Chapter 5

The Role of Adverse Childhood Experiences and Infant Temperament in Women's Adjustment to Parenthood

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ABSTRACT

This study examined how women's own adverse childhood experiences and infant temperament predicted parenting self-efficacy and mood symptoms across the transition to parenthood. Participants were 104 primiparous women selected from at-risk populations. They filled out questionnaires on adverse childhood experiences during pregnancy and on infant temperament at 3 months postpartum, in addition to prenatal and postpartum questionnaires on parenting self-efficacy, state anxiety symptoms, and depressive symptoms. Results showed that an accumulation of adverse childhood experiences, and not infant negative reactivity, predicted less decrease in depressive symptoms, whereas infant negative reactivity predicted less increase in parenting self-efficacy across the transition to parenthood, both independently and in conjunction with an accumulation of adverse childhood experiences. None of the determinants used in this study were associated with changes in anxiety symptoms. These findings suggest that prevention and intervention projects should consider the differential mechanisms involved in the prediction of parenting self-efficacy, anxiety symptoms, and depressive symptoms across the transition to parenthood.

Becoming a parent is a significant life event, which may enhance personal well-being and life satisfaction in many new mothers (Dyrdal & Lucas, 2013; Nelson, Kushlev, & Lyubomirsky, 2014), but may trigger negative emotions and stress in mothers with less fortunate backgrounds (Matthey, Barnett, Ungerer, & Waters, 2000). Women who had adverse experiences in childhood, such as physical or sexual abuse, may be at risk for a more negative adjustment to parenthood, as evidenced by higher prenatal and postnatal mood symptoms (e.g., Buist & Janson, 2001; Madigan et al., 2014) and lower postpartum parenting self-efficacy (Cole, Woolger, Power, & Smith, 1992), defined as "expectations caregivers hold about their ability to parent successfully" (Jones & Prinz, 2005, p. 342). Another notable factor for parental adjustment is infant temperament (e.g., Porter & Hsu, 2003). Whereas infants with a difficult temperament are likely to provoke negative emotions and cognitions from their parents, infants with an easy temperament may elicit positive emotions and feelings of competence (Crockenberg & Leerkes, 2003a; Nelson, Kushlev, & Lyubomirsky, 2014). Furthermore, during the transition to parenthood changes in mood symptoms and parenting self-efficacy were found to be reciprocally associated (Kunseler, Willemen, Oosterman, & Schuengel, 2014). This raises the question whether mood symptoms and parenting self-efficacy are distinct aspects of women's adjustment to parenthood or reflect a common underlying process. To address this question, the current study examined putative determinants of the adaptation to parenthood – adverse childhood experiences and infant temperament – and their unique and shared associations with women's parenting self-efficacy, anxiety and depressive symptoms.

Parents' own childhood experiences likely contribute to both the development of parenting self-efficacy and mood symptoms (Coleman & Karraker, 1997; Gotlib & Hammen, 1992). Bowlby (1973) theorized that people develop models about themselves and relationships to others in the realm of early experiences with parents or caregivers in childhood that guide their behavior, cognition and emotion in adulthood. Women who had positive childhood experiences are therefore more likely to develop a positive self-image, as competent, self-assured and as deserving of love and support, whereas adverse childhood experiences may have opposite effects (Bowlby, 1973; Crockenberg & Leerkes, 2003b; Leerkes & Crockenberg, 2002). Consistent with this hypothesis, studies found that women who grew up with warm and supportive parents had less depressed feelings (Crockenberg & Leerkes, 2003b), while childhood rejection and abuse experiences jeopardized women's psychological functioning (Madigan et al., 2014; Ross & Dennis, 2009). Childhood rejection or abuse has also been found to be associated with lower parenting self-efficacy, albeit studies are scarce and effects were

more often found to be indirect through self-esteem or depressed feelings (Caldwell, Shaver, Li, & Minzenberg, 2011; Cole et al., 1992; Leerkes & Crockenberg, 2002).

Studies on the link between adverse childhood experiences and mood symptoms or parenting self-efficacy were mostly focused on specific types of childhood abuse, whereas exposure to multiple risks may be even more harmful to parenting competence (Belsky, 1984). Research on the cumulative risk hypothesis showed that a higher number of parental and environmental risk factors was associated with less adaptive child development (Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Cyr, Euser, Bakermans-Kranenburg, & Van IJzendoorn, 2010; Rutter, 1979). Results from the Adverse Childhood Experiences (ACE) study (Felitti et al., 1998) indicated "a graded relationship" between adverse childhood experiences before the age of eighteen and adult's mental health, with more exposure categories being related to increased risks for depression or anxiety (Anda et al., 2002; Chapman et al., 2004; Edwards, Holden, Felitti, & Anda, 2003). It is unknown, however, to what extent the accumulation of adverse childhood experiences is also predictive of adaptation to major life transitions, such as becoming a parent.

