Individual differences in the linkage between infant negative temperament and parenting self-efficacy

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Under revision.
Abstract

Infant negative temperament is associated with lower parenting self-efficacy (PSE), but strength of this linkage varies between parents. To test whether variability in this linkage can be predicted from susceptibility to infant temperament during pregnancy, 180 first-time pregnant women participated in an experiment with simulated temperamental differences. Participants also filled out questionnaires on PSE and infant temperament until one year after birth. In the experiment, PSE increased after responding to a simulated temperamentally easy infant (80% successful soothing) and decreased with the simulated difficult infant (20% successful soothing). Higher negative impact of simulated difficult temperament predicted stronger associations between infant negative reactivity and decreased PSE after birth. Strength of PSE may have prognostic value for parenting besides level of PSE.
Becoming a parent is a major life transition (Nystrom & Ohrling, 2004). Bandura has shown that efficacy beliefs, which are “beliefs in one’s capabilities to organize and execute the courses of action required to produce given outcomes” (Bandura, 1997, p. 3), play an important role in adapting to new situations. For new parents, their “expectations about their ability to parent successfully”, that is their parenting self-efficacy (Jones & Prinz, 2005, p. 342), is based on as yet limited experiences. After birth, however, parenting self-efficacy may change in response to their day-to-day experiences. These experiences may be partly shaped by what infants bring to the relationship, but also by the cognitive appraisals that parents make of their failures and successes as parents. Research has shown that parenting self-efficacy is associated with children’s temperamental characteristics (Cutrona & Troutman, 1986; Lipscomb et al., 2011; Porter & Hsu, 2003). When children were more prone to negative emotional reactions to stimuli, parents reported lower parenting self-efficacy. One explanation for this association is that infant negative reactivity is interpreted as negative performance feedback on the way parents take care of their children. However, because most research on this association was based on parental perceptions of infant temperament, another interpretation may be that diminishing parenting self-efficacy leads to adaptations of the perception of infant temperament. Some parents may align their self-efficacy perceptions and their perceptions of their infants more actively than others, as was suggested by Bandura (1977) with respect to more general self-efficacy. The current study investigated whether individual differences in the parenting self-efficacy–perceived temperament linkage may be predicted from prenatal responses to a simulated caregiving task for women expecting their first child.

Parenting self-efficacy has been shown to be an important factor in parenting. Research has shown associations between parenting self-efficacy, parenting competence, and child outcomes (for a review, see Jones & Prinz, 2005). High parenting self-efficacy was associated with positive maternal interactive behavior with infants (Bohlin & Hagekull, 1987), maternal perseverance in dealing with a temperamentally difficult infant (Teti & Gelfand, 1991), and promoting positive child adjustment (Ardelt & Eccles, 2001). Studies also demonstrated that children of parents with high parenting self-efficacy had higher academic and social competence (Bogenschneider, Small, & Tsay, 1997) and less parent-reported behavioral problems (Hill & Bush, 2001) than children of parents with low parenting self-efficacy.

Bandura (1977) theorized that self-efficacy is influenced by multiple sources, of which the most important one is personal mastery experiences. When people perform a certain task, this will provide them with information on whether or not they will be able to perform this task again in the future. Their own success and failure experiences will be most informative for their self-efficacy, which will increase or decrease according to the outcome of the experience. Other sources of self-efficacy are experiences of other people with whom they can compare themselves, verbal persuasion by others and emotional arousal felt during the task. These same sources of self-efficacy have also been identified as sources of self-efficacy specific to the parenting domain, parenting self-efficacy (de Montigny & Lacharite, 2005).
For first-time parents, parenting self-efficacy is not based on personal experiences with parenting yet. However, after birth of the child, personal experiences with parenting increase and this information is integrated in their efficacy expectations. Studies showed that first-time mothers had steadily increasing parenting self-efficacy over the first months after birth (Hudson, Elek, & Fleck, 2001; Porter & Hsu, 2003). However, not every parent has the same experiences with their infant; some infants get comforted easily, whereas other infants cry often without obvious causes and are not easily soothed by their parents. These differences between infants lie in their temperamental characteristics. Rothbart defines temperament as “constitutionally based individual differences in reactivity and regulation” (Rothbart, 1986, p. 356). Temperament exists of multiple dimensions, some reflecting positive reactivity, such as smiling and laughter, and some reflecting more negative reactivity, such as unsoothable crying and irritability. Parents of infants displaying more negative reactivity may understand these reactions as failure in their parenting behaviors and may therefore experience decreases in their parenting self-efficacy. Vice versa, parents with lower parenting self-efficacy are less competent as parents (for a review, see Jones & Prinz, 2005), which may lead them to attribute the mismatches to their infants responses to characteristics of their children, perceiving their temperament more negatively.

