Posttraumatic stress following pregnancy and childbirth
Stramrood, Claire Annetje Ivana

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POSTTRAUMATIC STRESS FOLLOWING PREGNANCY AND CHILDBIRTH

Claire A.I. Stramrood
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Posttraumatic stress following pregnancy and childbirth

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SCOPE OF THE THESIS
SCOPE OF THE THESIS

Psychological problems in women during pregnancy and after childbirth are common. Approximately 10% of women experience a major depressive episode during pregnancy or postpartum\textsuperscript{1,2}, 12% meet the diagnostic criteria for an anxiety disorder\textsuperscript{3}, 7.5% have severe fear of childbirth\textsuperscript{4,5}, and 1-2% develop a posttraumatic stress disorder (PTSD) following childbirth\textsuperscript{6}. These conditions affect not only the women involved but may also impair secure attachment of the infant and affect the partner relationship.\textsuperscript{7}

PTSD is an anxiety disorder that can develop following confrontation with a traumatic stressor. Its most characteristic symptoms are re-experiencing the event, avoidance of stimuli associated with the event, emotional numbing and hyperarousal\textsuperscript{8}. PTSD commonly co-occurs with major depressive disorder\textsuperscript{9,10}, and is often seen in conjunction with postpartum depression (PPD) in the population of puerperal women.\textsuperscript{11,12} Over the past decade-and-a-half, increasing attention has been devoted to childbirth as a possible traumatic event.\textsuperscript{13,14}

This thesis contains the results of 2 large studies on PTSD following childbirth carried out in the Netherlands, and a pilot-study on a possible treatment for the condition.

The study “Hoe bevalt het”, was conducted at 2 general hospitals (Gelre Teaching Hospital Apeldoorn, Amphia Hospital Breda), the University Medical Center Groningen and 4 local midwifery practices. Aims of the study were to evaluate the prevalence of and risk factors for posttraumatic stress following childbirth in The Netherlands, and to compare instruments used to measure PTSD following childbirth.

The study “Hypertension as Predictor for PTSD” (HAPP) was conducted at the University Medical Center Groningen in collaboration with a local midwifery practice, and evaluated the prevalence of and risk factors for PTSD and depression following pregnancies complicated by preeclampsia (PE) or preterm premature rupture of membranes (PPROM), as compared to uneventful pregnancies.

A pilot study regarding the effects of eye-movement desensitization and reprocessing (EMDR) for the treatment of posttraumatic stress following childbirth was conducted, involving 3 women with a traumatic childbirth experience who were in their second pregnancy at the time of treatment.
Aims

- To evaluate instruments used to assess posttraumatic stress disorder (PTSD) following childbirth with both quantitative (reliability analysis and factor analysis) and qualitative (comparison of operationalization) techniques.
- To determine the prevalence of and to identify risk factors for posttraumatic stress (disorder) following childbirth
  - in home and hospital settings in The Netherlands
  - in women who conceived after fertility treatment
  - in women whose pregnancy was complicated by preeclampsia (PE) or preterm premature rupture of membranes (PPROM)
  - in partners of women with PE and PPROM
- To establish whether eye-movement desensitization and reprocessing (EMDR) could be an effective treatment for posttraumatic stress following childbirth

Chapter 2 provides an overview of psychiatric disorders with characteristics specific to the peripartum period, in order to place the topic of this thesis, PTSD following childbirth, in a context with other psychiatric disorders. A comprehensive overview of the main characteristics of major depressive disorder, bipolar disorder, puerperal psychosis, obsessive-compulsive disorder, fear of childbirth, PTSD will be provided, including diagnostic tools, prevalence, risk factors, possible consequences, treatment options and prevention strategies.

Chapter 3 critically evaluates two instruments used for measuring posttraumatic stress disorder (PTSD) following childbirth: the Traumatic Event Scale-B (TES-B) and the PTSD Symptom Scale-Self Report (PSS-SR). The two instruments were compared with both quantitative (reliability analysis and factor analysis) and qualitative (comparison of operationalization) techniques.

Chapter 4 presents the results of a study on the prevalence of and risk factors for posttraumatic stress following childbirth in the population of childbearing women in The Netherlands, with an emphasis on potential differences in obstetric complication and intervention rates between the homelike and hospital settings.

Chapter 5 compares the postpartum prevalence of PTSD, anxiety and depression in 32 women who conceived through medically assisted conception and 396 women who conceived naturally.

Chapter 6 presents the results of a prospective longitudinal study on the prevalence of and risk factors for PTSD and depression in women with preeclampsia (PE) and preterm premature rupture of membranes (PPROM), as compared to women with uneventful pregnancies.
Chapter 7 describes the prevalence and risk factors for PTSD and depression in the partners of women with PE, PPROM and uncomplicated pregnancies, with an emphasis on the relationship between symptoms in men and women.

Chapter 8 evaluates eye-movement desensitization and reprocessing (EMDR) treatment for women with PTSD symptoms following childbirth. Three women suffering from PTSD symptoms following the birth of their first child were treated with EMDR during their next pregnancy.

Chapter 9 provides recommendations and suggestions for clinical practice and future research on posttraumatic stress following childbirth related to the conclusions of this thesis.

Chapter 10 and 11 summarize the findings of this thesis in English and Dutch, respectively.
REFERENCES


GENERAL INTRODUCTION

PSYCHIATRIC DISORDERS DURING PREGNANCY AND POSTPARTUM

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Submitted for publication
GENERAL INTRODUCTION:

PSYCHIATRIC DISORDERS DURING PREGNANCY AND POSTPARTUM

Pregnancy, childbirth and the postpartum period are supposed to be joyful times. However, they are also major life events that require many adjustments due to the new role of being a mother, which is accompanied by many physiological and hormonal changes. The transition to parenthood after having given birth is challenging for both women and men as a result of sleep deprivation, adjustments in conjugal relationships, new or increased parental responsibilities, potential physical trauma and traumatic experiences, and possible problems with (breast-)feeding or other child-related worries. While most adjustment issues are transient and within the normal range of difficulties, the development of psychiatric symptoms in women during pregnancy and after childbirth is not uncommon. Approximately 10% of women experience a major depressive episode during pregnancy or postpartum\textsuperscript{1,2}, 12% meet the diagnostic criteria for an anxiety disorder\textsuperscript{3}, 7.5% have severe fear of childbirth\textsuperscript{4,5}, and 1-2% develop a posttraumatic stress disorder (PTSD) following childbirth.\textsuperscript{6} Sometimes these conditions are specifically linked to pregnancy and childbirth, and in other cases they are unrelated to pregnancy, and simply reflect the occurrence of mental disorders among women in their reproductive ages. Nonetheless, these conditions not only affect the women involved, they may also prevent secure attachment of the infant and affect the relationship with the partner.\textsuperscript{7,8} Depending on the definition used and causality assumed, suicide and psychiatric disorders may be considered one of the leading causes of (late) maternal mortality in developed countries.\textsuperscript{9,11}

The focus of this thesis is ‘PTSD following childbirth’. In order to place this topic in a context with other psychiatric disorders, to understand the similarities and differences in underlying mechanisms, and to consider the effects of possible co-morbidities, this chapter provides a comprehensive overview of psychiatric disorders with characteristics specific to the peripartum period. Traditionally, literature distinguishes three postpartum psychiatric conditions: the ‘maternity blues’, postpartum depression (often incorrectly referred to as postnatal depression), and puerperal psychosis. This, however, is an oversimplification of reality\textsuperscript{12}. This chapter reviews a number of psychiatric disorders that frequently have their onset or an increased prevalence during pregnancy or postpartum, or often intensify during the peripartum period, and/or have characteristics and symptoms that are specific to pregnancy and puerperium. These include two categories of disorders and symptoms:

1. **Mood disorders**, including major depressive disorder (MDD), bipolar disorder, puerperal psychosis, and ‘maternity blues’;

2. **Anxiety disorders**, including obsessive-compulsive disorder (OCD), fear of childbirth (FoC), and PTSD.
Each section will review the main characteristics and symptoms of the condition, diagnostic tools, prevalence in the general population as well as during pregnancy/postpartum, risk factors, possible consequences, treatment options and prevention strategies. The most important facts are summarized in table 1.

Two fields of study fall beyond the scope of this chapter: stress during pregnancy, and psychopathology without distinct features during the peripartum period. Firstly, much is known regarding the biological and psychological pathways by which ‘stress’ and psychosocial problems (relationships, finances, work), not related to a psychiatric disorder, may affect pregnancy and delivery outcomes. Although the impact of these should not be underestimated, this chapter solely focuses on psychiatric conditions. Secondly, the characteristics of some psychiatric disorders are not distinctly different during pregnancy and the postpartum period than before pregnancy. Although women previously diagnosed with eating disorders, substance abuse disorders, attention deficit hyperactivity disorder (ADHD), personality disorders etc. may experience pregnancy, childbirth and puerperium as stressful periods, their conditions do not necessarily intensify or give rise to problems different from women without previously diagnosed mental disorders. Moreover, research into the manifestation of these conditions in the peripartum period is limited. Nonetheless, preconceptional counseling, vigilance with respect to potential derailment, and interventions to prevent exacerbations in the peripartum period should be included in the antepartum care these women receive. A recent Dutch study found that gynecologists’ detection rate of women ‘at risk’ based on psychiatric history, current depressive symptoms, use of psychotropic medication, psychosocial stressors and substance abuse is about 1 in 5. An initiative worth mentioning in this context are the Psychiatric-Obstetric-Pediatric (POP)-outpatient clinics that many hospitals in The Netherlands have established for women with pre-existing (as well as new) mental health conditions. In addition to gynecologists, psychiatrists and pediatricians, other relevant health care providers, such as social workers, psychiatric nurses and infant mental health specialists are involved in order to organize and coordinate care for expecting mothers and newborns.