Adverse childhood experiences may hinder the new demands of parenthood (Crockenberg & Leerkes, 2003b). The transition to parenthood was found to be more challenging for women who experienced childhood rejection or abuse. Crockenberg and Leerkes (2003b) found that memories of parental rejection were associated with higher depressive symptoms at five months postpartum, controlled for prenatal depressive symptoms. Madigan and her colleagues (2014) found evidence for an attenuated decrease in depressive symptoms from the prenatal period to 12 months postpartum for female adolescents who were sexually abused in childhood. Female adolescents may have less psychological resources to deal with parenthood and the experiences of childhood abuse have happened more recently, which could make them more vulnerable to develop mood symptoms during this time period (Figueiredo, Pacheco, & Costa, 2007; Lanzi, Bert, Jacobs, & the Centers for the Prevention of Child Neglect, 2009). However, it is still unclear whether the effects of childhood abuse on women's adjustment to parenthood are stronger for adolescent than for adult mothers. In addition, the study by Madigan and colleagues (2014) did not take into account the effects of multiple adverse childhood experiences.

One of the postpartum factors that could affect the quality of women's parenting experiences and their adjustment to parenthood is infant temperament (Nelson et al., 2014). Difficult temperamental characteristics, such as increased negative reactivity and low soothability, may be experienced by mothers as evidence of failure on their performance leading to a decreased sense of parenting competence and to heightened

postpartum depressive symptoms as well (Bandura, 1977; Cutrona & Troutman, 1986). Several studies supported that high infant negative reactivity and low soothability were associated with lower postpartum parenting self-efficacy (Leerkes & Crockenberg, 2002; Porter & Hsu, 2003; Teti & Gelfand, 1991) and higher postpartum depressed or anxious feelings (Britton, 2011; Cutrona & Troutman, 1986; Solmeyer & Feinberg, 2011). Some studies also controlled for the effects of prenatal parenting self-efficacy in the prediction of postpartum parenting self-efficacy, suggesting that the general increase in parenting self-efficacy during the transition to parenthood was attenuated for women who were exposed to the challenge of having an infant with difficult temperamental characteristics (Leerkes & Crockenberg, 2002; Porter & Hsu, 2003).

Although studies on the effects of adverse childhood experiences and infant temperament on women's adjustment to parenthood are informative, they do not provide us with a complete picture, because the combination of adverse childhood experiences and temperament may create synergistic effects. Crockenberg and Leerkes (2003a, 2003b) suggested that infant difficult temperament is not necessarily harmful for parenting, but in conjunction with other risks it may lead to less parental emotional well-being and insensitive parenting behavior. Individual risk characteristics based on parents' own childhood history may explain differential reactions of parents to their infant's temperamental difficulty (Crockenberg & Leerkes, 2003a). For example, infants' more difficult temperament was only related to more postpartum depressive symptoms in mothers who felt highly rejected by their fathers in childhood, and not in mothers who experienced low levels of rejection from their fathers (Crockenberg & Leerkes, 2003b). Another line of research indicative of a relation between adverse childhood experiences and an increased vulnerability to infant's temperamental difficulty, showed that women who were abused in childhood or were at risk for child physical abuse perceived infant crying as more negative or reacted to infant cues with physiological hyperreactivity (Casanova, Domanic, Mccanne, & Milner, 1994; Crouch, Skowronski, Milner, & Harris, 2008; Crowe & Zeskind, 1992), which may relate to a decreased sense of competence or increased feelings of depression as well (Sturge-Apple, Skibo, Rogosch, Ignjatovic, & Heinzelman, 2011; Verhage, Oosterman, & Schuengel, 2013a).

In the current study, first-time pregnant women with a heightened likelihood of exposure to multiple adverse childhood experiences were followed-up from pregnancy to three months postpartum to assess their adjustment to parenthood, as indicated by parenting self-efficacy, depressive and anxiety symptoms across this time period. The first goal of this study was to assess whether the accumulation of women's adverse childhood experiences, and infant temperament would independently predict changes

in parenting self-efficacy, depressive symptoms, and anxiety symptoms across the transition to parenthood. Following the findings by Madigan and colleagues (2014), we also tested whether the specific experience of childhood sexual abuse was predictive of changes in depressive symptoms and examined whether results linking adverse childhood experiences to parental adjustment were specific to young age (i.e. adolescence) or extended to a broader age range. In order to examine whether challenging postpartum experiences would exacerbate the effects of adverse childhood experiences on women's adjustment to parenthood, our second goal was to examine the interaction between infant difficult temperament (i.e. high negative reactivity and low soothability) and the accumulation of adverse childhood experiences on changes in parenting self-efficacy, depressive symptoms, and anxiety symptoms from pregnancy to three months postpartum. We expected that women who had more adverse experiences in childhood would show less increase in parenting self-efficacy and less decrease in anxiety and depressive symptoms from the prenatal to the postpartum period (e.g., Cole et al., 1992; Crockenberg & Leerkes, 2003b; Madigan et al., 2014). Further, both high infant negative reactivity and low soothability were expected to exacerbate the negative effects of adverse childhood experiences on women's parenting self-efficacy, depressive symptoms and anxiety symptoms in the transition to parenthood (Crockenberg & Leerkes, 2003b).

