Published in final edited form as:

Int J Behav Dev. 2011 March ; 35(2): 136–143. doi:10.1177/0165025410375922.

Do Maternal Protective Behaviors Alleviate Toddlers' Fearful Distress?

Kristin A. Buss and
The Pennsylvania State University

Elizabeth J. Kiel
Miami University

Abstract

Parenting behaviors during times when young children may feel vulnerable, such as when encountering novelty, undoubtedly affect how children learn to regulate their reactions to these events. Theory suggests and some research supports the link between protective behavior – behaviors that shield child from a potential threat - and regulation of emotions. Less is known, however, about the immediate effects of these behaviors on children's distress. That is, do these protective behaviors alleviate distress in the moment? Presumably, this type of "successful" regulation of distress would be important for the development of successful regulation in other situations. To this end, the current study examined changes in the time course of toddlers' fearful distress, when protective maternal behaviors were observed during a highly novel, fear-eliciting task. Analyses were conducted for two subgroups of dyads: one group where toddlers' distress preceded mothers' protective behavior and one group where mothers' protective behavior preceded toddler distress. When toddlers' distress preceded mothers' reactions, protective behaviors were found to be associated with less steep decreases in fear for toddlers who had the highest initial distress reactions. Results are discussed in the context of toddlers' emerging ability to regulate emotions and the adaptive development of these skills.

Parents, in particular mothers, influence their children's behavioral development through the behaviors they enact. Maternal emotional support in times of infant distress has been examined as one mechanism by which children learn to regulate emotions and thus has implications for socioemotional adjustment. For instance, how mothers help their children learn to regulate distress has been examined as a potential mechanism of developmental trajectories to maladaptive behaviors such as anxiety. Despite a great deal of work supporting the importance of maternal contingent responses to infants' distress for emotion regulation, less work has directly examined the immediate effects of these maternal behaviors on changes in distress. Thus, the goal of the current project was to examine whether maternal protective behaviors support the reduction of distress during a novel task designed to elicit fear in toddlers.

There is mixed evidence in the literature as to the effects of maternal protective on children's distress. Maternal protection may reflect sensitive parenting. Several studies have linked sensitive maternal behaviors to infants' regulation of distress (Crockenberg & Leerkes, 2004, 2006; Jahromi et al., 2004; Moore & Calkins, 2004; Leerkes, Blankson, O'Brien, 2009), suggesting that failure to engage in these behaviors would be insensitive and relate to children's difficulties in regulation. During the course of early development, children shift from relying on their parents to externally regulate their emotional reactivity to

Correspondence concerning this article should be addressed to Kristin A. Buss at kbuss@psu.edu.

more independent coping (Calkins, 2007; Kopp, 1989; Sroufe, Duggal, Weinfield, & Carlson, 2000). This transition from infancy to early childhood provides fertile ground for the study of parental influences on child behavior (Brownell & Kopp, 2007). Thus, the toddler years are an informative stage to study the unfolding processes of emotion regulation and the influence of maternal behaviors.

This process has also been examined empirically and there is evidence for the influence of parent behaviors on young children's regulation of distress (Crockenberg & Leerkes, 2004; Haley & Stansbury, 2003; Jahromi, Putnam, & Stifter, 2004; Moore & Calkins, 2004). With 18-and 24-month-olds, Diener and Manglesdorf (1999) found that the effect of toddlers' regulatory behaviors on their own distress in fear-eliciting episodes changed depending on whether the mother was allowed to be involved in the episode with her toddler or was constrained in her behavior and remained uninvolved. Specifically, during fear-eliciting tasks, when mothers' behaviors were constrained, toddlers engaged in more help-seeking behaviors and when mothers were involved fearful distress decreased and positive affect increased. Although the study did not examine specific maternal behaviors, the results suggested that mothers' involvement impacted toddlers' experiences and regulation of fearful distress. Recent work by Leerkes and colleagues has also demonstrated that maternal sensitive responses to distress, but not sensitive responses to nondistress, in infancy were predictive of better emotion regulation and fewer behavior problems in preschool (Leerkes et al., 2009). These types of contingent maternal behaviors, when infants and children are distressed, are deemed as protective and comforting.

Few studies, however, have directly examined the dynamic changes in distress following protective maternal behavior. As a notable exception, Crockenberg and Leerkes (2004) found that infant distress to novelty, or fearful distress, was more likely to decrease with the presence of engaging or supportive maternal behavior (i.e., maintaining the infant's engagement with the stimulus), but, unexpectedly, maternal soothing was associated positively with infant distress. Despite being inconsistent with the authors' hypotheses, these results corroborate other work demonstrating a positive relation between physical affection and intrusive behaviors such as taking over children's tasks and unsolicited interventions (i.e., an "oversolicitous" style) (Rubin, Hastings, Stewart, Henderson, & Chen, 1997). The constellation of these behaviors, in turn, related to children's inhibition (Rubin et al., 1997). Thus, protective behavior may alternatively relate to maintained distress. Maternal behaviors that soothe or protect children from the stress of a novel stimulus may unintentionally communicate to children that the stimulus warrants fear or wariness. Further support for a relation between parental protection and the maintenance of fear comes from studies finding that gentle encouragement to interact with novelty related to reductions in toddlers' fear across time (Arcus, 2001). Thus, whether protective behaviors relate to the maintenance of toddlers' fearful or other distress behaviors during the periods of uncertainty remains understudied.