The association between parenting self-efficacy and negative reactivity has been the focus of many studies (e.g., Cutrona & Troutman, 1986; Gross, Conrad, Fogg, & Wothke, 1994; Leerkes & Crockenberg, 2002; Lipscomb et al., 2011; Porter & Hsu, 2003; Teti & Gelfand, 1991). These studies showed that infant negative temperament characteristics were associated with lower parenting self-efficacy in parents of infants and toddlers. A study by Porter and Hsu (2003) showed that parenting self-efficacy increased from prenatal to postnatal measurements, but this increase was less for women reporting high negative reactivity in their infants than for women reporting low negative reactivity. A longitudinal study by Lipscomb et al. (2011) showed that parenting self-efficacy decreased more in parents of children displaying more negative emotionality than in parents of children who displayed less negative emotionality between 9 and 27 months postpartum.

Although the association between parenting self-efficacy and infant negative temperamental characteristics has been established, the question remains why some parents are more susceptible to more negative perceptions of themselves as parents and of their children’s personal characteristics. While in some situations, updating of expectations by parents may be adaptive, in other cases they might be at risk for a cascading of negative perceptions of self and child.

However, assessing individual differences in the linkage between infant temperament and parenting self-efficacy is difficult when using naturally occurring variation in child temperament in families, because parents are then only confronted with their own infants’ temperamental characteristics. To assess individual differences in the linkage between infant temperamental characteristics and parenting self-efficacy, temperamental difficulty needs to be standardized across all participants. Analogue experimentation would allow for all individuals to be confronted...
with the same temperamental variation in infants, but also with the same amount of success experiences in coping with these infants. Such a design would make it possible to investigate the individual differences in susceptibility to simulated infant temperament, while controlling for the amount of success or failure experiences and other possible confounding factors.

The current study experimentally assessed first-time pregnant women’s susceptibility to infant temperament in order to investigate whether this prenatally assessed susceptibility would be predictive for the linkage between infant temperamental characteristics and parenting self-efficacy after birth. The experimental assessment took place during pregnancy, when participants were not yet influenced by the temperamental characteristics of their own children. First, an experimental paradigm was used to test participants’ susceptibility to infant temperament. It was hypothesized that parenting self-efficacy would increase or remain stable after soothing a temperamentally easy infant and decrease after soothing a temperamentally difficult infant. Furthermore, participants filled out questionnaires on parenting self-efficacy and infant temperament during the first year after birth, making it possible to link the susceptibility to manipulated infant negative reactivity during the experimental task to real-life outcomes. The amount of change in parenting self-efficacy during the experiment was tested as a predictor of the strength of the association between postnatal parenting self-efficacy and their own infant’s negative reactivity. It was hypothesized that pregnant women whose parenting self-efficacy was more strongly affected by the infant with simulated negative reactivity, would also exhibit stronger linkages between parenting self-efficacy and their own infant’s negative temperament after birth.

Method

Participants
The sample included 180 first-time pregnant women (age 18-40 years, \( M = 30.4, SD = 3.95 \)). Participants were primarily highly educated: 77% finished higher education (Bachelor or Master’s degree) as compared to 32% of the general Dutch same-age female population (Bureau of Statistics Netherlands, 2011). Women were mostly cohabiting (51%) or married (46%), but some were single (2%) or not living with their partner (2%). Based on their parents’ country of birth, participants were predominantly of Dutch origin (84%). Of the remaining participants, 38% had a non-Western background and 62% a Western background. There were slightly more girls (53%) than boys born in this subsample of the study.