METHOD

Participants

The sample of this study included 104 first-time pregnant women. About one half of the sample (n = 56) was recruited via a population based longitudinal survey study on pregnancy and parenthood, Generations[2]. Within this longitudinal study, women were approached for additional measurements for this study if they reported on experiences with youth services or other professional support before they were 18 years old. The other half of the sample (n = 48) was recruited into Generations[2] and the additional measurements with the help of youth care institutions or prenatal programs targeting at-risk families. All women provided informed consent after they were informed about the study in a recruitment visit. The study was approved by the Medical Ethical Committee of the VU Medical Center, Amsterdam (The Netherlands).

Women participating in the current study ranged in age from 15 to 41 (M = 25.05, SD = 6.64). Seventy-two women (69%) were married or had a partner, 31 women (30%) were single, and for one woman marital status was missing (1%). With respect

to educational attainment, 35 women (34%) finished bachelor or master degrees in higher education, 39 women (37%) finished tertiary vocational education or secondary education preparing for higher education, 20 women (19%) finished secondary middle-level applied education and 9 women (10%) finished primary education. Information on women's nationality showed that fifty-nine women (57%) had parents who were both born in The Netherlands, 12 women (11%) had a non-Dutch Western background (one or both parents born in a Western country) and 33 women (32%) had a non-Western background (one or both parents born in a non-Western country). In this study, forty-seven of the born children (45%) were boys, 55 children (53%) were girls, and for two children we had no information on gender (because parents could not be reached anymore in the postpartum period).

Procedure

Prenatal and postnatal questionnaires on parenting self-efficacy, depressive symptoms and anxiety symptoms were used, in addition to a prenatal questionnaire on adverse childhood experiences and a postnatal questionnaire on perceived infant temperament. Women were asked to fill out the prenatal questionnaires at 32 weeks of pregnancy (M = 33.15, SD = 2.08) and the postnatal questionnaires at 3 months postpartum (M = 3.31, SD = 0.84). Approximately forty-five women filled out these questionnaires during scheduled prenatal and postnatal home visits,
which was done to increase the response rate and to explain to women the questionnaire instructions if necessary.

Instruments

Adverse childhood experiences. A Dutch translation of the Adverse Childhood Experiences questionnaire (ACE; Felitti et al., 1998, see also http://acestudy.org/ace_score) was administered to examine the number of adverse experiences women had encountered before age 18. The questionnaire contains 28 items covering 10 categories, including the occurrence of psychological abuse (2 items), physical abuse (2 items), sexual abuse (4 items), psychological neglect (5 items), physical neglect (5 items), exposure to interparental violence (4 items), exposure to substance abuse (2 items), exposure to mental illness (2 items), criminal behavior in household (1 item) and parental divorce (1 item). All categories of adverse childhood experiences were assessed and scored corresponding to the criteria as described by Felitti and his colleagues (1998; see also http://acestudy.org/ace_score), with positive responses to an item indicating occurrence of an adverse childhood experience. The positive responses on the different categories of abuse, neglect or household dysfunction were summed

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to a score from 0 to 10. People who reported four or more ACEs were regarded at risk for (mental) health problems (Felitti et al., 1998). For the original ACE study the prevalence rates for women having four or more ACEs was 15% over a sample size of 17,337 (Centers for Disease Control and Prevention, 2014). In the current study, 35% of the women had four or more ACEs.

Parenting self-efficacy. Prenatal and postnatal parenting self-efficacy were assessed with the Self-Efficacy in the Nurturing Role questionnaire (SENR; Pedersen, Bryan, Huffman, & Del Carmen, 1989, April), which was translated in Dutch and previously used in a study by Verhage, Oosterman, & Schuengel (2013b). The questionnaire includes 16 items on women's expectations (i.e. the prenatal version) or feelings (i.e. the postnatal version) about their parenting competence specific to the period of infancy. One of the prenatal items is for example: "I find nothing unusually complicated or difficult about the prospect of feeding, playing with, or providing day-to-day care for a child". One of the postnatal items is: "I am unsure just how much attention I should give my baby". The items are rated on a scale from 1 (not at all representative of me) to 7 (strongly representative of me). Responses to negatively formulated items were recoded. Prenatal and postnatal sum scores ranged from 7 to 112. Previous studies reported good internal consistency with Cronbach's alpha's ranging from .78 to .91 (Hsu & Sung, 2008; Porter & Hsu, 2003; Verhage, Oosterman, & Schuengel, 2013b). In the current study, Cronbach's alpha was .84 for the prenatal assessment and .82 for the postnatal assessment.