There is evidence that mothers may use their children's behavior (i.e., distress) and temperament characteristics to guide their parenting strategies. Thus, rather than a focus on caregiver-to-child influences, this work suggests that child-to-caregiver influences are also operating. For instance, distress in the form of sadness has been shown to be a signal to the mother to respond with support (Hortsmann, 2003; Huebner & Izard, 1988; Shipman, Zeman, Nesin, & Fitzgerald, 2003). In particular, mothers were more likely to respond to their infants when they were sadness compared to episodes where they were angry (Huebner & Izard, 1988). Turning to studies of temperamentally inhibited children, Rubin and colleagues found that age 2 shyness predicted age 4 lack of encouragement of autonomy while the reverse was not true, suggesting that the child's behavior evoked this response (Rubin, Nelson, Hastings, & Asendorpf, 1999). Moreover, these maternal behaviors may have different immediate and long-term effects on distress for children with different temperaments. For instance, mothers of anxious children engage in more intrusive, controlling behaviors during situations involving negative affect (Hudson, Comer, & Kendall, 2008). Mothers who displayed more negativity during a free play interaction with their shy/reticient children had children who displayed more social withdrawal in a peer setting (Hane, Cheah, Rubin, & Fox, 2008). Child temperament is also a moderator of the relation between such parenting behaviors as gentle discipline, power assertion, and responsiveness and children's socialization (Kochanska, 1991, 1995; Kochanska, Aksan, & Joy, 2007). Thus, the current study will examine whether toddlers' initial distress moderates the relation between maternal protective behaviors and subsequent distress. In addition, we will investigate whether maternal protective behavior is enacted in response to the toddler's distress or whether mothers enact a behavior before toddlers' distress is observable.

The Current Study

The literature presented demonstrates a link between maternal behaviors enacted in response to children's distress, such as protection, and implications for the development of competence in emotion regulation and socioemotional adjustment. There is also evidence suggesting bidirectional influences between maternal and child behavior. However, questions remain as to whether mothers' behaviors, especially those that protect or shield the child from the distressing situation, relate to the pattern (or time course) of distress across a situation. That is, does maternal protection from threat aid in the down-regulation of distress in toddlers? In the current study, we examined the time courses of toddlers' distress in a novel, fear-eliciting situation. The current study had two goals: (1) to examine dynamic changes in toddlers' distress relative to mothers' protective behavior; and, (2) to examine whether these effects are moderated by toddlers' initial levels of distress and the timing between the toddlers' distress and maternal protective behavior.

Method

Participants

Ninety-one two-year-old toddlers (M_{age} = 24.05, range 24 to 25 months, 55% male) and their mothers were recruited from birth records published in local newspapers and participated in a larger study of toddler temperament. Participants were primarily Caucasian (90% Caucasian, 3% African American, 2% Hispanic, 3% Asian American, and 1% South American Indian) and middle class (mean Hollingshead = 47.68, range = 13–66), although the sample spanned the range of socioeconomic status.

Observational scoring of child behavior could not be completed on one child due to technical difficulties. Given specific hypotheses about reduction of distress, we only included dyads where distress was observed in children. Eleven children did not display any distress during the observed episode and so were not included in subsequent analyses, leaving a remaining sample size of 79 toddlers (36 female) and mothers.

Procedure

Age 2 laboratory visit—Upon a show of interest in participation, mothers were mailed a packet including a consent form and several questionnaires, which they were asked to bring with them when they brought their toddlers to the laboratory for their visits. Upon arrival to the lab, the primary experimenter told the mother that her child would be participating in a variety of episodes designed to elicit reactions to novel people and activities. The experimenter provided a detailed explanation of each episode and told the mother that although she would always be in the room with her toddler, she should limit her interactions with him or her to those warranted by intense distress. The episode was videotaped from behind the one-way mirrors for later scoring.

The current study focused on one episode, Spider, because on average the intensity and duration of distress was highest compared to other episodes (Kiel & Buss, 2010; Buss, 2010). In the *Spider* episode, the experimenter showed the toddler and mother into the room, the toddler sat on the mother's lap in a chair in one corner. In the opposite corner was positioned a large stuffed animal spider attached to a hidden remote control truck. After the experimenter left the room, the spider, controlled by remote from behind the one-way mirror, approached half-way towards the chair. It paused for 10 seconds and then returned to its starting place. After another 10-second pause, the spider approached the entire way towards the chair, paused for 10 seconds, and returned to its corner. The experimenter then returned and asked the child to touch the spider. The experimenter gave the child 3 prompts to touch the spider before ending the episode.

Measures

Observed maternal protective behavior—Mothers were scored for the occurrence and intensity of protective behaviors in each 10 second epoch during the episode. *Protective behavior* occurred when mothers shielded children from the stimulus or activity (e.g., moving or turning the child away from the stimulus). These behaviors were scored as follows: 0 = no behavior shown, 1 = slight behavior such as leaning child away from the stimulus or putting arm in front of the child, 2 = physically moving the child away from the stimulus or picking the child up, 3 = a more prolonged or intense (2) behavior, turning the child completely away from the stimulus, or asking that the episode be ended. Percent-agreement for protective behavior between the coders and a master coder was computed on an epoch-by-epoch basis and found to be high (96%). Intra-class coefficient (ICC) value was .75. Because there were a large number of epochs where no maternal protective behavior was coded (i.e., zero-values for the majority of epochs), reliability statistics such as ICC and kappa (κ) are biased. In particular, with κ the presence of a large number of zero cells results in unbalanced marginal totals which lead to an artificially low κ (Lantz & Nebenzahl, 1996) so it was not calculated.