Procedure
Recruitment of participants took place via midwifery practices and the research website. Participants were first asked to fill out questionnaires as part of a longitudinal study from early pregnancy until one year after birth. After obtaining informed consent, participants who lived within travel distance of the research facility and who did not receive a prenatal diagnosis of the
fetus based on the ultrasounds given at 12 and 20 weeks of pregnancy were sent an information letter with the request to take part in three additional measurements. Approximately 50% of these women agreed to participate. The Medical Ethical Committee of the VU University Medical Center granted permission for this study.

Data for the experimental setting were gathered during a home visit at 22 weeks of pregnancy ($M = 22.67$ weeks, $SD = 0.97$). To maximize consistency across home visits, participants were asked to switch off phones and other electronic devices such as radio and television. Furthermore, if other people were present, they were asked to leave. Participants completed the Cry Response Task, a computerized experiment to assess participants’ responses to infants with a simulated easy and a more difficult temperament.

Questionnaires were filled out at approximately 32 weeks of pregnancy ($M = 32.25$ weeks, $SD = 2.01$), 3 months after birth ($M = 3.05$, $SD = 0.37$) and 12 months after birth ($M = 12.16$, $SD = 0.54$). Parenting self-efficacy and depressive symptoms were measured at all time points, whereas questionnaires on infant temperament were added postpartum. Questionnaires were sent to participants home addresses and they sent them back to the research facility. If questionnaires were not returned, participants were reminded by e-mail and by telephone. Questionnaires were considered to be filled out in time when they were filled out before birth (32 weeks measurement), before 6 months postpartum (3 months measurement) and before 15 months postpartum (12 months measurement). Questionnaires that were filled out too late were considered ‘missing’ in the analyses.

**Instruments**

**Cry Response Task.** The Cry Response Task was an experiment developed especially for the current study, during which participants responded to infant cry sounds and received feedback on their responses. Cry aversiveness and soothability were manipulated to model salient characteristics of caring for a temperamentally easy infant and a temperamentally difficult infant. The task was programmed in E-Prime 2.0 and presented on a laptop computer. Participants’ responses were saved by E-Prime.

The Cry Response Task began with a 6-min baseline during which music was played and pictures of landscapes were shown. After baseline, women filled out a Visual Analogue Scale (VAS) as a measure of their parenting self-efficacy (see below). After filling out the VAS, women were informed that they were going to listen to ten baby cry sounds (baby 1) and that they could respond with caretaking responses. During the cry, they could choose one of four response methods (picking up the baby, distracting the baby, changing the baby’s diaper or feeding the baby) by clicking with the mouse. They could also choose not to respond to the cry. After each cry, a green smiley face or a red sad smiley face appeared on the screen to indicate whether or not they had chosen the right response to soothe the baby. For baby 1, this feedback was 80% positive for all participants. After baby 1, women filled out the VAS on parenting self-efficacy again. Participants were then confronted with another series of ten baby cries (baby 2), but
this time they only received 20% positive feedback. Baby 2 was again followed by the VAS on parenting self-efficacy. Women were debriefed after the task.

During the experiment, parenting self-efficacy was measured with a pictographic Visual Analogue Scale (VAS) during the Cry Response Task. This method was chosen because of the ease and less disruptive character of one single item versus multiple items and previous studies have confirmed the validity of measuring self-efficacy with a VAS (Kalichman et al., 2005; Turner, de Leemput, Draaisma, Oosterveld, & ten Cate, 2008). Turner et al. (2008) showed that a VAS to measure self-efficacy is a valid method of assessing self-efficacy with respect to tasks. Kalichman et al. (2005) developed and validated a pictographic VAS for the assessment of medication adherence self-efficacy. The VAS in our experiment followed the design employed by Kalichman et al. (2005) to measure parenting self-efficacy with the question “How well do you expect to respond to infant crying in daily situations?” Anchors on the scale were the color red and a picture of the hand gesture ‘thumbs-down’ on the left side of the scale changing into the color green, and a picture of ‘thumbs-up’ on the right side of the scale. E-Prime recorded scores on a scale ranging from 0 to 100. Participants filled out this VAS three times during the task: after baseline, after baby 1 and after baby 2. As a measure of validity, VAS scores after baseline were significantly correlated to scores on the parenting self-efficacy questionnaire (SENR; Pedersen, Bryan, Huffman, & Del Carmen, 1989), filled out on average at 22.00 (SD = 1.03) weeks of pregnancy ($r$ (179) = .41, $p$ <.001). This correlation between the VAS and the questionnaire was similar to the correlations found between VAS and questionnaire data by Kalichman et al. (2005), which ranged from $r$ = .33 to $r$ = .39.

