Chapter 3

Changes in Parenting Self-Efficacy and Mood Symptoms in the Transition to Parenthood: A Bidirectional Association

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ABSTRACT

Objective. Anxiety and depressive symptoms are assumed to relate to parenting self-efficacy in the context of changes and adaptations taking place in the transition to parenthood. The aim of this study was to elucidate the direction of effects. ***Design.*** Participants were 822 first-time expectant women who filled out questionnaires on depressive and anxiety symptoms and parenting self-efficacy at 32 weeks of pregnancy and at 3 and 12 months postpartum. ***Results.*** From 32 weeks of pregnancy to 3 months postpartum, parenting self-efficacy increased, whereas anxiety and depressive symptoms decreased. Multivariate response models showed that higher prenatal parenting self-efficacy was associated with more decreases in anxiety and depressive symptoms; lower prenatal mood symptoms were associated with more increases in parenting self-efficacy to 3 months postpartum. Higher postpartum parenting self-efficacy at 3 months predicted less increase in trait anxiety from 3 to 12 months postpartum. ***Conclusions.*** Parenting self-efficacy appears to be a result of mental health and a predictor for the course of mental health in first-time mothers. These results highlight the importance of focusing on both factors for intervention and prevention efforts.

In the transition to parenthood women experience changes at a physical, psychological, and cognitive level. Parenting self-efficacy, defined as "the expectation caregivers hold about their ability to parent successfully" (Jones & Prinz, 2005, p. 342), is considered to be an important cognitive construct during this period. Parenting self-efficacy has been found to be associated with the adaptation to motherhood, parenting practices, and child outcomes (Coleman & Karraker, 1997; Jones & Prinz, 2005; Williams et al., 1987). Another important issue in the transition to parenthood concerns mood states and mood symptoms. Depressive and anxiety symptoms show considerable prevalence during the perinatal period (e.g., Bennett, Einarson, Taddio, Koren, & Einarson, 2004; Gotlib, Whiffen, Mount, Milne, & Cordy, 1989; Heron, O'Connor, Evans, Golding, & Glover, 2004), and the accompanying negative thoughts, ruminations, and worries have been found to be negatively linked to parenting self-efficacy (e.g., Porter & Hsu, 2003; Teti & Gelfand, 1991). Given Bandura's (1977) considerations on the reciprocal and bidirectional processes between self-efficacy and depression, it is possible that both low parenting self-efficacy and heightened mood symptoms in pregnancy indicate a risk process that ultimately affects parenting. However, from previous studies the direction of influence between parenting self-efficacy and mood symptoms is unclear (Jones & Prinz, 2005; Leerkes & Burney, 2007). In the current study we examine the direction of effects between changes in parenting self-efficacy and depressive as well as anxiety symptoms from pregnancy until 1 year postpartum.

Parenting Self-Efficacy as a Predictor or Consequence of Mood Symptoms

Parenting self-efficacy originates from Bandura's (1977) work on the concept of self-efficacy. Self-efficacy can be influenced by several sources, including people's emotional arousal and mood states. Bandura (1977, 1982) argued that people may partly use their physiological or fear arousal to form their expectations about the possibility of success with respect to impending tasks. Women who are emotionally aroused and anxious in anticipating their forthcoming role as a parent may therefore feel more vulnerable and expect less parenting success than women who feel less aroused. In addition, a negative mood could prime negative thoughts and memories, which feed incompetent self-judgments (Bandura, 1997; Bower, 1983) and lower levels of self-efficacy (Bandura, 1997).

Based on cognitive theories of mood disorders, low parenting self-efficacy may also have effects on perinatal anxiety and depressive symptoms. Alloy, Kelly, Mineka, and Clements (1990) proposed that people are prone to depression if they expect negative outcomes, whereas people experience anxiety if they feel uncertain about their

potential to control outcomes (see also Mineka, Watson, & Clark, 1998). Women's expectations regarding their competence as parents - their parenting self-efficacy - may therefore negatively affect their mood states. In addition, Bandura (1997) argued that women with low self-efficacy may accentuate their failures and attribute them to faults in themselves, rather than to external circumstances, consistent with a "depressive attribution style" (Bandura, 1982, 1997; Seligman, Abramson, Semmel, & Baeyer, 1979). Low self-efficacy has also been associated with heightened reported fear arousal and more physiological reactivity in dealing with stressors (Bandura, Reese, & Adams, 1982). In the transition to parenthood, many new possible stressors arise related to the infant's health and emotion regulation. Cries of infants, for example, tend to generate distress in mothers, including physiological arousal and more negative ratings of mood (Frodi & Lamb, 1980). Low parenting self-efficacy may contribute to feelings of losing control and becoming overwhelmed in the face of these stressors.

Various studies have examined predictive associations between mood states and parenting self-efficacy in the transition to parenthood and/or the first year postpartum. Whereas in the postpartum period most studies have reported significant associations between mood symptoms and parenting self-efficacy (Cutrona & Troutman, 1986; Haslam, Pakenham, & Smith, 2006; Teti & Gelfand, 1991; Weaver, Shaw, Dishion, & Wilson, 2008), conclusions have been inconsistent with respect to studies in the transition to parenthood. Some studies found no significant correlations between parenting self-efficacy and mood symptoms measured in the prenatal versus the postnatal period (Cutrona & Troutman, 1986; Haslam et al., 2006; Leerkes & Burney, 2007), whereas other studies found significant associations (Olioff & Aboud, 1991; Porter & Hsu, 2003). Two studies also controlled for prenatal effects of parenting self-efficacy in the prediction from prenatal mood symptoms to postnatal parenting self-efficacy (Leerkes & Burney, 2007; Porter & Hsu, 2003), or for prenatal effects of depressive symptoms in the prediction from prenatal parenting self-efficacy to postpartum depression (Olioff & Aboud, 1991). However, whereas Porter and Hsu (2003) and Olioff and Aboud (1991) found negative associations between mood symptoms and parenting self-efficacy, Leerkes and Burney (2007) found no significant effects for prenatal depressive symptoms on postpartum parenting self-efficacy (corrected for prenatal parenting self-efficacy).