We examined the latency of behavior (number of seconds until the behavior had a nonzero value), the intensity of first behavior shown, and the proportion of epochs across the episode in which the mother displayed the behavior.

Toddler distress—Toddlers were scored for facial fear and sadness, bodily fear and sadness, and crying for each second during the episode. Facial fear and sadness were scored according to the AFFEX coding system (Izard, Dougherty, & Hembree, 1983). The AFFEX system requires coders to focus on three regions of the face and provide an objective score on a 0 to 3 scale that summarizes muscle movements across the face. A score of "0" indicated the absence of the expression. A score of "1" indicated a fleeting expression or a moderate expression in one region of the face. A score of "2" indicated moderate expressions in two regions or a strong expression of the emotion in one facial region. A score of "3" indicated a strong expression of the emotion in at least two regions of the face. Facial fear was indicated by the brows being straight or normal but slightly raised and drawn together, the eyelids being raised or tense, and/or an open mouth with corners pulled straight back. Facial sadness was indicated by the inner corners of the brows being raised and outer corners being lowered, the eyes being narrowed or squinted, the cheeks being raised, and/or the corners of the mouth being pulled down and out, often resulting in the upper lip protruding at the center. Bodily expressions and crying were scored on a similar intensity scale, with 0 indicating no expression, and 3 indicating the maximum intensity. Bodily fear was indicated by reduced activity, tensing of the muscles, or at the extreme end, trembling. Bodily sadness was indicated by slumping or dropping of the head. Crying ranged from whimpering to full intensity crying or screaming. Inter-coder reliability was calculated on 15% of cases, and percentage agreement ranged from 81 to 91%. Since coding for these distress behaviors involved micro-coding using second-by-second ratings of each behavior, most coding epochs resulted in no observable behavior (i.e., scores of zero) which resulted in unbalanced marginal totals, and artificially low κ (Lantz & Nebenzahl, 1996), so kappa was not calculated.

For each second, the average of facial fear and sadness was computed for a score of average facial distress and the average of bodily distress was computed for a score of average bodily distress. A final "distress" composite (for each second) was formed as the mean of facial distress, bodily distress, and, crying. In addition to examining the growth in distress across the seconds of the episode, we were also interested in examining toddlers' initial reaction to the stimulus, so a "reaction" composite was also formed as the mean of the first five seconds of distress.

Results

Preliminary Analyses

Recall that we only included in the analyses dyads where the toddler showed some distress. We compared the latencies (number of seconds until first occurrence) of toddler distress and maternal protective behavior and grouped toddlers according to whether they became distressed before mothers engaged in protective behavior ("toddler-first," $n = 45$) or whether mothers behaved before toddlers became distressed ("mother-first," $n = 34$). In subsequent analyses this is a dummy variable with toddlers behaving first coded as 1 and mothers behaving first coded as 0.

We examined toddlers' initial reaction and each of the maternal protective behavior variables for mean differences between the toddler-first and mother-first groups. The toddler-first group demonstrated higher initial distress ($M = 0.91$) than the mother-first group ($M = 0.49$; $t[77] = -2.72$, $p < .01$). It was expected that toddlers who displayed distress before mothers' engaged in protective behaviors would likely do so in the first five seconds, when initial reaction was scored. Mothers displayed a marginally higher proportion of protective behavior in the mother-first group ($M = 0.51$) than in the toddler-first group ($M = 0.36$; $t[77] = 1.72$, $p < .10$). No group difference existed for the intensity of mothers' first protective behavior ($t[77] = 0.96$, *ns*).

Gender differences did not exist for toddlers' initial reaction or for either of the maternal protective behavior variables (*t*s < 0.30, *p*s > .20). Gender was evenly distributed across the toddler-first and mother-first groups ($\chi^2[1] = 0.47$, $p = .51$). SES did not relate to toddler distress reaction, maternal protective behavior variables, or the toddler-first/mother-first dummy variable. Descriptive statistics and bivariate correlations among primary variables are presented in Table 1.

Growth Models Examining Change in Toddlers' Distress

We used multilevel modeling (MLM) to estimate individual change (i.e., growth models) in distress across the time period of the spider episode. MLM accounts for the repeated measurements (i.e., each second of distress) within individuals and partitions the variance of distress between within-toddler and between-toddler portions in order to accommodate the nesting of data within toddlers (Raudenbush & Bryk, 2002). A two-level model was appropriate, such that second-by-second measurements of distress (Level 1) are nested within individual toddlers (Level 2).

Before estimating the growth parameters, we examined an empty model with distress as the dependent variable and no independent variables for the proportion of variance in distress attributable to each level to determine the necessity of a multilevel framework. An ICC of .66 was found in the empty model, indicating that 66% of the variance in distress occurred between individuals. In other words, distress scores tended to be much more similar within a toddler than across toddlers, warranting a multilevel approach. Thus, each second of distress for each toddler acted as a dependent variable, resulting in a 6980 total observations. The Level 1 variable (varying within toddlers with parameter estimates denoted as β) of time (i.e., which second the particular observation of distress occurred) was used to organize the observations chronologically within each toddler to assess changes in distress across the episode. Variables that remained constant across time for a toddler but varied across toddlers (initial distress reaction and maternal protective behavior, with parameters denoted as γ) resided at Level 2.

