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Temperamental sensitivity moderates the effects of maternal love-withdrawal on perception of infant crying: An interactive infant simulator approach

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Abstract

Parenting has an impact on the offspring’s social and behavioral outcomes. However, not all individuals are affected equally: according to the differential susceptibility hypothesis temperamental traits may moderate the effects of early life experiences. We examined the association between young adults’ experiences of maternal love-withdrawal and their perception of infant crying, and the potentially moderating role of temperamental orienting sensitivity. In an ecologically valid but standardized setting, 132 female participants spent two consecutive evenings taking care of an infant simulator. Orienting sensitivity moderated the relation between experienced love-withdrawal and the perception of infant crying: Participants with high orienting sensitivity who experienced low levels of love-withdrawal perceived the crying bouts as less negative than others. We conclude that the long-term impact of early life experiences may be moderated by temperamental characteristics, with implications for individual differences in perceptual responses to infant stimuli in adulthood.

Keywords

Differential susceptibility, Infant crying, Orienting sensitivity, Infant simulator, Parenting, Temperament.
Introduction

From an evolutionary point of view crying is one of the most important behaviors shown by pre-verbal infants since it signals the caregiver about a real or potential threat to the infant. Crying elicits caregiving behavior in the parent that results in relieving the infant from the source of discomfort (Murray, 1979; Zeifman, 2001). However, research has also revealed various parental and infant attributes that interfere with this seemingly simple sequence of infant cry - adult caregiving, resulting in various degrees of sensitive to harsh parenting (Crouch et al., 2008; McCanne and Hagstrom, 1996; Stith et al., 2009). While repetitive and inconsolable crying has been shown to be an important trigger for more harsh and insensitive parenting (Barr et al., 2006; Soltis, 2004), individual differences in parents’ physiological responses and perception of infant crying might also influence (intended) parenting (Crowe and Zeskind, 1992; Out et al., 2010b).

Insensitive parents have been reported to display strong physiological responses to infant cry sounds (Joosen et al., 2013; McCanne et al., 1996), to perceive cry sounds as more aversive and distressing, and to use more harsh caregiving after listening to experimentally manipulated cry sounds, compared to more sensitive parents (Frodi and Lamb, 1980a, b). Moreover, listening to cry sounds may also have an effect on individuals’ mood as seen by increased negative affect ratings (Bruning and McMahon, 2009; Del Vecchio et al., 2009). Using a twin design, both environmental factors and genetic make-up have been shown to contribute to individual differences in physiological responses and perception of infant crying (Out et al., 2010a).

Parents provide one of the earliest and most continuously experienced environment that helps a child to build schemas (also known as internal working models) of self and others (Bowlby, 1969) including relations with one’s own offspring (Bretherton and Munholland, 2008). Individuals might therefore differ in their perceptions and responses to infant crying, based on these early caregiving experiences (Casanova et al., 1994). One important class of caregiving experiences pertains to parental discipline. A strategy of withholding love and affection if the child misbehaves or fails at a task is known as the disciplinary strategy of using love-withdrawal. Although this strategy might prove effective in the short run (Garner, 2012), when used excessively it is considered psychological maltreatment (Euser et al., 2010), and it may come with considerable costs later in life, such as low self-esteem, low emotional well-being, fear of failure, and more feelings of resentment towards parents (Assor et al., 2004; Elliot and Thrash, 2004). Moreover, early life experience of maternal love-withdrawal has been shown to play an important modera-
tor role in the relation between biological factors (e.g., oxytocin) and responses to social cues (Huffmeijer et al, 2012; Riem et al, 2013; Riem et al, in press; Van IJzendoorn et al, 2011). For example, intranasally administered oxytocin enhanced pro-social behavior in individuals with few experiences of maternal love-withdrawal but not in individuals with higher exposure to maternal love-withdrawal. Given the associations between love-withdrawal and social behavior and the substantial intergenerational transmission of parenting behaviors (Van IJzendoorn, 1992), exposure to parental love-withdrawal might induce later negativity towards infant signals.

However, all individuals may not be equally influenced by the same environmental factors (Bakermans-Kranenburg and Van IJzendoorn, 2010; Ellis et al, 2011). Recent studies have suggested that some individuals are not only more vulnerable than others to adverse environment, but also benefit more from positive environment, and thus should be considered more susceptible for better and for worse (differential susceptibility hypothesis; Belsky et al, 2007).