Infant temperament. Infant temperament was measured with the Dutch version of the Infant Behavior Questionnaire (IBQ) developed by Rothbart (1981). The questionnaire consists of 94 items, which measure the frequency of different types of behaviors during the last week. An example item includes "How often during the last week did the baby: cry or show distress at a loud sound (blender, vacuum cleaner)"? Responses were given on a Likert-scale, ranging from 1 (never) to 7 (always). A score of 8 (does not apply) was also an option, given the possibility that particular behaviors may not have occurred in the last week (Rothbart, 1981). Six scales were then obtained by averaging the relevant item scores, excluding those that were not applicable (Rothbart, 1981). For the current study, the scales that measure distress to limitations (20 items), distress and latency to approach sudden or novel stimuli (16 items), and soothability (11 items) were used. The two scales distress to limitations and distress and latency to approach sudden or novel stimuli were combined to form a negative reactivity scale. The IBQ is a widely used instrument and was found to be a valid measure of infant temperament (e.g., Goldsmith & Rothbart, 1991). For the six separate scales of the IBQ, filled out when infants were 3 months old, internal consistency was found to

be adequate, with Cronbach's alpha's ranging from .72-.85 (Rothbart, 1981). In the current study, Cronbach's alphas for the composite negative reactivity scale and the soothability scale were .89 and .82, respectively.

Depressive symptoms. The Dutch version of the Beck Depression Inventory, second edition (BDI-II; A. T. Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; Van der Does, 2002) was administered. The BDI-II is a state-like measure consisting of 21 items measuring the cognitive, somatic and affective symptoms of depression over the last two weeks. The items are rated on a 4-point scale, with statements ranging from 0 (absence of symptoms) to 3 (severe symptoms). An example item is "guilty feelings", consisting of the following statements: 0) "I don't feel particularly guilty", 1) "I feel guilty over many things I have done or should have done", 2) "I feel guilty most of the time", 3) "I feel guilty all of the time". A sum score with a possible range from 0 to 63 was obtained by adding the individual item scores. The BDI was found to be a valid screening tool for measuring depression during pregnancy (Holcomb, Stone, Lustman, Gavard, & Mostello, 1996; Tandon, Cluxton-Keller, Leis, Le, & Perry, 2012). In a recent comprehensive review (Wang & Gorenstein, 2013) the psychometric properties of the BDI-II were positively evaluated, with a high internal consistency (Cronbach's alpha's ranging from .83 to .96). In the current study, Cronbach's alphas were .89 for both the prenatal and the postnatal assessment.

State anxiety symptoms. The state part of the State Trait Anxiety Inventory translated in Dutch by van der Ploeg (1980) was used in this study to measure women's prenatal and postnatal current feelings of anxiety (Spielberger, Goursuch, & Lushene, 1970). The state anxiety scale consists of 20 items measured on a 4 point Likert scale, ranging from 1) "not at all" to 4) "very much so". Example items are: "I feel secure" and "I am tense". Positively worded items were recoded and scores on the individual items were then summed to obtain a total score ranging from 20 to 80. Grant, McMahon and Austin (2008) reported that the STAI was a valid self-report measure to be used during pregnancy, being able to distinguish cases from non-cases. In several previous studies, the internal reliability of the STAI was proven to be high, with Cronbach's alpha's ranging from .91 to .95 (Grant et al., 2008; Meades & Ayers, 2011; Porter & Hsu, 2003). In the current study, Cronbach's alphas were .92 for both the prenatal and the postnatal assessment.

Statistical Analyses

Patterns of missing data were examined in order to find out whether missing data were completely at random (MCAR), missing at random (MAR), or missing not at random (MNAR). Little Mcar's test was performed, which is non-significant if missingness

is completely at random (Little & Rubin, 1987). In order to deal with missing data, multiple imputation was chosen (Schafer & Graham, 2002). Following recommendations for small sample sizes, twenty five datasets were generated in which values were estimated for missing data based on the observed distribution of all variables which were used in the analyses, including interaction terms (Johnson & Young, 2011). To that end, both infant temperament (i.e. negative reactivity and soothability) and adverse childhood experiences were centered, and their interaction terms were calculated prior to the multiple imputation procedure. Analyses were performed over a pooled estimate of the 25 generated datasets as provided in SPSS 21. In line with suggestions from Schafer and Graham (2002), both multiple imputation and analyses were performed on the total sample, thus including the participants who dropped out of the study or had nonresponse at the postnatal assessment. However, given that von Hippel (2007) advocated for the exclusion of the participants with missing outcome measures in the analyses (Multiple Imputation, then Deletion (MID)), analyses were also performed without these participants and potential differences were mentioned.

Second, preliminary analyses were conducted to explore the association of demographic variables (age, educational attainment, single status, nationality and gender of the child) with the dependent and independent variables. Demographic variables were included as covariates in further analyses if they were significantly associated with both the dependent and (one of) the independent variable(s).

