Published in final edited form as:

J Res Pers. 2017 April ; 67: 97–105. doi:10.1016/j.jrp.2016.05.008.

Predicting toddler temperamental approach-withdrawal: Contributions of early approach tendencies, parenting behavior, and contextual novelty

Mairin E. Augustine¹, Kameron J. Moding, and Cynthia A. Stifter

Pennsylvania State University

Abstract

Research suggests that temperamental approach-withdrawal is subject to parenting influences, but few studies have explored how specific parenting behaviors and contextual novelty contribute to the observed pattern of effects. The present study examined associations between infant temperamental approach, mother behavior while introducing novel objects (12 months) and temperamental approach-withdrawal in toddlerhood (18 months) in a sample of 132 infants (68 males). Maternal positive affect predicted more toddler approach-withdrawal for high-approach infants and maternal stimulation predicted less toddler approach-withdrawal for low-approach infants; however, these patterns varied with intensity of novelty in both parenting and toddler outcome contexts. Thus, maternal behavior may lead to stronger associations between earlier and later measures of approach-withdrawal; however, these effects are tied to contexts of measurement.

Keywords

Temperament; approach-withdrawal; infancy; parenting; context

1. Introduction

Temperamental characteristics in infancy and childhood are believed to be a core basis for later personality development (Rothbart & Ahadi, 1994; Rothbart & Bates, 2006). Temperament, here defined as individual differences in reactivity and self-regulation, involves patterns of behavior and emotion that show relative consistency over time. One quality implicated throughout development is the tendency to approach or withdraw from novel stimuli. Researchers studying infants' responses to novel objects (Putnam & Stifter, 2002, 2005; Rothbart, 1988) have found that infants display increasing inhibition of approach to novelty in the second half of the first year of life. Specifically, infants' inhibition of approach (i.e., latency to reach or grasp) to high-intensity novel objects (i.e., objects involving high stimulation such as flashing lights, movement, or sounds) tends to increase

¹Correspondence should be addressed to Mairin Augustine, Department of Human Development and Family Studies, 119 Health and Human Development Building, Pennsylvania State University, University Park, PA, 16802. meal184@psu.edu.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

over this time period, as does the amount of variation in responses across infants. In addition, these individual differences in responses to novel objects have been related to later approach-withdrawal behaviors. For example, Putnam and Stifter (2005) showed that individual differences in latency to reach for novel objects at the end of the first year of life related to patterns of approach-withdrawal as well as positive and negative emotional responses to novelty in toddlerhood, indicating some consistency across the second year of life. It is important to consider, however, that these significant relations from infancy to toddlerhood were modest ($r_s = .21-.33$), suggesting that infants do not maintain an identical rank-order distribution from early to later measures of approach-withdrawal.

One potential explanation for this inconsistency is that early individual differences in temperamental approach to novel stimuli are better-reflected by other temporal responses. For example, the tendency to quickly approach novel stimuli is distinct from the tendency to also persist in exploring and engaging with novel stimuli. Active exploration of novel stimuli and environments is also thought to reflect greater approach tendencies (e.g., Rothbart & Ahadi, 1994), and exploration or manipulation of novel objects within reach is considered a separate marker of positive behavioral response in other observational measures of temperament (e.g., Goldsmith & Rothbart, 1999). Exploration may perhaps generate more instances of enjoyable interaction with stimuli in the environment over time, thus better maintaining approach motivation. Exploration thus appears to be an additionally valuable marker of early temperamental approach to consider in relation to developmental outcomes.

Another explanation is that infants have the potential for change in their temperamental predispositions. Research in early personality suggests that stability coefficients tend to increase through early development, with relatively greater stability found after the preschool years (Nepl et al., 2010; Shiner & Caspi, 2003). Infants may thus evidence some changes in their developing expression of early temperamental approach-withdrawal based on early experiences. Environmental influences and temperament-by-environment interactions have often been implicated in models of temperament through development (see Kiff, Lengua, & Zalewski, 2011; Putnam, Sanson, & Rothbart, 2002; Rothbart & Bates, 2006). Parenting may be one major extrinsic contribution to this variation, due to either direct or temperament-specific influences.

First, parent behavior is found to have direct associations with infants' concurrent and later responses to novelty. Infants and children are found to make attempts to involve the parent in their interactions with novel objects (Mayes, Carter, & Stubbe, 1993), including objects intended to elicit fearful approach-withdrawal responses (Diener & Mangelsdorf, 1999). Because of this, the manner in which parents introduce infants to novel objects may be important to consider when understanding developing patterns of approach-withdrawal in infancy. Past research highlights parental sensitivity, positive affect, and stimulation as three major patterns of behavior relevant to this outcome.

High maternal sensitivity/non-intrusiveness in naturalistic parenting contexts has been found to relate to lower levels of child fear or withdrawal to novelty (Hane & Fox, 2006) and slower growth in fear reactivity in infancy (Braungart-Rieker, Hill-Soderland, & Karrass, 2010). Particular to parent-child interactions surrounding novel stimuli, Crockenberg and

Leerkes (2004) showed that in a task in which 6-month-old infants were exposed to novel toys that were highly-stimulating and might easily elicit infant distress, mothers' putative regulatory behaviors (e.g., distraction, support while infant engaged with object) related to in-the-moment reductions in infant distress responses. Together these findings suggest that parents' ability to respond contingently and appropriately to infant cues surrounding novel stimuli could help infants to have more positive or engaged responses, but no study has examined longitudinal relations between maternal sensitivity in novel contexts and later approach-withdrawal responses.

Several studies have found that parents' positive affective displays when introducing novel objects related to their infants' and children's tendency to engage with these objects in the immediate or near future (Dubi, Rapee, Emerton, & Schniering, 2008; Gerull & Rapee, 2002; Gunnar & Stone, 1984; Hornik, Risenhoover, & Gunnar, 1987). However, it is not clear if displays of positive affect with novel stimuli relate to infants' patterns of behavior over greater periods of time.

There is also evidence that mothers' stimulating behaviors and attempts to engage their child with novel objects, such as demonstrating movement, sound, or tactile features of the object in order to facilitate interactions between the object and child, may influence subsequent child responses. Mothers appear to structure their behavior in specialized ways when introducing infants to novel objects (Brand, Baldwin, & Ashburn, 2002). Compared to behavior with adult partners, they put objects closer to infants, made larger movements, and displayed more enthusiastic, interactive, simplistic, and repetitive behavior. Joint engagement with novel objects has also been shown to relate to the tendency for the infant to then engage in solitary object play (Bakeman & Adamson, 1984). Maternal stimulating behavior thus appears to facilitate infant interest with novel objects, and in turn may increase approach behavior.