Temperament has been proposed as a susceptibility factor, which in interaction with the environment may result in variations in psychological adjustment and physical health (Ellis et al, 2011). Van Zeijl et al, (2007) found that children with difficult temperament were more susceptible to both negative and positive discipline, compared to children with relatively easy temperament. Data from the large-scale NICHD Study of Early Child Care showed that children with difficult temperament benefit more than children with easy temperament from exposure to sensitive parenting (Bradley and Corwyn, 2008). In the same vein, compared to children with easy temperament, difficult children had more behavior problems early in their school careers when exposed to low-quality child care during infancy or early childhood, but fewer problems when quality was high (Pluess and Belsky, 2009).

Research on infants has been conducted with various temperamental indicators of differential susceptibility, such as difficult temperament (Belsky et al, 1998), temperamental reactivity (Klein Velderman et al, 2006), negative emotionality (Kochanska et al, 2007), and fearfulness (Gilissen et al, 2008). It is important to realize that not only infants but also caregivers may be differentially susceptible to stressors and social experiences (Van IJzendoorn et al, 2008). Orienting sensitivity (in terms of variation in depth of processing of sensory information, with more sensitive individuals processing information more thoroughly) has been suggested as a good indicator of differential susceptibility in adults (Ellis et al, 2011). In a series of studies on the interaction between orienting
sensitivity and childhood stressors, stronger associations between childhood adversity and self-reported shyness and negative affectivity were found for participants with high scores on sensory processing sensitivity (Aron et al., 2005). Orienting sensitivity includes perceptual sensitivity (awareness of slight, low intensity stimulation arising from within the body or the environment), affective sensitivity (awareness of emotional valence associated with low intensity stimuli), and associative sensitivity (reactive cognitive content that is not related to standard associations with the environment) (Evans and Rothbart, 2007, 2008).

High temperamental sensitivity has been shown to interact with (experimentally manipulated) negative environmental factors (adverse parental environment and extremely difficult or impossible assignments, respectively) to predict more negative outcomes (Aron and Aron, 1997; Aron et al., 2005). Although this specific result supports a dual risk model, individuals with high orienting sensitivity may be more susceptible not only to negative caregiving experiences but also to positive caregiving experiences than individuals low in orienting sensitivity. To our knowledge there are no published studies that assess the role of caregivers’ temperament in moderating the relation between childhood experiences and parenting and caregiving behaviors. In the current study we assess how young adults’ temperamental orienting sensitivity moderates the relation between parental love-withdrawal and their perception of infant crying and their mood after taking care of an infant simulator that cries in a lifelike way.

Most of the previous studies measuring physiological and psychological responses to infant crying involved listening to recorded (and manipulated) cry sounds (Crouch et al., 2008; Crowe et al., 1992). Although these studies have provided us with great insights into physiological and behavioral outcomes, they are of low ecological validity (Bruning et al., 2009), as they necessarily fail to approximate the real-life situation of the presence of a crying infant. Moreover, such paradigms lack the controllability component that may give the caregiver a sense of coping and assurance that they are capable of soothing the infant and terminating the crying behavior. Crying infant simulators that can be soothed by the participant, as used in the current study might increase ecological validity in cry research.

The infant simulators were originally developed as a prevention tool for teenage pregnancies, by providing the teenagers a hands-on experience of infant caretaking (Roberts and McCowan, 2004; Strachan and Gorey, 1997). Infant simulators have been used in various settings and groups as a part of parenting teaching aid. Research shows
that simulators are taken seriously by the participants (Barnett and Hurst, 2004). In the present study we used the infant simulator in an interactive setting, where the participants over the course of five hours were exposed to a number of cry episodes. During each cry episode they had to figure out the appropriate caregiving to soothe the infant simulator. Appropriate care would result in the termination of the crying. Participants’ perception of these cry sounds and participants’ mood were assessed after each cry episode. Moreover, as opposed to earlier studies in which infant simulators were used in laboratory settings (Bruning et al, 2009), our participants took the infant simulator home to take care of it for two consecutive evenings, increasing the ecological validity of the assessments.