Third, hierarchical regression analyses were performed to predict changes in parenting self-efficacy, depressive symptoms and anxiety symptoms from pregnancy to three months postpartum by adverse childhood experiences, infant temperament (i.e., infant negative reactivity or infant soothability) and the interaction of adverse childhood experiences with infant temperament. Finally, postnatal state anxiety and depressive symptoms were added to the regression analyses on changes in parenting self-efficacy; and postnatal parenting self-efficacy was added to the regression analyses on changes in state anxiety and depressive symptoms in order to control for the associations between these concepts (Kunseler, Willemen, Oosterman, & Schuengel, 2014). Also for the additional questions regarding unique effects of sexual abuse and maternal age, the same regression approach was employed. Hierarchical regression analyses included a maximum amount of six predictors, so that it was still possible to detect medium effect sizes, given the sample size ($N = 104$) of the current study (Miles & Shevlin, 2001).

RESULTS

Missing Data and Preliminary Analyses

In the current study, 20 of the 104 participants (19%) had missing data on one or more of the questionnaires, which mostly included drop-out or nonresponse on the postnatal assessment (i.e. for 13 participants, 13%). See Table 1 for descriptive statistics of women with complete data for each of the study variables. According to the Little's MCAR test, χ^2 (46) = 40.85, p = .687, missing data were completely at random. Multiple imputation was therefore applied. Analyses including all participants after multiple imputation (N = 104) yielded similar results as analyses that excluded participants who had no postnatal assessment (n = 91).

Table 1 presents correlations of adverse childhood experiences, parenting self-efficacy, depressive symptoms, state anxiety symptoms and infant temperament. With respect to covariates, only educational attainment was significantly associated with both postpartum parenting self-efficacy (i.e. dependent variable), and prenatal depression and infant soothability (i.e. independent variables). Therefore educational attainment was included as a covariate in the respective regression analyses.

With respect to changes of parenting self-efficacy in the transition to parenthood for the entire sample, paired t-tests revealed that the means for parenting self-efficacy were significantly lower at the prenatal than the postnatal assessment, t(957) = 3.12, p = .002. Both state anxiety and depressive symptoms significantly decreased between the prenatal and the postnatal assessment, t(2315) = -3.40, p = .001 and t(614) = -2.67, p = .008 respectively.

Adverse Childhood Experiences

Hierarchical regression analyses were performed to examine whether adverse childhood experiences were associated with the aforementioned changes in parenting self-efficacy, state anxiety symptoms, and depressive symptoms in the transition to parenthood. To that end, we controlled for prenatal variables in the first step of the regression analyses, and entered adverse childhood experiences as a second step. The first two steps of the regression analyses as displayed in Table 2 show the results. With respect to parenting self-efficacy, prenatal parenting self-efficacy (step 1) significantly predicted postnatal parenting self-efficacy, p < .001, but adverse childhood experiences (step 2) were not significantly associated with postpartum parenting self-efficacy, p = .183. Corrected for prenatal state anxiety symptoms, p < .001 (step 1) adverse childhood experiences were not significantly associated to postpartum state anxiety symptoms either, p = .880. However, a regression analysis for depressive symptoms showed that

Table 1. *Descriptive Statistics and Correlations for Adverse Childhood Experiences, Parenting Self-Efficacy, Depressive Symptoms, State Anxiety Symptoms, Infant Negative Reactivity and Infant Soothability*

	1	2	3	4	5	6	7	8	9
1. Adverse childhood experiences	-								
2. Prenatal parenting self-efficacy	-.09	-							
3. Prenatal depressive symptoms	.20*	-.56***	-						
4. Prenatal state anxiety symptoms	.17	-.55***	.67***	-					
5. Postnatal parenting self-efficacy	-.16	.55***	-.40**	-.38***	-				
6. Postnatal depressive symptoms	.31**	-.35**	.60***	.40***	-.46***	-			
7. Postnatal state anxiety symptoms	.10	-.41***	.45***	.52***	-.54***	.57***	-		
8. Infant negative reactivity	-.02	-.14	.18	.23*	-.31**	.21	.26*	-	
9. Infant soothability	-.13	-.05	.12	.13	.10	-.02	-.00	.17	-
M a	2.88	90.41	11.97	36.65	93.84	9.77	33.00	2.85	4.99
SD a	2.28	10.73	7.69	10.74	10.65	7.13	9.95	0.65	0.98
N a	99	102	101	102	91	91	91	91	91

Note. a Descriptive statistics are reported over the original, complete data.