**MOOD DISORDERS**

Whereas postpartum depression has, in part due to media attention, gained significant attention over the past years, a strong association has been reported between the occurrence of depression before and during pregnancy and depression during the postpartum period. In a considerable number of cases, women already suffer from depression during pregnancy, or even before conception. Puerperal psychosis may be defined as a ‘brief psychotic disorder with postpartum onset’ according to the diagnostic and statistical manual of mental disorders, 4th edition (DSM-IV), but will be discussed in this section on mood disorders given its strong association with bipolar disorder. Finally, maternity blues comprises a set of symptoms frequently experienced by women during the first two weeks postpartum. It is not a psychiatric disorder, but a self-limiting condition that usually does not require treatment.
Table 1. Psychiatric disorders and symptoms specific to the peripartum period

<table>
<thead>
<tr>
<th></th>
<th>typical manifestation</th>
<th>prevalence (%)</th>
<th>symptoms</th>
<th>self-report measures</th>
<th>treatment</th>
<th>note</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mood related</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major Depressive Disorder (MDD)</td>
<td>yes</td>
<td>yes</td>
<td>7-13 (^{L,2}) Depressed mood, loss of interest and pleasure in activities previously enjoyed. Altered sleep pattern, concentration, appetite, and feelings of guilt(^{15})</td>
<td>EPDS (29)</td>
<td>Pharmacotherapy (SSRI)(^{123}) CBT/ Psychotherapy(^{123,219})</td>
<td>Frequent overlap with (physiological) somatic pregnancy complaints</td>
</tr>
<tr>
<td>Bipolar disorder (BD)</td>
<td>yes</td>
<td>yes</td>
<td>1-2 (^{125,126}) Depressive episodes (see MDD) in conjunction with manic episodes: inflated self-esteem/grandiosity, little sleep, keeps talking, racing thoughts, distractibility, increase in goal-directed activity/ psychomotor agitation, excessive involvement in pleasurable activities that have a high potential for painful consequences(^{15})</td>
<td>-</td>
<td>Pharmacotherapy (mood stabilizers (lithium), antipsychotics, antidepressants, anticonvulsants)(^{132}) CBT, IPT, FFT(^{149})</td>
<td>High risk (40%) of puerperal psychosis(^{17,123,129})</td>
</tr>
<tr>
<td>Puerperal psychosis (PP)</td>
<td>no</td>
<td>&lt; 2 weeks</td>
<td>0.1-0.2 (^{153,154}) Confusion, depersonalization, misrecognitions, loss of connection to reality, delusions, hallucinations, sleep deprivation, agitation, disorganized behavior, suspiciousness, thoughts or actions to harm oneself or the baby(^{128,150})</td>
<td>-</td>
<td>Pharmacotherapy (antipsychotics, mood stabilizers (lithium), anxiolytics (benzodiazepines))(^{157,159}) Electroconvulsive treatment(^{157,158})</td>
<td>Related to bipolar disorder(^{17,128}) Recurrence rate without medication 40-60%(^{17,160}).</td>
</tr>
<tr>
<td>Maternity blues</td>
<td>no</td>
<td>&lt; 2 weeks</td>
<td>15-85 (^{36,2}) Incontrollable tearfulness, mild depressive symptoms, anxiety, unstable moods, sorrow/weeping, and confusion(^{38,164})</td>
<td>-</td>
<td>Not necessary (self-limiting)</td>
<td>3-fold increased risk PPD or anxiety disorder(^{36})</td>
</tr>
<tr>
<td>Anxiety related</td>
<td>yes</td>
<td>&lt; 4 weeks</td>
<td>4(^{172})</td>
<td>Obsessions (contamination, harming the infant) and compulsions (washing/cleaning, checking, avoidance)(^{175})</td>
<td>SSRI(^{194})</td>
<td>Peripartum period marks onset of disorder in 24-29% of women with OCD(^{178,179})</td>
</tr>
<tr>
<td>-----------------</td>
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</tr>
<tr>
<td>Fear of childbirth (FoC)</td>
<td>yes</td>
<td>yes (^{*})</td>
<td>7.5 (^{4, 5, 187})</td>
<td>Continuously dreading upcoming labor and delivery, anticipation of the delivery provokes an anxiety response (such as a panic attack), attempts to avoid childbirth (request for elective cesarean, pregnancy termination)(^ {15})</td>
<td>WDEQ(^{180})</td>
<td>Psychotherapy(^{194, 195})</td>
</tr>
<tr>
<td>Posttraumatic stress disorder (PTSD)</td>
<td>yes (^{*})</td>
<td>yes</td>
<td>1-2 (^{6})</td>
<td>Delivery (subjectively) experienced as traumatic; re-experiencing/intrusions, avoidance, numbing of affective responses, hyperarousal(^ {15})</td>
<td>TES-B(^ {200})</td>
<td>Co-morbidity with PPD 50%(^ {193})</td>
</tr>
<tr>
<td>Posttraumatic stress disorder (PTSD)</td>
<td>yes (^{*})</td>
<td>yes</td>
<td>1-2 (^{6})</td>
<td>Delivery (subjectively) experienced as traumatic; re-experiencing/intrusions, avoidance, numbing of affective responses, hyperarousal(^ {15})</td>
<td>PSS-SR(^ {198})</td>
<td>More common in women with depression and fear of childbirth(^ {191}) and after preterm delivery, emergency CS(^ {20})</td>
</tr>
</tbody>
</table>

Abbreviations:
CBT, cognitive behavioral therapy; CS, cesarean section; EMDR, eye-movement desensitization and reprocessing; FFT, family focused therapy; FoC, fear of childbirth; MDD, major depressive disorder; OCD, obsessive compulsive disorder; PPD, postpartum depression; PTSD, posttraumatic stress disorder; SSRI, selective serotonin reuptake inhibitor (category of anti-depressants)
* secondary to a prior traumatic delivery experience
Depression

Characteristics and Diagnosis

Major depressive disorder (MDD) is characterized by depressed mood and diminished interest or pleasure in activities that were previously enjoyed (anhedonia). Additional symptoms may include (a) insomnia/hypersomnia; (b) weight or appetite loss/gain; (c) psychomotor agitation/retardation; (d) fatigue or loss of energy; (e) feelings of worthlessness or inappropriate guilt; (f) diminished concentration or indecisiveness; (g) recurrent thoughts of death or suicide. At least five of these symptoms should be present simultaneously for two weeks or more, and they must include depressed mood or anhedonia. Minor depressive disorder is a mood disorder in which at least two depressive symptoms are present for two weeks, but in which the full criteria for MDD have not been met. Mood and cognitive symptoms (sadness, loss of pleasure/enjoyment, irritable or anxious mood, pessimism, difficulty concentrating, lack of involvement, and fatigue) appear to be more common in minor depressive disorder than neurovegetative symptoms (changes in sleep/weight/appetite, psychomotor agitation/retardation and suicidal thoughts).

While the criteria for depression during or outside the peripartum period do not differ, the DSM-IV does contain a specific category (code) for mood disorders “with postpartum onset”, implicating that symptoms should commence within the first four weeks following childbirth. It is often argued to extend this period to three, six or twelve months after delivery, since elevated relative risks for first-time psychiatric hospital admission or outpatient contact have been found up to five months following childbirth compared to non-puerperal females in the same age group. Although a vast body of literature is available on postpartum depression, researchers still do not agree whether depression during the peripartum period should be considered a distinct disorder or as an episode of ‘regular’ major depressive disorder that happens to have its onset during the peripartum period.

Assessment of depressive symptoms can be performed by psychologists or psychiatrists by means of a clinical interview such as the Structured Clinical Interview for DSM-IV Disorders (SCID) or Mini International Neuropsychiatric Interview (MINI). Trained non-professionals may use the World Health Organization’s Composite International Diagnostic Interview (CIDI). In outpatient settings, one often chooses to use self-report measures due to their availability and ease in use. These intend to screen for, rather than diagnose, depression. Frequently used instruments include the Edinburgh (Postnatal) Depression Scale (E(P)DS), Beck Depression Inventory second edition (BDI-II), and Hospital Anxiety and Depression Scale (HADS). The E(P)DS is the most widely used screening tool in the peripartum period, which has been internationally validated for use during pregnancy and postpartum in both women and men. It assesses depressive symptoms during the previous week by means of 10 questions with 4 answer categories (scores 0-3). A cut-off value (sum-score) of 12-13 during the postpartum period indicates ‘probable’ clinical depression. For screening during pregnancy, cut-off values ranging from 11 to 14-15 have been suggested in order to obtain an optimal balance between sensitivity and specificity. The BDI-II assesses depressive symptoms
during the preceding two weeks, includes all DSM-IV symptom criteria and allows for differentiation between somatic and non-somatic symptoms. It consists of 21 items containing four statements that reflect increasing symptom severity. A cut-off score of 20 (range 0-63) or more corresponds with moderate depression.\textsuperscript{30} The HADS is a screening instrument for depression and anxiety. It has been designed particularly for the general hospital (somatic patient) setting, disregarding all possible somatic components of depression and anxiety in order to avoid confounding with symptoms of somatic conditions. It contains 7 items for depression and seven for anxiety, which are each rated on a 4 point scale (0-3). A cut-off value of 8 or more on each scale represents clinically relevant depression or anxiety.\textsuperscript{36}

Mistaking genuine depressive symptoms in the peripartum period for typical somatic discomfort is a common error, and therefore requires diagnostic experience with this patient group. Alternatively, components of physiological pregnancy and postpartum period (changes in sleep pattern and appetite, difficulties concentrating, diminished energy levels) may erroneously be interpreted as somatic symptoms of depression.\textsuperscript{21} As a consequence, physicians’ rate of recognition of depression during the obstetric period is low.\textsuperscript{13,37} The unfamiliarity with standardized screening instruments may play an additional role in the infrequent detection of depression by obstetric care professionals.\textsuperscript{38} What may further complicate an adequate diagnosis is that, even when asked, women themselves may be reluctant to admit that they are not excited about their pregnancy or newborn.

\textit{Prevalence}

Mood disorders are more prevalent in women than in men, irrespective of pregnancy, fertility status or age. Results of the World Mental Health survey\textsuperscript{39}, for which 72,933 individuals in 10 developed and 5 developing countries were interviewed, revealed that women are 1.8 times more likely to develop MDD at some point in their lives than men. Pregnancy is a time of increased vulnerability for a major depressive episode in women with a history of depression.\textsuperscript{40-42} It remains a topic of vigorous debate whether or not women are more likely to develop a major depressive episode during the peripartum period, and whether pregnancy/childbirth is the cause of depression. Two large systematic reviews have critically discussed the prevalence of MDD during pregnancy and the postpartum period. Bennett \textit{et al.} (2004)\textsuperscript{7} reviewed 21 studies that used clinical interviews or self-report measures, and calculated 3-month prevalence rates for MDD (including 95%CI) of 7.4% (2.2-12.6), 12.8% (10.7-14.8) and 12.0% (7.4-16.7) for the first, second and third trimesters, respectively. Gavin \textit{et al.}(2005)\textsuperscript{1} summarized 28 prospective studies that used clinical interviews or clinical assessment (i.e. excluding self-report questionnaires). At some point during their pregnancy (i.e., 9-month prevalence), 12.7% of women were found to have an episode of MDD, with 7.5% of women reporting the onset of the episode during pregnancy. During the first three months postpartum, the prevalence of MDD was 7.1% and most of these episodes had their onset following delivery.\textsuperscript{1}

Large population studies that made use of clinical interviews have provided estimates of the 1-year prevalence of MDD in women. Researchers in six European countries and the USA found 1-year
prevalence rates for MDD of 5.3 (n=2142544), 6.9 (n=4309344) and 7.7% (n=555446), respectively. The combined findings of these population studies and the abovementioned systematic reviews with 3-month1 and 9-month1 prevalence rates of 13% during pregnancy and 7% postpartum, suggest that MDD is (a) more common during pregnancy than postpartum, and (b) more common in pregnant than in non-pregnant women. However, a large US study5 compared the prevalence of psychiatric disorders in a sample of pregnant (n=453) and postpartum (n=994) women to women who had not been pregnant (n=13025) in the year prior to data collection. Lower rates of mood disorders were found among pregnant women than among non-pregnant women, but higher rates of MDD in postpartum women than in non-pregnant women (9.3% vs. 8.1%, adjusted OR 1.52, 95%CI 1.05-2.15). Combining the data does not allow for a decisive conclusion on whether or not the prevalence of MDD is increased during pregnancy and postpartum.

