



Published in final edited form as:

*Infancy*. 2012 November 1; 17(6): 715–730. doi:10.1111/j.1532-7078.2012.00114.x.

## Maternal Caregiving Moderates the Relation Between Temperamental Fear and Social Behavior with Peers

Elizabeth C. Penela<sup>1</sup>, Heather A. Henderson<sup>1</sup>, Amie Ashley Hane<sup>2</sup>, Melissa M. Ghera<sup>3</sup>, and Nathan A. Fox<sup>4</sup>

<sup>1</sup>University of Miami, Department of Psychology

<sup>2</sup>Williams College, Department of Psychology

<sup>3</sup>St. John Fisher College, Department of Psychology

<sup>4</sup>University of Maryland, Department of Human Development

### Abstract

Temperament works in combination with a child's environment to influence early socioemotional development. We examined whether maternal caregiving behavior at infant age 9 months moderated the relation between infant temperamental fear (9 months) and observations of children's social behavior with an unfamiliar peer at age 2 in a typically-developing sample of 155 children. When infants received lower quality maternal caregiving, temperamental fear was inversely related to observed social engagement and aggression. These relations were nonsignificant when infants received higher quality maternal caregiving. Findings indicate that variations in temperamental fear may predict individual differences in future peer interactions, but sensitive, nonintrusive caregiving behaviors can attenuate these associations.

---

The quality of social interactions in toddlerhood is an important precursor to socioemotional outcomes (Hay, Payne, & Chadwick, 2004; Howes & Phillipsen, 1998), and therefore examining peer interactions as an outcome in early childhood research is essential. Extremely high or low levels of temperamental fear can enhance the risk of future internalizing and externalizing problems, respectively (Calkins & Degnan, 2006; Colder, Mott, & Berman, 2002). Recent literature also suggests that temperamentally negative infants are differentially susceptible to rearing influences (Belsky & Pluess, 2009). The differential sensitivity to context model, however, relies on global measures of infant proneness to distress, and not temperamental fearfulness specifically. Here we examined if early-occurring maternal caregiving behavior (MCB), measured in the home during routine care-focused activities (Hane & Fox, 2006), moderates the relation between temperamental fear and two important aspects of children's social behavior at age two: social engagement and aggression. This study extends past findings by (1) examining specific effects of temperamental fear, (2) examining mother-infant interaction during routine, caregiving tasks administered in the home, and (3) utilizing observations of peer interactions as an outcome measure. Peer observations are an important extension given past research showing that maternal sensitivity moderates the relation between temperamental fear and maternal-reported social behavior in early childhood, such as anxious symptoms and conduct problems (Crockenberg & Leerkes, 2006; Lahey et al., 2008). This methodology overcomes the limits of maternal reporting bias and allows for examination of children's adaptive and

maladaptive social behavior in a context particularly salient for temperamentally fearful toddlers—an interaction with an unfamiliar peer.

## Influences on Early Social Development

### Temperament in infancy

Rothbart (1989) defines temperament as constitutionally-based individual differences in reactivity and emotion regulation. Beginning in early infancy, children show differences in the duration and intensity of their vocal, motor, and facial reactions to novel and mildly frustrating stimuli and environments (Calkins, Fox, & Marshall, 1996; Stifter & Braungart, 1995). Differences in negative emotional reactivity can be separated into two domains: proneness to fear and distress to limitations. During the first year of life, behavioral and physiological measures of infants' fear reactions to novelty are modestly related to social outcomes. Increased temperamental fear predicts behavioral inhibition in toddlerhood and social reticence in early childhood (Fox, Henderson, Rubin, Calkins, & Schmidt, 2001), whereas low levels of maternal-reported fearfulness to the same types of stimuli lead to increased risk for future maternal-reported externalizing problems (Colder et al., 2002; Lahey et al., 2008). Importantly, many past studies utilize maternal reports of infant reactivity that combine proneness to fear and distress and maternal-reported social outcomes (Pleuss & Belsky, 2010), whereas the current study included only ratings of temperamental fear to predict observed social engagement and aggression with an unfamiliar peer.