*** $p < .001$, ** $p < .01$, * $p < .05$.

Table 2. *Hierarchical Multiple Regression Analyses Predicting Changes in Parenting Self-Efficacy, State Anxiety Symptoms, and Depressive Symptoms*

	Postpartum parenting self-efficacy			Postpartum state anxiety symptoms			Postpartum depressive symptoms		
	B	*SE (B)*	*ΔR² a*	*B*	*SE (B)*	*ΔR² a*	*B*	*SE (B)*	*ΔR² a*
Step 1									
Prenatal parenting self-efficacy	0.56	0.09	.31***	-	-	-	-	-	-
Prenatal state anxiety symptoms	-	-	-	0.49	0.09	.27***	-	-	-
Prenatal depressive symptoms	-	-	-	-	-	-	0.60	0.13	.36***
Step 2									
Adverse childhood experiences	-0.56	0.42	.01	0.06	0.42	.00	0.66	0.29	.04*
Step 3v									
Infant negative reactivity	-4.05	1.40	.06**	2.30	1.47	.02	1.43	1.05	.01
Step 4									
Adverse childhood experiences X Infant negative reactivity	-1.64	.74	.04*	0.81	0.71	.01	0.39	0.50	.00

Note. a Given that SPSS does not provide the pooled results for *R2* yet, *ΔR2* is calculated by squaring the semi-partial (part) correlation.

*** $p < .001$, ** $p < .01$, * $p < .05$.

corrected for prenatal depressive symptoms (step 1), p <.001, adverse childhood experiences (step 2), *p* = .023, were positively associated with postpartum depressive symptoms, explaining 3.6% of the variance. See Figure 1 for change trajectories in depressive symptoms for -1SD, mean level and +1SD adverse childhood experiences. Figure 1 shows that in addition to the less steep decrease in depressive symptoms for women with high adverse childhood experiences (+1SD) than for women with low adverse childhood experiences (-1SD), more adverse childhood experiences were also associated with higher mean levels of prenatal and postnatal depressive symptoms. A separate regression analysis revealed that sexual childhood abuse was not significantly predictive of changes in depressive symptoms, *b* = 2.71, *SE* = 1.67, *p* = .106. Separate hierarchical regression analyses examining whether the interaction between age and adverse childhood experiences was significantly associated with changes in parenting self-efficacy, anxiety symptoms, and depressive symptoms, showed no significant interaction effects either (*p* > .320).
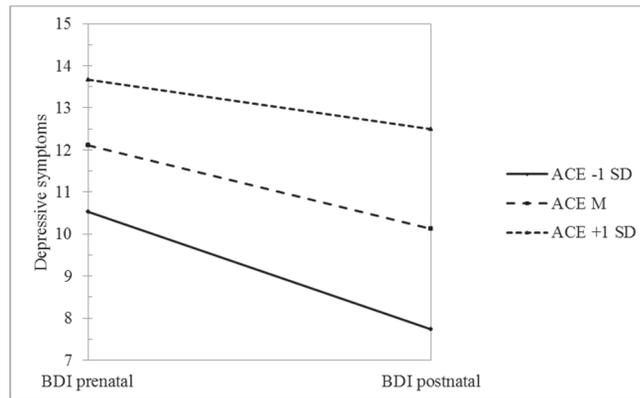
Figure 1. Effect of Adverse Childhood Experiences (ACE) on changes in depressive symptoms over the transition to parenthood

Infant Temperament

After adverse childhood experiences, infant temperament was added to the hierarchical regression analyses on changes in parenting self-efficacy, state anxiety symptoms and depressive symptoms (see Table 2, step 3). Controlled for the effects of prenatal parenting self-efficacy and adverse childhood experiences (step 1 and 2), infant negative reactivity was negatively associated with postpartum parenting self-efficacy, $p = .004$ (step 3), explaining 5.7% of the variance, which indicated that women who perceived their infant as more negatively reactive increased less in parenting self-efficacy. Infant negative reactivity was no significant predictor in regression analyses examining changes in state anxiety symptoms, $p = .117$, or depressive symptoms, $p = .174$ (see Table 2). Separate regression analyses which included infant soothability instead of infant negative reactivity, showed no significant effects on one of the outcome measures either (p > .438).

Interaction between Adverse Childhood Experiences and Infant Temperament

The addition of the interaction between adverse childhood experiences and infant negative reactivity (Table 2, step 4), revealed a significant effect for changes in parenting self-efficacy, $p = .028$. The moderation by adverse childhood experiences accounted for 4.2% of the variance in postnatal parenting self-efficacy adjusted for the effects of prenatal parenting self-efficacy, adverse childhood experiences and infant negative reactivity. As Figure 2 shows and simple slope analysis suggested, infant negative reactivity was associated with lower postnatal parenting self-efficacy (corrected for prenatal parenting self-efficacy) for women with many (+1SD) adverse childhood experiences, $b = -7.70$,

SE = 2.13, *p* < .001, whereas infant negative reactivity was not significantly associated to postnatal parenting self-efficacy for women with few (-1SD) adverse childhood experiences, *b* = -0.52, *SE* = 1.99, *p* = .793. The interaction term of adverse childhood experiences by infant negative reactivity was not significantly associated with changes in state anxiety symptoms and depressive symptoms (see Table 2). Neither was the interaction of adverse childhood experiences by infant soothability significantly associated with changes in parenting self-efficacy, state anxiety, or depressive symptoms (*p* > .397).