To our knowledge, this is the first study examining the effects of young adults’ orienting sensitivity and experienced parenting on perception of infant cry sounds, using an interactive infant-caregiving paradigm. We hypothesized that individuals with high orienting sensitivity will be affected more by their love-withdrawal experiences than individuals with low orienting sensitivity. In individuals with high orienting sensitivity, we expected that less maternal love-withdrawal would be associated with less negative perception and more maternal love-withdrawal would be associated with more negative perception of infant crying. We expected that these associations would be weaker or absent in individuals with low orienting sensitivity. Earlier studies also report a significant increase in negative mood after exposure to infant cry sounds when participants could not do anything to stop the cry sound (Bruning et al, 2009), thus increased negative affect may be related to their helplessness rather than to infant crying per se. We therefore explore the effects of temperamental sensitivity and experienced parenting on participants’ mood after infant crying without a specified expectation of the direction of the effect.

Method

Participants

A total of 353 undergraduate students from the Institute of Education and Child Studies, and Department of Psychology at Leiden University participated in the first phase of the study. In this phase, the participants completed online questionnaires on their temperament, perception of parenting by their mothers, and some demographic details. One participant was excluded due to random responses. Ten male participants and five females with children of their own were also excluded to avoid gender and experience
effects on any of the outcomes. The final sample consisted of 337 females between 18 and 30 years (\( M = 19.93, SD = 1.56 \)). More than 90% of the sample was Caucasian.

The participants were then invited for the second phase of the study where they had to take care of a ‘life-like’ infant simulator for two evenings (in order to examine the effects of familiarity and experience). Forty-two of them (12.61%) were not willing to participate in the second phase. They did not differ from the rest of the participants on demographics, temperament and maternal parenting dimensions (all \( p > .05 \)). For the current study the first 132 students who participated in the ongoing second phase were selected, since this sample size provided a power of .80 to find a medium-sized (interaction) effect at a significance level of alpha = .05. The mean age of the participants was 20.12 years (\( SD = 1.74 \)). This group of participants was similar to the initial sample in demographics, temperament and maternal parenting dimensions (all \( p > .05 \)). Ten participants were excluded from the final analyses because of missing values due to technical failure of the instruments used during the sessions. The study was approved by the departmental ethics committee and informed consent was obtained from all participants.

**Procedure**

Participants completed online questionnaires on their temperament, their mothers’ parenting strategies and some demographic details. After that they received information about the possibility to take care of a realistic infant simulator. The participants were asked to take care of the simulator for two evenings (5 p.m. - 10 p.m.) as if it were their own baby. The participants used a hand held computer to answer questions about their perception of the cry sounds and their mood after each cry and caretaking episode.

The infant simulator was programmed to start at 5 p.m. every evening and stop at 10 p.m. During these 5 hours, the simulator had various cry episodes such as hunger cry, for diaper change, for burping etc. The infant simulator schedules (cry frequencies, gap between cry episodes etc.) are based on diaries kept by parents of real infants. A “difficult baby” schedule was used in order to have sufficient cry episodes. The simulator could be soothed by responding appropriately, i.e. feeding the simulator for hunger cry, changing the diaper when required etc. After soothing the simulator, the participant completed some questions on the hand held computer about the perception of the cry, such as the urgency and aversiveness of the cry sound. The participants also indicated their mood after each cry episode.
Measures

Love-withdrawal. The 11-item scale for love-withdrawal (Huffmeijer et al, 2011) was administered in order to assess the use of this disciplining strategy by participants' mothers up until participants were 16 years old. Five items came from the Withdrawal of Relations subscale of the CRPBI (Beyers and Goossens, 2003; Schludermann and Schludermann, 1970), two items were adapted from this same questionnaire, and four items adapted from the Parental Discipline Questionnaire (PDQ; Hoffman and Saltzstein, 1967; Patrick and Gibbs, 2007). These questionnaires have been well validated and the 11-item version was used in previous research (see Huffmeijer et al, 2011). Each item (e.g., *My mother was a person who is less friendly with me, if I do not see things her way*) was rated on a 5-point scale ranging from *not applicable* to *fully applicable*. One of the items was inadvertently not visible in some questionnaires due to a technical error. The score for this item was substituted with the mean score of the other items of the love-withdrawal scale. Internal consistency of the scale was high (Cronbach's $\alpha = .93$).

Temperament. Temperament was assessed using the 77 item Adult Temperament Questionnaire (ATQ-77; Evans et al, 2008). Each question (e.g., *I am often consciously aware of how the weather seems to affect my mood*) was rated on a 7-point rating scale ranging from *not at all* to *always*. Four temperament scales, as suggested earlier in literature (Evans et al, 2007) were distinguished: Negative affect, Extraversion, Effortful control, and Orienting sensitivity. We used orienting sensitivity to test for moderation of the association between maternal love-withdrawal and negative perception of infant crying. Cronbach's $\alpha$ for the orienting sensitivity scale for the current sample was .76.