Before conducting the current study, a pilot study with an earlier version of the Cry Response Task was done with 55 parents of children between the ages of 0 and 5 years. This earlier version of the Cry Response Task consisted of two parts. During the first part, participants listened to infant cries and were asked to identify the cause of the cry. After this first part, participants got manipulated positive or negative feedback on their responses and were primed with a message that they would likely perform well or poorly on the second part of the task. During this second part of the task, participants had to try to soothe infant crying. Soothing success was manipulated, which led to participants getting 20%, 40%, 50% or 80% soothing success rates. Results from this pilot study showed an interaction effect: participants with a positive prime after the first part of the task showed significantly larger decreases in parenting self-efficacy than participants with a negative prime in response to low soothing success ($F$ (3,54) = 3.66, $p$ = .02). This priming effect led to the decision not to counterbalance in the current version of the Cry Response Task, because counterbalancing would likely introduce carry-over effects from the first presented baby to the second presented baby, thereby introducing interaction effects that would have to be controlled, lowering statistical power of analyses using the response to the two babies as indicators of individual differences in susceptibility in infant temperament.
Longitudinal parenting self-efficacy. Longitudinally, parenting self-efficacy was measured with a Dutch translation of the Maternal Self-Efficacy in the Nurturing Role Questionnaire (SENR; Pedersen et al., 1989), which was developed based on the Parenting Sense of Competence Scale (PSOC; Gibaud-Wallston & Wandersman, 1978; Johnston & Mash, 1989). The SENR is a 16-item questionnaire measured on a 7-point Likert scale ranging from 1 (Not at all representative of me) to 7 (Strongly representative of me). Each item holds a statement regarding expectations of competence in a certain area of parenting, such as “I feel I can catch on quickly to the basic skills of caring for my child” and “I wonder if I really can understand my baby’s needs”. Scores on all items were summed to obtain a total score, with higher scores reflecting higher parenting self-efficacy. At the 32 weeks assessment, the prenatal version of the SENR was used, which reflected on expectations of parenting, whereas after birth, the postnatal version of the SENR was used, which reflected on actual experiences with parenting. Both versions of the SENR have been used in previous research and test-retest reliability and internal consistency of the scales were moderate to high (Hsu & Sung, 2008; Pedersen et al., 1989; Porter & Hsu, 2003). Internal consistency (Cronbach’s alpha) in the current study was .83 for the prepartum scale and .84 and .87 for the postpartum scales.

Infant temperament. Infant temperament was measured with the Dutch version of the Infant Behavior Questionnaire (IBQ; Rothbart, 1981). This questionnaire holds 94 items that reflect infant behavior during the past two weeks, such as “During feeding, how often did the baby fuss or cry when he or she had enough to eat?” and “When introduced to a strange person, how often did the baby cling to parent?”. Responses are given on a 7-point Likert scale ranging from 1 (Never) to 7 (Always). If items were not applicable, a score of 8 would be given, and these items would be dismissed from the scale scores. Scores on scale items were averaged to six scale scores: Distress to limitations (20 items), Distress and latency to approach sudden or novel stimuli (16 items), Smiling and Laughter (15 items), Soothability (11 items), Activity level (17 items), and Duration of Orienting (11 items). Four items were not used in the scales. In the current study, only the subscales Distress to limitations and Distress and latency to approach sudden or novel stimuli were used, because these subscales reflect characteristics of negative temperament. The two subscales were averaged to form a Negative Reactivity composite score, as was done by Rothbart (1986).

The IBQ is a widely used measure of infant temperament with high internal consistency (Leerkes & Crockenberg, 2002; Rothbart, 1981, 1986). Internal consistency (Cronbach’s alpha) in the current study was .80 at 3 months and .82 at 12 months for the Negative Reactivity composite scores.