In addition, most studies of the link between mood symptoms and parenting self-efficacy only included depressive symptoms, which is remarkable given that feelings of *both* anxiety and depression could go along with low self-efficacy (Alloy et al., 1990; Bandura, 1982, 1997). The few studies that examined the association between anxiety symptoms and parenting self-efficacy only focused on trait anxiety (Barnett,

Schaafsma, Guzman, & Parker, 1991), measuring people's disposition to respond to perceived threats with anxiety, or on state anxiety (Porter & Hsu, 2003), measuring tense or apprehensive feelings at the current moment. Spielberger (1972) argued that these constructs may be highly associated under conditions that are perceived as challenging and more differentiated under conditions that are perceived as under control (see also Van der Ploeg, Defares, & Spielberger, 1980). Given that women may feel differently challenged before, during, and after the transition to parenthood, there may be variability in how state anxiety scores reflect trait anxiety scores during this period, as well as differences between the associated changes with parenting self-efficacy. In the current study, both state and trait anxiety were assessed in relation to parenting self-efficacy.

Evidence for the Association between Mood Symptoms and Parenting Self-Efficacy from Longitudinal Studies

To address the changes and adaptations taking place in the transition to parenthood, mood symptoms and parenting self-efficacy need to be studied longitudinally. Several studies of changes occurring from late pregnancy to a few months postpartum showed that parenting self-efficacy increases (Porter & Hsu, 2003; Ruble et al., 1990; Verhage, Oosterman, & Schuengel, 2013; Zayas, Jankowski, & McKee, 2005) and depressive and anxiety symptoms decrease (Evans, Heron, Francomb, Oke, & Golding, 2001; Heron et al., 2004; Ross, Gilbert Evans, Sellers, & Romach, 2003). Given the negative association between parenting self-efficacy and mood symptoms, it is plausible that these patterns of change across the transition to parenthood may vary according to prenatal parenting self-efficacy and mood. Only a few studies of the association between mood symptoms and parenting self-efficacy used a longitudinal design with more than two assessments. In a study focused on the transition to parenthood, Porter and Hsu (2003) reported that prenatal anxiety and depressive symptoms were significantly associated with lower parenting self-efficacy at 1 month postpartum, but not at 3 months postpartum. Weaver and colleagues (2008) focused their study on a different developmental period and found that higher parenting self-efficacy at 2 years of age predicted lower maternal depression at 3 years of age, controlling for depression at age 2. However, these studies were not focused on longitudinal processes of change examining both directions of influence in one study.

Despite the examination of average change trajectories over the transition to parenthood, studies of anxiety or depressive symptoms have shown a diversity of change patterns, with women who start from high levels of depressive or anxiety symptoms and continue at these levels (stable high) in pregnancy and postpartum, but also

women for whom symptom levels alter from course after birth (i.e., only show elevated symptom levels in the prenatal or the postpartum period). For example, Heron and colleagues (2004) showed that 44% of the women with postpartum depression and 36% of the women with postpartum anxiety did not experience depression or anxiety in pregnancy. In addition, women who had elevated symptom levels during pregnancy, did not necessarily report elevated anxiety or depression in the postpartum period. Postpartum changes could therefore arrive unexpected relative to prenatal feelings and expectations, which makes it important to study prenatal predictors of mood symptom course other than symptom levels alone.

The Current Study

In this longitudinal study first-time pregnant women were followed up over the transition to parenthood to 1 year postpartum. Parenting self-efficacy and mood symptoms (depressive symptoms and state and trait anxiety symptoms) were measured at one time point during pregnancy (32 weeks) and at two time points in the postpartum period (3 and 12 months). The addition of a prenatal time point had the advantage that child effects or experiences with parenting could not play a role in women's assessment of their parenting self-efficacy and mood symptoms. At 3 months postpartum, parenting self-efficacy reflects the experiences that mothers have had with caring for their infants and responding to their signals. Because it is well-known among parents that during the first 6 weeks infants on average increase their crying (St James-Roberts, 2008), the experiences that mothers have after this crying peak may be used by mothers as feedback on their caregiving skills. These first responses to the new parenting task were followed up at the end of the first year of life, when mothers and children have settled into a relationship pattern (Ainsworth, Blehar, Waters, & Wall, 1978).

The present study had several aims. First, changes in parenting self-efficacy, anxiety symptoms, and depressive symptoms were examined from 32 weeks of pregnancy to 3 months postpartum and from 3 to 12 months postpartum. Second, the direction of effects between parenting self-efficacy and anxiety or depressive symptoms was tested in the context of these change trajectories. For this purpose, we tested whether prenatal parenting self-efficacy was predictive of change in both parenting self-efficacy (stability effect) and mood symptoms (cross effect) and whether prenatal mood symptoms were predictive of change in both mood symptoms (stability effect) and parenting self-efficacy (cross effect). Similar predictive relations were tested for postpartum parenting self-efficacy and postpartum mood symptoms. The third aim was to examine whether postnatal effects added to prenatal effects on change in parenting self-efficacy and mood symptoms from pregnancy to 1 year postpartum. Based

on previous research, we expected increases in parenting self-efficacy and decreases in anxiety and depressive symptoms, at least until 3 months postpartum (e.g., Evans et al., 2001; Verhage et al., 2013). The direction of effects between parenting self-efficacy and mood symptoms was expected to be bidirectional (Bandura, 1989, 1997), such that lower prenatal mood symptoms related to more increases in parenting self-efficacy and higher prenatal parenting self-efficacy related to greater decreases in mood symptoms, from pregnancy to 3 months postpartum. Finally, we expected that postpartum parenting self-efficacy and mood symptoms would contribute uniquely to the variance in postpartum change trajectories of parenting self-efficacy and mood symptoms (Porter & Hsu, 2003). Similar to the prenatal effects, the postpartum cross effects from parenting self-efficacy to changes in mood symptoms, and from mood symptoms to changes in parenting self-efficacy, were expected to be negative.