Infant simulator. The infant simulator (Realityworks, Inc., Virtual Parenting, Coffs Harbour, NSW) is a doll resembling a real infant in physical appearance, size and weight (2.95 kg). The physical features of the simulator are modeled in a way that requires taking care like a real infant. For example, it has a lifelike neck that falls back if not supported. The simulator is programmed similar to an infant with realistic cry sounds (beginning with mild fuss eventually increasing to full-blown crying) as well as breathing, burping and sucking sounds. All the sounds, including cry sounds, are recorded from real infants. Each cry episode requires specific caregiving, such as feeding, burping, diaper change and rocking. Inbuilt sensors in combination with external sensors (in diapers and feeding bottles) register whether correct caregiving was provided or not. The infant simulator responds by being calm again if the appropriate care is provided. The participants were introduced to the simulator by indicating the baby doll's name (e.g.,
Lisa), and they were asked to take care as if it was a real baby. They were instructed to provide proper head support when carrying the baby, and to either feed, burp or change the diaper in order to soothe the crying baby. Feeding bottles, diapers and extra clothing were provided to the participants, as well as a soft baby carrier.

**Perception of infant simulator’s crying.** After each cry episode the participants rated the degree of aversiveness, urgency, sickness and irritability of the cry sounds on a 5-point rating scale. These adjectives have been used in previous cry research as a measure of parents’ negative perceptions of the cry sounds (LaGasse et al, 2005). The total number of times the participants completed the questionnaires after hearing a cry sound varied among the participants depending on their handling of the simulator. We therefore choose the first 8 cry episodes for constructing the scale for cry perception as approximately 88% of the participants had complete data for 8 cry episodes on both days. As the internal consistency of urgency was low (cry episode 1-8, Cronbach’s α = .40), this item was not used for further analysis. Factor analysis resulted in one factor based on the remaining three items (aversiveness, sickness and irritability) explaining 50% of the total variance. Higher factor scores indicated more negative perception of the cry sounds.

**Mood.** Eight items were selected from the Positive Affect Negative Affect Scale (PANAS; Crawford and Henry, 2004; Watson et al, 1988) to assess the transient mood of the participant after each cry episode. Each item was rated on a 5- point scale ranging from not at all to a lot. Two scales, Positive affect (α (day1) = .94, α (day 2) = .96) and Negative affect (α (day1) = .95, (α (day2) = .96) were constructed using the four items for each dimension (cry episode 1-8, separately for day 1 and day 2).

**Response bias.** Eighteen social desirability items from the Child Abuse Potential Inventory (CAPI; Milner, 1994) were used for assessing the degree of social desirability in participants’ responses to the questionnaires. Cronbach’s α for the current sample was .64.

**Reality value of the infant simulator.** Five items were presented to assess the participants’ perception of their taking care of the infant simulator as a realistic experience (see e.g., Bath et al, 2000). Participants took the simulators seriously as evident from their scores on the items such as, “did you notice yourself talking to the baby” (84 %) and “taking care of the doll was a realistic experience”: The mean score on the item asking about the reality value of the infant simulator was $M = 6.21$ (SD = 1.71) on a scale from 1 to 10. Cronbach’s α for the 5-item overall scale was .74.


Chapter 5

Results

Descriptives and Bivariate Correlations

Distributions of all variables of interest were checked for normality. Table 1 presents descriptive data of maternal love-withdrawal, temperamental orienting sensitivity and their correlations with perception of cry sounds and transient mood after the cry episodes. Since response bias and positive affect on day 2 were modestly correlated ($r = .21$, $p = .02$), residual scores for mood and perception of cry (controlling for response bias) were used in the analyses. Negative perception of crying showed stability over the two days, as did positive and negative mood. Regarding the lifelike features of the infant simulator, high reality value of the simulator was correlated to more negative perception of crying on day 2 ($r = .19$, $p < .05$).