Risk factors and consequences
As is the case with most psychiatric disorders, risk factors for depression in pregnant and postpartum women seem to be similar to the risk factors for depression in non-pregnant women. Somatic causes for depressed mood should always be evaluated in women presenting with postpartum depression. Several studies have demonstrated associations between clinical and subclinical thyroid dysfunction and depression during pregnancy or the postpartum period.56-52 Furthermore, observational and experimental data suggest that reproductive hormonal changes during parturition and the postpartum period (notably estradiol and progesterone) may trigger depression in a subgroup of women sensitive to the mood destabilizing effects of gonadal hormones.53,54 A recent US study found that vitamin D deficiency was associated with clinically significant symptoms of depression in pregnant African American women (OR 0.54, 95%CI 0.29-0.99).55 With respect to psychological factors, literature has previously described that women with a history of depression are at an increased risk of relapse during pregnancy.56 Risk factors for postpartum depression further include previous (postpartum) depression, depression during pregnancy, prepartum distress, social isolation and disturbed relationships.57

The association between MDD during the peripartum period and poor outcomes, which may affect both mother and child, warrant vigilance and screening of women for (increased risks of developing) depression. Depression during pregnancy is associated with unhealthy parental behaviors58, preeclampsia59 and higher rates of postpartum depression.60-62 Whether or not depression may cause preterm birth is controversial. A meta-analysis63 summarized the findings of 20 studies to a relative risk of 1.13 (95%CI 1.06-1.21), but noted that effect sizes in studies using dichotomous measures of depression were larger than in studies with continuous measures. Other studies compared depressed women, women using selective serotonin reuptake inhibitors (SSRIs), and healthy pregnant controls, and found no increased risk of preterm birth (OR 1.2, 95%CI 0.68-2.1064; OR 1.1, 95%CI 0.77-1.59.65 Recent findings (Quispel, submitted) suggest that both depression and preterm birth may have similar predictive factors (among which low education level) that give
an increased likelihood for preterm birth, rather than depression being the cause of an increased incidence of preterm delivery.

Postpartum depression has been associated with serious disturbances in mother-child interaction, i.e. less sensitivity and engagement of the mothers and less responsiveness to the infants\textsuperscript{66,67}, thoughts of harming the child and the use of harsher punishments\textsuperscript{66,67}, compromised care giving activities, e.g. cessation of breastfeeding, feeding difficulties, unhealthy sleep routines and fewer vaccinations.\textsuperscript{68-72} Furthermore, children of depressed mothers more often show poor cognitive functioning, behavioral inhibition, lower social competence, lower school adjustment and emotional maladjustment, as compared to children of healthy mothers.\textsuperscript{73-77}

Treatment and prevention

Treatment of depression during pregnancy and postpartum is justified, since a state of clinical depression may negatively affect fetal and infant development.\textsuperscript{78} Most applied treatments include pharmacological and non-pharmacological interventions, in addition to psycho-education aimed at promoting a healthy lifestyle. Often, women as well as physicians hesitate to start or continue the use of antidepressant medication during pregnancy, since data on long term effects of antidepressants on the fetal development are not unanimous.\textsuperscript{79} It is therefore necessary to consider the effects of treatments that are potentially harmful for the newborn, against prolonging the state of being mentally unhealthy with possible adverse effects on the fetal and infant development as well. Additionally, in women with a history of depression, the risk of relapse with and without medication should be evaluated in making a decision whether or not to commence or discontinue the use of antidepressants.

Most studies on the use of antidepressants during pregnancy and postpartum focus on selective serotonin reuptake inhibitors (SSRIs), which have a well established efficacy for cases of MDD.\textsuperscript{80} Considerable controversy exists with regard to a potential increased risk of developing persistent pulmonary hypertension of the newborn (PPHN) in infants of women taking SSRIs during pregnancy.\textsuperscript{81,82} Recent data\textsuperscript{83} suggest a two-fold increased risk of PPHN after SSRI use in pregnancy (OR 2.1; 95%CI 1.5-3.0). However, absolute risks remain very low: 1.2 infants with PPHN per 1000 without SSRI versus 3.0 per 1000 with SSRI. Literature has also suggested that depression itself, rather than SSRI use, may account for the increased incidence of PPHN in depressed mothers\textsuperscript{81}.

Infants of depressed mothers exposed to SSRIs appear to have a different neurobehavioral profile than women with MDD who did not take SSRIs during pregnancy.\textsuperscript{84} On the long term, similar neurodevelopmental outcomes are to be expected.\textsuperscript{85} Some studies report associations between maternal SSRI usage and childhood psychopathology, for example with autism spectrum disorder (OR 2.5, 95%CI 1.1-5.5).\textsuperscript{86} However, other research suggests that maternal depression predicts child cognitive and behavioral outcome independent of antidepressant usage\textsuperscript{87,88}, and also that fetal
neurodevelopmental programming is influenced by maternal depression, without mediating effects of SSRI use.\textsuperscript{89}

SSRIs have also been said to increase the risk of congenital malformations. However, recent research\textsuperscript{90} comparing women exposed to SSRIs throughout the first trimester of pregnancy and women who discontinued antidepressants prior to conception, found similar rates of major congenital malformations and cardiac defects in both groups, but a twofold increase compared to women who had not used SSRIs during or shortly before pregnancy. The study concludes that there may be other confounding factors in women with an indication for SSRI use.

Whether or not SSRI use during pregnancy increases the risk of preterm birth is controversial. A US study (n=2793)\textsuperscript{84} found that the use of a SSRI, both with (OR 2.1, 95%CI 1.0-4.6) and without (OR 1.6, 95%CI 1.0-2.5) a major depressive episode, was associated with preterm birth. A Dutch study\textsuperscript{85} (n=7696) also demonstrated that SSRI exposure increased the risk of preterm birth (OR 2.14, 95%CI 1.08-4.25) and affected head growth, while exposure to depression had a negative effect on overall growth. The association between SSRI use and preterm birth seems to be facilitated by the level of depressive symptoms, as well as sociodemographic and lifestyle factors.\textsuperscript{91} After adjusting for these factors, exposure to antidepressants during pregnancy (n=699) was not associated with increased risk of preterm birth (adjusted OR, 1.21; 95%CI, 0.87-1.69) or low birth weight (adjusted OR, 0.62; 95%CI, 0.33-1.16) compared to women who did not use antidepressants during pregnancy (n=62696).

The possible role of antidepressants in the prevention of relapse is likely to be dependent on a greater number of previous episodes of major depression\textsuperscript{92} and severity of symptoms, but is nonetheless controversial. One study (n=201) reported that pregnant women with a history of MDD who were not depressed during the first trimester of pregnancy, were more likely to relapse during pregnancy when discontinuing medication shortly before or during pregnancy, as compared to women who continued medication (68 vs. 26%; hazard ratio 5.0, 95%CI 2.8-9.1).\textsuperscript{93} Another study with similar inclusion criteria (n=778) found that failure to use or a decision to discontinue the use of antidepressants in pregnancy did not have a strong effect on the development of a major depressive episode (hazard ratio 1.14; 95%CI 0.67-1.50) compared to women who used antidepressants throughout pregnancy.\textsuperscript{92} There is no evidence for the efficacy of medication in the treatment of minor depression.\textsuperscript{94}

With regard to psychosocial and psychological interventions, a 2007 Cochrane review\textsuperscript{95} concluded that currently, there is insufficient research to conclude whether or not non-pharmaceutical interventions are effective in treating antepartum depression. More recently, two pilot studies have been published showing promising results of mindfulness-based stress reduction interventions on symptoms of depression and anxiety in pregnant women.\textsuperscript{96,97} Cochrane reviews revealed that, based on 956 subjects of nine trials combined, psychotherapy and psychosocial interventions are effective
in treating postpartum depression. A meta-analysis concluded that interventions including an interpersonal therapy (IPT) component were found to have greater improvement in depressive symptoms, compared to control conditions, than interventions including a cognitive behavioral component.

IPT is based on attachment and interpersonal theory, and assumes that “patients’ maladaptive communication patterns lead to difficulties in their current interpersonal relationships.” In the context of pregnancy and postpartum period, IPT may target the gap between the desired and perceived social support of women. IPT was associated with a reduction in the risk of depressive symptoms among pregnant women with diagnosed MDD. IPT during pregnancy as compared to enhanced care as usual, led to significant reductions in depressive symptoms and MDD diagnoses during pregnancy and postpartum, and showed significant improvements in social functioning at six months postpartum. Among women with PPD, IPT resulted in a significantly greater proportion of recovery (defined as a BDI score of 9 or lower) compared to waitlist-controls (43.8% and 13.7%, respectively). It also appears that the effects of IPT remain over a longer period of time.

A multitude of complementary and alternative medicine treatments for MDD have been evaluated, some of which have also been conducted in pregnant and postpartum women, usually on a small scale. Several reviews have summarized research on the possible role of omega-3 supplementation in treatment and prevention of antepartum and postpartum depression, concluding that evidence is ambiguous. Light therapy is a well established treatment option for MDD outside pregnancy and the postpartum period. Women with MDD during pregnancy report significantly lower relapse rates when receiving light therapy when compared to women who receive regular ‘ineffective’ light. The effects of hormone therapies (estrogen, progesterone) on treating and preventing depression during pregnancy and postpartum are insufficiently researched. A systematic review concluded that the effects of acupuncture as monotherapy and antidepressants were comparable with respect to improving clinical response and alleviating symptom severity of MDD, but the results of acupuncture were not different from sham acupuncture. Studies involving pregnant women with MDD found greater symptom reduction in acupuncture treatment groups than in waitlist-controls or women receiving massage therapy. However, the differences between women receiving depression-specific acupuncture and control (non-specific) acupuncture were not always statistically significant. Case series and pilot studies have provided limited evidence for the efficacy and safety of electroconvulsive therapy (ECT) in pregnant and postpartum women with severe depression, who were unresponsive to pharmacological treatment and often have additional psychotic features.