### Maternal behavior

The development of socioemotional skills in infancy occurs largely in the context of early sensitive interactions (van den Boom, 1994). Sensitive maternal behaviors have been defined as timely and appropriate responses to infants' cues (Ainsworth, Blehar, Waters, & Wall, 1978). Past studies have shown that maternal responsiveness in infancy is positively related to children's level of play sophistication (Tamis-LeMonda, Bornstein, Baumwell, & Damast, 1996) and inversely related to behavior problems in early childhood (Shaw, Winslow, Owens, Vondra, Cohn, & Bell, 1998). Sensitive parents may at times also display intrusive behaviors, such as interrupting a child's ongoing activity to prevent a potentially upsetting experience. Intrusive parenting, or the tendency to impose one's own agenda without regard for the child, predicts stability of early peer inhibition (Rubin, Burgess, & Hastings, 2002). The measure of MCB used in this report includes both aspects of high-quality caregiving: sensitive and nonintrusive parenting. The current study builds upon the evidence drawn from this sample to show that low quality MCB is directly and contemporaneously associated with biobehavioral markers of fearfulness and stress reactivity (Hane & Fox, 2006) and is predictive of stress reactivity and social difficulties, including peer aggression, in early childhood (Hane, Henderson, Reeb-Sutherland, & Fox, 2010). These effects were modest, however, suggesting that not all infants are equally affected by low quality MCB. Instead, consistent with transactional models, MCB likely interacts with the temperamental disposition of the infant in the prediction of individual differences in social behavior in toddlerhood.

### Joint Influences of Temperament and Maternal Behavior

Studies have highlighted the importance of using a goodness-of-fit theoretical model and shown that certain parenting behaviors moderate the relation between early temperament and future social outcomes (Eggum et al., 2009; Rubin, Hastings, Stewart, Henderson, & Chen, 1997). Eggum and colleagues (2009) recently found that the association between fearfulness at 18 months and shyness at 30 months was stronger among children experiencing lower levels of maternal sensitivity at 18 months. Further, Crockenberg and Leerkes (2006) showed that early maternal-reported negative reactivity (i.e., distress and

fear) predicted later anxiety for infants who manifested low self-regulatory skills, but only among infants whose mothers showed relatively low maternal sensitivity in the laboratory. Similarly, among infants high on maternal-reported early negative reactivity, maternal sensitivity to distress at six months was negatively associated with affective dysregulation during a mother-child compliance task in toddlerhood (Leerkes, Blankson, & O'Brien, 2009). Collectively, these findings suggest that maternal behaviors can alter the longitudinal effects of temperamental fear on future internalizing difficulties. Relatedly, Kochanska and colleagues have consistently identified an interaction between temperament and maternal sensitivity, such that among highly fearful children, gentle discipline parenting promotes optimal conscience development in the context of compliance (Kochanska, Aksan, & Joy, 2007). The current study will extend the existing literature by examining whether infants experiencing high levels of temperamental fearfulness benefit from highly sensitive and responsive parenting with regard to positive peer interactions.

Additional evidence shows that maternal behavior also moderates the association between low levels of temperamental reactivity and behavior and affect regulation. For example, Lahey and colleagues (2008) found that only among low fear infants, higher levels of interviewer-rated maternal responsiveness during a home visit in the first year of life was related to fewer maternal-reported conduct problems in early to middle childhood. Leerkes and colleagues (2009), however, found that among infants low on temperamental reactivity, maternal sensitivity to distress was related to greater affect dysregulation during a compliance task, perhaps because low reactive infants might perceive sensitive responses as intrusive. Overall, studies show inconsistent findings regarding the type of caregiving behavior that promotes optimal future social outcomes among infants low on temperamental fear. These mixed results may be explained by differences in the types of measures used (e.g., observation during distress, maternal-report). The current study seeks to extend this literature by examining how caregiving behavior during routine caregiving tasks moderates the relation between maternal-reported infant temperament and positive and negative aspects of peer interaction in toddlerhood (e.g., social engagement, aggression). Findings related to aggression, however, must be interpreted with caution, as past research shows that positive and negative peer interactions in toddlerhood are correlated (Hawley, 2002; NICHD Early Child Care Research Network, 2001). Specifically, researchers in this line of inquiry propose that certain forms of aggression in toddlerhood may be a result of immature interaction skills, rather than an indicator of risk.

## Summary and Hypotheses

Previous research reveals that suboptimal maternal behavior places temperamentally vulnerable children at risk for future maternal-reported socioemotional problems. Missing from the existing literature, however, is how temperamental fearfulness and parenting factors jointly influence children's social interactions with peers—an essential outcome given extensive empirical evidence demonstrating that early positive peer relationships lead to positive social and academic outcomes (Ladd, 2005). We examined the joint influences of maternal report of infant temperamental fear and observed MCB (9 months) on children's social interactions (age 2). Past studies utilizing the differential sensitivity to context framework use maternal reports of temperament and show that highly distress-prone infants show disproportionate gains and adverse effects from high- vs. low-quality maternal interactions, respectively. The current study examined temperamental fearfulness in particular, which may operate differently. We hypothesized that when paired with low-quality caregiving, low and high levels of fearfulness in infancy would relate to lower quality peer interaction, as observed during a structured peer play paradigm in the laboratory at age 2 years. When met with sensitive early caregiving, however, we expected that children at low and high levels of temperamental fear would not show low-quality peer play

behavior. Specifically, maternal behaviors during routine caregiving tasks were expected to moderate the relation between infant fear and two subsequent social outcomes: (1) social engagement and (2) aggressive play with an unfamiliar peer. Perceptions of high temperamental fear were hypothesized to relate to lower levels of social engagement, whereas low temperamental fear was expected to predict higher levels of aggression. Maternal behaviors were hypothesized to moderate these relations, such that they would not exist among children receiving high levels of MCB.