Perception of infant crying: Multivariate approach

Two repeated-measures analyses of variance were conducted, one for mood and one for the perception of crying. Mood (positive and negative affect) and perception of the cry sounds on day 1 and day 2 of taking care of the infant simulator were within-subjects factors. Love-withdrawal and orienting sensitivity were dichotomized using a median split and were entered as between-subjects factors. For perception of cry, the three-way interaction between day, love-withdrawal, and orienting sensitivity was significant ($F (3,118) = 3.17$, $p = .027$, $\eta^2 = .07$). Post hoc analyses were conducted to clarify the interpretation of the significant three-way interaction. Comparison within high and low orienting sensitivity groups showed no significant interaction between day and maternal love-withdrawal in the two groups. A significant main effect of maternal love-withdrawal was present for the participants with high orienting sensitivity ($F (1, 60) = 4.57$, $p = .04$; $\eta^2 = .07$) but not for participants with low scores on orienting sensitivity ($F (1, 58) = 0.80$, $p = .38$; $\eta^2 = .01$). Inspection of means revealed that individuals with high orienting sensitivity and low exposure to maternal love-withdrawal perceived the infant cry sounds significantly less negative than the other three groups. There was no significant difference in cry perception among the other three groups (see Figure 1).

For positive and negative mood there were no significant main, two-way or three-way interaction effects (all $p > .17$). None of the predictors contributed or interacted significantly to predict participants’ mood after the cry episodes.
Table 1. Descriptive data and correlations of maternal love withdrawal, orienting sensitivity, perception of cry sounds and mood after cry episodes.

<table>
<thead>
<tr>
<th></th>
<th>Maternal love withdrawal</th>
<th>Orienting sensitivity</th>
<th>Reality value of simulator</th>
<th>Perception of cry Day1</th>
<th>Positive mood Day1</th>
<th>Negative mood Day1</th>
<th>Perception of cry Day2</th>
<th>Positive mood Day2</th>
<th>Negative mood Day2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal love withdrawal</td>
<td>1.66 (0.73)</td>
<td></td>
<td></td>
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<tr>
<td>Orienting sensitivity</td>
<td>4.27 (0.75)</td>
<td>0.12</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Reality value of simulator</td>
<td>6.21 (1.71)</td>
<td>-0.14</td>
<td>-0.05</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Perception of cry Day1</td>
<td>-0.04 (0.96)</td>
<td>0.25 **</td>
<td>-0.05</td>
<td>0.01</td>
<td></td>
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<tr>
<td>Positive mood Day1</td>
<td>3.38 (0.59)</td>
<td>0.05</td>
<td>0.15</td>
<td>0.05</td>
<td>-0.20 *</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Negative mood Day1</td>
<td>2.01 (0.64)</td>
<td>0.13</td>
<td>-0.15</td>
<td>0.08</td>
<td>0.67 **</td>
<td>-0.25 **</td>
<td></td>
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<tr>
<td>Perception of cry Day2</td>
<td>-0.03 (0.97)</td>
<td>0.03</td>
<td>0.11</td>
<td>0.19 *</td>
<td>0.45 **</td>
<td>0.05</td>
<td>0.37 **</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive mood Day2</td>
<td>3.49 (0.69)</td>
<td>-0.06</td>
<td>0.01</td>
<td>0.08</td>
<td>-0.29 **</td>
<td>0.33 **</td>
<td>-0.28 **</td>
<td>-0.42 **</td>
<td></td>
</tr>
<tr>
<td>Negative mood Day2</td>
<td>1.63 (0.61)</td>
<td>-0.04</td>
<td>0.00</td>
<td>0.18</td>
<td>0.38 **</td>
<td>-0.05</td>
<td>0.55 **</td>
<td>0.66 **</td>
<td>-0.35 **</td>
</tr>
</tbody>
</table>

\( n = 122, \) * \( p < .05 \) ** \( p < .01 \)
We found that temperamentally high-sensitive participants who experienced little maternal love-withdrawal perceived infant crying as significantly less negative than participants who experienced more maternal love-withdrawal. In the low orienting sensitivity group, the perceived negativity in the infant cry sounds did not differ between the high and low love-withdrawal groups.

A positive perception of infant crying as an ‘honest’ signal (Furlow, 1997) is important for sensitive caretaking and subsequent well-being of the infant (Zeifman, 2003). More negative perception of infant cues renders the infant vulnerable to more negative...
and harsh parenting experiences (Lee et al., 2007; Leerkes and Crockenberg, 2006; Soltis, 2004). For example, excessive and uncontrollable crying is more often perceived negatively and can trigger parental abuse and neglect (Lee et al., 2007). We used the infant simulator with interactive features, which, like in real life, starts with fussing, and cries more intensely over time. The caregiver has to identify the reason for crying and provide appropriate care in order to calm the baby. This sequence mimics real-life caregiving and makes the paradigm more ecologically valid than listening to pre-recorded cry sounds in a lab environment. Indeed, the participants reported that the experience was rather realistic, as evident from the fact that they talked to the babies and mentioned them by their names.