Prophylaxis with antidepressants seems to be effective to prevent MDD, and it is therefore necessary to identify those at risk of developing MDD. A comprehensive Cochrane review concluded that there is insufficient evidence for the use of psychosocial interventions to prevent MDD.
However, identifying and focusing psychosocial interventions on mothers ‘at-risk’ for PPD is more effective in preventing PPD (RR 0.67, 95%CI 0.51 to 0.89) than targeting all women (RR = 0.87, 95%CI 0.66 to 1.16).124

**Bipolar disorder**

**Characteristics and diagnosis**

Bipolar disorder (BD) is a mood disorder characterized by manic episodes, often alternated with depressive episodes – hence its previous term ‘manic depression’. The DSM-IV15 distinguishes 2 types of BD: Bipolar I disorder, during which individuals have experienced at least one manic or mixed episode; Bipolar II disorder, during which individuals have experienced one or more hypomanic episodes in addition to at least one depressive episode (as described under MDD). A (hypo)manic episode is characterized by at least three of the following seven symptoms: (a) inflated self-esteem or grandiosity; (b) decreased need for sleep; (c) pressure to keep talking; (d) flight of ideas or subjective experience that thoughts are racing; (e) distractibility; (f) increase in goal-directed activity or psychomotor agitation; (g) excessive involvement in pleasurable activities that have a high potential for painful consequences. Hypomanic episodes do not extensively impair daily life (social and professional) functioning, do not require hospitalization and do not include psychotic components15, which makes them easier to go unnoticed by health care professionals than manic episodes.

**Prevalence**

Epidemiological studies estimate lifetime prevalence rates of 0.6–1% for bipolar I disorder, and 0.4-1.1% for bipolar II disorder.125,126 A substantial amount of women experience a relapse during pregnancy (22%) or postpartum (24%), despite adequate medication in most cases.127

**Risk factors and consequences**

Clinicians should be vigilant of the close link between BD and postpartum psychosis (PP)16: 40% of women with BD develops PP17,128, which is a 100-fold increase when compared to non-bipolar women.129 In some women a postpartum psychosis marks the onset (i.e. is the first episode) of later diagnosed bipolar disorder.17,128 Among women with BD, the likelihood of developing PP is doubled in case of a family history of PP.17 BD has been associated with adverse pregnancy outcomes, as a recent study found that induction, elective cesarean section and neonatal hypoglycemia were more common among women with BD, regardless of whether or not they used mood stabilizers.130

**Treatment and prevention**

A wide range of pharmacological treatments are available for those suffering from BD. A key component in the effective management of BD patients is the mood stabilizer lithium, also during pregnancy and postpartum.127 The risk of relapse during pregnancy is approximately doubled in
women without medication (40-85.5%), compared to women using medication (19-37%).\textsuperscript{127,131} Depending on the mental state of the patient (mania/depression; acute/prophylaxis), additional drugs can be prescribed, including atypical antipsychotics, antidepressants and anticonvulsants.\textsuperscript{132}

Weighing the risks and benefits of continued use of medication during pregnancy versus discontinued pharmacological treatment should be done with care, as is the case with depression. Untreated bipolar disorder has been associated with preterm birth and low birth weights.\textsuperscript{133} The overall incidence of congenital defects does not seem to be altered with the use of lithium, although there is evidence that the incidence of cardiac malformations is increased\textsuperscript{134,135}, and anecdotal evidence suggests increased risks of other conditions as well.\textsuperscript{136} Furthermore, monitoring of plasma lithium concentrations and thyroid function is warranted during pregnancy, as lithium may not only deregulate maternal thyroid function\textsuperscript{137}, but also increase glomerular filtration rate and creatinin clearance during pregnancy, resulting in lower concentrations of circulating lithium. High serum lithium concentrations prior to delivery have been associated with lower APGAR scores and central nervous system complications in the neonate, with adverse effects proportional to the dosage of lithium, which is the reason that a 24-48 hour interruption of lithium intake prior to delivery has been suggested.\textsuperscript{138} Anticonvulsants are known for their teratogenic effects on embryonic and fetal development,\textsuperscript{139,140} whereas antipsychotics increase the risk of gestational diabetes.\textsuperscript{141,142} The long term effects on infant development vary depending on the type of medication, ranging from lower intelligence levels after use of the anticonvulsant valproic acid\textsuperscript{143-145}, to macrosomia at birth\textsuperscript{141,146} and deficits in neuromotor development\textsuperscript{147} for antipsychotics, to no significant long term effects on growth, cognitive, behavioral and neurological development for lithium.\textsuperscript{148}

A number of psychological interventions have been found effective for treating bipolar disorder, ranging from cognitive behavioral therapy (CBT) and IPT to family focused treatment.\textsuperscript{149} Their effectiveness in pregnancy and postpartum has not researched extensively.

**Puerperal psychosis**

*Characteristics and diagnosis*

Characteristics of puerperal psychosis (PP) include confusion, depersonalization, misrecognitions, loss of connection to reality, delusions (false beliefs held with absolute conviction, despite evidence proving otherwise), hallucinations (perceptions in the absence of a stimulus, usually visual or auditory), sleep deprivation, agitation (sometimes manic), disorganized behavior, suspiciousness, and thoughts or actions to harm oneself or the baby.\textsuperscript{128,150} In the DSM-IV, *postpartum (or puerperal) psychosis* is not described as a separate disease entity, and is therefore frequently categorized as either psychotic disorder not otherwise specified, brief psychotic disorder, or mood disorder (manic, mixed, or major depressive episode) with psychotic features, all requiring the specifier “with postpartum onset” (4 weeks or less after delivery).\textsuperscript{127,151,152}
Prevalence
PP is a condition that affects approximately 1-2 per 1000 women after childbirth.\textsuperscript{153,154} The onset is usually within the first two weeks after delivery\textsuperscript{155,156}, with a median of 8 days postpartum.\textsuperscript{151}

Risk factors and consequences
As previously mentioned, a close link exists between PP and bipolar disorder (BD). In addition to BD being a risk factor for the development of PP, PP may also mark the onset of later diagnosed bipolar disorder.\textsuperscript{17,128} Often there is a familial occurrence of PP.\textsuperscript{16}

Among women with PP, the prevalence of auto-immune thyroid disorder (AITD, defined as elevated concentrations of thyroperoxidase (TPO) antibodies) and clinical thyroid failure (abnormal values of both TSH and FT4) is clearly increased.\textsuperscript{152} There was a significant difference between the prevalence of AITD among women with PP at 4 weeks postpartum (19\%) versus healthy postpartum controls (5\%). Furthermore, at 9 months postpartum, 19\% of women with PP were diagnosed with clinical thyroid disease versus 3\% of healthy controls. It was suggested that AITD may be an etiological factor for the development of PP, and therefore evaluation of thyroid function including TPO antibodies is warranted.

Treatment and prevention
Management of PP usually includes hospital admittance, to rule out possible organic causes and to prevent suicide and infanticide from occurring. Treatment often comprises a combination of prescription of (atypical) antipsychotic medication, mood stabilizers (lithium), anxiolytics (benzodiazepines), and, in severe cases, electroconvulsive treatment.\textsuperscript{157-159} The recurrence rate without treatment is approximately 40-60\%.\textsuperscript{17,160} In many cases, prophylactic use of lithium immediately after delivery can effectively prevent a new episode of PP.\textsuperscript{127,161}

Maternity blues
Maternity blues is not a mental disorder, rather, it is a transitory psychological condition experienced by 15-85\% of mothers during the first days after childbirth.\textsuperscript{162} Characteristics include incontrollable tearfulness, mild depressive symptoms, anxiety, unstable moods, sorrow/weeping and confusion.\textsuperscript{163,164} The symptoms women experience during the ‘maternity blues’ have been related to the radical changes in hormone levels immediately postpartum.\textsuperscript{165} Symptoms should disappear within two weeks and generally do not require intervention. However, if the symptoms persist, women have an increased risk of developing postpartum depression (20\%; OR 3.8, 95\%CI 1.2-16.5) or an anxiety disorder (OR 3.9, 95\%CI 1.1-20.0).\textsuperscript{166}
ANXIETY DISORDERS

Both anxiety disorders and mood disorders reveal a higher prevalence in women than in men. The results of the World Mental Health survey, for which 72,933 individuals in 10 developed and 5 developing countries were interviewed, showed that women are 1.7 times more likely to develop an anxiety disorder at some point in their lives than men. Whereas a vast body of research is available regarding peripartum depression, the literature on anxiety disorders in the peripartum period is far less substantial. Recently, a large population-based study found no significant difference in the prevalence of DSM-IV anxiety disorders between 1,524 women who had been pregnant the year before assessment and 13,025 women who had not (13% and 15%, respectively; adjusted OR, 0.99 (95%CI 0.68-1.43)). Importantly, PTSD and OCD were not part of this study. Nonetheless, the physiological, hormonal, and psychosocial changes that occur in the peripartum period may increase perceived stress levels, thereby eliciting symptoms in women vulnerable for developing anxiety disorders. Regardless of the likelihood of an increase in (symptoms of) anxiety disorders during the peripartum period, anxiety is common among childbearing women, and is associated with changes in fetal behavior, a higher incidence of pregnancy complications, and difficulties in adjustment postpartum in both mother and child.

Research regarding the precise effects of anxiety disorders during pregnancy on obstetric, fetal and neonatal outcome has yielded varying results. Among others, this is related to differences in sample characteristics, timing, specific measures, and accounting for possible confounders (e.g., ‘stress’) and protective factors in the various studies. Furthermore, criteria for anxiety varying from higher than average scores on self-report measures, to specific DSM-IV anxiety disorders, to any DSM-IV anxiety disorder have been used. Nonetheless, as a comprehensive review concluded, “anxiety symptoms during pregnancy contribute independently of other biomedical risk factors to adverse obstetric, fetal and neonatal outcome”.

In practice it is useful and necessary to distinguish between (a) women with a history of anxiety symptoms or a diagnosed anxiety disorder (whose symptoms during the peripartum period may be regarded as recurrent), and (b) women who were (relatively) well adapted before pregnancy, and experience de novo anxiety symptoms. In the latter case it may mean the onset of an anxiety disorder, or of pregnancy related anxiety, which is markedly different from general anxiety and depressive symptoms. Three anxiety disorders have characteristics specific to the peripartum period: (1) obsessive-compulsive disorder (OCD) often has its onset in the peripartum period; and with (2) fear of childbirth (FoC) and (3) posttraumatic stress disorder (PTSD) following childbirth the object of women’s fear or trauma is related to delivery and childbirth.
Obcessive-compulsive disorder (OCD)

Characteristics and diagnosis

OCD is an anxiety disorder characterized by unwanted, intrusive thoughts and/or images (obsessions) and repetitive physical or mental activities that one feels forced to carry out (compulsions). During pregnancy, OCD often manifests itself as a preoccupation with contamination and symmetry/meticulousness (obsessions) and subsequent repetitive washing/cleaning behavior and checking (compulsions). During the postpartum period, OCD often manifests as intrusive thoughts about harming the infant, or the child dying in its sleep (obsessions), followed by excessive checking (of breathing and heart rate) or avoidant behavior (compulsions). It is important to note that subclinical intrusive, senseless, obsessive thoughts and compulsive behavior are also found in women without OCD, depression, puerperal psychosis or other psychiatric disorders. From a cognitive-behavioral perspective, these thoughts and behaviors become clinically relevant when an individual (mis)appraises such thoughts as highly significant and threatening, and requiring attention to prevent a feared negative consequence.