Maternal depressive symptoms. Maternal depressive symptoms were measured by the Dutch version of the Beck Depression Inventory-II (BDI-II; (Beck, Erbaugh, Ward, Mock, & Mendelsohn, 1961; Beck, Steer, & Brown, 1996; Van der Does, 2002). The BDI consists of 21 items measured
on a 4-point Likert scale. Each item represents a symptom of depression, for which one of four graded statements can be chosen reflecting symptom presence and severity. Scores per item range from 0 (absence of symptom) to 3 (severe symptom presence). The BDI is widely used as a self-report questionnaire in research of non-clinical samples, but has also proven valid in distinguishing clinical from non-clinical cases of depression (Beck et al., 1961). Validity and reliability of the BDI have been previously demonstrated (Osman et al., 1997), also in a group of pregnant women (Van der Does, 2002). Internal consistency (Cronbach’s alpha) in the current study was .86 at 32 weeks of pregnancy and .87 at 3 and 12 months after birth.

Data analysis

Data on parenting self-efficacy were extracted from E-Prime and imported into SPSS 19.0. Because data on parenting self-efficacy were not normally distributed, outliers of more than 3 SD were winsorized.

First, associations were tested between demographic characteristics (age, education level, marital status, immigrant status) and parenting self-efficacy during the Cry Response Task. Changes in parenting self-efficacy during the Cry Response Task were then tested with Repeated Measures ANOVA.

Secondly, it was assessed whether changes in parenting self-efficacy during the Cry Response Task (CRT) were associated with changes in parenting self-efficacy related to temperament during the longitudinal study. A new variable ‘Change during CRT’ was created by calculating the amount of change in parenting self-efficacy following the difficult infant compared to parenting self-efficacy following the easy infant in the Cry Response Task. Values for this variable were centered and multiplied by centered values of Infant Negative Reactivity at 3 months after birth and 12 months after birth to create interaction variables ‘Interaction Negative Reactivity and CRT’ for both time points. These interaction variables were then used in a cross-lagged panel design in MPlus 6.11 (Muthén & Muthén, 1998-2010) to assess the association between parenting self-efficacy, infant negative reactivity and the ‘Interaction negative reactivity and CRT’ variable. Cross-sectional correlations between these variables at different time points were also included in the model. Furthermore, cross-lagged paths between all variables were added to the model.

Three model fit indices were used to assess how well the model fit the data: (1) the comparative fit index (CFI; Bentler, 1990), which indicates good fit if values are above .95, (2) the standardized root mean square residual (SRMR), with values less than .08 indicating good model fit, and (3) the root mean square error of approximation (RMSEA), which indicates good fit if values are below .06 (Hu & Bentler, 1998).

Several demographic variables (maternal age, education, marital status, immigrant status and infant gender) were added to the model as covariates to account for the effects of potential third
variables. Maternal scores on the BDI were added as covariates for each concurring time point, because studies have shown that heightened maternal depressive symptoms are associated with both lowered parenting self-efficacy (Cutrona & Troutman, 1986; Gross et al., 1994; Teti & Gelfand, 1991) and heightened perceived negative reactivity (Edhborg, Seimyr, Lundh, & Widstrom, 2000; Gross et al., 1994). The new ‘Change during CRT’-variable was also used as a control variable.

All cases for the longitudinal analyses were retained using the Full Information Maximum Likelihood (FIML) method of handling missing data, which has shown to be the better choice in handling missing data in structural equation modeling (Enders & Bandalos, 2001). None of the variables had more than 10% missing data.

Results

Preliminary analyses showed that none of the demographic variables were significantly associated with parenting self-efficacy during the Cry Response Task ($p > .11$). Descriptive data on parenting self-efficacy during the Cry Response Task are presented in Table 1. Repeated Measures ANOVA revealed significant differences between time points ($\text{Wilks } \Lambda = .54, F(2,178) = 74.63, p < .001, \eta^2 = .46$). Post hoc analyses showed a significant increase in parenting self-efficacy from baseline to baby 1 ($F(1,179) = 4.29, p < .05, \eta^2 = .02$) and a significant decrease from baby 1 to baby 2 ($F(1,179) = 145.79, p < .001, \eta^2 = .45$). These results indicate that lack of success in calming a modeled infant led parenting self-efficacy to decrease during the experiment.