## Method

### Participants

Drawn from a larger longitudinal sample, the final sample included 155 children and their mothers with complete data at 9 and 24-months (81 girls). Children's ethnicities were 69% Caucasian, 10% African-American, 3% Hispanic, and 18% multiracial. Mothers were well-educated (80% graduated college), and most parents (93%) were married when the child was 24 months of age. Families were recruited as part of a larger longitudinal study using commercially-available mailing lists, which targeted households with young infants. Using telephone interviews, infants of interested families were screened for developmental delays and serious medical problems. Mothers were financially compensated and children were given a toy for their participation.

### Procedure

Interested mothers of developmentally healthy infants were scheduled for a laboratory visit when their infant was 4 months of age. During this initial visit, 779 infants were screened for emotional and motor reactivity to auditory and visual stimuli to ensure a wide range of variability in reactions to novelty in the study sample (see Hane, Fox, Henderson, & Marshall, 2008, for a full description of screening procedures). Based on infants' reactions during this screening, 291 mother-child dyads were invited to participate in the study, of which 242 agreed to participate in the 9-month home visit. Because caregiving tasks were not initially part of the protocol, only 209 mothers completed the tasks used to assess MCB. Of these, 198 mothers also completed the temperament questionnaire. Children with complete data at 9 months were compared to those with missing data and analyses revealed no significant differences with regard to sex, maternal education, ethnicity, or 4-month temperament variables. At age 2, social engagement and aggression with an unfamiliar peer was observed in the laboratory. Of the 198 mother-child dyads with complete 9-month data, 155 children returned for the 24-month peer interaction assessment. Missing data analyses showed that among families who returned at 24 months, 9-month maternal sensitivity was higher,  $t(154)=4.49$ ,  $p=.001$ , and 9-month maternal intrusiveness was lower,  $t(154)=4.415$ ,  $p=.001$ , compared to those with incomplete data; however, they did not differ with regard to sex, ethnicity, maternal education, and 9-month fear as measured by the IBQ. All observational measures were videotaped and coded in the laboratory by trained coders.

### Measures

**Infant fearfulness**—Infant fearfulness was measured using the Infant Behavior Questionnaire (IBQ; Rothbart, 1981), an 87-item maternal-report questionnaire that assesses the frequency of temperamentally-relevant infant behaviors. Using a 7-point Likert scale, mothers rated their infants along several temperament dimensions. Of interest in the current study was the Fear subscale, which consists of 16 items that evaluate the infant's distress to sudden changes in physical or social stimulation, as well as their inhibited approach to novel stimuli (e.g., How often during the last week did the baby cry after startling?). The IBQ shows strong psychometric properties (Rothbart, 1981), and the alpha coefficient for the Fear subscale in this study sample was .73.

**Maternal caregiving behavior**—Quality of MCB was assessed using a similar approach to that reported by Hane and Fox (2006). Mothers were observed in their home while interacting with their infant during three routine caregiving-related activities, including mother busy in the kitchen (e.g., snack preparation), spoon-feeding, and change of clothing/application of lotion. Maternal sensitivity was rated during each episode using a modified version of Ainsworth's Maternal Care Behavior rating system (Ainsworth, 1976). Mothers received a global rating on the following dimensions using a 9-point Likert scale: Acceptance-Rejection, Sensitivity-Insensitivity, Appropriateness of feeding, and Degree of Availability. Scores across these dimensions were averaged to obtain a sensitivity score for each episode. Additionally, maternal intrusiveness was coded during each episode using a 4-point Likert scale (Park, Belsky, Putnam, & Crnic, 1997). Across episodes, scores were averaged and standardized to create sensitivity and intrusiveness composite scores. Finally, the quality of MCB composite was created by subtracting the standardized Intrusiveness score from the standardized Sensitivity score, such that a higher MCB composite represents maternal behavior that was both sensitive and nonintrusive throughout the course of caregiving tasks. Inter-rater reliability between two independent raters was achieved across 40 cases and the overall Intraclass Correlations (ICCs) averaged .80 for sensitivity, .69 for intrusiveness, and .76 for the MCB composite.