The fixed effect of time demonstrated a significant linear decrease across this episode ($t[6908] = -25.25$, $p < .001$), suggesting that overall, children tended to decrease in distress across the episode. Adding a random component to time increased model fit ($\chi^2_{[2]} = 354.22$, $p < .001$), indicating significant individual differences in patterns of growth between toddlers. Next, we entered the quadratic variable for time and found it to be significant, but adding a random component for the quadratic trend resulted in a model that did not converge, so it was not added. Thus, we continued to investigate only linear trends in growth.

We examined this model separately for the toddler-first group versus the mother-first group. It appeared that toddlers who expressed distress before their mothers displayed protective behavior showed a sharper decline in distress ($\beta = -0.004$, $t[38.21] = -6.26$, $p < .001$) than toddlers whose mothers displayed protective behavior before their expression of distress ($\beta = -0.003$, $t[25.29] = -4.87$, $p < .001$). These slopes are displayed for descriptive purposes in Figure 1. To test this difference, we examined all children in the same analysis and added the dummy variable of the order of toddler distress and maternal protective behavior, along with its interaction with time (calculated as the cross-product between the dummy variable and time) to the model to determine whether toddlers displayed different patterns in distress based on the sequence of toddler distress and maternal behavior. The interaction was not significant ($t[66.29] = -1.45$, $p = .15$), suggesting that the groups showed similar decreases in distress across the episode.

Given that the relation between maternal protection and toddler distress might differ based on the timing of distress (whether or not it preceded maternal behavior) and intensity of toddlers' initial distress reaction, interactions among time, initial distress reaction, and maternal protective behavior variables (intensity of first protective behavior, proportion of epochs in which protective behavior was displayed) were investigated in subsequent MLM models separately for the toddler-first and mother-first groups. Each model included the main effects of time, initial reaction, intensity of first maternal behavior, the proportion of maternal protective behavior, all 2-way interactions, and 3-way interactions among time, initial reaction, and each of the maternal protective behavior variables. All variables except for time were centered at their means prior to analyses to reduce multicolinearity and aid in interpreting significant interaction terms. Significant interactions were probed by examining the simple slopes of time at recentered values (−1 SD or zero if −1 SD is outside of observed range [low], mean, +1 SD [high]) of the other variable(s) involved in the interaction. Non-significant interactions were dropped and the model was re-run to examine lower-order effects.

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Toddlers displaying distress before maternal protective behavior—In the model with all terms (Table 2), a significant interaction existed among time, toddlers' initial reaction, and the proportion of epochs in which mothers displayed protective behavior (t[36.77] = 2.27, $p < .05$) (Figure 2). Probing this interaction revealed that the lower-order interaction between time and proportion of protective behavior was not significant at low (t[37.04] = −0.58, $p = .56$) or mean (t[36.26] = 0.78, $p = .44$) levels of toddlers' initial reaction, but it was significant at a high level of toddler initial distress reaction (t[34.82] = 2.73, $p < .01$). Maintaining the centering of initial reaction at +1 SD, the time X proportion protective behavior interaction was further probed by examining the simple slopes of time across values of proportion of protective behavior. Although the variable of time was significant across these values, the slope became flatter as the proportion of protective behavior increased from low (β = −0.008, t[33.55] = −5.87, $p < .001$) and mean (β = −0.006, t[34.91] = −6.12, $p < .001$) to high values (β = −0.003, t[36.80] = −2.77, $p < .01$). In other words, when toddlers displayed distress before their mothers reacted to it with protective behavior, we observed a smaller decrease in distress as mothers displayed more frequent protective behavior.

Toddlers displaying distress after maternal protective behavior—In the initial model, neither of the three-way interactions with time reached significance, so they were dropped and the model was rerun to examine two-way interactions between time and the other variables. In this model, only the time X initial reaction emerged as significant (Table 2). Examination of the simple slopes of time at different levels of initial reaction (see Figure 3) suggested that as toddlers displayed higher initial distress, they showed a sharper decrease in distress. The time slope was significantly negative at both high (β = −0.006, t[24.77] = −5.02, $p < .001$) and mean levels of initial reaction (β = −0.004, t[25.07] = −5.67, $p < .001$), but not at a low (zero) initial reaction (β = −0.001, t[23.02] = −1.66, $p = .11$). Likely, a floor effect occurred such that when toddlers showed zero initial distress, they stayed relatively low in distress across the episode and so had a flat slope.

Discussion

The current study examined the short-term relations between maternal protective behaviors and the time course of toddler distress during a fear-eliciting situation. Overall, toddlers' fearful distress decreased significantly across the episode whether or not toddlers became distressed before or after mothers' initial protective behavior. As predicted, however, there was significant individual variability in these trajectories of change. Toddlers' initial reactions were associated with their distress slopes, as we would expect. Toddlers with higher initial reactions had steeper negative slopes (i.e., greater decreases in distress across the episodes), when mothers engaged in protective behavior before toddlers expressed distress. However, maternal protective behavior was unrelated to distress slopes for this "mother-first" subgroup. In the other subgroup, when toddlers displayed distress first there was a significant moderating effect of maternal protective behavior for toddlers experiencing the highest levels of distress. Specifically, a greater proportion of protective behavior related to *less* reduction of distress across the episode. In other words, mothers' protective behavior was related to maintenance of distress levels for the toddlers with the highest initial distress levels whereas protection had no relation to distress when toddlers were low or average in initial distress.