Table 1. Parenting self-efficacy at baseline, baby 1, and baby 2 during the Cry Response Task

<table>
<thead>
<tr>
<th>PSE</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>69.22</td>
<td>13.77</td>
</tr>
<tr>
<td>Baby 1</td>
<td>70.68</td>
<td>11.91</td>
</tr>
<tr>
<td>Baby 2</td>
<td>59.48</td>
<td>15.23</td>
</tr>
</tbody>
</table>

Note. Baby 1 = temperamentally easy infant, Baby 2 = temperamentally difficult infant.

To test the association between changes in parenting self-efficacy during the Cry Response Task and changes in parenting self-efficacy related to infant negative reactivity during the longitudinal study, a cross-lagged panel model was used. Although FIML allowed for all cases to be retained in the model, women with complete data ($N = 149$) were compared to women with incomplete data ($N = 31$) on all variables to assess whether there was selective attrition. Responders and non-responders did not differ on any of the variables.
Table 2. Descriptive statistics and correlations among parenting self-efficacy, infant negative reactivity, and control variables

| Measure | Mean | SD  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8  | 9 | 10 |
|---------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|----|-----|
| 1. PSE T1 | 90.69 | 9.61 | -   |     |     |     |     |     |     |     |    |    |     |
| 2. PSE T2 | 93.70 | 9.92 | .56** | -   |     |     |     |     |     |     |    |    |     |
| 3. PSE T3 | 96.54 | 9.69 | .56** | .70** | -   |     |     |     |     |     |    |    |     |
| 4. NR T2 | 2.69  | 0.56 | -.09 | -.29** | -.14 | -   |     |     |     |     |    |    |     |
| 5. NR T3 | 3.03  | 0.60 | -.13 | -.22** | -.20* | .45** | -   |     |     |     |    |    |     |
| 6. BDI T1 | 9.11  | 5.26 | -.28** | -.24** | -.21* | .06  | -.07 | -   |     |     |    |    |     |
| 7. BDI T2 | 7.83  | 5.68 | -.12 | -.37** | -.30** | .13  | .09  | .44** | -   |     |    |    |     |
| 8. BDI T3 | 6.90  | 5.52 | -.19* | -.27** | -.36** | .02  | .07  | .41** | .59** | -   |    |    |     |
| 9. Δ CRT | -11.11 | 12.35 | .17* | .13  | .17* | -.04 | .00  | -.04 | -.01 | -.10 | -  |    |     |
| 10. Age T1 | 30.65 | 4.01 | -.09 | -.14 | -.13 | .02  | .15  | -.13 | .06  | .25** | .01 | -  |     |

Note. PSE = parenting self-efficacy, NR = Negative Reactivity, BDI = Beck Depression Inventory, Δ CRT = change in PSE during Cry Response Task, T1 = 32 weeks of pregnancy, T2 = 3 months after birth, T3 = 12 months after birth. *p < .05, **p < .01

Descriptive data on longitudinal parenting self-efficacy, negative reactivity, and control variables are presented in Table 2. The cross-lagged panel model of parenting self-efficacy, infant negative reactivity and the interaction between negative reactivity and change during the CRT had good model fit (CFI = .999, SRMR = .02, RMSEA = .00). Results are displayed in Figure 1. Autoregressive paths for all variables were significant, indicating stability over time. Furthermore, cross-sectional correlations between parenting self-efficacy and negative reactivity at 3 and 12 months after birth were significant. In addition, the interaction between negative reactivity and change during the CRT was significantly associated with parenting self-efficacy at 3 months, but not at 12 months after birth. None of the cross-lagged pathways were significant.

Figure 1. Cross-lagged path model results for parenting self-efficacy, infant negative reactivity, and the interaction between negative reactivity and change during Cry Response Task.

Note. PSE = parenting self-efficacy, NR = Negative Reactivity, NRxCT = interaction negative reactivity and change during Cry Response Task, T1 = 32 weeks of pregnancy, T2 = 3 months after birth, T3 = 12 months after birth. # p < .10, * p < .05, ** p < .01, *** p < .001
To assess the nature of the interaction effect, participants were grouped based on showing high or low susceptibility during the experiment. The correlation between infant negative reactivity and parenting self-efficacy at 3 months was not significant for the low susceptible group ($r = -.13, p = .23$), but it was negative for the high susceptible group ($r = -.44, p < .001$). These results indicate that women who were highly susceptible to simulated negative temperament during the Cry Response Task also showed stronger linkages between perceptions of their infants’ difficult temperament and lower parenting self-efficacy, even when controlling for prenatal parenting self-efficacy.