METHOD

Participants

The current study is part of an ongoing longitudinal study of first-time pregnancy and parenthood. Participants were recruited in and around Amsterdam, The Netherlands, with the help of midwives who were asked to hand out recruitment materials to women who were pregnant with their first child and had their first consult. In addition, women could enrol in the project via a website and at a pregnancy fair. For the purpose of the ongoing longitudinal study 928 women were followed until 12 months postpartum and thus participated in the current study. Women were included in the current study if they filled-out questionnaires for at least one time point. Of the 928 women, 106 (12%) dropped out or were excluded because they decided not to participate anymore and/or did not fill out any of the questionnaires (n = 59), did not master the Dutch language (n = 1), or had a miscarriage during their current pregnancy (n = 19). Women were also excluded if they had a miscarriage or abortion after 10 weeks in a previous pregnancy (n = 27), which was decided because a miscarriage may have an impact on women's mental health in a subsequent pregnancy (Armstrong, 2004; Geller, Kerns, & Klier, 2004), particularly after the ultrasound at about 10 weeks which determines whether a pregnancy is viable. Excluded women did not differ significantly from women who were included on age, $t(920) = 0.37$, $p = .710$, ethnic background (birth country of parents), χ^2 (2, n = 927) = 1.13, $p = .568$, and marital status, χ^2 (3, n = 927) = 1.23, p = .745. With respect to educational level, the groups did differ, χ^2 (3, n = 925) = 10.92, p

= .012; this effect was mainly due to the fact that women with somewhat lower levels of education were more likely to drop out than women with higher levels of education.

The final sample for the current study consisted of 822 first-time pregnant women, with a mean age of 30.15 years at 32 weeks of pregnancy (SD = 4.16, n = 820; for two women, their age could not be computed due to missing maternal birth dates). Most women (87%) were Dutch, based on the fact that both of their parents were born in The Netherlands, 8% of the women had a non-Dutch Western background (i.e., one or both parents born in another Western country), and 5% a non-Western background (i.e., one or both parents born in a non-Western country). The sample was on average highly educated: 67% of the women finished college or university as opposed to 33% with lower attained levels of education. Most women were married (43%) or living together with a partner (53%). Two percent of the women were single, and 2% had a partner, but were living separately.

Procedures

Women who signed informed consent for participation received the questionnaires by mail at 32 weeks of pregnancy (T1), and at 3 (T2) and 12 months postpartum (T3). If questionnaires were not returned or had missing items, participants were contacted by e-mail, telephone, or a letter. Questionnaires on parenting self-efficacy, depressive symptoms, and anxiety symptoms were used for the current study. Table 1 shows the number of returned questionnaires for each time point, only including those with fewer than 20% missing items.

Instruments

Parenting self-efficacy. Dutch translations of the prenatal and the postnatal version of the Self-Efficacy in the Nurturing Role questionnaire (SENR; Pedersen, Bryan, Huffman, & Del Carmen, 1989) were used to measure parenting self-efficacy. The self-report questionnaire consists of 16 items measuring the expectations women have about their competence in parenting their infants. An example item of the prenatal questionnaire is "I think I will have difficulty interpreting my baby's cries, knowing whether he or she wants to be fed rather than played with or held." An example item of the postnatal questionnaire is "I feel confident in my role as a parent." Items were rated on a Likert scale, ranging from 1 (*not at all representative of me*) to 7 (*strongly representative of me*). Negatively formulated items were recoded so that higher scores indicated higher parenting self-efficacy. If fewer than 20% of the individual item scores were missing (a maximum of 3 items), missing scores were replaced by the mean value of the participant's own remainder item scores on that specific questionnaire. The in-

dividual item scores were summed to obtain a total score (possible range 16 to 112) for each time point. Porter and Hsu (2003) reported good internal reliability of the SENR with Cronbach's alphas of .91 for the prenatal measurements and .78 for postpartum measurements (at 1 and 3 months). In the current study, Cronbach's alphas ranged from .85 to .87.

Depressive symptoms. Depressive symptoms were measured with the Beck Depression Inventory- second edition (BDI-II; A. T. Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), which was translated and adapted in Dutch by Van der Does (2002). The BDI has 21 items, which measure the presence and severity of cognitive (e.g., past failures, worthlessness), somatic (e.g., tiredness, agitation), and affective (e.g., pessimism, loss of interest) symptoms of depression. The items are rated on a scale of 4 statements (range from 0 to 3) in sequence of severity, with a 0 as indicative of the absence of symptoms. As with the SENR, missing item scores on the BDI were substituted by the mean value of the participant's own remainder item scores on that questionnaire, but only if fewer than 20% (a maximum of 4 items) were missing. Individual items scores were summed to obtain a total score for each time point with a possible range from 0 to 63. A score of 14 or above is representative of mild to severe depression. Previous research demonstrated that the BDI is a suitable instrument to be used during the perinatal period (Holcomb, Stone, Lustman, Gavard, & Mostello, 1996), although optimal cutoff points may be influenced during this period partly by repeated measurements (Ji et al., 2011). The psychometric characteristics of the BDI-II are good (Van der Does, 2002), and high correlations with the Edinburgh Postnatal Depression Scale were found, $r = .82$, $p < .001$ (C. T. Beck & Gable, 2001). The BDI-II was chosen for the purpose of following the women beyond the perinatal period. The internal consistency of the Dutch version of the BDI-II was high with Cronbach's alphas of .92 and .88 for a large patient group and a control group (including pregnant women and their partners) respectively (Van der Does, 2002). Cronbach's alphas in the current study ranged from .82 to .87.