Because we cannot determine causality in this study, we will discuss two possible interpretations of these findings. First, mothers' use of protective behaviors for highly fearful toddlers decreased the likelihood of reducing that distress. This interpretation would suggest that mothers' behavior influenced the trajectory of distress. Second, when toddlers are highly distressed mothers may increase their use of protective behavior with the goal of reducing their toddlers' distress. This interpretation would suggest that toddlers are eliciting this behavior from their mothers. We will now turn to the extant literature and speculate on these two alternative explanations for these results. Future work needs to be conducted to augment these findings through the use of experimental designs or sequential analyses that can provide firmer conclusions about the directionality of effects.

Consequences of Protection for the Time Course of Distress

We will first turn to the interpretation that mothers' protective behaviors influenced the trajectory of distress reduction. This interpretation is consistent with previous work showing that protective behavior may not always be effective in alleviating children's distress (Barrett, Rapee, Dadds, & Ryan, 1996; Bayer, Sanson, & Hemphill, 2006). Note that our study contributed to this literature in showing short-term associations between maternal protection and distress. However, these findings may be particularly salient for extremely distressed toddlers or those who are temperamentally vulnerable to distress to novelty. Previous longitudinal work found that protective behavior predicted maladaptive outcomes only for children who show initially high levels of distress or inhibition (Degnan, Henderson, Fox, & Rubin, 2008; Hastings, Sullivan, McShane, Coplan, Utendale, & Vyncke, 2008).

Despite the fact that protective behavior putatively aims to soothe children's distress and in other situations is often successful in doing so, there are several reasons why protective behaviors might be associated with distress maintenance. First, protective behavior may reinforce the toddlers' distress. When a child displays distress and the mother reacts by removing the child from the source of stress (e.g., by moving the child away from the stimulus), she may confirm the threatening nature of the stimulus, maintaining the child's distress. Second, this type of behavior in some situations or for some toddlers may represent overprotection, which is believed to undermine the child's independent coping. As children age through the toddler years, they should be shifting from external to more internal regulation of distress. Stability in protective behavior over time, may communicate to the child that coping will occur through the mother, relieving the child from having to learn to cope on one's own.

Toddler Elicitation of Maternal Protection

The previous discussion suggests that the direction of effects is mother-to-child. However, transactional models of parent-child influence have replaced this unidirectional view that parents' behaviors influence child behavior and outcomes. As previously mentioned, in the emotion regulation literature, before children are able to self-regulate, they engage in a variety of behaviors that elicit various responses and behaviors from caregivers. Thus, it is equally plausible to interpret the findings from the current study as reflecting a child-to-parent influence such that mothers are engaging in more protective and comforting behavior because their toddlers are highly distressed and are not being soothed. There is support for this in the literature. Parents' perceptions of behaviorally inhibited children influence their "protective" behavior (in this case, restriction of autonomy) two years later (Rubin, Nelson, Hastings, and Asendorpf, 1999). Turning specifically to children's distress behavior and mothers responses, Huebner & Izard (1988) demonstrated that mothers are more likely to help their toddlers when they are sad versus when they are angry, suggesting that children elicit particular reactions from caregiver depending on the behaviors they display. Although parental responses were not measured, we have demonstrated that toddlers were more likely to express sad facial affect when looking at their mothers in both an anger- and fear-eliciting situation (Buss & Kiel, 2004). Together these results demonstrate that toddlers' behavior influences mothers' responses, which is one likely interpretation of the current results. However, note that in the current study it was the "mother-first" group where mothers engaged in more protective behaviors and the “toddler-first” group where toddlers showed the most distress. This finding coupled with the inability to determine the direction of effects makes it difficult to conclude whether mothers’ protective behavior was directly contingent with the level of toddler distress.

Possible Effects of Protective Behavior in the Development of Independent Regulation

Regardless of the direction of effects, the current findings still contribute to the literature on the effectiveness of maternal soothing strategies and development of emotion regulation and adjustment. Implicit in the extant literature, and reviewed in the introduction, is the belief that these maternal behaviors, which are sensitive to the child’s needs, and in many cases serve a regulatory function, will result in positive outcomes (i.e., regulation of distress and socioemotional adjustment). In fact, there is a large body of literature demonstrating that mothers’ sensitive responding to child distress has positive implications for socioemotional development. There is theoretical and empirical support in the attachment literature that sensitivity to distress compared to non-distress predicts attachment security (Thompson, 1997; McElwain & Booth-LaForce, 2006). Sensitive and contingent parent behaviors have been associated with mothers’ ability to anticipate their children’s behavior (e.g., Davidov & Grusec, 2006; Hastings & Grusec, 1997). In a recent study, Leerkes and colleagues found that maternal sensitive responses to distress at 6 months was associated with better emotion regulation for temperamentally reactive children, fewer behavior problems, and more social competence at ages 2 and 3 (Leerkes et al., 2009).