**Discussion**

As expected, parenting self-efficacy increased in response to a temperamentally easy simulated infant and decreased in response to a temperamentally difficult infant. This finding is congruent with the use of personal mastery experiences as source of information for parenting self-efficacy (Bandura, 1977) and bolsters interpretations of findings from previous studies (Cutrona & Troutman, 1986; Gross et al., 1994; Leerkes & Crockenberg, 2002; Lipscomb et al., 2011; Porter & Hsu, 2003; Teti & Gelfand, 1991), which showed that difficult infant temperament is associated with lower parenting self-efficacy.

In accordance with our second hypothesis, some participants showed a stronger linkage between their perceptions of their infants’ temperament and their parenting self-efficacy at 3 months after birth, which could be partly predicted by their susceptibility to infant temperament as indicated by decreased parenting self-efficacy in response to exposure to a simulated temperamentally difficult infant during pregnancy. Bandura (1977) already stated that the incorporation of new efficacy information into efficacy expectations partly depends on the strength of the existing efficacy expectation. Strength is defined as the resilience against information inconsistent with the efficacy beliefs. The current findings show that strength of parenting self-efficacy is important to study in addition to level. The association between the strength of the linkage between parenting self-efficacy and negative reactivity after birth and susceptibility to negative temperament during pregnancy suggests that the social cognitive processes involved in adapting to infant temperament can already be tapped during pregnancy, allowing further study of susceptibility and resilience to parenting-related stressors without the confounding influence of experience with their own child. Ultimately, prospective parents with higher susceptibility to the negative effect of children’s temperamental characteristics might be more specifically targeted for early intervention aimed at bolstering parenting self-efficacy (Breitenstein et al., 2012; Gross, Fogg, & Tucker, 1995). Targeting these more susceptible parents for early parenting support may prevent negative effects on their parenting self-efficacy, resulting in better outcomes for both parents and children.

Several limitations to the current study should be noted. The first limitation can be found in the set-up of the experiment. The experiment tested changes in parenting self-efficacy after
confrontation with two crying infants, first the temperamentally easy infant and then the temperamentally difficult infant. The decision not to counterbalance was based on our desire to examine individual differences in the adjustment of parenting self-efficacy after the difficult infant while already being exposed to positive experiences as well. However, the decision against counterbalancing poses a limitation on the interpretation of the results, because the drop in parenting self-efficacy after the difficult infant might also be due to the duration of exposure to crying and fatigue. This interpretation is unlikely, given the small but significant upward trend for parenting self-efficacy after the first, easy infant.

Furthermore, the Cry Response Task is a new paradigm, and may or may not offer an ecologically valid simulation of a caregiving situation. The observed drop in parenting self-efficacy after the second, more difficult to soothe baby, may therefore also be brought about by the effect of the performance feedback on general self-efficacy. Although scores of parenting self-efficacy during the experiment were correlated with scores on a validated questionnaire measuring parenting self-efficacy, this cannot fully prove the construct validity of our measure. Whether the stronger association between perceived infant temperament and postnatal parenting self-efficacy may be explained by a more fragile self-efficacy in the caregiving domain or by a more fragile self-efficacy across domains, remains to be investigated, therefore.

Also, the experiment focused only on aspects of negative infant temperament, such as crying and difficulty to comfort the baby, whereas there are more positive aspects of temperament as well. It might be that these positive temperament characteristics have positive associations with expectations of parenting self-efficacy, but this could not be investigated with the current study. However, positive aspects of temperament may not buffer against negative aspects of temperament, as a recent study has showed that infant high negative reactivity and low positive reactivity are most salient to maternal perceptions of infant temperament (Hane, Fox, Polak-Toste, Ghera, & Guner, 2006).

In conclusion, the results of the current study underscore the association between parenting self-efficacy and infant difficult temperamental characteristics and show that there are individual differences in the strength of the linkage between infant negative reactivity and parenting self-efficacy. These differences can partly be predicted during pregnancy, meaning that social-cognitive processes involved in the adaptation to parenthood can be studied before infants are born, offering prospects for more targeted preventive and supportive practice.

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From expecting to experiencing