State and trait anxiety symptoms. The Dutch adaptation of the Spielberger State-Trait Anxiety Inventory (STAI: Spielberger, Goursuch, & Lushene, 1970; Van der Ploeg et al., 1980) was used to measure anxiety symptoms. The questionnaire contains two subscales each consisting of 20 items, with state anxiety measuring people's state of current anxiety, a concept which is changeable over time (e.g., "I feel anxious.", "I feel calm."), and trait anxiety measuring people's anxiety disposition (e.g., "I worry too much over things that really don't matter.", "I feel at ease."; Van der Ploeg et al., 1980). Response categories ranged from 1 (*not at all*) to 4 (*very much so*) for the state subscale, and from 1 *(almost never*) to 4 (*almost always*) for the trait subscale. Positively

formulated items were reverse scored so that higher scores represented more anxiety. If participants missed fewer than three items on one of the subscales, these missing items were replaced by an individual item score of 2, in line with the procedures described in the Dutch manual of the STAI (Van der Ploeg et al., 1980). By summing individual item scores, separate total scores for state and trait anxiety were obtained (possible range 20 to 80). A cutoff score above 40 was used as indicative of high anxiety (Barnett & Parker, 1985). The Dutch adaptation of the STAI was found to be reliable (Van der Ploeg et al., 1980), and the validity of the STAI has been demonstrated in pregnancy and the early postpartum period (Meades & Ayers, 2011). In a study by Grant, McMahon, and Austin (2008), the internal consistency of the STAI was found to be high for both prenatal and postnatal measurements (respectively, a = .95 and .94). In the current study, Cronbach's alphas ranged from .93 to .94 for state anxiety and from .92 to .94 for trait anxiety.

Data Analyses

Because of the longitudinal design (measurements within persons) a multilevel approach was chosen to model individual changes in parenting self-efficacy and mood variables (state/ trait anxiety and depressive symptoms) during the transition into parenthood. In this approach, the level 1 variable consisted of the repeated measurement occasions, nested within individuals (the level 2 variable). Intraclass Correlation Coefficients (ICC) for parenting self-efficacy, depressive symptoms, and (state or trait) anxiety symptoms indicated that about half of the response variation was explained on the level of the individual (range 47% to 63%), which confirmed that multilevel modeling was appropriate (Snijders & Bosker, 1999). Multilevel modeling deals effectively with different sample sizes due to missing data, and with unequal time periods between measurements (Snijders & Bosker, 1999). The mixed models procedure in SPSS 20 was used to perform the analyses. Because the main focus of the current study was to examine the direction of effects between parenting self-efficacy and mood variables in the transition to parenthood, three multivariate response models (PSE with depressive symptoms, PSE with state anxiety, and PSE with trait anxiety) were performed. Within these models, the outcome was a latent variable including both time varying variables of PSE and mood. In this way, the contribution and direction of prenatal or postnatal (PSE and mood) effects on the outcome variables could be investigated. All (predictor and outcome) variables were included in the models as raw scores instead of standardized scores (Willett, Singer, & Martin, 1998).

To model change in parenting self-efficacy (PSE) and mood variables during the transition into parenthood a stepwise procedure was used. First, unconditional

multivariate response models were fitted, in which the intercept was estimated as a random effect, allowed to differ for each individual. Second, in growth models with an autoregressive heterogeneous covariance structure, dummy variables for the measurement occasions were added. The measurement occasion of 3 months after birth (T2) was used as a reference category, so that change trajectories from 32 weeks of pregnancy to 3 months postpartum (T1 to T2) and from 3 months to 12 months postpartum (T2 to T3) could be estimated. Third, demographic variables (age at T1, level of education, and ethnic background) were tested simultaneously as fixed effects on level and change of PSE and mood variables. In each multivariate response model, only significant covariates were maintained in subsequent analyses. Fourth, to test the effects of prenatal (T1) and subsequently of postnatal predictors (T2) on mean level of parenting self-efficacy and mood symptoms, these variables were included as time-invariant predictor variables. In each multivariate response model, stability effects were added first (e.g., prenatal PSE as an effect on mean level of PSE over time), and then cross effects were added (e.g., prenatal PSE as an effect on mean level of state anxiety over time). Fifth, the effects of the time-invariant prenatal and subsequently postnatal predictors were examined on slope, by adding interaction terms between predictor and slope. Again, stability effects (e.g., prenatal PSE as an effect on change in PSE) were added before cross effects (e.g., prenatal PSE as an effect on change in state anxiety). The effects of prenatal predictors were tested on two slopes: from T1 to T2 and from T2 to T3. The effects of postnatal predictors were examined on slopes from T2 to T3.

All steps were performed separately for the three multivariate response models. Predictors were added one by one, and change of fit was examined accordingly by use of the χ^2 difference test for deviance values (-2 Log-Likelihood). To test for statistical significance, an alpha of .05 was used. All predictors were entered as fixed effects and were maintained in the models to correct for previous associations with the addition of a new predictor. Random effects were allowed when the model fit improved. The final multivariate response models were bootstrapped (simple method, percentile confidence intervals) to deal with the non-normal, skewed distributions of depressive and anxiety symptoms and for the purpose of correcting for potential bias (Hox, 2010; Roberts & Fan, 2004). Final bootstrapped multivariate response models were interpreted. Because this study was designed to examine the prediction of change trajectories, we only reported the effects on slope.

To examine the percentage of variance explained by the effects of predictors on change, the total variance of the final models was divided by the variance of the step 4 models (growth models including covariates and effects on mean level), and subtracted

from 1 (Snijders & Bosker, 1999). Given the value of R^2, Cohen's f^2 was calculated to indicate the effect size. Effect sizes of ≤ .02 were considered small, effect sizes of approximately .15 moderate, and effect sizes of approximately .35 large (Cohen, 1988).

RESULTS

Preliminary Analyses

In Table 1 correlations and descriptive statistics are reported for parenting self-efficacy, depressive symptoms, and state and trait anxiety symptoms. At T1, 15% of the women had depression scores of 14 or higher, which is indicative of at least minor depression; at T2 and T3, respectively, 11% and 10% of the women scored 14 or higher. With respect to state anxiety symptoms, 15% of the women scored above 40 (considered as high on anxiety) at T1, and 12% of the women scored above 40 at T2 and T3. For trait anxiety, 13%, 10%, and 13% of the women scored above 40 at T1, T2, and T3, respectively. These percentages were based on data excluding missing values (Table 1).