**Social behavior with peers**—At age 2, social engagement was measured during a 10-minute free play session in the laboratory with an unfamiliar, same-sex peer. Play partners during the novel, social situation were not part of the target sample. Children were instructed to play with the toys in the room. Their mothers were present, but were instructed not to interact with the children. Using 7-point Likert scales, target children were coded along eight dimensions of affect and social behavior: (1) social interest, (2) wariness, (3) uninvolved (4) adult contact, (5) activity level, (6) positive affect, (7) negative affect, and (8) verbal and physical aggression. Coders assigned global scores that reflected the best representation of the variable across the free play session. A composite score indexing Social Engagement (Almas et al., 2011) was calculated by summing the global scores on social interest, activity level, and positive affect (alpha coefficient=.77). The global aggression score was used to index children's aggression during play. Table 1 provides a brief description of the coding used in the current study. Observers overlapped on 16% of cases and ICCs for global scores on social interest, activity level, positive affect, and aggression were .74, .77, .74, and .89, respectively.

## Results

### Descriptive statistics

Descriptive statistics for study variables are listed in Table 2. A series of correlations among the variables of interest were also computed and results showed that MCB at 9 months was negatively associated with observed aggression with an unfamiliar peer,  $r(154)=-.16$ ,  $p=.046$ . Additionally, social engagement and aggression with a peer were positively correlated,  $r(154)=.22$ ,  $p=.01$ . Sex differences among all key variables were examined, and results showed that girls were rated higher on temperamental fear than boys,  $t(153)=2.03$ ,  $p=.044$ . Therefore, sex was added as a covariate to all models. Importantly, temperamental fear and MCB were unrelated,  $r(154)=-.07$ ,  $ns$ .

### Moderating role of maternal caregiving

Hierarchical regression analyses were conducted to test the independent and interactive effects of infant fear and MCB at 9 months on children's social engagement and aggression at age 2. To avoid multi-collinearity, the predictors were mean centered (Aiken & West, 1991). Using guidelines provided by Dearing and Hamilton (2006), multiple regression

analyses were performed with variables entered in the following order: (1) gender covariate, (2) infant fear, (3) MCB, and (4) interaction between infant fear and MCB. Results are listed in Table 3.

**Social engagement**—There was a main effect of infant fear, such that higher levels of fear at 9 months predicted lower levels of social engagement with an unfamiliar peer at age two. This effect was qualified, however, by an interaction with MCB. Figure 1 plots the significant interaction and shows the simple slopes for the effect of infant fear on social engagement at three levels of MCB. At low MCB ( $-1 SD$ ), infant fear was inversely associated with social engagement,  $\beta = -2.34$ ,  $t(154) = -3.02$ ,  $p = .003$ . Similarly, at average MCB ( $M$ ), infant fear was also inversely associated with social engagement,  $\beta = -1.13$ ,  $t(154) = -2.58$ ,  $p = .011$ . At high MCB ( $+1 SD$ ), however, infant fear was not significantly related to future social engagement.

**Aggression**—There was a main effect for MCB such that higher levels of MCB at 9 months predicted lower levels of aggression with a peer at age two. There was not a direct effect of fear on aggression. Instead, the relation between fear and aggression was moderated by MCB. Figure 2 plots the interaction and shows simple slopes for the effect of infant fear on aggression at three levels of MCB. At low MCB ( $-1 SD$ ), infant fear was inversely associated with aggression at a trend level, such that lower levels of fear tended to predict higher levels of aggression,  $\beta = -.65$ ,  $t(154) = -1.93$ ,  $p = .055$ . At average ( $M$ ) and high MCB ( $+1 SD$ ), however, infant fear was unrelated to aggression.

## Discussion

Our findings demonstrate that early-occurring maternal and infant behavior act in tandem to influence socioemotional functioning in toddlerhood. Results indicated that the quality of maternal caregiving at 9 months moderates the relations between maternal ratings of temperamental fear at 9 months and two aspects of play with an unfamiliar peer at age 2. Among infants who received lower quality caregiving, high fearfulness was associated with low social engagement, whereas low fearfulness was associated with more aggression during peer play. In contrast, among infants who received higher quality caregiving, temperamental fear was unrelated to these outcomes. Thus, these findings suggest that early caregiving behavior may alter a continuous trajectory of temperamental risk.

In contrast to past studies relying exclusively on maternal-report outcome measures, the current study used observational measures of social engagement and aggression with an unfamiliar peer. Thus, these results cannot be explained by maternal characteristics that might bias ratings of children's behaviors or by a unique characteristic of the mother-child relationship; instead, it is clear that ratings of infant temperamental fear and lower quality caregiving behavior jointly impact the emerging behavioral profile of the young child, with convergent evidence pointing to difficulties in social engagement and more aggressive acts during peer play for high and low fearful children, respectively.