However, parent behaviors that result in the dampening or alleviation of children’s distress may not necessarily promote adaptive outcomes over time. Protective parent behaviors, which in some contexts may be categorized as overprotective, could hinder children’s development of autonomy and mastery during uncertain, novel situations if they are enacted in such a way that reinforces children’s fear or dependence on parental intervention (Dadds & Roth, 2001). In support of this, in a recent study we found that parental protective behavior accounted for some of the stability in children’s fearful/inhibited behavior across the toddler period (Kiel & Buss, 2010). Specifically, when mothers accurately predicted fearful behavior in their toddlers, maternal protective behavior partially mediated the longitudinal association between fearful temperament at age 2 and anxiety symptoms at age 3. Thus, when mothers anticipate fearful behaviors in their toddlers they may respond contingently, but this behavior may be viewed as overprotective (Kiel & Buss, 2010). When considered in the context of the opportunity for developing coping skills and mastery during uncertainty, protective behavior (i.e., shielding child from distressing stimuli) could be considered a type of controlling behavior. Taking control away from the child either by shielding them from the distressing situation may undermine the child’s ability to cope with or regulate their own distress. For instance, we know from work with cortisol reactivity in toddlers that perceived lack of control is related to increases in cortisol for fearful children (Nachmias et al., 1996). This may be particularly problematic in the toddler period when development of autonomy should develop with respect to multiple aspects of social and emotional functioning (Brownell & Kopp, 2007).

Limitations

Because mothers were instructed to remain minimally involved unless toddlers were highly distressed this may have limited the variance in mothers’ behavior and limited the types of behaviors she would typically engage in to reduce distress in her toddler. The larger study, from which these data were derived, was not designed to address these types of mother-toddler interactions. We believe, therefore, our findings are a conservative estimate of effects of these behaviors on the dynamic changes in toddler distress. This sample was predominantly white and middle class. Given accumulating work suggesting that processes in socio-emotional development may vary across culture, ethnic, and racial groups the limits to the generalizability of our findings should be noted. The sample size was modest, especially when we split the sample into the toddler- versus mother-first groups. This could have limited our ability to detect meaningful effects. Finally, the study design and coding limited our ability conduct sequential analyses and to determine the direction of effects between toddler distress and maternal behavior which we know is a dynamic transactional processes. Even though we were able to examine whether mothers' protective behavior occurred before or after the toddlers' initial displays of distress this does not fully address the timing issue.

Conclusion

In sum, we demonstrated that maternal behaviors characterized as protective – shielding child from a threatening stimulus- were associated with regulation of children's fearful distress but individual differences emerged. For toddlers with very high initial levels of distress, increasing amounts of protective behavior was associated with less reduction in distress. Thus, we argue that these findings have implications for which maternal behaviors are effective in reducing distress, for which children, and what the developmental processes are for competence in emotion regulation across the preschool years. Although this study could not address direction of effects, we feel that it contributes by providing initial evidence that in-the-moment influence between parents and toddlers is important. Future studies should be designed to build on these findings.

Acknowledgments

This work was supported by two grants from the National Institutes of Health to Kristin A. Buss (R0 MH3067797 and R01 MH075750). Wish with to extend a thank you to the parents and toddlers who participated in this study and to the staff and students in the Emotion Development Labs at University of Missouri and Penn State.

This study was funded by two grants to the first author from the National Institute of Mental Health (R03 MH67797, R01 MH075750) and a National Research Service Award from the National Institute of Mental Health to the second author (F31 MH077385). We wish to express our appreciation to the families that participated in this study and to the staff and students of the Emotion Development Labs at University of Missouri and Penn State.

References

Arcus, DM. Inhibited and uninhibited children. In: Wachs, TD.; Kohnstamm, GA., editors. Temperament in context. Mahwah, NJ: Lawrence Erlbaum Associates; 2001. p. 43-60.

Barrett PM, Rapee RM, Dadds MR, Ryan S. Family enhancement of cognitive styles in anxious and aggressive children: The FEAR effect. Journal of Abnormal Child Psychology. 1996; 24:187–203. [PubMed: 8743244]

Bayer JK, Sanson AV, Hemphill SA. Parent influences on early childhood internalizing difficulties. Journal of Applied Developmental Psychology. 2006; 37:542–559.

Brownell, CA.; Kopp, CB. Socioemotional development in the toddler years: Transitions and transformations. New York, NY, US: Guilford Press; 2007.

Buss KA. Which fearful toddlers should we worry about? Effects of context on observed fear and risk for anxiety. 2010 Manuscript submitted for publication.

Calkins, SD. The emergence of self-regulation: Biological and behavioral control mechanisms supporting toddler competencies. In: Brownell, CA.; Kopp, C., editors. Socioemotional development in the toddler years: Transitions and transformations. New York: Guilford Press; 2007. p. 261-284.

Crockenberg SC, Leerkes EM. Infant and maternal behaviors regulate infant reactivity to novelty at 6 months. Developmental Psychology. 2004; 40(6):1123–1132. [PubMed: 15535761]

Crockenberg SC, Leerkes EM. Infant and maternal behavior moderate reactivity to novelty to predict anxious behavior at 2.5 years. Development and Psychopathology. 2006; 18(1):17–34. [PubMed: 16478550]

Dadds, MR.; Roth, JH. Family processes in the development of anxiety problems. In: Vasey, MW.; Dadds, MR., editors. The developmental psychopathology of anxiety. New York: Oxford University Press; 2001. p. 278-303.