Finally, with the addition of both postnatal state anxiety and depressive symptoms as predictors in the last step of the hierarchical regression analysis focusing on changes in parenting self-efficacy, the effect of infant negative reactivity was still associated with changes in parenting self-efficacy, *b* = -2.92, *SE* = 1.32, *p* = .028, and the moderation effect by adverse childhood experiences remained significantly predictive of changes in parenting self-efficacy *b* = -1.52, *SE* = .70, *p* = .030. With the addition of postnatal parenting self-efficacy to the last step of the regression analysis that examined changes in depressive symptoms, adverse childhood experiences remained a significant predictor of changes in depressive symptoms, *b* = .61, *SE* = .28, *p* =.031.
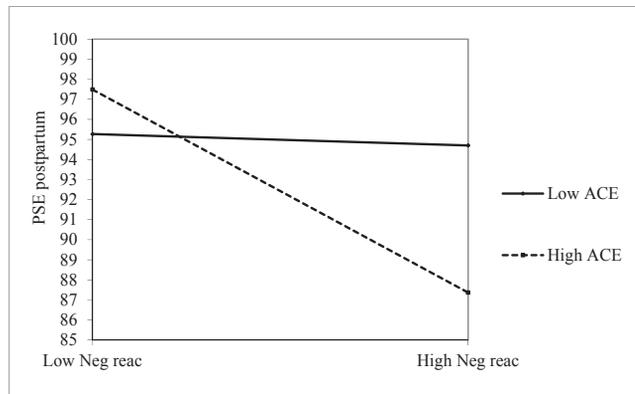

Figure 2. *Moderation effect of Adverse Childhood Experiences (ACE) on the association between infant negative reactivity (Neg reac) and postpartum parenting self-efficacy (PSE; corrected for prenatal parenting self-efficacy).*

DISCUSSION

The current study examined both the unique and interactive effects of adverse childhood experiences and infant temperament on changes in women's parenting self-efficacy, anxiety and depressive symptoms across the transition to parenthood. Changes

in depressive symptoms from pregnancy to three months postpartum were uniquely predicted by an accumulation of adverse childhood experiences, whereas changes in parenting self-efficacy during this same time period were uniquely predicted by infant negative reactivity and the interaction between adverse childhood experiences and infant negative reactivity. Changes in anxiety symptoms could not be predicted from any of the determinants considered in this study. These findings suggest that changes in parenting self-efficacy, depressive symptoms, and anxiety symptoms in the transition to parenthood are determined by differing underlying mechanisms, some of which involving adverse childhood experiences.

In line with our expectations, women who were exposed to more adverse childhood experiences decreased less in depressive symptoms from pregnancy to three months postpartum. Previous studies also found less decline in depressive symptoms ascross the transition to parenthood for women who experienced more childhood rejection (Crockenberg & Leerkes, 2003b) or for female adolescents exposed to sexual abuse (Madigan et al., 2014). The current study could not replicate the specific effect of sexual abuse. In addition, the effect of cumulative risk on depressive symptomatology was not limited to the young mothers in our sample.

Because prenatal depression is one of the strongest predictors for postpartum depression (e.g., Robertson, Grace, Wallington, & Stewart, 2004), it is remarkable that the effect of adverse childhood experiences remained predictive of postpartum depressive symptoms even after controlling for prenatal symptoms (see Crockenberg & Leerkes, 2003b). As Crockenberg and Leerkes (2003b) already proposed based on Fraiberg's work (1980), this finding suggests that postpartum parenting experiences may engender depressed feelings and cognitions associated with women's own more negative childhood history. Nevertheless, the strength of the association between adverse childhood experiences and postpartum depressive symptoms was not impacted by differential infant temperamental characteristics. Given that there is quite a convincing set of studies linking people's childhood history to depressive symptoms in particular (Ross & Dennis, 2009), it is reasonable to assume that an accumulation of adverse childhood experiences may actually serve as a main predictor for depressed affect, not being easily influenced by differrential infant temperamental characteristics. Alternatively, other experiences specific to the postpartum period, such as childcare stress or changes in the partner relationship may interact with adverse childhood experiences to predict changes in depressive symptoms in the transition to parent-hood (for a meta-analysis on factors predicting postpartum depression, see C. T. Beck, 2001).

No effects were found in this study that linked an accumulation of adverse child-hood experiences to changes in state anxiety across the transition to parenthood. Anxiety symptoms are thought to reflect anticipation of failure and loss of control, whereas feelings of depression concern perceived hopelessness and inefficacy (Alloy, Kelly, Mineka, & Clements, 1990; Bandura, 1997; Mineka, Watson, & Clark, 1998). The inevitable failures and disappointments of new parenthood may reactivate internalized feelings of low self-worth and inefficacy in women who encountered (many) adverse childhood experiences, leading to a less positive course of depressive symptoms (Crockenberg & Leerkes, 2003b; Fraiberg, 1980). In depth study of the differential perceptions and psychological mechanisms involved in anxiety and depression is necessary to clarify these distinct effects.