These results are consistent with previous literature showing that maternal behavior moderates the relation between early temperament and future social outcomes (Crockenberg & Leerkes, 2006; Eggum et al., 2009; Leerkes et al., 2009). The current study extends this literature by showing that perceptions of fearfulness specifically combined with caregiving behavior characterized by low sensitivity and high intrusiveness, place children at risk for lower levels of observed social engagement with unfamiliar peers. Importantly, observed maternal behavior within the average range on these scales also predicted lowered social engagement with peers in toddlerhood among temperamentally fearful infants. Thus, it appears that high-quality caregiving can increase resilience among infants rated high in

temperamental fear. Past research has shown similar findings in older children; specifically, maternal behaviors moderated the relation between fearfulness in toddlerhood and social reticence at preschool age (Rubin et al., 2002). The current study extends this literature and demonstrates that even in infancy, temperamental fearfulness and maternal caregiving interact to predict the quality of peer interactions.

Results also show that lower levels of perceived temperamental fear predicted higher levels of observed aggression with peers in toddlerhood only for children who experienced lower quality maternal caregiving in infancy (see Figure 2). This finding is consistent with the findings of Lahey and colleagues (2008) showing that maternal responsiveness may attenuate risk for future general maternal-reported conduct problems. The current study extends this literature by showing that increased aggression is evident in peer play behavior as early as age two. These results must be interpreted with caution, however, as aggressive behavior in toddlerhood may be an indicator of immature sociability and may comprise part of typical social development (NICHD ECCRN, 2001). Future research should examine whether the longitudinal trajectories of aggressive behavior in toddlerhood differs according to levels of early temperamental fearfulness. Interestingly, Figure 1 shows that infants low on temperamental fear who experienced lower quality maternal caregiving showed the highest levels of social engagement. It is important to note that social engagement here represents high levels of interest, positive affect, and motor activity, and that these ratings were modestly positively correlated with displays of aggression; thus, these play behaviors may encapsulate exuberance, which is associated with a mix of adaptive and maladaptive outcomes in later childhood (Degnan et al., 2011).

Overall, these findings show that infant fear is a temperamental trait that when paired with a suboptimal rearing environment can predict individual differences in behavior during peer interactions. The differential sensitivity to context model proposes that a difficult temperament predisposes infants to increased sensitivity to environmental influences, such that they are more likely to be adversely affected by low quality environments but may also disproportionately benefit under optimal rearing conditions, compared to less difficult infants (Pleuss & Belsky, 2009). Results of this study indicate that infant fear operates differently than generalized distress. Specifically, among infants at both low and high levels of temperamental fear, low-quality caregiving contexts can increase risk for lowered social engagement and increased aggressive behavior with peers. Furthermore, disproportionate benefits as a result of high-quality caregiving were not observed in the current study. Indeed, in the case of high fearfulness, a significant shift away from this trajectory was only seen for children experiencing highly sensitive maternal caregiving behavior. Thus, infant fear constitutes individual differences in reactions to novel physical and social stimuli, which may place children on different trajectories of socioemotional development (Rothbart & Bates, 2006); results indicate that interactions with the caregiver may alter these pathways.

### Limitations & Future Directions

The mechanisms through which the quality of maternal caregiving influences the relationship between temperamental fear and social behavior in toddlerhood are not fully understood. Self-regulatory abilities are a necessary avenue to explore in this regard, as past research shows that reactivity and regulation in early childhood are important predictors of social functioning (Eisenberg, Fabes, Guthrie, & Reiser, 2002). Lower levels of sensitive caregiving may lead to fewer opportunities for infants to rely on their caregiver to support regulation, due to ineffective regulatory support and/or the experience of stress as a direct function of maternal interventions. Less assistance in regulating distress may place temperamentally vulnerable infants (i.e., high or low in temperamental fear) at risk for future internalizing and externalizing problems, as both are characterized by the dysregulation of negative affect (Campbell-Sills & Barlow, 2007; Frick & Morris, 2004).

Furthermore, results of the current study show that temperamental fear and maternal caregiving explain a small proportion of the variance in social behavior in toddlerhood. Future studies should investigate the influence of other variables that may affect this multi-determined outcome.

In this study, higher rates of attrition occurred among mothers rated low on sensitivity and high on intrusiveness, suggesting that mothers in our sample likely engaged in higher quality caregiving than the general population. Nonetheless, children at low and high levels of temperamental fear receiving lower quality maternal caregiving in this relatively advantaged sample showed lower quality peer interactions. Given the difficulties with selective attrition in the current study, future studies should consider whether the current findings generalize to more high-risk samples. Additionally, the current study did not examine the influence of observational measures of infant fearfulness nor maternal behavior at age two on concurrent social outcomes in toddlerhood. Perceptions of infant distress, however, may be critically important in their own right. Past research has shown that perceptions of high infant distress may predict lower quality maternal care, which directly relates to heightened stress reactivity and poorer social functioning (Hane & Fox, 2006; Hane et al., 2010). Thus, interventions that aim to enhance the quality of maternal caregiving will likely benefit from including approaches designed to alter perceptions of infant difficulty. Overall, results of this report show that focusing on enhancing quality of maternal caregiving behavior prior to the first year may alter a trajectory of temperamental risk very early in development.