MDD is the most commonly diagnosed co-morbid diagnosis in non-gravid patients with OCD, with a lifetime prevalence of 60-80%. Women with pre-existing OCD may also be at increased risk of developing postpartum depression. Although both OCD and MDD are associated with negative affect, the obsessions in OCD usually pertain to specific bizarre fears and/or negative consequences, whereas thoughts in depression are pessimistic in general and predominantly concern real life circumstances. It is important to distinguish between the different features of aggressive thoughts towards the infant as seen in OCD and puerperal psychosis. Thoughts and behavior in OCD are ego-dystonic, causing fear and distress. Women with OCD experience their obsessions with harming the child as unwanted, senseless and inconsistent with their typical behavior, they realize that their thoughts and imaginations are the product of their own mind, and will rather avoid the child in response to their own aggressive thoughts than act upon them.

Prevalence

The lifetime prevalence of OCD is estimated at 1.6%. Prevalence estimates of OCD during the peripartum period are scarce. During the third trimester of pregnancy a prevalence of 3.5% has been found, and postpartum incidences of 2.3 and 4% have been reported. The peripartum period marks the onset of symptoms in a substantial number of women diagnosed with OCD. In several small retrospective studies (17-78 patients), 6-39% of women with at least one child connected the onset of their OCD to their pregnancy, whereas 0-22% reported their first OCD symptoms to occur during the postpartum period. Women with preexisting OCD often report worsening of their symptoms during the peripartum period. In various studies, 8-34% of women indicated exacerbations during pregnancy, and 29-50% reported worsening of symptoms during the postpartum period.
Risk factors and consequences

Neurobiological substances that are thought to be involved in the etiology of OCD include serotonin and oxytocin. In a substantial number of women, the onset or worsening of OCD seems to be related to reproductive cycle events, especially postpartum and menarche. Furthermore, 20-50% of women report worsening of OCD during the premenstrual period. This observation has led to the hypothesis that fluctuations in estrogen and progesterone levels may cause OCD symptoms through dysregulation of the serotonergic system. Moreover, increases in oxytocin during the third trimester of pregnancy and postpartum are related to the increase of OCD symptoms during that period.

Treatment and prevention

Treatment options of OCD during the peripartum period include psychotherapy (CBT), and, if this proves insufficiently effective, pharmacotherapy (SSRIs). The risks and benefits of SSRI usage in women during pregnancy and lactation have been discussed in the section on MDD. The focus during CBT lies on exposure to feared situations and prevention of compulsive responses. In non-postpartum populations, the combination of both treatments has been shown to be most effective, but in postpartum populations no RCT’s have been conducted yet.

Fear of childbirth (FoC)

Characteristics and diagnosis

Fear is a common reaction to childbirth, which demands much from the biological, psychological and social abilities of the pregnant woman. In a significant minority of women, this healthy, functional apprehension takes the pathological, impairing, distressing form known as ‘severe fear of childbirth’ or tocophobia. These women meet the DSM-IV criteria for specific phobia if they continuously dread the upcoming labor and delivery, even though they realize that their fear is excessive and unreasonable; anticipation of the delivery provokes an anxiety response (such as a panic attack), and they try to avoid childbirth (e.g. by demanding an elective cesarean, avoiding or terminating pregnancy) and/or suffer throughout childbirth with intense fear. One could distinguish between primary and secondary FoC, with the former occurring in nulliparous women who have never given birth, and the latter in multiparous women following a previous traumatic delivery experience. Screening for FoC can be done with the use of the Wijma Delivery Expectations/Experience Questionnaire (WDEQ), a validated, frequently used, easily-administered self-report questionnaire. A sum-score of 85 or higher indicates severe FoC. Several domains have been identified around which the fear is centered. Factor analysis identified 6 factors that comprise the ‘FoC’ construct: (a) (general) fear, (b) negative appraisal, (c) loneliness, (d) lack of self-efficacy, (e) lack of positive anticipation and (f) concerns for the child. Similar results were obtained by Huizink, who found that women fear not only giving birth, but also bearing a handicapped child, and they are concerned with their appearance.
Prevalence
FoC is more common in nulliparous women than in multiparous women.4,5 In unselected samples, severe FoC is reported by approximately 7.5% of women. A Norwegian study4 among 2206 women found a prevalence of 7.5% for severe FoC (WDEQ-A ≥85), further subdivided into 9.0% of nullipara and 5.9% of multipara (p=.009). In a Finnish cohort of 1400 women, 7.4% revealed a WDEQ-A score of ≥1006, which could be subdivided into 7.0% of nullipara and 7.7% of multipara (p-value not mentioned), although median WDEQ scores of nullipara were higher than multipara (72.0 vs. 65.4, p<0.001). This study also used a visual analogue scale (VAS) to screen for FoC, by asking women to indicate on a scale from 1 to 10 “how afraid [they were] of childbirth”. The VAS showed a sensitivity of 97.8% and specificity of 65.7% in screening for FoC (WDEQ ≥100) with a VAS threshold of 5.0. In a sample of 30480 healthy nulliparous Danish women with a singleton pregnancy, 7.5% answered the question “Are you anxious about the course of the upcoming delivery?” with “a lot”.187

Risk factors and consequences
Risk factors for FoC include a history of depression and of sexual abuse, low self-esteem and coping abilities, poor social support system, as well as a previous traumatic delivery experience.187 Labor duration is significantly longer in women with severe FoC.4 Additionally, women with FoC have a six-fold increased risk of developing PTSD.191 Furthermore, several studies find an increased risk of emergency cesarean section in women with severe FoC. In a sample of 25.297 healthy nulliparous Danish women in spontaneous labor with a single fetus in cephalic presentation at term following an uncomplicated pregnancy, FoC (as measured at 16 and 31 week pregnancy) was associated with emergency cesarean section (OR 1.43, 95%CI 1.13–1.80).192 In a sample of 1.981 Swedish-speaking women (both nulliparous and multiparous), women with FoC were more likely to undergo emergency cesarean section than women without FoC (OR 3.0, 95%CI 1.4–6.6).193

Treatment and prevention
Research into optimal intervention and prevention strategies with respect to FoC is ongoing. A limited number of studies have found promising effects (reduction of elective cesarean requests, shorter duration of labor) through the use of individual psychotherapy and group psycho-education and relaxation.194,195

Posttraumatic Stress Disorder (PTSD)
Characteristics and diagnosis
PTSD is an anxiety disorder that can develop after exposure to a traumatic stressor. In order to diagnose PTSD following childbirth, specific criteria have to be met, as described in the DSM-IV, outlined in table 2.15 In addition to symptoms of re-experiencing, avoidance/ numbing and hyperarousal, the diagnosis of PTSD requires a genuine or perceived threat to the life of self or others; that the threat elicited a subjective response of intense fear, horror, or helplessness; that the symptoms persist for at least a month; and that the symptoms interfere with daily life functioning. PTSD commonly co-occurs with major depressive disorder196,197, and is often seen in conjunction
with postpartum depression in puerperal women. As with other disorders, the SCID\textsuperscript{16} or MINI\textsuperscript{27} can be used by psychiatrists and psychologists to diagnose PTSD. Additionally, numerous self-report instruments are available, some of which have been designed specifically for PTSD following childbirth\textsuperscript{200}, whereas others are generic questionnaires that can be used to diagnose PTSD following a variety of traumatic events\textsuperscript{201-203} or broad instruments that contain PTSD-related items.\textsuperscript{204,205}

Table 2. DSM-IV diagnostic criteria for PTSD

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<tr>
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<th>Stressor</th>
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<tr>
<td>A</td>
<td>1. Trauma involved actual or threatened death/serious injury, or threat to physical integrity of self or other</td>
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<td>2. Individual responded with intense fear, helplessness and/or horror</td>
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<th>Symptoms</th>
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<td>B</td>
<td>1. Recurrent and intrusive distressing recollections of the event</td>
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<td>2. Recurrent distressing dreams of the event</td>
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<td></td>
<td>3. Acting or feeling as if the event was recurring (e.g., flashbacks, hallucinations)</td>
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<td>4. Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the event</td>
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<td>5. Physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the event</td>
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<tr>
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<th>Avoidance &amp; numbing</th>
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<td>C</td>
<td>1. Efforts to avoid thoughts, feelings, or conversations associated with the event</td>
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<td></td>
<td>2. Efforts to avoid activities, places, or people that arouse recollections of the event</td>
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<td></td>
<td>3. Inability to recall an important aspect of the trauma</td>
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<td></td>
<td>4. Diminished interest or participation in significant activities</td>
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<td></td>
<td>5. Feeling of detachment or estrangement from others</td>
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<td></td>
<td>6. Restricted range of affect</td>
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<td>7. Sense of foreshortened future</td>
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<th></th>
<th>Hyperarousal</th>
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<td>D</td>
<td>1. Difficulty falling or staying asleep</td>
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<td></td>
<td>2. Irritability or outbursts of anger</td>
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<td></td>
<td>3. Difficulty concentrating</td>
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<tr>
<td></td>
<td>4. Hypervigilance</td>
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<td></td>
<td>5. Exaggerated startle response</td>
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<th></th>
<th>Duration</th>
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<td>E</td>
<td>One month or more</td>
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<th>F</th>
<th>Disability</th>
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<td></td>
<td>Symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning</td>
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Prevalence
Studies performed between 1 and 6 months postpartum have yielded prevalence estimates of PTSD following childbirth ranging from 0.0% to 5.9%\textsuperscript{200,206-216}, although experts consider 1-2% as a more realistic estimate in developed countries.\textsuperscript{6} Another 22-40% of postpartum women do not meet all criteria for PTSD, but do suffer from one or more clinically relevant symptoms of PTSD.\textsuperscript{6}