Secondly, beyond direct effects, these parenting behaviors may relate to approach-withdrawal in ways that vary with temperament-relevant child characteristics. Research examining the influence of parental sensitivity on infant temperamental approach-withdrawal based on early infant individual differences has produced more mixed findings than studies looking at direct effects of sensitivity (Fox, Henderson, Marshall, Nichols, & Ghera, 2005), but the effects may differ with the type of sensitivity measured. Some studies have found that sensitivity specifically in non-distressing tasks relates to less-inhibited behavior in later novel situations for children higher in temperamental inhibition (Early et al., 2002; Panella, Henderson, Hane, Ghera, & Fox, 2012). However, it is important to consider that these studies examined parenting in naturalistic contexts, not specific to novel objects or to situations designed to elicit individual differences in approach-withdrawal. Instead, researchers imply that maternal sensitivity to infants' distress or withdrawal reactions to novelty could predict stable or increased inhibition, as it may send an implicit message that withdrawal responses are acceptable (Degnan & Fox, 2007; Fox et al., 2005). Conversely, sensitivity for approach-oriented infants may involve reinforcing the tendency to approach novel stimuli. However, to our knowledge, no study has addressed this specific pattern of parental influence.

To date, no longitudinal research has examined temperament-specific associations between maternal positive affect displays and variations in temperamental approach-withdrawal. Positive affective influences may be particularly salient for more approach-oriented infants, as children with higher approach tendencies are thought to have greater sensitivity to reward cues (Carver, Avivi & Laurenceau, 2008; Corr, 2004; Larsen & Augustine, 2008), and accordingly, greater susceptibility to reinforcing parent-child relationship qualities such as mutual positivity (e.g., Kochanska, Akan, & Joy, 2007). Thus, positive affect may relate to even greater approach for these infants, whereas it may not have a meaningful influence on the behavior of low-approach infants.

Temperament-based influences of parents' tendencies to encourage infant interaction with novel objects through stimulation has also not received much attention in the literature. For infants higher in approach, stimulation may elicit approach tendencies by demonstrating more interesting aspects of the object, and thus serve to increase approach motivations over time. Similarly, it may encourage more approach to novelty for initially low-approach infants by intentionally fostering and guiding interactions between the infant and the novel object. However, researchers have highlighted a construct called maternal solicitousness in studies of infant inhibition or withdrawal that might suggest opposite effects of stimulation for low-approach infants (e.g., Degnan, Henderson, Fox, & Rubin, 2008; Rubin, Cheah, & Fox, 2001; Rubin, Hastings, Stewart, Henderson, & Chen, 1997). Solicitousness includes behaviors like facilitating, controlling, or spontaneously intervening by parents (Degnan et al., 2008; Rubin et al., 1997, 2001), which may create fewer opportunities for the child to practice self-controlled responding. The mother's control of the novel object in order to encourage child engagement may serve a function similar to solicitous behavior, in that it disrupts self-initiated attempts to approach or engage with the object for infants not prone to approach, thus predicting less approach over time. More research on this particular behavior is warranted.

Lastly, the effects of parenting may be tied to contexts of measurement. Specifically, because little research on parenting behaviors with novel objects exists, it is also unclear if intensity of novelty of these objects plays a role in the prediction of approach-withdrawal patterns. Much of the research on contextual differences in parenting behavior suggests that children may require less support from parents in tasks involving lower levels of contextual threat or stress, thus parental interventions in low-intensity tasks may actually lead to greater inhibition for low-approach children than interventions in high-intensity tasks. For example, Kiel and Buss (2012) found that maternal protective behavior in low-threat contexts explained the relation between early and later toddler inhibition, whereas protective behavior in a high-threat context was not related to inhibition. Similarly, Rubin et al. (2001) found that higher maternal solicitousness displayed in a low-stress (free play) task related to greater child social reticence (a measure of social inhibition), whereas there was no significant relation from solicitousness in a higher-stress (teaching) context.

As described, parental stimulation may serve a similar role as solicitousness for low-approach infants, so mothers' tendency to display this behavior when introducing a low-intensity object may predict less approach over time, while displaying the same behaviors with a higher-intensity object may be less meaningful. For high-approach infants, however,

mothers' positive affect and stimulation with a low-intensity toy may actually predict greater approach than that with a high-intensity toy. Although these infants are less likely to display withdrawal responses, they may become bored with objects of low-intensity. Thus positive affect and stimulation may serve to make low-intensity objects more appealing to these infants and increase the likelihood of approach behavior over time. However, given previous speculation about parental sensitivity as a potential reinforcer of infant approach-withdrawal tendencies in either direction (i.e., reinforcing approach or reinforcing withdrawal), this behavior may have a more significant moderating influence when displayed by mothers while introducing high-intensity objects. These objects may pull for greater differences in approach-withdrawal responses among infants, thus providing more extreme responses that sensitivity may serve to reinforce.

Another important contextual variation to consider is variations in intensity of the outcome measure of approach-withdrawal. As higher-intensity novel objects and situations are found to pull for more variability in approach-withdrawal, it may be the case that the moderating influences of maternal behavior on infant approach-withdrawal are stronger overall when predicting later behavior in a novel context with greater ambiguity or threat compared to one with fewer threat cues. No research to date has considered variation in novelty of both predictor parenting contexts and outcome contexts when examining parenting as a moderator of approach-withdrawal-related behavior.

Taken together, early infant temperament, parent-child interactions with novel objects, and variations in contextual novelty all play a role in predicting approach-withdrawal tendencies throughout infancy. However, very little research has specifically explored these patterns of moderation. This study extends previous research on the development of approach-withdrawal by examining the role of two measures of infant temperamental approach, as well as maternal behaviors during two mother-child interactive contexts that vary in intensity of novelty, in predicting toddler approach-withdrawal tendencies exhibited during two novel contexts that also vary in intensity of novelty. Based on previous research, it was hypothesized that maternal positive affect, stimulation, and sensitivity with novel objects would each relate to more withdrawal in toddlerhood for low-approach infants, and greater approach for high-approach infants. Further, the moderating effects of maternal positive affect and stimulation were expected to be stronger when observed with a low-intensity novel object, whereas the effects of maternal sensitivity would be stronger when observed with a high-intensity novel object. Lastly, it was hypothesized that all direct and moderating influences would be stronger when predicting toddler approach-withdrawal behavior observed in a higher-intensity novel context compared to a lower-intensity novel context.