## Acknowledgments

This research was supported by a grant from the National Institutes of Health (HD17899) to Nathan A. Fox.

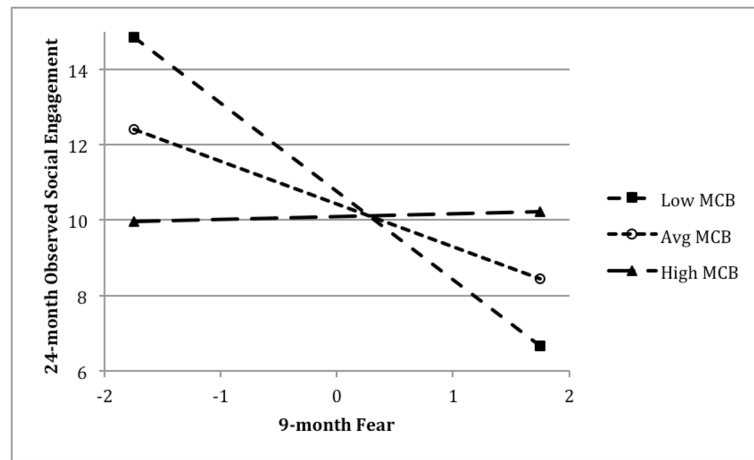
## References

- Aiken, L.S.; West, S.G. *Multiple regression: Testing and interpreting interactions*. London, UK: Sage Publications; 1991.
- Ainsworth, MDS. *Technical manual for the Systems for Coding Infant Attachment and Reciprocal Maternal Behaviors*. Princeton, NJ: Educational Testing Service; 1976.
- Ainsworth, M.S.; Blehar, M.C.; Waters, E.; Wall, S. *Patterns of attachment: A psychological study of the strange situation*. Oxford, England: Lawrence Erlbaum; 1978.
- Almas AN, Degnan KA, Fox NA, Phillips DA, Henderson HA, Moas OL, et al. The relation between infant negative reactivity, non-maternal childcare, and children's interactions with familiar and unfamiliar peers. *Social Development*. 2011; 20(4):718–740. [PubMed: 22563147]
- Calkins SD, Fox NA, Marshall TR. Behavioral and physiological antecedents of inhibited and uninhibited behavior. *Child Development*. 1996; 67(2):523–540. [PubMed: 8625726]
- Calkins, S.D.; Degnan, K.A. Temperament in early development. In: Ammerman, R.T., editor. *Comprehensive handbook of personality and psychopathology*. Hoboken, NJ: John Wiley & Sons Inc; 2006. p. 64-84.
- Campbell-Sills, L.; Barlow, D.H. Incorporating emotion regulation into conceptualizations and treatments of anxiety and mood disorders. In: Gorss, J.J., editor. *Handbook of emotion regulation*. 2007. p. 542-559.
- Colder CR, Mott JA, Berman AS. The interactive effects of infant activity level and fear on growth trajectories of early childhood behavior problems. *Development and Psychopathology*. 2002; 14:1–23. [PubMed: 11893087]
- Crockenberg SB, Leerkes EM. Infant and maternal behavior moderate reactivity to novelty to predict anxious behavior at 2.5 years. *Development and Psychopathology*. 2006; 18:17–34. [PubMed: 16478550]
- Dearing E, Hamilton LC. Contemporary advances and classic advice for analyzing mediating and moderating variables. *Monographs of the Society of Research and Child Development*. 2006; 71(3):88–104.