Our results show that temperamentally sensitive individuals with little experience of maternal love-withdrawal perceived infant crying as less negative compared to temperamentally sensitive individuals with more love-withdrawal experiences and individuals low on orienting sensitivity. Complementary to the results of earlier studies which pose temperamental sensitivity as a risk factor (Aron et al., 1997), our results show the potential of sensory sensitivity to benefit more from positive circumstances. This is of particular importance since it underscores the difference between a double risk and a differential susceptibility model. While one might argue that our results only partly support the differential susceptibility hypothesis, as temperamentally sensitive individuals with low love-withdrawal experiences perceived infant crying less negative than temperamentally sensitive individuals with high love-withdrawal, but the latter group did not perceive infant crying as more negative compared to individuals with low sensory sensitivity and high love-withdrawal, it is important that our study shows the ‘for better’ outcomes that are essential for the differential susceptibility model.

One explanation for our pattern of results may be that there was an under-representation of extremely high scores on love-withdrawal in our low-risk sample, which may lead to an under-detection of the complete for better and for worse differential susceptibility model. In a more heterogeneous sample including individuals subjected to more extreme levels of love-withdrawal, participants with higher scores on orienting sensitivity might perceive crying as most disturbing of all other groups. In the present study the absence or infrequent use of love withdrawal was an indicator of positive environmental influences. One might argue that the absence of love-withdrawal might not necessarily qualify as an indicator of sensitive and supportive parenting. Future studies might address this shortcoming by assessing a full range of parenting dimensions, including highly positive experiences such as unconditional love (Bradley et al., 2008). Other parenting
dimensions such as acceptance by parents and experiences of harsh parenting might also have an effect on the perception of infant crying (Leerkes et al., 2006). Future research might demonstrate these effects.

Positive or negative affect might also influence the difference in perception of crying (Forgas, 1995). In our study however, the perception of the infant cry sounds was not mediated by participants’ transient mood, as participants’ mood in response to infant crying did not differ systematically between high and low love-withdrawal groups with high or low orienting sensitivity. Moreover, given the stability of temperamental characteristics (Kagan and Snidman, 1991), our results suggest an early life interaction between orienting sensitivity and love-withdrawal, leading to the development of individual differences in processing of and reactions to infant stimuli.

Previous research with recorded and manipulated cry sounds shows an increase in negative affect after listening to cry sounds (Bruning et al., 2009). However, in these studies the participants could do nothing to stop the crying, which may induce negative affect related to feelings of helplessness rather than due to cry sounds per se. This idea is supported by a recent finding, showing that testosterone levels increased in adult males listening to recorded cry sounds, but decreased when the crying infant simulator could be soothed by parenting activities (Van Anders et al., 2012).

The participants in the current study were females with ages ranging between 18 and 30 years. This group of participants was chosen so as to increase homogeneity and to avoid any confounding effects of gender and caregiving experiences. Also, most of the earlier research assessed the effect of maternal love-withdrawal on their daughters (Assor et al., 2004; Elliot et al., 2004). Future research with more diverse groups might test for effects of gender and caregiving experiences and include paternal love-withdrawal as a predictor. Moreover, future research might extend our findings by using a sample including parents and cry stimuli from their own versus unknown infants. Previous research has shown that parents differ from non-parents in response to infant stimuli (Seifritz et al., 2003) and own versus unknown infant stimuli might trigger different responses (Strathearn et al., 2008).

In sum, this is the first study showing that temperamental orienting sensory sensitivity moderates the association between individuals’ early caregiving experiences and their response to infant crying, using an interactive infant simulator paradigm. Our results show the potential of using an infant simulator to assess parenting styles that may
closely reflect real life. We found that temperamentally sensitive individuals were least negative to infant crying when they had experienced supportive parenting in their family of origin. These results suggest the potential of individuals with a highly sensitive temperament to benefit more from positive caregiving experiences than temperamentally less sensitive individuals, in line with the differential susceptibility hypothesis. Moreover, these results indicate that the long-term impact of early life experiences may be moderated by temperamental characteristics, with implications for individual differences in perceptual responses to infant stimuli in adulthood.
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