Risk factors and consequences
Previous studies have identified multiple obstetric, personality and psychosocial factors that promote the development of PTSD following childbirth. Demographic factors such as age, marital status and educational level, on the other hand, were consistently found to be unrelated to PTSD following childbirth.\textsuperscript{200,208,212,213} Women with a history of childhood sexual abuse seem to be at increased risk for developing symptoms of PTSD postpartum.\textsuperscript{217,218} No associations have been observed between parity and PTSD.\textsuperscript{208,209,211-213} A dose-response relationship between the intensity of the event and the risk of developing PTSD has been suggested.\textsuperscript{219} Accordingly, one may postulate that the prevalence of PTSD is higher among women with complicated pregnancies, as these women have often been exposed to stressful interventions and hospitalization of mother and infant. Indeed, obstetric interventions (e.g., emergency cesarean section and instrumental vaginal delivery) did increase the risk of posttraumatic stress symptoms\textsuperscript{191,207,220}, as did complications such as preeclampsia and preterm birth.\textsuperscript{221-224} However, although the relative risk of developing PTSD following obstetric complications is elevated, in absolute numbers, PTSD is still most prevalent among women with spontaneous vaginal deliveries, during which no medically or objectively identifiable complications occurred.\textsuperscript{191}

While the possible influence of personality characteristics and psychological factors such as general state anxiety, trait anxiety and some specific coping strategies is controversial\textsuperscript{209,211,213,225,226}, strong associations have consistently been found between anxiety/depression during pregnancy and PTSD after childbirth.\textsuperscript{211,212,216} Half of the women with PTSD following childbirth show a co-morbid PPD.\textsuperscript{191,198} There appears to be a concordance between women and their partners in experiencing PTSD symptoms following childbirth, as well as an association between PTSD symptoms and dissatisfaction with partner support.\textsuperscript{227} Furthermore, the perceived degree of support, care, and communication from the staff who assisted during labor seem to play crucial roles in the way women reflect on the experience.\textsuperscript{223} This provides an interesting opening for further research, as obstetric care practice may not merely be targeted at identifying women ‘at risk’, but also focus on strategies to prevent the development of PTSD that are linked to empathic care, women’s involvement in decision making, and strengthening partner support.

Delivery settings substantially influence women’s appraisals of childbirth: a recent Cochrane review\textsuperscript{228} concluded that, compared to conventional hospital settings, women who delivered in a homelike setting reported higher satisfaction about the birthing process and had lower intervention
rates. Obstetric health care in The Netherlands comprises a fairly unique echelon system. All healthy women with uncomplicated medical and obstetrical histories enter the primary care system, where pregnancy and delivery are monitored by community midwives working independently from hospitals. Only in case of (an increased risk for) well-defined complications or need for interventions during pregnancy or delivery (as defined by national guidelines), women are referred to a gynecologist/obstetrician in a hospital. In the primary care setting, women can choose to deliver at home (23%), or in a homelike setting in a hospital or birth center (11%). Women who initially or entirely received prenatal and/or peripartum care from midwives in primary care settings describe their delivery experience as more negative after (a) hospital deliveries (compared to home births), (b) referral to the hospital during labor, (c) emergency cesarean sections and (d) instrumental vaginal deliveries.

Symptoms in women with PTSD following childbirth usually do not spontaneously fade out. Possible consequences of (untreated) PTSD following childbirth include impaired bonding to the child, problems in the partner relationship, avoidance of future pregnancies and demanding an elective cesarean section (due to secondary fear of childbirth) during the next pregnancy.

Treatment and prevention
Due to insufficient research thus far (both qualitatively and quantitatively), no standard intervention with proven effectiveness is currently available for women with PTSD following childbirth. International guidelines on the management of PTSD recommend trauma-focused CBT and eye-movement desensitization and reprocessing (EMDR) as the treatments of choice for trauma victims. In women with PTSD following childbirth, a limited number of pilot studies have found promising results of both interventions. There may be a role for pharmacological treatment in cases of severe PTSD (in particular with severe co-morbid depression), in the event of insufficient effects of psychological treatments or after refusal to engage in psychological treatments. However, the evidence for the efficacy of pharmacological treatments (mainly SSRIs) as compared to placebos in the reduction of PTSD symptoms is inconclusive. Considering the possible consequences of PTSD following childbirth for the mother, infant, the partner and future pregnancies, further research into treatment options is of vital importance.
CONCLUSION

While psychiatric disorders may be present in women independent of their reproductive status, a number of disorders and conditions seem to be connected to the peripartum period. As summarized in table 1, these include several mood and anxiety related conditions. These psychiatric conditions carry the potential to have a serious negative impact not only on maternal well-being but also on the mother-child bonding and infant development. Treatment options include a variety of psychotherapeutic and pharmacological interventions, depending on the disorder, severity, potential risk to the fetus or neonate, co-morbidity and individual circumstances.

Maternity blues is the most common state of impaired mental well-being, affecting 15-85% of women during the first days postpartum. Tearfulness, feelings of sadness, anxiety, unstable moods, sorrow/weeping, and confusion are its most characteristic features. Due to the fact that it is generally a transient and self-limiting condition, it is not classified as a psychiatric disorder.

Major depressive disorder is characterized by depressed mood and diminished interest or pleasure in activities that were previously enjoyed. Various large studies suggest that the prevalence of MDD is quite similar among pregnant and non-pregnant women (7-13%), whereas there may be an increased risk of MDD with an onset during the postpartum period.

Bipolar disorder is a mood disorder characterized by depressive episodes in conjunction with manic episodes that has a lifetime prevalence of 1-2%. It has a much lower incidence than major depressive disorder, but is clinically relevant during the peripartum period since women with bipolar disorder have a high risk of developing a puerperal psychosis.

Puerperal psychosis is a medical emergency that requires hospitalization in most cases. It is rare (1-2 in 1000 women), but quite common among women with a bipolar disorder or a family history of puerperal psychosis and/or bipolar disorder.

Obsessive compulsive disorder often manifests as a preoccupation with contamination and intrusive thoughts about the infant being harmed (obsessions), with subsequent repetitive washing/cleaning behavior and checking or avoidant behavior (compulsions).

Fear of childbirth may be so severe that women meet the DSM-IV criteria for specific phobia. Approximately 7.5 percent of women report clinically significant fear of childbirth. Cesarean section on maternal request is common, some women even decide to terminate pregnancy, and some avoid becoming pregnant at all.

Posttraumatic stress disorder may occur when labor and delivery have been experienced as traumatic, and women suffer from symptoms of re-experiencing (e.g. nightmares, flashbacks),
avoidance, emotional numbing and hyperarousal. It occurs in 1-2 percent of women following childbirth.

Obstetric care professionals do not always recognize symptoms of these conditions in their patients. This is at least partially due to considerable overlap with normal (physiological) pregnancy and postpartum-related physical inconveniences, as well as reluctance among women to acknowledge that they do not feel elated about their pregnancy or newborn. Furthermore, obstetric care professionals may not explicitly ask for symptoms of mental disorders, because they are lacking knowledge, time, effective screening instruments, affinity with psychopathology, referral options or a combination of these. Mental health workers often have insufficient experience with the characteristic features of common mental disorders in the peripartum period, and the challenges that pharmacological treatment during pregnancy and lactation poses. Awareness, recognition and prompt referral are key to early intervention and prevention of long-term impairment of maternal well-being and adverse effects on mother-child bonding and infant development. Future research warrants evaluation of effective interventions and prevention strategies, as these are insufficiently studied for many of the conditions discussed in this particular, vulnerable population.
REFERENCES


PART I

IDENTIFICATION, PREVALENCE AND RISK FACTORS
MEASURING POSTTRAUMATIC STRESS FOLLOWING CHILDBIRTH: A CRITICAL EVALUATION OF INSTRUMENTS

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K Marieke Paarlberg
ABSTRACT

Objectives
To evaluate instruments used to assess posttraumatic stress disorder (PTSD) following childbirth with both quantitative (reliability analysis and factor analysis) and qualitative (comparison of operationalization) techniques.

Methods
An unselected population of 428 women completed the Traumatic Event Scale-B (TES-B) and the PTSD Symptom Scale-Self Report (PSS-SR) two to six months after delivery.

Results
Assessment of internal consistency yielded similar results for the TES-B and PSS-SR (Cronbach’s α = .87 and .82, respectively). Factor analysis revealed two rather than three DSM-IV symptom categories for both instruments: childbirth related factors (re-experiencing/avoidance) and symptoms of depression and anxiety (numbing/hyperarousal). Although the TES-B and the PSS-SR sum-scores show a strong relationship (Spearman’s rho = .78), agreement between the instruments on the identification of PTSD cases is low (kappa = .24); Discrepancy between TES-B and PSS-SR is largely due to differences in instruction to respondents, formulation of items, answer categories and cut-off values.

Conclusions
Large operationalization differences between TES-B and PSS-SR have been identified, i.e., in the formulation of questions, answer categories, cut-off values and instructions to respondents. Comparison between studies using different instruments for measuring PTSD following childbirth should be done with utmost caution.

Keywords: posttraumatic stress disorder, psychometrics, instruments, operationalization, childbirth, postpartum
INTRODUCTION

Posttraumatic stress disorder (PTSD) is an anxiety disorder that may develop following exposure to a traumatic stressor. Table 1 presents an overview of the criteria for PTSD according to the Diagnostic and Statistical Manual of Mental Diseases (DSM-IV). In the past decade awareness has been raised that childbirth may be a possible traumatic event. A limited number of studies have reported estimates of the prevalence of posttraumatic stress (disorder) following childbirth, ranging from 0% to 14.9% between 1 and 14 months after childbirth. Table 2 summarizes the most prominent studies on the prevalence of PTSD following childbirth, excluding research focusing on specific patient characteristics (e.g., stillbirth, pregnancy loss, emergency cesarean section). In addition to differences in diagnostic instruments and timing of measurements (ranging from 1 to 14 months after childbirth), the size and composition of study populations differ considerably: some included only low-risk patients or women attending childbirth classes, others excluded patients in which (certain) complications arose, while again others did make use of an unselected population.

In order to diagnose PTSD following childbirth, several measures are available, some of which have been designed specifically for PTSD following childbirth, whereas others are more generic questionnaires that can be used to diagnose PTSD following a variety of traumatic events, or broad instruments containing PTSD-related items. Until now, few measures have been validated with clinical interviews and a great variance in reported sensitivity and specificity is observed.

Most instruments include all the DSM-IV criteria, although some lack (explicit) questions on the duration and severity of symptoms, and in several measures the stressor (childbirth) being traumatic (criterion A) is not included. In- or excluding certain DSM-IV criteria is likely to have substantial implications for PTSD prevalence estimates, and thereby for comparing studies using different instruments. Researchers and clinicians increasingly acknowledge that significant posttraumatic stress symptoms without qualifying for the diagnosis PTSD may also be of clinical relevance.