Table 1. *Correlations and Descriptive Statistics of Parenting Self-Efficacy, Depressive Symptoms, and State and Trait Anxiety Symptoms*

	1	2	3	4	5	6	7	8	9	10	11	12
1. Parenting self-efficacy-T1	-	-.26	-.50	-.48	.59	-.25	-.40	-.41	.60	-.26	-.39	-.39
2. Depressive symptoms-T1		-	.59	.62	-.22	.46	.32	.40	-.18	.42	.24	.33
3. State anxiety symptoms-T1			-	.81	-.33	.36	.51	.54	-.39	.40	.50	.51
4. Trait anxiety symptoms-T1				-	-.36	.42	.54	.64	-.38	.42	.49	.60
5. Parenting self-efficacy-T2					-	-.46	-.54	-.53	.72	-.33	-.42	-.46
6. Depressive symptoms-T2						-	.69	.69	-.36	.60	.42	.50
7. State anxiety symptoms-T2							-	.84	-.47	.51	.58	.60
8. Trait anxiety symptoms-T2								-	-.47	.50	.57	.65
9. Parenting self-efficacy-T3									-	-.41	-.50	-.53
10. Depressive symptoms-T3										-	.69	.73
11. State anxiety symptoms-T3											-	.85
12. Trait anxiety symptoms-T3												-
M	92.13	8.86	31.99	31.05	95.71	7.25	29.57	29.64	97.53	6.51	29.91	30.33
SD	10.09	4.66	8.89	8.02	9.85	5.53	9.27	8.64	9.36	5.30	9.18	8.85
N	796	799	795	794	774	775	766	766	753	757	754	754

Note. T1 = 32 weeks of pregnancy; T2 = 3 months postpartum; T3 = 12 months postpartum.
All *p*s < .001.

Parenting Self-Efficacy and Mood Growth Models

Parenting self-efficacy increased in the transition to parenthood, with a significantly larger increase from T1 to T2, $B = 3.43$, $p < .001$, 95% CI [2.82, 4.04], than from T2 to T3, $B = 1.85$, $p < .001$, 95% CI [1.24, 2.46]. State anxiety decreased from T1 to T2, $B = -2.30$, $p < .001$, 95% CI [-2.90, -1.69], and remained stable from T2 to T3, $B = .40$, $p = .204$, 95% CI [-0.22, 1.01]. Trait anxiety also decreased from T1 to T2, $B = -1.28$, $p < .001$, 95% CI [-1.84, -0.72], but increased significantly again from T2 to T3, $B = 0.72$, $p = .013$, 95% CI [0.15, 1.28]. Depressive symptoms decreased across both time intervals; from T1 to T2, $B = -1.56$, $p < .001$, 95% CI [-1.98, -1.13], and from T2 to T3, $B = -0.73$, $p < .001$; 95% CI [-1.15, -0.31]. Given the physical discomforts of pregnancy, analyses of the trajectories of depressive symptoms were also performed without the nine items from the somatic subscale of the BDI-II. When somatic depressive symptoms were excluded, depressive symptoms increased from T1 to T2, $B = 0.22$, $p = .030$, 95% CI [.02-.41], and remained stable from T2 to T3, $B = -.02$, $p = .817$, 95% CI [-.22-.18]. Main analyses of associated change trajectories that excluded somatic depressive symptoms yielded similar results as the ones that are subsequently reported and are therefore not described separately.

In all multivariate response models, there were multiple significant associations between the covariates (age, educational attainment, and ethnic background) on the one hand and mean level and/or change in parenting self-efficacy, depression, or anxiety on the other hand. In Appendix 1, results regarding the associations between demographic covariates and changes in parenting self-efficacy, depression, and anxiety were summarized. All significant effects were taken into account in the specific multivariate response models.

Direction of Effects: Prenatal and Postnatal Effects on Slope

The three multivariate response models for PSE with depression, PSE with state anxiety, and PSE with trait anxiety are reported in separate columns of Table 2.

PSE with depressive symptoms. With respect to stability effects on slope, the multivariate response model of PSE with depressive symptoms showed that higher prenatal scores on PSE predicted less increase in PSE from T1 to T2 ($p < .001$; Table 2); and fewer prenatal depressive symptoms predicted less decrease in depression from T1 to T2 ($p < .001$, Table 2). In addition, higher prenatal PSE was related to more increase in PSE from T2 to T3 ($p = .002$; Table 2) and higher postnatal PSE was related to less increase in PSE from T2 to T3 ($p < .001$; Table 2). With respect to cross effects (from PSE to depressive symptoms and vice versa), the effects of prenatal predictors on the slope from T1 to T2 were significant, showing that women with higher prenatal PSE

scores decreased more in depressive symptoms from T1 to T2, B = -.07, p < .001, and that women with fewer prenatal depressive symptoms increased more in PSE from T1 to T2, B = -.16, p = .003. Other cross effects were not significant, which indicated that both prenatal and postnatal predictors were not significantly related to change from T2 to T3 (.065 ≤ p ≤ .703; Table 2). In the multivariate response model of PSE with depression, all prenatal and postnatal effects on slope as reported in Table 2 together explained 14.3% of the variance, f^2 = .17.

PSE with state anxiety. The multivariate response model of PSE with state anxiety showed that prenatal stability effects on slope from T1 to T2 were significant, indicating that higher scores on, respectively, prenatal PSE or state anxiety were significantly related to less increase in PSE or more decrease in state anxiety from T1 to T2 (p < .001; Table 2). Stability effects from prenatal or postnatal predictors to slopes from T2 to T3 were not significant (.092 ≤ p ≤ .921; Table 2). The cross effects on slope showed that higher prenatal PSE scores predicted stronger decreases in state anxiety from T1 to T2, B = -.15, p < .001, and that lower prenatal state anxiety scores also predicted stronger increases in PSE from T1 to T2, B = -.07, p = .009. The cross effects from prenatal and postnatal predictors to change from T2 to T3 were not significant (.105 ≤ p ≤ .479; Table 2). The prenatal and postnatal effects on slope together explained 14.3% of the variance, f^2= .16.