Davidov M, Grusec JE. Multiple pathways to compliance: Mothers' willingness to cooperate and knowledge of their children's reactions to discipline. Journal of Family Psychology. 2006; 20:705–708. [PubMed: 17176207]

Degnan KA, Henderson HA, Fox NA, Rubin KH. Predicting social wariness in middle childhood: The moderating roles of childcare history, maternal personality, and maternal behavior. Social Development. 2008; 17:471–487.10.1111/j.1467-9507.2007.00437.x [PubMed: 20463856]

Diener ML, Manglesdorf SC. Behavioral strategies for emotion regulation in toddlers: Associations with maternal involvement and emotional expressions. Infant Behavior & Development. 1999; 22(4):569–583.

Haley DW, Stansbury K. Infant stress and parent responsiveness: Regulation of physiology and behavior during still-face and reunion. Child Development. 2003; 74(5):1534–1546. [PubMed: 14552412]

Hane AA, Fox NA, Henderson HA, Marshall PJ. Behavioral reactivity and approach-withdrawal bias in infancy. Developmental Psychology. 2008; 44(5):1491–1496. [PubMed: 18793079]

Hastings P, Grusec J. Conflict outcome as a function of parental accuracy in perceiving child cognitions and affect. Social Development. 1997; 6:76–90.

Hastings PD, Sullivan C, McShane KE, Coplan RJ, Utendale WT, Vyncke JD. Parental socialization, vagal regulation, and preschoolers' anxious difficulties: Direct mothers and moderated fathers. Child Development. 2008; 79:45–64.10.1111/j.1467-8624.2007.01110.x [PubMed: 18269508]

Horstmann G. What do facial expressions convey: Feeling states, behavioral intentions, or action requests? Emotion. 2003; 3:150–166. [PubMed: 12899416]

Hudson JL, Comer JS, Kendall PC. Parental responses to positive and negative emotions in anxious and nonanxious children. Journal of Clinical Child and Adolescent Psychology. 2008; 37(2):303–313. [PubMed: 18470768]

Huebner RR, Izard CE. Mothers' responses to infants' facial expressions of sadness, anger, and physical distress. Motivation and Emotion. 1988; 12:185–196.

Izard, CE.; Dougherty, LM.; Hembree, EA. A system for identifying affect expressions by holistic judgments (Affex). Newark: University of Delaware, Computer Network Services and University Media Services; 1983.

Jahromi LB, Putnam SP, Stifter CA. Maternal regulation of infant reactivity from 2 to 6 months. Developmental Psychology. 2004; 40(4):477–487. [PubMed: 15238037]

Kiel EJ, Buss KA. Maternal accuracy and behavior in anticipating children's responses to novelty: Relations to fearful temperament and implications for anxiety development. Social Development. 2010; 19:304–325. [PubMed: 20436795]

Kochanska G. Socialization and temperament in the development of guilt and conscience. Child Development. 1991; 62(6):1379–1392. [PubMed: 1786722]

Kochanska G. Children's temperament, mother's discipline, and security of attachment: Multiple pathways to emerging internalization. Child Development. 1995; 66(3):597–615.

Kochanska G, Aksan N, Joy ME. Children's fearfulness as a moderator of parenting in early socialization: Two longitudinal studies. Developmental Psychology. 2007; 43(1):222–237. [PubMed: 17201521]

Kopp C. Regulation of distress and negative emotions: A developmental view. Developmental Psychology. 1989; 25:343–354.

Lantz CA, Nebenzahl E. Behavior and interpretation of the κ Statistic: Resolution of the two paradoxes. Journal of Clinical Epidemiology. 1996; 49:431–434. [PubMed: 8621993]

Leerkes EM, Nayena Blankson A, O'Brien M. Differential effects of maternal sensitivity to infant distress and nondistress on social-emotional functioning. Child Development. 2009; 80(3):762–775. [PubMed: 19489902]

McElwain NL, Booth-LaForce C. Maternal sensitivity to infant distress and nondistress as predictors of infant-mother attachment security. Journal of Family Psychology. 2006; 20:247–255. [PubMed: 16756400]

Moore GA, Calkins SD. Infants' vagal regulation in the still-face paradigm is related to dyadic coordination of mother-infant interaction. Developmental Psychology. 2004; 40(6):1068–1080. [PubMed: 15535757]

Nachmias M, Gunnar M, Mangelsdorf S, Parritz R, Buss KA. Behavioral inhibition and stress reactivity: The moderating role of attachment security. Child Development. 1996; 67:508–522. [PubMed: 8625725]

Raudenbush, SW.; Bryk, AS. Hierarchical linear models: Applications and data analysis methods. Thousand Oaks, CA: Sage Publications; 2002.

Rubin KH, Hastings PD, Stewart SL, Henderson HA, Chen X. The consistency and concomitants of inhibition: Some of the children, all of the time. Child Development. 1997; 68:467–483. [PubMed: 9249961]

Rubin KH, Nelson LJ, Hastings P, Asendorpf J. The transaction between parents' perceptions of their children's shyness and their parenting styles. International Journal of Behavioral Development. 1999; 23(4):937–958.