We expected that, in addition to the described differences in study design, timing and research populations, differences between questionnaires (items, phrasing, answer categories etc.) might account for the considerable discrepancies in prevalence rates of PTSD following childbirth. It is topic of debate whether screening measures used to identify PTSD in the general population are specific enough to measure PTSD following childbirth. The aim of the present study is to critically evaluate two instruments used for measuring PTSD following childbirth: the Traumatic Event Scale-B (TES-B) and the PTSD Symptom Scale-Self Report (PSS-SR). The two instruments will be compared on both quantitative and qualitative level, in order to provide relevant information to establish which of the two is to be preferred for assessing PTSD following childbirth. In the methods section, the
characteristics of the two measures will be described. Subsequently, a quantitative comparison and analysis is carried out, followed by a qualitative comparison and analysis. Finally, recommendations and conclusions are presented.

Table 1. DSM-IV diagnostic criteria for PTSD

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td><strong>Stressor</strong></td>
</tr>
<tr>
<td></td>
<td>1. Trauma involves actual or threatened death/serious injury, or threat to physical integrity of self or other</td>
</tr>
<tr>
<td></td>
<td>2. Individual responded with intense fear, helplessness and/or horror</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td><strong>Re-experiencing</strong></td>
</tr>
<tr>
<td></td>
<td>1. Recurrent and intrusive distressing recollections of the event</td>
</tr>
<tr>
<td></td>
<td>2. Recurrent distressing dreams of the event</td>
</tr>
<tr>
<td></td>
<td>3. Acting or feeling as if the event were recurring (e.g., flashbacks, hallucinations)</td>
</tr>
<tr>
<td></td>
<td>4. Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the event</td>
</tr>
<tr>
<td></td>
<td>5. Physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the event</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td><strong>Avoidance &amp; numbing</strong></td>
</tr>
<tr>
<td></td>
<td>1. Efforts to avoid thoughts, feelings, or conversations associated with the event</td>
</tr>
<tr>
<td></td>
<td>2. Efforts to avoid activities, places, or people that arouse recollections of the event</td>
</tr>
<tr>
<td></td>
<td>3. Inability to recall an important aspect of the trauma</td>
</tr>
<tr>
<td></td>
<td>4. Diminished interest or participation in significant activities</td>
</tr>
<tr>
<td></td>
<td>5. Feeling of detachment or estrangement from others</td>
</tr>
<tr>
<td></td>
<td>6. Restricted range of affect</td>
</tr>
<tr>
<td></td>
<td>7. Sense of foreshortened future</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td><strong>Hyperarousal</strong></td>
</tr>
<tr>
<td></td>
<td>1. Difficulty falling or staying asleep</td>
</tr>
<tr>
<td></td>
<td>2. Irritability or outbursts of anger</td>
</tr>
<tr>
<td></td>
<td>3. Difficulty concentrating</td>
</tr>
<tr>
<td></td>
<td>4. Hypervigilance</td>
</tr>
<tr>
<td></td>
<td>5. Exaggerated startle response</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td><strong>Duration</strong></td>
</tr>
<tr>
<td></td>
<td>One month or more</td>
</tr>
<tr>
<td><strong>F</strong></td>
<td><strong>Disability</strong></td>
</tr>
<tr>
<td></td>
<td>Symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning</td>
</tr>
</tbody>
</table>
Table 2. PTSD measures and DSM-IV criteria used in previous studies

<table>
<thead>
<tr>
<th>Study</th>
<th>sample size</th>
<th>instrument</th>
<th>DSM-IV criteria</th>
<th>prevalence PTSD (%)</th>
<th>months post partum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wijma (1997)²</td>
<td>1640</td>
<td>TES-B²</td>
<td>ABCDEF</td>
<td>1.7</td>
<td>1.0 - 14.0</td>
</tr>
<tr>
<td>Creedy (2000)⁶</td>
<td>499</td>
<td>PSS-I¹⁶</td>
<td>(A)BCD⁹</td>
<td>5.6</td>
<td>1.0 - 1.5</td>
</tr>
<tr>
<td>Czarnocka (2000)⁵</td>
<td>264</td>
<td>PTSD-I(Q)¹⁰</td>
<td>BCDE</td>
<td>3.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Ayers (2001)³</td>
<td>289</td>
<td>PSS-SR¹⁶</td>
<td>BCDF</td>
<td>3.2 / 2.0</td>
<td>1.5 / 6.0</td>
</tr>
<tr>
<td>Skari (2002)⁸</td>
<td>127</td>
<td>IES² + GHQ-28²²</td>
<td>BCD</td>
<td>0.0 / 0.8</td>
<td>1.5 / 6.0</td>
</tr>
<tr>
<td>Soet (2003)⁷</td>
<td>103</td>
<td>TES-B²</td>
<td>ABCD</td>
<td>1.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Cohen (2004)⁸</td>
<td>200</td>
<td>DTS¹⁸</td>
<td>BCD</td>
<td>0.0</td>
<td>2.0 - 2.5</td>
</tr>
<tr>
<td>Olde (2005)⁹</td>
<td>140</td>
<td>PSS-SR¹⁶</td>
<td>ABCDF</td>
<td>2.1</td>
<td>3.0</td>
</tr>
<tr>
<td>Wenzel (2005)¹⁰</td>
<td>147</td>
<td>SCID¹⁹</td>
<td>ABCDEF</td>
<td>0.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Adewuya (2006)¹¹</td>
<td>876</td>
<td>M.I.N.I.¹⁷</td>
<td>ABCDEF</td>
<td>5.9</td>
<td>1.5</td>
</tr>
<tr>
<td>Maggioni (2006)¹²</td>
<td>93</td>
<td>PTSD-I(Q)¹⁰</td>
<td>BCD</td>
<td>2.4</td>
<td>3.0 - 6.0</td>
</tr>
<tr>
<td>Söderquist (2006)¹³</td>
<td>1224</td>
<td>TES-B²</td>
<td>BCD</td>
<td>3.0</td>
<td>1.0 - 11.0</td>
</tr>
<tr>
<td>Zaers (2008)¹⁴</td>
<td>47</td>
<td>PSS-SR¹⁶</td>
<td>BCD</td>
<td>6.0 / 14.9</td>
<td>1.5 / 6.0</td>
</tr>
<tr>
<td>Stramrood (2011)¹⁵</td>
<td>428</td>
<td>TES-B²</td>
<td>ABCDEF</td>
<td>1.2</td>
<td>2.0 - 6.0</td>
</tr>
</tbody>
</table>

TES-B, Traumatic Event Scale-B²; PSS, PTSD Symptom Scale, SR = self-report, I = interview¹⁰; PTSD-I(Q), Posttraumatic Stress Disorder Interview (Questionnaire)²⁰; IES, Impact of Event Scale²¹; GHQ-28, General Health Questionnaire²²; SCID-NP, Structured Clinical Interview for DSM-IV Disorders - non patient version²³; M.I.N.I., MINI International Neuropsychiatric Interview²⁴; DTS, Davidson Trauma Scale²⁵

* question about traumatic event was included, but not according to DSM-IV guidelines

METHODS

Design, setting and population

In this cross-sectional multi-center study one academic referral center, two general hospitals, and four midwifery practices in The Netherlands participated. A written request was sent to all 907 women who delivered between July 1st and October 1st, 2007 (i.e., two to six months prior to partaking in the study), followed by a reminder to non-responders. All women giving birth after 16 weeks gestation or longer were approached, including those with still-births and late pregnancy terminations. Four-hundred-twenty-eight women (47%) completed the questionnaires. Table 3 summarizes the characteristics of the respondents.
Table 3. Sample characteristics

<table>
<thead>
<tr>
<th>Factor</th>
<th>n or M (± SD)</th>
<th>% or range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>32 (± 4)</td>
<td>17-45</td>
</tr>
<tr>
<td>Education</td>
<td>235</td>
<td>54.9</td>
</tr>
<tr>
<td>Marital status</td>
<td>413</td>
<td>96.5</td>
</tr>
<tr>
<td>Country of origin</td>
<td>398</td>
<td>93.0</td>
</tr>
<tr>
<td>Obstetric history</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscarriage / termination of pregnancy in history</td>
<td>103</td>
<td>24.1</td>
</tr>
<tr>
<td>Pregnancy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primiparity</td>
<td>213</td>
<td>49.8</td>
</tr>
<tr>
<td>Fertility treatment</td>
<td>32</td>
<td>7.5</td>
</tr>
<tr>
<td>Multiple pregnancy</td>
<td>9</td>
<td>2.1</td>
</tr>
<tr>
<td>Pregnancy complications</td>
<td>198</td>
<td>46.3</td>
</tr>
<tr>
<td>Delivery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preterm delivery</td>
<td>&lt; 37 weeks gestation</td>
<td>39</td>
</tr>
<tr>
<td>Postterm delivery</td>
<td>&gt; 42 weeks gestation</td>
<td>24</td>
</tr>
<tr>
<td>Induction of labor</td>
<td>82</td>
<td>19.4</td>
</tr>
<tr>
<td>Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NVD</td>
<td>316</td>
<td>74.5</td>
</tr>
<tr>
<td>IVD</td>
<td>37</td>
<td>8.7</td>
</tr>
<tr>
<td>UPCS</td>
<td>37</td>
<td>8.7</td>
</tr>
<tr>
<td>PCS</td>
<td>34</td>
<td>8.0</td>
</tr>
<tr>
<td>Pain medication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>101</td>
<td>23.6</td>
</tr>
<tr>
<td>Hospital</td>
<td>298</td>
<td>69.6</td>
</tr>
<tr>
<td>Referral from home to hospital</td>
<td>44</td>
<td>10.3</td>
</tr>
</tbody>
</table>

M, median; SD, standard deviation; NVD, normal vaginal delivery; IVD, instrumental vaginal delivery; PCS, planned cesarean section; UPCS, unplanned cesarean section

Measures
The Traumatic Event Scale-B (TES-B)² and the PTSD Symptom Scale-Self Report (PSS-SR)¹⁰ were administered as part of a larger anonymous web based questionnaire, in which variables and outcome measures (PTSD) were not explicitly mentioned. A detailed description of the instructions to participants, answer categories, phrasing of items and cut-off values of each instrument is presented in table 4.
Table 4. Description of characteristics of TES-B and PSS-SR