PSE with trait anxiety. In the multivariate response model of PSE with trait anxiety, stability effects again showed that higher scores on prenatal PSE or trait anxiety were related to less increase in PSE or more decrease in trait anxiety from T1 to T2. The cross effects of prenatal PSE on change in trait anxiety, and of prenatal trait anxiety on change in PSE, from T1 to T2, were both significant as well, respectively B = -.12, p < .001, and B = -.15, p < .001. These results indicated that women with higher prenatal scores on PSE decreased more in trait anxiety in the transition to parenthood, and women with lower prenatal trait anxiety scores increased more in PSE. None of the prenatal predictors was significantly related to change from T2 to T3 (.061 ≤ p ≤ .757; Table 2). Cross effects of postnatal predictors on slope from T2 to T3 showed that higher postnatal PSE scores were associated with less increase in trait anxiety, B = -.11, p = .010, but not vice versa, B = -.07, p = .131. All prenatal and postnatal effects on slope together explained 12.2% of the variance, f^2= .14.

Table 2. *Model Summaries of Multivariate Response Models Including Prenatal and Postnatal Effects on Change in Parenting Self-Efficacy (PSE) and Mood Symptoms*

	Multivariate Response Model with PSE and Depressive Symptoms		Multivariate Response Model with PSE and State Anxiety Symptoms		Multivariate Response Model with PSE and Trait Anxiety Symptoms	
Predictor	*B*	95% CI	*B*	95% CI	*B*	95% CI
Prenatal effects on slope T1-T2						
PSE → slope PSE	-.43***	[-.48, -.39]	-.45***	[-.49, -.40]	-.47***	[-.52, -.41]
Mood → slope mood	-.47***	[-.53, -.40]	-.52***	[-.60, -.45]	-.35***	[-.42, -.29]
PSE → slope mood	-.08***	[-.10, -.05]	-.15***	[-.21, -.10]	-.12***	[-.16, -.08]
Mood → slope PSE	-.16**	[-.26, -.06]	-.07**	[-.13, -.01]	-.15***	[-.23, -.07]
Prenatal effects on slope T2-T3						
PSE → slope PSE	.19**	[.11, .30]	-.04	[-.09, .14]	-.01	[-.09, .07]
Mood → slope mood	.01	[-.10, .30]	.03	[-.08, .14]	.03	[-.08, .15]
PSE → slope mood	-.17	[-.19, .00]	.03	[-.05, .11]	.05	[-.01, .11]
Mood → slope PSE	.03	[-.10, .19]	-.04	[-.13, .03]	.06	[-.05, .16]
Postnatal effects on slope T2-T3						
PSE → slope PSE	-.35***	[-.51, -.23]	-.03	[-.33, .03]	-.02	[-.13, .08]
Mood → slope mood	-.09	[-.64, .04]	-.12	[-.24, -.00]	-.11	[-.24, .02]
PSE → slope mood	.28	[-.00, .29]	-.08	[-.17, .00]	-.11**	[-.19, -.01]
Mood → slope PSE	.04	[-.14, .15]	-.05	[-.12, .03]	-.07	[-.17, .01]

Note. T1 = 32 weeks of pregnancy; T2 = 3 months postpartum; T3 = 12 months postpartum; PSE = Parenting Self-efficacy; CI = Bootstrapped confidence interval. *B*'s were unstandardized estimates. All effects as reported in the table were controlled for effects of time, covariates, and prenatal and postnatal effects on mean level.
** $p < .01$. *** $p < .001$.

DISCUSSION

In this study, effects were found from prenatal mood symptoms to change in parenting self-efficacy from 32 weeks of pregnancy to 3 months postpartum, as well as vice versa. Based on the general increases found in parenting self-efficacy from pregnancy to 3 months postpartum, and decreases in depressive and anxiety symptoms, these findings showed that reduced prenatal mood problems (depression, state anxiety, or trait anxiety) link to increased parenting self-efficacy; also higher prenatal parenting self-efficacy links to decreased mood problems, indicative of a bidirectional association. Only one significant postnatal cross effect was found, which links higher postnatal parenting self-efficacy to less increase in trait anxiety symptoms from 3 to 12 months postpartum. The findings suggest that the prenatal effects were specifically important

for explaining either more negative or positive changes of mood and parenting self-efficacy in the transition to parenthood, with parenting self-efficacy not only being an outcome, but also a predictor for the course of mental health in first-time mothers.

The average increase in parenting self-efficacy and decreases in depressive and anxiety symptoms in the transition to parenthood are consistent with findings from several previous studies (Evans et al., 2001; Heron et al., 2004; Porter & Hsu, 2003; Verhage et al., 2013; Zayas et al., 2005). Similar to this study, the one study of parenting self-efficacy across the first year postpartum also revealed an increase in parenting self-efficacy (Elek, Hudson, & Bouffard, 2003). The increase in parenting self-efficacy might result from success experiences, mutual modeling by both parents, encouragement by others, and positive feelings associated with being a parent (Bandura, 1977; Porter & Hsu, 2003). From pregnancy to 3 months postpartum, the steepest increase in parenting self-efficacy occurred, which may relate to the parenting skills and routines that new parents acquire in the first months after their infant's birth. In addition, some initial parenting difficulties may eventually be overcome, which could strengthen parents' feelings of efficacy even more (Bandura, 1977).