Shipman KL, Zeman J, Nesin AE, Fitzgerald M. Children's strategies for displaying anger and sadness: What works with whom? Merrill-Palmer Quarterly. 2003; 49:100–123.

Sroufe, LA.; Duggal, S.; Weinfield, N.; Carlson, E. Relationships, development, and psychopathology. In: Sameroff, AJ., editor. Handbook of developmental psychopathology. 2. Dordrecht, Netherlands: Kluwer Academic Publishers; 2000. p. 75-91.

Thompson RA. Sensitivity and security: New questions to ponder. Child Development. 1997; 68:595–597.

NIH-PA Author Manuscript
NIH-PA Author Manuscript

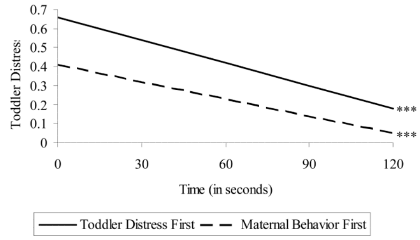

Figure 1.
Change in toddler distress across the Spider episode for toddlers who displayed distress before their mothers engaged in protective behavior and for toddlers whose mothers displayed protective behavior before they displayed distress.
***$p < .001$.

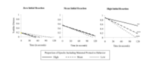

Figure 2.

Only for toddlers who displayed distress before their mothers engaged in protective behavior, a three-way interaction existed among time, proportion of epochs including maternal behavior, and toddlers' initial distress reaction. The relation between time and toddler distress (i.e., growth slopes) varied across values of proportion of epochs, only when toddlers displayed a high initial reaction. At Zero Initial Reaction, simple slopes were significant at High and Mean proportions ($ps < .05$) but not at Low proportion. At Mean Initial Reaction, simples slopes were significant ($p < .001$) at Low and Mean proportions as well as at a High proportion ($p < .01$). Significance of simple slopes at High Initial Reaction are noted within the graph.

$^{**}p < .01$, $^{***}p < .001$.

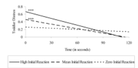

Figure 3.
The slope of distress varied across toddlers’ initial reactions to the Spider episode. Toddlers experienced a steeper decline in distress across the episode as they displayed a more intense initial reaction.
***$p < .001$.

Table 1

Descriptive Statistics and Bivariate Correlations

Variable	*Mean*	*SD*	*Range*	Gender *t*-test	2	3	4
1. SES (Hollingshead Index)	49.26	10.87	13.00–66.00	−0.56	−.06	−.11	−.06
2. Toddler Initial Reaction	0.73	0.75	0.00–3.00	0.29	--	.29*	.29*
3. Intensity of first maternal protective behavior	1.06	0.91	1.00–3.00	−0.18		--	.59**
4. Proportion of epochs in which mothers displayed protective behavior	0.42	0.38	0.00–1.00	0.05			--

Note. Toddler initial reaction was scored as the average of distress behaviors (all scored 0–3) across the first 5 seconds of the episode.

No gender differences were significant.

* $p < .05$,

** $p < .01$.

NIH-PA Author Manuscript

NIH-PA Author Manuscript

Table 2

Growth Models for Toddler Distress by Group

Fixed Effect	Toddler Distress First			Toddler Distress After Maternal Behavior		
	Estimate (*SE*)	*t*-test	95% CI	Estimate (*SE*)	*t*-test	95% CI
Intercept (β)	0.537 (0.061)	8.82***	0.41, 0.66	0.460 (0.053)	8.61***	0.35, 0.57
Time (β)	−0.004 (0.001)	−6.33***	−0.01, −0.00	−0.004 (0.001)	−5.67***	−0.005, −0.002
Toddler Initial Reaction (γ)	0.487 (0.080)	6.09***	0.33, 0.65	0.278 (0.089)	3.13**	0.10, 0.46
Proportion of epochs with protection (γ)	−0.021 (0.217)	−0.10	−0.46, 0.42	0.263 (0.152)	1.73	−0.048, 0.574
Intensity of first protective behavior (γ)	0.140 (0.089)	1.57	−0.04, 0.32	−0.043 (0.069)	−0.62	−0.18, 0.10
Time X Reaction (β)	−0.002 (0.001)	−1.68	−0.003, 0.003	−0.003 (0.001)	−3.11**	−0.005, −0.001
Time X Proportion (β)	0.002 (0.003)	0.78	−0.003, 0.012	−0.002 (0.002)	−1.02	−0.006, 0.002
Time X Intensity (β)	−0.001 (0.001)	−0.91	−0.003, 0.001	−0.000 (0.001)	0.47	−0.001, 0.002
Reaction X Proportion (γ)	−0.004 (0.215)	−0.02	−0.44, 0.43			
Reaction X Intensity (γ)	0.124 (0.088)	1.41	−0.05, 0.30			
Time X Reaction X Proportion (β)	0.006 (0.003)	2.27*	0.001, 0.011			
Time X Reaction X Intensity (β)	−0.000 (0.001)	−0.25	−0.002, 0.002			
Random Effect	Estimate	SE	Wald *Z*	Estimate	SE	Wald *Z*
Time	0.120	0.029	4.21***	0.070	0.019	3.62***
Residual	0.115	0.003	43.83***	0.104	0.003	38.48***

Note. All variables except time were centered at their means prior to analyses. Models with highest-order significant effects are shown.

* $p < .05$,

** $p < .01$,

*** $p < .001$