2. Method

2.1 Participants

Participants for this study were 146 infants and their mothers recruited for a longitudinal study of emotional development in children. The larger study followed infants from 6 months of age with data collection ongoing to the present; the current study utilized observations of children and mothers when the child was 12 months old and 18 months old. Infants in the original sample were equally distributed by gender (53% male) and primarily

Caucasian (95%). Mothers averaged 29.67 years of age at the time of the child's birth ($SD = 4.79$ years) with an average of 14.85 years of education ($SD = 2.03$ years). The majority of mothers (81.8%) were married to the infant's father. Median annual family income in this sample fell in a category of \$40,000–\$60,000. All study procedures were approved by the institutional review board and informed consent was obtained from all participants (mothers provided consent on behalf of their infants).

A total of 14 families from the original sample did not participate in the 12- and/or 18-month visits. Compared to the full sample, these mothers tended to have fewer years of education ($t(144) = -2.06, p = .04$), but did not differ on other demographic characteristics. Additionally, due to task administration issues (1 infant) and a request by the parent not to complete the task (1 infant), 2 infants did not have usable data for the clown task. Thus, the final sample size for models examining the risk room (low-intensity) outcome is 132 and the final sample size for the clown (high-intensity) outcomes is 130.

2.2 Procedure

2.2.1 12 month assessment—Mothers and infants participated in a laboratory visit within approximately two weeks of the child's first birthday (12 months of age). Relevant to this study, infants participated in a temperamental approach assessment, and mothers and infants participated in a joint novel toy interaction.

2.2.1.1 Toy reach task: To assess infant temperamental approach, infants took part in a toy reach task (Rothbart, 1988; Putnam & Stifter, 2002). Infants were seated in a high chair, and were presented with trays from behind that contained low intensity novel objects (plastic teacup, plastic saucer, wooden block) and high-intensity novel objects (flashing light toy, plastic musical-playing toy bottle, and wind-up butterfly toy). Each tray was presented twice, in a low-high-low-high alternating pattern. Each presentation lasted 30 seconds. Infant behavior in response to the high-intensity trays was utilized as a measure of individual differences in early approach to novelty.

2.2.1.2 Novel toy interaction: To assess maternal behavior with novel objects, mothers and infants participated in a novel toy interaction (following Fish, Stifter, & Belsky, 1993; Gunnar & Stone, 1984) with one low-intensity object (stuffed snail toy), and one high-intensity object (shaking bumble ball toy). The mother and infant sat on the floor of a laboratory play room; for each interaction the experimenter handed the mother the toy, asked her to play with her child and this toy for about one minute with no further instructions, left the room, and returned after one minute. They interacted with the low-intensity toy prior to the high-intensity toy, and between toy interactions the experimenter took away the current toy before handing the next toy to the mother.

2.2.2 18 month assessment—Mothers and infants participated in a second laboratory visit 6 months later (within two weeks of when the infant turned 18 months of age). Relevant to this study, infants participated in a risk room and clown interaction in order to observe later approach-withdrawal in two separate contexts. Both tasks were adapted from the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith, Reilly, Lemery,

Longley, & Prescott, 1994) and other observational assessments of infant and child temperament (e.g., Buss, 2011; Calkins & Fox, 1992). Because of the young age of participants, the mother was present in the room during each of these interactions.

2.2.2.1 Risk room: In this task, the infant and mother were invited to enter a laboratory room filled with a number of novel objects, including a small pop-up tunnel, a set of steps, a black box with “teeth,” and a gorilla mask on a table. The mother was asked to sit in a chair in the corner of the room and allow the infant to interact with the room. After 3 minutes of free exploration, an unfamiliar experimenter entered the room; s/he asked the mother to sit back but did not intentionally approach the infant. Speaking in a positive tone of voice, the experimenter then asked the child to engage with each object (climb through the tunnel, jump from the steps to a small mattress below, put a hand in the black box, pet the gorilla mask). The experimenter-present portion of the task was observed as a comparatively low-intensity novel context due to the child’s previous opportunity to warm-up to the room prior to the experimenter interaction and the normal appearance of the experimenter.

2.2.2.2 Clown interaction: At the beginning of this task, the infant and mother were alone in the lab room and the mother was seated in a chair in the same location as the risk room task. An experimenter dressed as a clown (wearing a clown suit, wig, and glasses with a large rubber nose) entered the room and sat on the floor approximately 3 feet from the mother’s chair. The clown sat silently and looked at the floor for 1 minute, initiated a conversation with the mother for 1 minute, then began to blow bubbles and asked the child to pop the bubbles for 2 minutes. The entire clown task was observed for approach-withdrawal behavior due to the immediate introduction of the novel person. Further, this task was considered a high-intensity novel context due to the atypical appearance and behavior of the novel person.

2.2.2.3 Infant language assessment: Due to possible differences in understanding of verbal requests for behavior by the experimenter in the risk room and clown interactions, infants’ receptive vocabulary was assessed using the Bayley Scales of Infant and Toddler Development, Third Edition (Bayley, 2006). Scaled receptive vocabulary scores were created for each infant ($M = 10.33$, $SD = 3.20$).

2.3 Behavioral Coding

2.3.1 12 month assessment

2.3.1.1 Infant approach to novelty—Two infant temperamental approach behaviors were coded from the high-intensity toy reach task by trained coders. Following Rothbart (1988) and Putnam and Stifter (2002) latency to reach was coded in seconds, defined as the latency to make intentional forward movements toward the toy. The additional variable of exploration was also coded in seconds, defined as time spent visually engaged with and manipulating (e.g., rotating, sliding, picking up, actively mouthing, banging on the tray). Drift reliability was assessed on 20% of recordings, $ICC = .99$ for latency, $ICC = .97$ for exploration. Henceforth, these variables will be referred to as “infant toy reach latency” and “infant toy reach exploration.”

2.3.1.2 Mother behavior with novel objects—Three mother behaviors were coded throughout both novel toy interactions. These behaviors were coded separately by different teams of trained coders.