The repeated success experiences parents have with their infant may also negate pre-existing worries and negative thoughts about parenting that may exist during pregnancy, explaining the decreases in mood symptoms found in the transition to parenthood (Porter & Hsu, 2003). In addition, it has been suggested in several studies that the postpartum drop in mood symptoms could be explained by a decrease in fears specific to (the end of) pregnancy, such as anxiety about labor or health of the fetus (Heron et al., 2004; Ross et al., 2003). However, because the first postpartum assessment of the current study was at 3 months, it is unknown whether the uplifting effects of parenthood start immediately after birth (Goodman, 2004; Moss, Skouteris, Wertheim, Paxton, & Milgrom, 2009; Porter & Hsu, 2003). Porter and Hsu (2003), for example, speculated that the increase they found in parenting self-efficacy from 1 to 3 months postpartum could be related to the decrease they found in mothers' perceptions of their infant's temperamental negativity over that same period. The period between 1 and 3 months postpartum may therefore partly account for women's growth in parenting self-efficacy from pregnancy to 3 months postpartum, given that infants' decreased negativity after the crying peak around 6 weeks and increased social cues and smiles may convince parents about their ability to successfully react to their infant's signals (Porter & Hsu, 2003).

A note should also be added with respect to the finding that depressive symptoms decreased from pregnancy to 1 year postpartum. In our study, these decreases were driven by the somatic depressive symptoms women experienced in pregnancy and

the early postpartum period. Although women may still feel burdened by somatic complaints, several depressive somatic symptoms may also be complaints specific to pregnancy or the early postpartum period (i.e., to changes in sleeping pattern or appetite), which is the reason that some researchers have called for a higher BDI cut-off value around pregnancy in screening for depression (Holcomb et al., 1996).

As expected, our findings were indicative of a reciprocal process between parenting self-efficacy and mood symptoms in the transition to parenthood. In all multivariate response models, overlapping confidence intervals indicated that there were no significant differences in strength of prediction from prenatal parenting self-efficacy to change in mood symptoms or from prenatal mood symptoms to change in parenting self-efficacy from pregnancy to 3 months postpartum. The bidirectional associations found in this study are inconsistent with some previous studies in which no significant correlations between prenatal depressive symptoms and postnatal parenting self-efficacy were found (Cutrona & Troutman, 1986; Haslam et al., 2006; Leerkes & Burney, 2007). Possibly our results can be explained by the large sample size which allowed a wider range of depressive symptoms and stronger statistical power to detect associations. Previous studies that revealed a negative relation between parenting self-efficacy and depressive symptoms in the postpartum period did not disentangle the direction of effects with respect to change trajectories (Cutrona & Troutman, 1986; Gross, Conrad, Fogg, & Wothke, 1994; Haslam et al., 2006; Weaver et al., 2008). The current study adds to existing studies that it is important to consider both directions of effects between mood problems and parenting self-efficacy in the context of changes in the transition to parenthood, as is concordant with Bandura's work on self-efficacy (1989, 1997).

This study highlights that, besides depressive symptoms, anxiety symptoms are associated with parenting self-efficacy in the transition to parenthood, which is consistent with other studies reporting this link (Barnett et al., 1991; Porter & Hsu, 2003). Although Alloy and colleagues (1990) distinguished depression from anxiety by focusing on certain versus uncertain negative outcome expectancies, respectively, Bandura (1997) argued that whereas people with depression generally perceive themselves as being inefficacious in realizing important goals, feelings of low control over negative outcomes are central to anxiety. In the transition to parenthood, women may experience feelings of uncertainty to control and manage prospective parenting tasks, which could explain why, besides cognitions related to depression, cognitions related to anxiety may play an important role in predicting parenting self-efficacy during this time period as well. However, given the comorbidity between anxiety and depression

future research is needed to examine the unique and shared association of depressive and anxiety symptoms with parenting self-efficacy in the transition to parenthood.

Bidirectional effects were found between mood symptoms and parenting self-efficacy in the transition to parenthood, whereas only one significant postpartum cross effect was found between parenting self-efficacy and trait anxiety. Although on average women increased in trait anxiety from 3 to 12 months postpartum, women with higher postpartum parenting self-efficacy reported less increased trait anxiety. Infants' increasing autonomous behaviors (e.g., crawling, sitting, standing) may lead to increased proneness to anxiety and apprehension, but less so for mothers who experience confidence in themselves with respect to comforting and supporting their child. Postpartum parenting self-efficacy was not associated with trajectories of postpartum state anxiety. Another explanation for the mean postpartum increases in trait anxiety may be found in personality research, which suggests that transitional phases may be turning points in people's lives and exacerbate individual differences and enhance continuity in personality (Caspi & Moffitt, 1993; Caspi & Roberts, 2001). Although a large group of women may report decreased anxiety from pregnancy to the postpartum, and a stable low course thereafter, a smaller subgroup might have a stable high (or even increasing) pattern of anxiety from pregnancy to 1 year postpartum (Don, Chong, Biehle, Gordon, & Mickelson, 2014). The high postpartum trait anxiety scores of this subgroup may influence mean trajectories in the postpartum period when the other group has a stable, low pattern of trait anxiety. In contrast to prenatal parenting self-efficacy, only postpartum parenting self-efficacy was found to predict less increase in trait anxiety postpartum. As Bandura (1977) argued, mastery experiences are most influential in raising one's self-efficacy. Instead of expected competence, proven competence in parenting may specifically relate to higher parenting self-efficacy and to fewer feelings of uncontrollability over parenting challenges.

A possible explanation for the few postpartum cross effects could be that, instead of mood symptoms, other sources of self-efficacy become important, such as success or mastery experiences, modeling, and encouragement by others. Although the negative correlations between parenting self-efficacy and mood symptoms at 3 and 12 months postpartum may suggest otherwise, these concurrent correlations could be more easily explained by reporter bias or current mood compared to the non-significant longitudinal associations. The current findings therefore imply that changes in parenting self-efficacy and mood symptoms should (also) be predicted by factors that were not measured in the current study. For example, Leerkes and Burney (2007) found that, besides prenatal factors, aspects of the parenting context should be considered as well in the prediction of mothers' postpartum parenting self-efficacy. Perceptions and expe-

riences with respect to parenting (such as infant temperament) may play an important role in explaining changes in both parenting self-efficacy and mood problems during the postpartum period and should therefore be added to the prediction of postpartum changes in future studies.

