1.20 – 5.00	0 – 2.89	0.25
Sad/Discouraged	1.32	1.28	0 – 3.00	0 – 2.83	0.11
Irritated/Angry	1.25	1.38	0 – 3.50	0 – 2.38	0.16
Concerned/Worried	1.17	1.22	0 – 3.88	0 – 2.12	0.19
Actual Disengagement	0.80	1.21	0 – 2.13	0 – 1.99	0.16
Motivation to Disengage	1.82	1.65	0 – 3.44	0 – 2.58	0.18
Actual Engagement	3.94	1.05	0 – 5	0 – 1.86	0.25
Motivation to Engage	3.17	1.41	0 – 5	0 – 2.58	0.26

Notes: $N = 806$ occasions nested within 55 persons.

Minimum-maximums for variables across all moments were 0–5.

Variables that were slightly skewed were: Actual Disengage (1.43) and Actual Engage (–1.18).

For intra-class correlations, possible range is 0 – 1 and lower numbers indicate greater within-person variability.

Table 2.

Associations among mothers' self-reported emotions, motivational states, and behaviors

	Actual Disengagement			Motivation to Disengage			Actual Engagement			Motivation to Engage		
	Est.	SE	<i>t</i> ^a	Est.	SE	<i>t</i> ^a	Est.	SE	<i>t</i> ^a	Est.	SE	<i>t</i> ^a
Happy												
Intercept	0.73	0.08	9.06	1.80	0.12	15.39	3.98	0.09	46.74	3.15	0.11	27.74
Within-person (state)	-0.08	0.03	-2.55	-0.31	0.04	-7.32	-0.03	0.02	-1.05	0.22	0.04	5.57
Between-person (trait)	-0.25	0.12	-2.13	-0.34	0.17	-2.06	0.03	0.12	0.25	0.34	0.16	2.15
Confident												
Intercept	0.74	0.08	9.10	1.79	0.11	15.81	3.98	0.08	47.45	3.16	0.11	29.42
Within-person (state)	-0.09	0.04	-2.34	-0.38	0.05	-7.15	0.00	0.03	0.08	0.30	0.04	7.05
Between-person (trait)	-0.16	0.10	-1.63	-0.40	0.14	-2.90	0.07	0.10	0.69	0.41	0.13	3.10
Sad/Discouraged												
Intercept	0.73	0.08	8.76	1.81	0.11	15.93	3.98	0.09	46.80	3.15	0.12	27.38
Within-person (state)	0.12	0.04	3.11	0.40	0.04	9.64	0.04	0.03	1.23	-0.20	0.05	-4.39
Between-person (trait)	0.15	0.14	1.03	0.47	0.19	2.44	-0.14	0.14	-1.02	-0.20	0.19	-1.05
Irritated/Angry												
Intercept	0.73	0.08	8.98	1.79	0.10	17.53	3.97	0.09	46.94	3.16	0.11	28.32
Within-person (state)	0.11	0.04	2.93	0.47	0.05	10.33	0.00	0.04	0.04	-0.28	0.04	-6.50
Between-person (trait)	0.18	0.11	1.63	0.61	0.14	4.29	0.20	0.11	1.80	-0.35	0.15	-2.29
Concerned/Worried												
Intercept	0.72	0.09	8.48	1.78	0.12	14.80	3.98	0.08	47.24	3.17	0.12	27.15
Within-person (state)	-0.06	0.04	-1.54	0.06	0.05	1.14	0.09	0.04	2.38	0.00	0.05	-0.02
Between-person (trait)	-0.07	0.13	-0.59	0.16	0.18	0.89	0.21	0.12	1.70	0.01	0.17	0.07

Note: *N* = 806 occasions nested within 55 persons* *p* < .05

Variable representing time elapsed since previous moment was included as a covariate, but results are not shown here.

$p < .001$

 $p < .01$
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Table 3.

Excerpts From Mothers' Open-Ended Descriptions of the Situation, Their Thoughts, and Their Behaviors by Class

Mothers' description of the situation, thoughts, and actions	Class
"She had a meltdown...a full-fledged outburst...I was just trying to remain calm, trying to soothe her w/out making the situation worse...[but I was] thinking, "It would be really nice if her father would come and deal w/ this..."	Regulated Disengagement
"Trying to clean her up from a dirty diaper & I didn't have a diaper with me...just worried that [it] was gonna get everywhere...I just cleaned her up...you have to just laugh about it cause it's just so gross!"	Regulated Disengagement
"She was crying for ice cream at 9:30 AM...[I was thinking] 'I'm gonna give her this ice cream because I want her to be quiet...I'm sucking as a mother right now giving into this tantrum.'"	Disengaged
"I continued to make dinner, she was throwing a tantrum, but I let her have it and continued doing what I was doing....I thought "how typical""	Disengaged
"I had to pull back because I was starting to get a little angry. I don't want to be angry with them."	Ambivalent
"She wanted me to snuggle but I have a bunch of stuff I need to do. Explained to her that mommy has work to do, if she wanted to go outside to play later, she needed to take a good nap...told her that I couldn't snuggle, obviously that made me feel sad...but I felt I was doing the right thing...trying to choose between making her happy in the interim & spoiling her in the long run & sticking to a commitment I made to myself..."	Ambivalent
[While playing a game] "I thought it was fun...I just tried to keep things moving along, tried to be as fair a possible so everyone had a chance to participate."	Engaged
[While children were having fun jumping on a mattress together] "I watched them closely, and when it was more anxiety provoking for me, I stopped them."	Engaged