Maternal sensitivity was coded following Fish and Stifter (1995). Coders rated the frequency and/or intensity of mothers' sensitive and contingent responding in 10-second intervals on a 4-point scale from 0 = "None; no response to the infant's actions or does not attend to the infant's actions for the majority of the interval," to 3 = "High/Active; very aware of the infant and contingently responsive to the infant's interests and affect and/or responds to the infant's actions with vocalizations or other behaviors showing much greater than minimal attunement with the infant." Drift reliability was assessed on 22% of recordings, ICC = .81. Maternal sensitivity scores were calculated for each toy interaction as the mean sensitivity level across intervals.

Coders rated the peak level of mothers' positive affect from their facial affect and vocal tone in 10-second intervals on a 4-point scale from 0 = "None; the mother shows no positive affect, a neutral or blank expression with no smile, and no positive intonation in her voice" to 3 = "High; smile with mouth open widely or intense, loud laugh." Drift reliability was assessed on 21% of recordings, ICC = .96. Maternal positive affect scores were calculated for each toy interaction as the mean positive affect level across intervals.

Mothers' level of stimulation with the toy was coded on a second-by-second basis on a 4-point scale from 0 = "No stimulation; not engaging with the toy, or in contact with the toy but not moving it in any way" to 3 = "High stimulation; the mother's actions with the toy are very intense, with a lot of energy behind them." Drift reliability was assessed on 22% of recordings, ICC = .98. Maternal level of stimulation scores were calculated for each toy interaction as the mean stimulation level across total seconds.

As maternal behavior in this task may have been influenced in part by the infant's willingness to engage or not with the objects, differences in infant behavior was controlled for in the statistical models. Presence of infant engagement with the toy (defined as looking at the toy while manipulating it) was coded in 5-second intervals through each toy interaction. Drift reliability was assessed on 21% of recordings with an average kappa of .90. Infant novel toy engagement scores were calculated for each toy interaction as the proportion of intervals in which the behavior was observed; low-intensity novel toy (snail) $M = .26$, $SD = .20$; high-intensity novel toy (bumble ball) $M = .47$, $SD = .25$.

2.3.2 18 month assessment

2.3.2.1 Toddler approach-withdrawal to novelty—Toddler approach-withdrawal responses to the risk room and clown are expressed through both an affective and behavioral manner (Putnam & Stifter, 2005). To represent the affective response, toddler positive and negative affect were coded from facial affect and vocalizations in 5-second intervals through both tasks by teams of trained coders. Positive affect was coded on a 4-point scale from 0 = "No positive; no indication of positive facial affect and no positive intonation in voice" to 3 = "High positive; highly positive affect such as a smile with mouth open widely, intense laughing, or squealing with delight." Negative affect was also coded on a 4-point scale from

0 = “No negative: no indication of negative facial affect and no positive intonation in voice” to 3 = “High negative; highly negative affect such as a large grimace with mouth open, extreme crying, or screaming.” Separate teams of coders observed each task. Drift reliability was assessed on 20% of recordings, with an ICC = .98 for risk room and ICC = .98 for clown. Toddler positive and negative affect scores were calculated for each task as the mean affect level across intervals.

To represent the behavioral response, specifically willingness to approach the novel person, proximity to the mother was coded second-by-second through both tasks by trained teams of coders on a 5-point scale from 1 = “Both hands or a significant part of the body is touching mother” to 5 = “More than two arm lengths from mother.” As such, a high score on this measure represented a greater distance from the mother. Separate teams of coders observed each task. Drift reliability was assessed on 20% of recordings with an ICC = .99 for risk room and ICC = .99 for clown. Toddler proximity scores were calculated for each task as the mean level of proximity to the mother across total seconds.

Because the clown interaction appeared to pull for additional activation of the Fight-Flight-Freeze system (see Corr, 2004), an additional behavior of freezing was coded during this task following Buss (2011). Presence or absence of freezing was coded across the clown interaction in 5-second intervals, defined as being still or rigid in response to stimuli (e.g., child sits completely still, perhaps with stiff limbs, and stillness is not due to a natural orienting response) for more than 2 seconds during the interval. Drift reliability was assessed on 21% of recordings, average kappa = .66. Infant freezing behavior scores were calculated as the proportion of intervals in which freezing behavior was observed.

2.4 Analytic Approach

Hierarchical multiple regression models were conducted to test the study hypotheses. All models controlled for infant engagement with the novel toy and 18-month receptive vocabulary.

In each model the control variables (receptive vocabulary and infant novel toy engagement) were entered on the first step, infant toy reach approach behavior (latency to reach or exploration) and the three novel toy maternal behaviors (sensitivity, positive affect, stimulation) were entered on the second step, and three interaction terms (toy reach task behavior by novel toy maternal behavior) were entered on the third step. Because statistical interactions between toy reach task behaviors, within-toy maternal behaviors, and across-toy maternal behaviors were not of specific interest in this study, these models were kept distinct and three-way and four-way interactions were not examined. Significant interactions were probed by testing the simple slope of maternal behavior at one standard deviation above and below the mean on infant toy reach behavior, and alternatively, the simple slope of toy reach behavior at one standard deviation above and below the mean on maternal behavior.

3. Results

3.1 Preliminary Analyses

Means and standard deviations of infant (12 month) toy reach behaviors, novel toy maternal behaviors, and toddler (18 month) risk room and clown behaviors are reported in Table 1. To confirm the relevance of contextual differences for infant and child behavior, *t*-tests were conducted to compare mean maternal behavior levels in the low-intensity toy interaction and high-intensity toy interaction, as well as mean toddler behavior levels in the risk room and clown tasks. As can be seen in Table 1, significant cross-context differences were found for all behaviors of interest.

Prior to examining correlations among the central variables of the study, within-context correlations for toddler behaviors in the risk room and clown task were examined. Consistent with previous research (e.g., Putnam & Stifter, 2005) positive affect and negative affect displays were not significantly related to each other within-context (risk room $r = -.07$, $p = .44$; clown $r = -.14$, $p = .10$). Similarly, freezing and negative affect responses appeared to be independent reflections of withdrawal or inhibition in the clown task ($r = .04$, $p = .68$). However, each of these variables was significantly related to proximity within-task in the expected directions ($r_s = \pm .20-.30$ $p_s \leq .02$) and positive affect was negatively related to freezing in the clown task ($r = -.32$, $p < .001$). Given the correlational patterns within-task, a composite approach-withdrawal variable was created by standardizing the scores of each of these measures (negative affect and freezing were reversed before standardizing), and calculating a mean score for each task. Higher scores represented relatively greater affective and/or behavioral approach displayed in the given task (risk room $M = 0$, $SD = .69$, range $-2.66-1.66$; clown $M = 0$, $SD = .63$, range $-2.50-1.77$).