- Degnan KA, Hane AA, Henderson HA, Moas OL, Reeb-Sutherland BC, Fox NA. Longitudinal stability of temperamental exuberance and social-emotional outcomes in early childhood. *Developmental Psychology*. 2011; 47(3):765–780. [PubMed: 21114347]
- Eggum ND, Eisenberg N, Spinrad TL, Reiser M, Gaertner BM, Sallquist J, et al. Development of shyness: Relations with children's fearfulness, sex, and maternal behavior. *Infancy*. 2009; 14(3): 325–345. [PubMed: 20011459]
- Eisenberg, N.; Fabes, RA.; Guthrie, IK.; Reiser, M. The role of emotionality and regulation in children's social competence and adjustment. In: Pulkkinen, L.; Avshalom, C., editors. *Paths to successful development: Personality in the lifecourse*. New York: Cambridge University Press; 2002. p. 46-70.
- Fox NA, Henderson HA, Rubin KH, Calkins SD, Schmidt LA. Continuity and discontinuity of behavioral inhibition and exuberance: Psychophysiological and behavioral influences across the first four years of life. *Child Development*. 2001; 72:1–21. [PubMed: 11280472]
- Frick PJ, Morris AS. Temperament and developmental pathways to conduct problems. *Journal of Clinical Child and Adolescent Psychology*. 2004; 33:54–68. [PubMed: 15028541]
- Hane AA, Fox NA. Ordinary variations in maternal caregiving influence human infants' stress reactivity. *Psychological Science*. 2006; 17(6):550–556. [PubMed: 16771807]
- 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]
- Hane AA, Henderson HA, Fox NA, Reeb-Sutherland BC. Ordinary variations in human maternal caregiving in infancy and biobehavioral development in early childhood: A follow-up study. *Developmental Psychobiology*. 2010; 52:558–567. [PubMed: 20806328]
- Hawley PH. Social dominance and prosocial and coercive strategies of resource control in preschoolers. *International Journal of Behavioral Development*. 2002; 26(2):167–176.
- Hay DF, Payne A, Chadwick A. Peer relations in childhood. *Journal of Child Psychology and Psychiatry*. 2004; 45:84–108. [PubMed: 14959804]
- Howes C, Phillipsen L. Continuity in children's relationships with peers. *Social Development*. 1998; 7:340–349.
- Kochanska G, Aksan N, Joy ME. Children's fearfulness as a moderator of parenting in early socialization: Two longitudinal studies. *Developmental Psychology*. 2007; 43:222–237. [PubMed: 17201521]
- Ladd, GW. Contributions of peer relationships to children's development and adjustment. In: Ladd, GW., editor. *Children's peer relationships and social competence*. New Haven and London: University Press; 2005. p. 145-158.
- Lahey BB, Van Hulle CA, Keenan K, Rathouz PJ, D'Onofrio BM, Rodgers JL, et al. Temperament and parenting during the first year of life predict future child conduct problems. *Journal of Abnormal Child Psychology*. 2008; 36(8):1139–1158. [PubMed: 18568397]
- Leerkes EM, Blankson AN, O'Brien M. Differential effects of maternal sensitivity to distress and nondistress on social-emotional functioning. *Child Development*. 2009; 80(3):762–775. [PubMed: 19489902]
- NICHD Early Child Care Research Network. Child care and children's peer interaction at 24 and 36 months: The NICHD Study of Early Child Care. *Child Development*. 2001; 72(5):1478–1500. [PubMed: 11699683]
- Park S, Belsky J, Putnam S, Crnic K. Infant emotionality, parenting, and 3-year inhibition: Exploring stability and lawful discontinuity in a male sample. *Developmental Psychology*. 1997; 33:218–227. [PubMed: 9147831]
- Pleuss M, Belsky J. Differential susceptibility to rearing experience: The case of child care. *Journal of Child Psychology and Psychiatry*. 2009; 50(4):396–404. [PubMed: 19175816]
- Pleuss M, Belsky J. Differential susceptibility to parenting and quality child care. *Developmental Psychology*. 2010; 46(2):379–390. [PubMed: 20210497]
- Rothbart MK. Measurement of temperament in Infancy. *Child Development*. 1981; 52(2):569–578.
- Rothbart, MK. Temperament in childhood: A framework. In: Kohnstamm, G.; Bates, J.; Rothbart, MK., editors. *Temperament in Childhood*. Chichester, UK: Wiley; 1989. p. 59-73.

- Rothbart, MK.; Bates, JE. Temperament. In: Damon, W.; Lerner, R.; Eisenberg, N., editors. *Handbook of Child Psychology: Vol. 3. Social, Emotional, and Personality Development*. 6. New York: Wiley; 2006. p. 99-166.
- Rubin KH, Burgess KB, Hastings PD. Stability and social-behavioral consequences of toddlers' inhibited temperament and parenting behaviors. *Child Development*. 2002; 73(2):483-495. [PubMed: 11949904]
- 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(3):467-483. [PubMed: 9249961]
- Shaw DS, Winslow EB, Owens EB, Vondra JI, Cohn JF, Bell RQ. The development of early externalizing problems among children from low-income families: A transformational perspective. *Journal of Abnormal Child Psychology*. 1998; 26(2):95-107. [PubMed: 9634132]
- Stifter CA, Braungart JM. The regulation of negative reactivity in infancy: Function and development. *Developmental Psychology*. 1995; 31(3):448-455.
- Tamis-LeMonda CS, Bornstein MH, Baumwell L, Damas AM. Responsive parenting in the second year: Specific influences on children's language and play. *Early Development and Parenting*. 1996; 5(4):173-183.
- van den Boom DC. The influence of temperament and mothering on attachment and exploration: An experimental manipulation of sensitive responsiveness among lower-class mothers with irritable infants. *Child Development*. 1994; 65(5):1457-1477. [PubMed: 7982362]