Strengths and Limitations

One limitation involves the fact that the sample from the current study is not entirely representative of the Dutch population. More participating women than on average were born in The Netherlands, had higher educational degrees, and were married or living together with a partner. Second, by using maternal reports to measure both parenting self-efficacy and mood symptoms, associations between variables may have been inflated. However, common method variance might be less a problem in the current study because of its focus on explaining changes over time rather than mean level differences. In addition, our interest was in women's own expectations and feelings with regard to parenting, which could not have been reported by someone other than the mothers themselves. Third, several other factors that were found to relate to mood symptoms and parenting self-efficacy in earlier studies were not included in the current study, such as infant birth outcomes and health, pre-existing psychiatric disorders, addiction, social support, (changes in the) quality of the partner relationship, infant temperament, parenting behaviors, conditions of economic hardship, and negative life events, such as divorce or separation (e.g., Cutrona & Troutman, 1986; Lancaster et al., 2010; Leerkes & Burney, 2007; Raver & Leadbeater, 1999; Schetter & Tanner, 2012). Fourth, we did not examine the unique and shared association of depression and anxiety with parenting self-efficacy, because of the large number of parameters that would be involved in a multivariate response model with three outcome variables.

Despite these limitations, the longitudinal follow-up of participants over three assessments made it possible to examine the direction of effects between mood symptoms and parenting self-efficacy and compare changes taking place during the transition to parenthood to changes later during the first year of parenthood. In addition, the design and statistical method made it feasible to correct for stability pathways (e.g., from prenatal parenting self-efficacy to change in parenting self-efficacy over time) in the prediction of cross effects from parenting self-efficacy to mood symptoms and vice versa, yielding a more realistic assessment of the size of effects than in follow-up studies in which both constructs are only measured once.

Conclusions

The current study highlights that for most women the mutually reinforcing effects of parenting self-efficacy and mood symptoms lead to positive trajectories in the transition to parenthood (i.e., increases in parenting self-efficacy, decreases in mood symptoms). However, women with a lower parenting self-efficacy or heightened mood problems during pregnancy did not experience such positive changes during the transition to parenthood. It could be that parenting self-efficacy may not be the "final common pathway" (Teti, Oconnell, & Reiner, 1996) of risk factors for maladaptive or insensitive parenting, but part of a reciprocal set of detrimental or promoting effects that determine the outcome of the transition to parenthood. Future studies might focus on risk or protective factors (such as adverse childhood experiences or social support) which may predict whether the reciprocity between mood symptoms and parenting self-efficacy will turn in a negative or positive direction.

Implications for Practice, Application, and Policy

In the transition to parenthood, for new parents with low parenting self-efficacy as well as parents with heightened mood symptoms, it would be useful to aim interventions on success experiences in parenting to alleviate feelings of incompetence, depression, uncontrollability and uncertainty. A possible avenue is by using the principle of mastery experiences from Bandura's self-efficacy theory (1977) in preventive interventions focusing on parenting skills. Interventions combining elements of self-efficacy theory to improve parenting, such as modeling caregiving tasks and providing positive feedback, have led to increases in parenting self-efficacy and decreases in parenting stress (Gross, Fogg, & Tucker, 1995; Kohlhoff & Barnett, 2013). Besides a focus on improving parenting skills, success experiences in parenting might also be raised by helping parents to form realistic expectations and goals about their child's development and teaching parents problem solving techniques to handle difficult caregiving situations. These are elements also used in the Triple P – Positive Parenting Program (Sanders, Markie-Dadds, & Turner, 2003), for which positive effects on parenting self-efficacy have been reported (De Graaf, Speetjens, Smit, De Wolff, & Tavecchio, 2008). These findings therefore support a possible integration of intervention programs for future parents with low parenting self-efficacy or heightened mood symptoms.

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APPENDIX 1

Associations between Demographic Covariates and Changes in PSE and Mood Symptoms

The associations between the demographic variables (age, level of education, and ethnic background) and changes in PSE and mood symptoms are reported here. In this study, two of the demographic variables were treated as categorical: Level of education (1 = *finished primary education or secondary preparatory applied education*, 2 = *finished secondary education preparing for higher education or tertiary applied education*, 3 = *finished bachelor degree*, 4 = *finished master degree*) and ethnic background (1 = *non-Dutch Western background* (i.e. one or both parents born in a Western country), 2 = *Dutch background* (i.e., both parents born in The Netherlands), 3 = *non-Western background* (i.e., one or both parents born in a non-Western country). In the multilevel approach in SPSS, categorical variables are dummy coded and the last code is taken as a comparison category. To compare all the groups included in the categorical demographic variables, the comparison categories were changed by recoding the variables (two times for level of education).

Covariates Associated With Changes in PSE

With respect to the increase in PSE from T1 to T2, women who had a bachelor degree increased less in PSE than women with any other level of education (B = -1.56, p = .034 compared to women in category 4, B = -3.06, p = .032 compared to women in category 1, and B = -2.12, p = .008 compared to women in category 2). With respect to increase in PSE from T2 to T3, women with a Dutch-background increased more in PSE than women with a non-Western background (B = 4.03, p = .007). In addition, women who finished secondary education preparing for higher education or tertiary applied education increased less in PSE from T2 to T3 than women with a bachelor degree (B = -1.53, p = .007), but this specific covariate was only significant for the multivariate model of PSE with depressive symptoms.

Covariates Associated With Changes in Depressive Symptoms

With respect to the decline in depressive symptoms from T1 to T2, women who were older decreased less in depressive symptoms (B = 0.13, p = .015) compared to women who were younger. Women who were older also decreased less in depressive symptoms from T2 to T3 (B = 0.14, p = .008).

Covariates Associated With Changes in State Anxiety Symptoms

With respect to the decrease in state anxiety symptoms from T1 to T2, older women decreased less in state anxiety symptoms than younger women ($B = 0.21$, $p = .007$).

Covariates Associated With Changes in Trait Anxiety Symptoms

With respect to the increase in trait anxiety symptoms from T2 to T3, older women increased more in trait anxiety symptoms compared to women who were younger ($B = 0.16$, $p = .033$).