Correlations among 12-month infant and mother behavior and 18-month risk room and clown approach-withdrawal scores are presented in Table 2. Toy reach latency and exploration were highly but not perfectly correlated. Greater toy reach latency and less toy exploration were both related to greater maternal stimulation with the high-intensity novel toy. Maternal positive affect and stimulation were consistent across low- and high-intensity toy interactions but sensitivity was not. Similarly, maternal behaviors were significantly interrelated in the low-intensity novel toy interaction but not in the high-intensity novel toy interaction. Risk room approach-withdrawal and clown approach-withdrawal were significantly related. Infant toy reach latency and toy exploration were not related to toddler risk room and clown approach-withdrawal; however, infant toy exploration was significantly and inversely related to toddler clown approach-withdrawal. No maternal novel toy interaction behavior was significantly related to toddler outcomes; however, there were marginally significant correlations ($p = .07-.08$) between maternal positive affect with either novel toy and risk room approach-withdrawal, and between maternal sensitivity with the high-intense novel toy and clown approach-withdrawal.

3.2 Primary Analyses

3.2.1 Low-intensity (Risk Room) approach-withdrawal—Neither of the multiple regression models predicting toddler risk room approach-withdrawal based on toy reach

latency and its interaction with maternal behavior were significant. The model predicting toddler risk room approach-withdrawal from infant toy reach exploration and maternal behavior with the low-intensity toy was also not significant. Except for effects of receptive vocabulary, no single predictor accounted for significant unique variance in the outcome in any of these models. However, the model predicting risk room approach-withdrawal from infant toy reach exploration and maternal behavior with the high-intensity toy was significant. Toy reach exploration and maternal behavior did not make a significant contribution to the model, but the interaction of exploration and maternal positive affect was significant (see Table 3 for final model).

Probing of this interaction for the simple effects of maternal behavior revealed that for infants who displayed more toy reach exploration, higher maternal positive affect during the high-intensity novel toy interaction related to significantly higher risk room approach in toddlerhood, $B = .35$, $t = 2.30$, $p = .02$ (see Figure 1). The simple effect of maternal positive affect was not significant for infants who displayed less toy reach exploration, $B = -.09$, $t = -.63$, $p = .53$. Further, alternate probing of the interaction revealed that more toy reach exploration related to significantly higher risk room approach at higher levels of maternal positive affect ($B = .03$, $t = 2.22$, $p = .03$) but not at lower levels ($B = -.01$, $t = -.74$, $p = .46$).

3.2.2 High-intensity (Clown) approach—Neither of the multiple regression models predicting toddler clown approach-withdrawal based on toy reach latency and its interaction with maternal behavior were significant. The model predicting toddler clown approach-withdrawal from infant toy reach exploration and maternal behavior with the high-intensity toy was also not significant. No single predictor accounted for significant unique variance in the outcome in any of these models. However, the model predicting toddler clown approach-withdrawal from infant toy reach exploration and maternal behavior with the low-intensity toy was significant. A significant main effect of maternal stimulation was qualified by a significant interaction of toy reach exploration and maternal stimulation (see Table 4 for final model).

Probing of this interaction revealed that for infants who displayed less toy reach exploration, higher maternal stimulation during the low-intensity novel toy interaction related to significantly more clown withdrawal in toddlerhood, $B = -1.54$, $t = -2.89$, $p = .005$ (see Figure 2). The simple effect of stimulation was not significant for infants who displayed more exploration, $B = 0.33$, $t = .98$, $p = .33$. Further, alternate probing of the interaction revealed that less toy reach exploration related to significantly more clown withdrawal at higher levels of maternal stimulation ($B = -.05$, $t = 3.54$, $p < .001$) but not at lower levels ($B = .02$, $t = 1.25$, $p = .21$).

3.2.4 Addressing Type II error risk—Due to the large number of predictors in each model relative to sample size, there is a risk for Type II error in detecting effects of single behaviors or interaction terms. To address this risk, models were re-examined separately by maternal behavior. The results were unchanged from the full models.

4. Discussion

This study is the first to examine moderating influences of specific maternal behaviors when introducing novel objects on longitudinal patterns of approach-withdrawal, as well as context-specificity in these patterns of effects. Based on previous research, it was predicted that maternal sensitivity, positive affect, and stimulation with novel toys would relate to more toddler withdrawal behavior for low-approach infants, and perhaps greater toddler approach behavior for high-approach infants. However, it was expected that the effect of maternal positive affect and stimulation would be stronger when observed in a low-intensity context, while the effects of maternal sensitivity would be stronger when observed in a high-intensity context. Lastly, it was expected that these patterns of moderation would be more predictive of toddler approach-withdrawal observed in a high-intensity novel context compared to a low-intensity novel context. The results are largely consistent with the prediction that there would be specific effects based on temperament, maternal behavior, and context, though with some important distinctions.

There were relatively weak relations between infant and toddler measures of approach-withdrawal. Among the two infant temperamental approach measures, toy reach latency to reach and exploration, only the amount of time infants explored novel objects was correlated with either toddler approach-withdrawal outcome, and only this behavior significantly interacted with maternal behavior to predict toddler approach-withdrawal. Whereas latency to reach represents a willingness to readily initiate approach to novel stimuli, these results support the idea that a tendency to persist in observing and manipulating highly stimulating novel objects may better predict a motivation to approach novel stimuli in the future, even if weakly. This speaks to the importance of examining multiple indicators of early temperament. Further, based on the findings relative to maternal behavior, individual differences in exploration of novel objects may be more relevant to parent-child interactions involving sustained joint engagement with a novel stimulus than the latency to approach novel objects. Taken together, results from the present study indicate that that early indicators of temperament may not evidence rank-order consistency with later measures. Instead, environmental influences such as parenting behavior may help to strengthen these associations over time.

Maternal behavior was found to have a differing pattern of effects for infants relatively higher and lower in temperamental approach. First, maternal positive affect with the high-intensity toy related to greater approach in the risk room in toddlerhood only for infants higher in approach. This effect is consistent with research suggesting that infants higher in approach tendencies are relatively more susceptible to socialization influences when they experience high levels of mutual positivity in the parent-child relationship (e.g., Kochanska, Akan, & Joy, 2007). Mothers' positive affect in interactions with novel objects may reinforce high-approach infants' engagement and enjoyment with novelty and thus predict even greater approach over time. It was tentatively hypothesized that these effects would emerge from mother behavior with the low-intensity novel toy because it may encourage interest even in less-arousing novel stimuli; however, this finding suggests that an interaction with a higher-intensity stimulus is a more salient context of socialization in regard to novelty for high-approach infants. High-approach infants likely experience greater interest or

enthusiasm with higher-intensity stimuli, so maternal behaviors that coincide with this interest may be more influential than those with low-intensity stimuli. On the other hand, positive affect appears not to function as such a potent influence on responses for low-approach infants, and thus does not serve to significantly reinforce (or discourage) approach behavior.