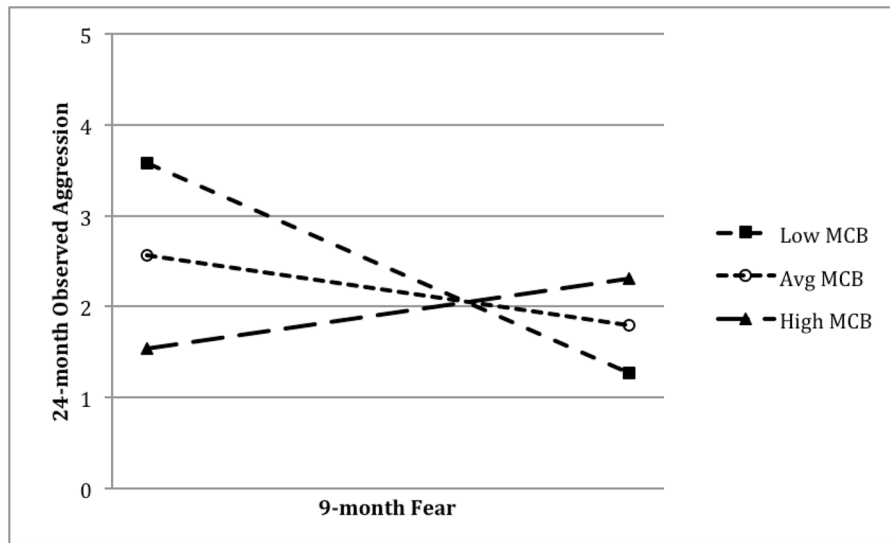


**Figure 1.** MCB at 9 months moderates the effect of infants’ fear at 9 months on children’s social engagement with an unfamiliar peer at 24 months. Simple slopes for low (–1 SD) and average MCB are significantly negative; simple slope for high MCB (+1 SD) is not significant.

\$watermark-text

\$watermark-text

\$watermark-text



**Figure 2.** MCB at 9 months moderates the effect of infants' fear at 9 months on children's aggression with an unfamiliar peer at 24 months. The simple slope for low MCB (-1 SD) is negative at a trend level; simple slopes for average and high MCB (+1 SD) are not significant.

**Table 1**

## Descriptions of Behavioral Coding during Free Play Task

Variable	Coding Definition
<b>Social Interest:</b>	Demonstration of social interest in peer through response and initiation.
1:	Lack of acknowledgement/reciprocity; ignores initiations of peer.
4:	Passive interest; responds to peer and sometimes initiates interactions.
7:	Total engagement with peer; frequent initiations.
<b>Activity Level:</b>	Demonstration of social interest in peer through response and initiation.
1:	Stays in one place or engages in few, slow movements.
4:	Short and infrequent bursts of intense activity.
7:	Continuous quick and intense movement (e.g., running, jumping, skipping).
<b>Positive Affect:</b>	Demonstration of positive affect.
1:	Complete absence of positive affect.
4:	Some expressions of excitement (e.g., singing, smiling, clapping).
7:	Continuous expressions of intense joy (e.g., laughing, smiling, yelling).
<b>Aggression:</b>	Physical or verbal aggression toward peer.
1:	Complete absence of aggressive acts.
4:	Harsh language directed at peer or forceful attempt to get toy.
7:	Frequent displays of aggression (e.g., name-calling, hitting, kicking, biting).

*Note.* Listed above are three anchors of the 7-point Likert scale for each variable. Lower scores indicated lower frequencies and intensities of the behavior, and higher scores indicated more frequent and intense displays of the behavior.

**Table 2**

## Descriptive Statistics

Key Variables	<i>M</i>	<i>SD</i>	<i>Range</i>
<b>9 Months</b>			
IBQ: Fear	2.65	.69	1.08 – 4.44
Maternal Sensitivity	6.67	.77	4.61 – 8.50
Maternal Intrusiveness	1.42	.34	1.00 – 2.67
Quality of Maternal Caregiving Behavior	0.31	1.46	–4.21 – 3.19
<b>Age 2</b>			
Social Engagement with Peer	10.37	3.51	3 – 19
Aggression with Peer	2.23	1.53	1 – 7

*N* = 155

**Table 3**

Infant Fear (9 months) and Maternal Caregiving Behavior (9 months) as Predictors of Social Behavior (Age 2)

Dependent Variable/Step	$\beta$	$t$	$R^2$ Change	Total $R^2$
Social Engagement				.06
Step 1: Child sex	-.03	.34	.00	
Step 2: Infant Fear	-.22	-2.58 *	.02	
Step 3: MCB	-.10	-1.21	.01	
Step 4: Fear x MCB Interaction	.21	2.45 *	.04	
Aggression				.05
Step 1: Child sex	.09	1.03	.00	
Step 2: Infant Fear	-.10	-1.14	.00	
Step 3: MCB	-.17	-2.07 *	.02	
Step 4: Fear x MCB Interaction	.18	2.04 *	.03	

\*  
p < .05