Changes in parenting self-efficacy were not uniquely predicted by adverse childhood experiences, but only if combined with infant negative reactivity. In addition, infant negative reactivity was associated with parenting self-efficacy as a main effect. The finding that mothers of infants with heightened negative reactivity may actually feel less competent as parents, fits in the theory of Bandura (1977) who already argued that self-efficacy beliefs are influenced mostly by people's perceptions of their performances. The importance of infant temperament in affecting women's parenting self-efficacy is also emphasized in previous studies (e.g., Cutrona & Troutman, 1986; Porter & Hsu, 2003). However, this is the first study finding a significant interaction effect between infant temperament and adverse childhood experiences on postpartum parenting self-efficacy. Provided that women may have developed a less positive self-image based on the adverse experiences with their parents in childhood (Bowlby, 1973; Leerkes & Crockenberg, 2002), they may feel confirmed in their feelings of incompetence if their postpartum parenting experiences with their infants are more challenging, resulting in a lower postpartum parenting self-efficacy. The interaction effect remained significant if we controlled for prenatal parenting self-efficacy and postpartum mood symptoms, which were found to be related to more negative perceptions of infant temperament in previous studies (Hanington, Ramchandani, & Stein, 2010; Verhage, Oosterman, & Schuengel, 2013b). Because it is therefore more likely that there are also actual rather than just perceived differences in infant temperament, it is important to consider the *"goodness-of-fit"* between parent and child already during the formation of social cog-nitions across the transition to parenthood, and not only with respect to the emerging parent-child relationship (Belsky, 1984; Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990; Thomas & Chess, 1977).

Contradictory to the findings for parenting self-efficacy, infant temperament was not predictive of changes in mood symptoms across the transition to parenthood. Consistent

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with this, a study on the direction of effects between maternal depression and infant temperament found little evidence for effects from infant temperament at six months to maternal mood at 24 months, whereas depressive symptoms predicted infant temperamental characteristics (Hanington et al., 2010). With other studies providing support for child to parent effects (e.g., Murray, Stanley, Hooper, King, & Fiori-Cowley, 1996), the direction of influence between maternal mood symptoms and infant temperament is still undecided (Britton, 2011). Our findings do not exclude the possibility that infant temperament may eventually affect or exacerbate maternal mood symptoms, particularly if infant negative reactivity sustains for a longer period of time and is associated with sleep deprivation and excessive infant crying (e.g., Lam, Hiscock, & Wake, 2003).

In addition to the strenghts of this study, including the use of an cumulative risk index and the examination of unique determinants for changes in both mood symptoms and parenting self-efficacy across the transition to parenthood, the current study has several limitations which should be taken into account. First, all questionnaires used in this study were based on maternal report, which increased the likelihood for inflated associations between the study variables, although our focus on changes (i.e. controlling for prenatal variables) may diminish the impact of common method bias. Second, this study only examined women's adjustment to parenthood until 3 months postpartum. Future research could be focused on mechanisms explaining the development of women's mood symptoms and parenting self-efficacy in the longer term.

In conclusion, findings of the current study suggest that an accumulation of adverse childhood experiences underlies both women's emotional and cognitive adjustment to parenthood, but for each in a different way. Whereas an accumulation of adverse childhood experiences is directly linked to a reduced decline in depressive symptoms, it is only linked to an eroded sense of parenting competence in conjunction with infant negative reactivity. The prominent role of cumulative childhood adversity in new mothers' well-being implies that attention to early screening and prevention efforts is important. Nevertheless, caution should be exercised with applying a cumulative risk approach, because besides risk factors possible unknown protective factors and buffering mechanisms must be taken into account as well (Rutter, 1985).

The finding that adverse childhood experiences are linked specifically to *changes* in parenting self-efficacy and depressive symptoms from the prenatal to the postpartum period, suggests that it is important to prepare at-risk women for the possible challenges that come along with parenthood. Albeit unsubstantiated positive verbal persuasion may actually lead to stronger declines in women's parenting self-efficacy in response to subsequent caregiving failures (Cassé, Oosterman, & Schuengel, in press), it may be helpful to empower pregnant women by stimulating them to build

up caregiving experiences, so that parenting self-efficacy beliefs are not unrealistically inflated but based on real parenting skills. Following Bandura's work (1977) on the factors affecting self-efficacy, it may also be beneficial to offer women effective modeling experiences and to guide and support their efforts in the early postpartum period. Several programs to prevent parenting problems and negative child outcomes, such as the nurse-family partnership (Mejdoubi et al., 2011; Olds, Henderson, Tatelbaum, & Chamberlin, 1986) and Triple-P (Sanders, Markie-Dadds, & Turner, 2003) have actually included principles of Bandura's self-efficacy theory. Our findings add that it is important to carefully consider in these programs the differential underlying mechanisms leading to increased mood symptoms or a decreased sense of parenting competence in the postpartum period.

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