Secondly, and consistent with expectations, greater maternal stimulation in the low-intensity novel toy interaction was associated with more withdrawal from the clown for low-approach infants. Somewhat parallel to findings regarding maternal solicitousness in a low-stress context (Rubin et al., 2001), mothers' tendency to introduce a low-intensity novel object with high levels of stimulation may disrupt a low-approach infant's opportunity to otherwise self-initiate engagement with the object. This may also prevent opportunities to form a sense of competence in managing interactions with novel stimuli, and discourage the tendency to approach in future interactions. Maternal stimulation did not have any influence on outcomes for the high-approach infants. The models examining maternal behaviors controlled for infant engagement with the novel toy because it may have precluded opportunities for mother stimulation. Thus, it may be that instances of maternal stimulation simply do not have such a disrupting influence for high-approach infants, who more readily accept or even self-initiate interaction with novel objects.

In terms of outcomes, it was hypothesized infant approach and maternal behaviors would relate more strongly to toddler behavior elicited within a high-intensity novel context. This hypothesis was supported, but only for low-approach infants. As evidenced by the significant mean differences in infant behavior across these two contexts (Table 1), the high-intensity (clown) task did appear to pose greater novelty and uncertainty compared to the risk room, and thus may have served as a better context in which to observe how parenting behavior can lead to relatively greater withdrawal in low-approach infants. For high-approach infants, mother interactive behavior was only related to toddler approach-withdrawal during the low-intensity (risk room) task. Because it was less challenging, the risk room may have pulled for experiences of positivity and enjoyment with novelty, and thus captured how parenting behavior can reinforce approach responses for high-approach infants over time. Thus, different forms of maternal behavior explained behavioral variation in each novel context in toddlerhood based on infant approach. This suggests the importance of contexts of measurement in examining approach-withdrawal processes from infancy to toddlerhood.

Maternal behavior had only weak direct relations with the outcome measures of toddler approach-withdrawal. These results were not unexpected given that we hypothesized that effects of maternal behavior during interactions around novelty would vary according to infant temperamental approach. Importantly, our findings support this expectation. Whereas many studies of parenting influences on approach-withdrawal tend to focus on inhibited tendencies (e.g., Degnan et al., 2008; Kiel & Buss, 2012; Rubin et al., 1997, 2001), the findings of this study also point to parenting influences specific to high-approach or uninhibited infants. Researchers should continue to explore ways in which both low- and high-approach (or inhibited and uninhibited) children develop different approach-withdrawal patterns based on various parenting experiences. Effects of maternal sensitivity, however,

were not apparent in these results. No studies have examined maternal sensitivity within a novel toy interaction like that in the present study, in which novel stimuli were introduced by the mother and were expected to elicit a wide range of behavioral responses in infants, rather than consistently high or low levels of distress. Clearer effects of maternal sensitivity may emerge from mother-infant interactions involving more consistent infant responses, particularly distress, to novelty.

This study has a number of strengths, including a longitudinal design, use of observational methods, as well as multiple measures of parenting and temperament across contexts and ages. This study is not without limitations, however. First, mothers were given few instructions for behavior in the novel toy interaction in order to observe more natural responses, but this also led to a somewhat restricted range of observed behaviors. Similarly, these models do not fully account for differences in real-time infant behavior in the novel toy interaction. Future studies should address more intensive examinations of the dynamics of parent and infant behavior within this interactive context. Secondly, because it was necessary to assess the development of approach-withdrawal using age-appropriate measures of temperament, this study does not address responses to identical measures over time. Lastly, this study did not address any experimental manipulations of parenting behavior, limiting the ability to draw causal conclusions.

In terms of future directions, an appropriate next step would be to examine underlying motivators of mothers' behavior during mother-infant interactions with novel toys. Both maternal characteristics (Coplan et al., 2008; Hastings, Nuselovici, Rubin, & Cheah, 2010; Kochanska, Friesenborg, Lange, & Martel, 2004) and maternal perceptions of child temperament (Hastings & Rubin, 1999; Kiel & Buss, 2010) have been found to relate to interactive behaviors such as protection, comfort, or shared positivity. Similarly, the elicitation and impact of mother behavior may vary with the degree of shared characteristics among mother and infant. Exploring these patterns of influence may help to further clarify parenting contributions to developing approach-withdrawal tendencies.

4.1 Conclusions

In conclusion, the present study explored the influence of mother-infant interactions with novel objects on patterns of temperamental approach-withdrawal from infancy to toddlerhood, addressing previously unexamined influences of multiple parenting behaviors and varying levels of contextual intensity in both parenting and child outcomes. We found that specific parenting behaviors during interactions encompassing novel objects related to individual differences in toddler approach-withdrawal that were relatively more consistent with individual differences in early temperamental approach. These results suggest that parenting behaviors may serve to strengthen, rather than weaken, relations between early and later measures of approach-withdrawal.

Acknowledgments

This study was supported by a grant from the National Institutes of Digestive Diseases and Kidney (DK081512) to the third author, and funding from the National Institute of Food and Agriculture, U.S. Department of Agriculture (award number 2011-67001-30117) to the second author.

References

- Bakeman R, Adamson LB. Coordinating attention to people and objects in mother-infant and peer-infant interaction. *Child Development*. 1984; 55:1278–1289. [PubMed: 6488956]
- Bayley, N. Bayley Scales of Infant and Toddler Development—Third Edition: Administration manual. San Antonio, TX: Harcourt Assessment; 2006.
- Brand RJ, Baldwin DA, Ashburn LA. Evidence for ‘motionese’: Modifications in mothers’ infant-directed action. *Developmental Science*. 2002; 5:72–83.
- Braungart-Rieker JM, Hill-Soderland AL, Karrass J. Fear and anger reactivity trajectories from 4 to 16 months: The roles of temperament, regulation, and maternal sensitivity. *Developmental Psychology*. 2010; 46:791–804. [PubMed: 20604602]
- Buss. Which fearful toddlers should we worry about? Context, fear regulation, and anxiety risk. *Developmental Psychology*. 2011; 47:804–819. [PubMed: 21463035]
- Calkins SD, Fox NA. The relations among infant temperament, security of attachment, and behavioral inhibition at twenty-four months. *Child Development*. 1992; 63:1456–1472. [PubMed: 1446562]
- Carver, CC., Avivi, YE., Laurenceau, J. Approach, avoidance, and emotional experiences. In: Elliot, AJ., editor. *Handbook of approach and avoidance motivation*. New York, NY: Psychology Press; 2008. p. 385-397.
- Corr PJ. Reinforcement sensitivity theory and personality. *Neuroscience and Biobehavioral Reviews*. 2004; 28:317–332. [PubMed: 15225974]
- Crockenberg SC, Leerkes EM. Infant and maternal behaviors regulate infant reactivity to novelty at 6 months. *Developmental Psychology*. 2004; 40:1123–1132. [PubMed: 15535761]
- Degnan KA, Fox NA. Behavioral inhibition and anxiety disorders: Multiple levels of a resilience process. *Development and Psychopathology*. 2007; 19:729–746. [PubMed: 17705900]
- Degnan KA, Henderson HA, Fox NA, Rubin KA. Predicting social wariness in middle childhood: The moderating roles of childcare history, maternal personality, and maternal behavior. *Social Development*. 2008; 17:471–487. [PubMed: 20463856]
- Diener ML, Mangelsdorf SC. Behavioral strategies for emotion regulation in toddlers: Associations with maternal involvement and emotional expressions. *Infant Behavior & Development*. 1999; 22:569–583.
- Dubi K, Rapee RM, Emerton JL, Schniering CA. Maternal modeling and the acquisition of fear and avoidance in toddlers: Influence of stimulus preparedness and child temperament. *Journal of Abnormal Child Psychology*. 2008; 36:499–512. [PubMed: 18080181]
- Early DM, Rimm-Kaufman SE, Cox MJ, Saluja G, Pianta RC, Bradley RH, Payne CC. Maternal sensitivity and child wariness in the transition to kindergarten. *Parenting: Science and Practice*. 2002; 2:355–377.
- Fish M, Stifter CA. Patterns of mother-infant interaction and attachment: A cluster-analytic approach. *Infant Behavior and Development*. 1995; 18:435–446.
- Fish M, Stifter CA, Belsky J. Early patterns of mother-infant dyadic interaction: Infant, mother, and family demographic antecedents. *Infant Behavior and Development*. 1993; 16:1–18.
- Fox NA, Henderson HA, Marshall PJ, Nichols KE, Ghera MM. Behavioral inhibition: Linking biology and behavior within a developmental framework. *Annual Review of Psychology*. 2005; 56:235–262.
- Gerull FC, Rapee RM. Mother knows best: Effects of maternal modelling on the acquisition of fear and avoidance behaviour in toddlers. *Behaviour Research and Therapy*. 2002; 40:279–287. [PubMed: 11863238]
- Gunnar M, Stone C. The effects of positive maternal affect on infant responses to pleasant, ambiguous, and fear-provoking toys. *Child Development*. 1984; 55:1231–1236.
- Goldsmith, HH., Reilly, HH., Lemery, KS., Longley, S., Prescott, A. Manual for the Preschool Laboratory Temperament Assessment Battery (Lab-TAB). Madison: University of Wisconsin; 1994. Unpublished manuscript

- Goldsmith, HH., Rothbart, MK. The laboratory temperament assessment battery (Lab-TAB): Locomotor Version 3.1. Technical manual, Department of Psychology, University of Oregon; 1999.
- Hane AA, Fox NA. Ordinary variations in maternal caregiving influence human infants' stress reactivity. *Psychological Science*. 2006; 17:550–556. [PubMed: 16771807]
- Hastings, PD., Nuselovici, JN., Rubin, KH., Cheah, CSL. Shyness, parenting, and parent-child relationships. In: Rubin, KH., Coplan, RJ., editors. *The development of shyness and social withdrawal*. New York, NY: Guilford Press; 2010. p. 107-130.
- Hastings PD, Rubin KH. Predicting mothers' beliefs about preschool-aged children's social behavior: Evidence for maternal attitudes moderating child effects. *Child Development*. 1999; 70:722–741. [PubMed: 10368918]
- Hornik R, Risenhoover N, Gunnar M. The Effects of maternal positive, neutral, and negative affective communications on infant responses to new toys. *Child Development*. 1987; 55:937–944.
- 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.
- Kiel EJ, Buss KA. Associations among context-specific maternal protective behavior, toddlers' fearful temperament, and maternal accuracy and goals. *Social Development*. 2012; 21:742–760. [PubMed: 23226924]
- Kiff CJ, Lengua LJ, Zalewski M. Nature and nurturing: Parenting in the context of child temperament. *Clinical Child and Family Psychology Review*. 2011; 14:251–301. [PubMed: 21461681]
- 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]
- Kochanska G, Friesenborg AE, Lange LA, Martel MM. Parents' personality and infants' temperament as contributor to their emerging relationship. *Journal of Personality and Social Psychology*. 2004; 86:744–759. [PubMed: 15161398]
- Larsen, RJ., Augustine, AA. Basic personality dispositions related to approach and avoidance: Extraversion/neuroticism, BAS/BIS, and positive/negative affectivity. In: Elliot, AJ., editor. *Handbook of approach and avoidance motivation*. New York, NY: Psychology Press; 2008. p. 151-164.
- Mayes LC, Carter AS, Stubbe D. Individual differences in exploratory behavior in the second year of life. *Infant Behavior & Development*. 1993; 16:269–284.
- Neppl TK, Donnellan MB, Scaramella LV, Widaman KF, Spilman SK, Ontai LL, Conger RD. Differential stability of temperament and personality from toddlerhood to middle childhood. *Journal of Research in Personality*. 2010; 44:386–396.
- Panella EC, Henderson HA, Hane AA, Ghera MM, Fox NA. Maternal caregiving moderates the relation between temperamental fear and social behavior with peers. *Infancy*. 2012; 17:715–730. [PubMed: 23355798]
- Putnam, SP., Sanson, AV., Rothbart, MK. Child temperament and parenting. In: Bornstein, M., editor. *Handbook of parenting: Vol. 1, Children and parenting*. 2nd. Mahwah, NJ: Erlbaum; 2002. p. 255-277.
- Putnam SP, Stifter CA. Development of approach and inhibition in the first year: Parallel findings from motor behavior, temperament ratings, and directional cardiac response. *Developmental Science*. 2002; 5:441–451.
- Putnam SP, Stifter CA. Behavioral approach-inhibition in toddlers: Prediction from infancy, positive and negative affective components, and relations with behavior problems. *Child Development*. 2005; 76:212–226. [PubMed: 15693768]
- Rothbart MK. Temperament and the development of inhibited approach. *Child Development*. 1988; 59:1241–1250. [PubMed: 3168640]
- Rothbart MK, Ahadi SA. Temperament and the development of personality. *Journal of Abnormal Psychology*. 1994; 103:55–66. [PubMed: 8040481]

- Rothbart, MK., Bates, JE. Temperament. In: Damon, W., Lerner, R., editors. Handbook of child psychology: Vol. 3, social, emotional and personality development. 6th. New York, NY: Wiley; 2006. p. 99-166.
- Rubin KH, Cheah CSL, Fox N. Emotion regulation, parenting and display of social reticence in preschoolers. *Early Education and Development*. 2001; 12:97–115.
- 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]
- Shiner R, Caspi A. Personality differences in childhood and adolescence: Measurement, development, and consequences. *Journal of Child Psychology and Psychiatry*. 2003; 44:2–32. [PubMed: 12553411]

Highlights

Examined multiple influences on developing temperamental approach-withdrawal.

Incorporated varying contextual novelty in predictor and outcome measures.

Parenting appeared to strengthen relations between infant and toddler temperament.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Figure 1.
Effect of maternal positive affect with high-intense novel toy on risk room approach-withdrawal based on toy reach exploration.

Figure 2.

Effect of maternal stimulation with low-intense novel toy on clown approach-withdrawal based on toy reach exploration.

Table 1

Means and Standard Deviations for Primary Study Variables

12-Month Approach	<i>M</i>	<i>SD</i>	<i>Range</i>				
Toy reach latency	5.84	5.48	0–30.00				
Toy reach exploration	22.66	6.67	0–30.00				
12-Month Novel Toy Interaction Maternal Behaviors	Low-Intensity Toy (Snail)		High-Intensity Toy (Bumble Ball)		Difference <i>t</i> , <i>p</i> -value		
	<i>M</i>	<i>SD</i>	<i>Range</i>	<i>M</i>	<i>SD</i>	<i>Range</i>	
Sensitivity	2.20	.27	1.57–2.86	2.00	.16	1.40–2.71	7.35, <.001
Positive affect	.64	.53	0–2.00	.99	.60	0–2.33	–6.36, <.001
Stimulation	.64	.23	.08–1.15	.16	.14	0–.86	22.67, <.001
18-Month Approach-Withdrawal	Low-Intensity Context (Risk Room)		High-Intensity Context (Clown)		Difference <i>t</i> , <i>p</i> -value		
	<i>M</i>	<i>SD</i>	<i>Range</i>	<i>M</i>	<i>SD</i>	<i>Range</i>	
Positive affect	.25	.31	0–1.41	.08	.13	0–.60	6.79, <.001
Negative affect	.04	.11	0–.76	.10	.24	0–1.50	–2.73, .007
Proximity	3.85	1.27	1.00–5.00	2.61	1.18	1.00–5.00	9.91, <.001
Freezing behavior (Clown only)	-	-	-	.24	.23	0–.94	-

Table 2

Correlations Among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Infant toy reach latency to reach	---	-.73**	.02	.07	.06	.07	.11	.24**	-.11	-.12
2. Infant toy reach exploration		---	.01	-.11	-.09	-.004	-.08	-.22*	.08	.18*
3. Maternal sensitivity, low-intensity toy			---	.05	.22**	-.003	.24**	.14	-.08	-.02
4. Maternal sensitivity, high-intensity toy				---	.03	.10	-.03	.10	.11	-.16 ⁺
5. Maternal positive affect, low-intensity toy					---	.35**	.18**	-.04	.16 ⁺	.08
6. Maternal positive affect, high-intensity toy						---	-.09	-.04	.16 ⁺	.03
7. Maternal stimulation, low-intensity toy							---	.19*	-.04	-.08
8. Maternal stimulation, high-intensity toy								---	-.02	-.07
9. Toddler low-intensity (Risk Room) approach-withdrawal									---	.33**
10. Toddler high-intensity (Clown) approach-withdrawal										---

⁺ $p < .10$;* $p < .05$,** $p < .01$

Table 3
Multiple Regression Model Predicting Toddler Low-Intensity (Risk Room) Context Approach-Withdrawal from Infant Toy Reach Exploration and High-Intensity Novel Toy Maternal Behavior

Step	Variables	B	SE(B)	β	F	R ²
1.	Receptive vocabulary	.04	.02	.20*	1.98*	.13
	Low-intensity novel toy infant engagement	.43	.25	.16 ⁺		
2.	Toy reach exploration	.01	.01	.09		
	Low-intensity novel toy sensitivity	.47	.36	.12		
	Low-intensity novel toy positive affect	.13	.10	.12		
	Low-intensity novel stimulation	-.06	.45	-.01		
3.	Exploration $\times$ Low-intensity sensitivity	-.04	.06	-.06		
	Exploration $\times$ Low-intensity positive affect	.03	.02	.19*		
	Exploration $\times$ Low-intensity stimulation	-.02	.04	-.06		

⁺ $p < .10$;

* $p < .05$;

** $p < .01$

Table 4

Multiple Regression Model Predicting Toddler High-Intensity (Clown) Context Approach-Withdrawal from Infant Toy Reach Exploration and Low-Intensity Novel Toy Maternal Behavior

Step	Variables	B	SE(B)	β	F	R ²
1.	Receptive vocabulary	.02	.02	.10	2.12*	.14
	Low-intensity novel toy infant engagement	-.16	.31	-.05		
2.	Toy reach exploration	.01	.01	.13		
	Low-intensity novel toy sensitivity	-.02	.22	-.01		
	Low-intensity novel toy positive affect	.14	.11	.11		
	Low-intensity novel stimulation	-.60	.29	-.22*		
3.	Exploration $\times$ Low-intensity sensitivity	.04	.04	.10		
	Exploration $\times$ Low-intensity positive affect	-.02	.03	-.08		
	Exploration $\times$ Low-intensity stimulation	.14	.05	.29**		

* $p < .05$;

** $p < .01$