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Instructions referring to</th>
<th>No. of items</th>
<th>Scale</th>
<th>Cut-off value item</th>
<th>Items needed to meet criterion</th>
<th>Answer categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>T: feelings during delivery (self &amp; baby)</td>
<td>3</td>
<td>T: 0-3</td>
<td>T: ≥ 2</td>
<td>T: ≥ 1</td>
<td>T: not at all</td>
</tr>
<tr>
<td></td>
<td>P: feelings about delivery in past week (self)</td>
<td>2</td>
<td>P: 0-3</td>
<td>P: ≥ 1</td>
<td>P: ≥ 1</td>
<td>P: not at all</td>
</tr>
<tr>
<td>A2</td>
<td>T: emotions during delivery</td>
<td>1</td>
<td>T: 0-3</td>
<td>T: ≥ 2</td>
<td>T: —</td>
<td>T: not at all</td>
</tr>
<tr>
<td></td>
<td>P: emotions about delivery in past week</td>
<td>3</td>
<td>P: 0-3</td>
<td>P: ≥ 1</td>
<td>P: ≥ 1</td>
<td>P: not at all</td>
</tr>
<tr>
<td>B</td>
<td>T: how subject feels now</td>
<td>5</td>
<td>T: 0-3</td>
<td>T: ≥ 2</td>
<td>T: ≥ 1</td>
<td>T: never/not at all</td>
</tr>
<tr>
<td></td>
<td>P: how symptoms affected in past week a</td>
<td>5</td>
<td>P: 0-3</td>
<td>P: ≥ 1</td>
<td>P: ≥ 1</td>
<td>P: never</td>
</tr>
<tr>
<td>C</td>
<td>T: how subject feels now</td>
<td>7</td>
<td>T: 0-3</td>
<td>T: ≥ 2</td>
<td>T: ≥ 3</td>
<td>T: never/not at all</td>
</tr>
<tr>
<td></td>
<td>P: how symptoms affected in past week a</td>
<td>7</td>
<td>P: 0-3</td>
<td>P: ≥ 1</td>
<td>P: ≥ 3</td>
<td>P: not at all</td>
</tr>
<tr>
<td>D</td>
<td>T: how subject feels now</td>
<td>5</td>
<td>T: 0-3</td>
<td>T: ≥ 2</td>
<td>T: ≥ 3</td>
<td>T: never/not at all</td>
</tr>
<tr>
<td></td>
<td>P: how symptoms affected in past week a</td>
<td>5</td>
<td>P: 0-3</td>
<td>P: ≥ 1</td>
<td>P: ≥ 2</td>
<td>P: never</td>
</tr>
<tr>
<td>E</td>
<td>T: duration of ≥1 symptoms (in months)</td>
<td>1</td>
<td>T: 0-12</td>
<td>T: ≥ 1</td>
<td>T: —</td>
<td>T: &lt;1 month ... &gt;12 months (and ‘not applicable’)</td>
</tr>
<tr>
<td></td>
<td>P: (no explicit question)</td>
<td>0</td>
<td>P: —</td>
<td>P: —</td>
<td>P: —</td>
<td>P: —</td>
</tr>
<tr>
<td>F</td>
<td>T: how much ≥1 symptom affects daily functioning</td>
<td>1</td>
<td>T: 1-10</td>
<td>T: ≥ 6</td>
<td>T: —</td>
<td>T: not at all influenced ... very much influenced</td>
</tr>
<tr>
<td></td>
<td>P: (no explicit question, sum-score calculation) b</td>
<td>0</td>
<td>P: 0-54</td>
<td>P: ≥ 18</td>
<td>P: —</td>
<td>P: —</td>
</tr>
</tbody>
</table>

T, TES-B; P, PSS-SR; —, not applicable; a English version referred to ‘in the past two weeks’; b items C1/C2/D1 have the same answer categories as criterion B.
The TES-B \(^2\) has been developed especially for diagnosing PTSD following childbirth. It includes all DSM-IV criteria for PTSD, but has not yet been validated with clinical interviews. As an estimate of the internal consistency of the scale, Cronbach’s alpha was calculated at 0.84. \(^2\) Items are posed as statements. The DSM-IV A criterion (traumatic experience) includes four statements, asking subjects to respond according to how they felt during delivery: (I) ‘the childbirth was a trying experience’; (II) ‘the childbirth was a threat to my physical integrity’; (III) ‘during the childbirth I was afraid that I and/or my baby was going to die or be seriously harmed’; (IV) ‘during the childbirth I felt anxious / helpless / horrified’.

The PSS-SR \(^16\) is a widely used generic measure for diagnosing PTSD following a variety of traumatic events, which can be adapted according to the stressor of interest. Psychometric properties in a non-post partum women population included a good internal consistency (Cronbach’s alpha = 0.91) and test-retest reliability (0.74). \(^16\) Using the Structured Clinical Interview for DSM-III-R (SCID) as gold standard \(^25\), the PSS-SR has a sensitivity of 0.62, specificity of 1.0 (i.e., no false positives), a positive predictive power of 1.0 and a negative predictive power of 0.82. \(^16\) In this study a Dutch translation of the PSS-SR \(^26\) (used before for PTSD following childbirth) \(^3\) has been administered. In addition to the 17 symptom items used in the original study (posed as questions), Arntz \(^26\) added items relating to the DSM-IV A-criterion (traumatic experience). Women are asked to what extent, during the past week, they were convinced that during the delivery (I) ‘they could have been seriously hurt’ or (II) ‘their life was threatened’, and whether in the past week they had felt (III) guilty (IV) ashamed and/or (V) angry about the delivery. As proposed by Dunmore \(^27\), a sum-score of 18 or more was considered an indication of significant severity of symptoms (criterion F). The PSS-SR does not assess the E-criterion (symptoms present at least one month) explicitly.

In addition, a specially designed 30-item questionnaire focusing on demographic factors, obstetric background, logistic features of the labor process, and expectations and appraisal of the delivery was administered. Data regarding complications and interventions during pregnancy and delivery were obtained from patient charts. The following pregnancy complications were included: hypertension, pre-eclampsia / HELLP-syndrome (hemolysis, elevated liver enzymes, low platelets), blood loss, intra-uterine death, congenital defects, membranes ruptured before 37 weeks gestation and membranes ruptured longer than 24 hrs.

**Statistical methods**

Data were analyzed with SPSS 15.0, using an alpha of 0.05. In order to assess internal consistency, Cronbach’s alphas and inter-item correlations (IIC) were calculated. The associations between TES-B and PSS-SR were evaluated using Spearman’s rank order coefficient, kappa’s (k) and intraclass correlation coefficients (ICC), where appropriate. As part of the internal validity, the dimensional structure of both instruments was assessed with principal components analysis (PCA).
Quantitative analysis

Reliability

Based on the current data set, the internal consistency of both scales was assessed. Cronbach’s α for the 17 symptom items was .87 for the TES-B and .82 for the PSS-SR, which is in line with the original studies\(^2,16\). Considering that alpha is influenced by the number of items in a scale, the IICs of the 17 symptom items were also calculated, generating acceptable values for both TES-B (.29) and PSS-SR (.27). Assessing criteria B,C and D separately generated IICs of .47, .28 and .39 for the TES-B and .32, .23 and .30 for the PSS-SR.

Five of the 428 respondents fulfilled the DSM-IV criteria for PTSD (1.2%) on the TES-B, compared with 3 participants on the PSS-SR (0.7%). One woman met the criteria on both scales, yielding a kappa (κ) of .24. A PTSD symptom-profile (meeting DSM-IV criteria B,C and D), as used in several previous studies, was found in 3.7% the women on the TES-B and in 9.1% on the PSS-SR (κ = 0.33).

Sum-scores on the TES-B and PSS-SR correlated strongly (Spearman’s rank order coefficient, r = 0.78). Additionally, the ratio between the variance between the two instruments (ideally zero) and between cases was assessed by calculating a single measures type C ICC (ICC(C,1) = 0.78).

Kappa coefficients were calculated for each of the 17 (dichotomized) symptoms as well as the (dichotomized) DSM-IV criteria (except E, as the PSS-SR does not include an explicit question regarding the duration of symptoms), using the cut-off values as described in the methods section. Kappa thereby indicates the degree of agreement between the TES-B and PSS-SR on whether or not respondents meet the criterion in question (table 5).

Despite the rather high ICC and Spearman’s rank order coefficient suggesting otherwise, the low kappa coefficients reveal that agreement between the two instruments is poor: the questionnaires did not identify the same cases, and substantial discrepancies in the percentage of women suffering from specific symptoms were found. Our findings demonstrate that consistency in sum-scores of the two instruments is mainly found in women with low scores, while respondents with moderate to severe symptoms on the TES-B were not identified with the PSS-SR, and vice-versa. This is an issue of concern, as it reveals that not only detection of PTSD ‘cases’, but also the identification of women with symptoms depends to a considerable extent on the instrument used.

Validity

The dimensional structure of the 17 symptom-items of the TES-B and PSS-SR was evaluated by means of PCA, with the goal of determining: (I) whether the three subdimensions of PTSD as listed in the DSM-IV could be identified; (II) whether the subdimensions of the TES-B and PSS-SR were similar; (III) whether the differences in response formats might have affected the responses.

For both instruments, the 17 symptom-items were included in the analysis (extraction method: PCA). Loadings on all items were sufficient for both TES-B (range: 0.41–0.70) and PSS-SR (range:
Table 5. Associations and degree of agreement between TES-B and PSS-SR

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Item</th>
<th>TES-B (%)</th>
<th>PSS-SR (%)</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Traumatic experience</td>
<td>1. threat to self or others</td>
<td>9.1</td>
<td>1.4</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>2. emotional response to stressor</td>
<td>38.1</td>
<td>3.5</td>
<td>.06</td>
</tr>
<tr>
<td>B - Re-experiencing</td>
<td>1. intrusions</td>
<td>10.3</td>
<td>20.3</td>
<td>.50</td>
</tr>
<tr>
<td></td>
<td>2. dreams</td>
<td>1.6</td>
<td>3.5</td>
<td>.63</td>
</tr>
<tr>
<td></td>
<td>3. flashbacks</td>
<td>1.4</td>
<td>9.1</td>
<td>.11</td>
</tr>
<tr>
<td></td>
<td>4. psychological distress</td>
<td>8.4</td>
<td>9.6</td>
<td>.27</td>
</tr>
<tr>
<td></td>
<td>5. physiological reactivity</td>
<td>4.7</td>
<td>2.8</td>
<td>.29</td>
</tr>
<tr>
<td>C - Avoidance &amp; numbing</td>
<td>1. avoid thoughts / feelings</td>
<td>7.9</td>
<td>21.7</td>
<td>.35</td>
</tr>
<tr>
<td></td>
<td>2. avoid activities / places</td>
<td>4.7</td>
<td>7.0</td>
<td>.41</td>
</tr>
<tr>
<td></td>
<td>3. inability to recall</td>
<td>3.0</td>
<td>3.5</td>
<td>.48</td>
</tr>
<tr>
<td></td>
<td>4. diminished interest</td>
<td>22.7</td>
<td>25.2</td>
<td>.57</td>
</tr>
<tr>
<td></td>
<td>5. detachment / estrangement</td>
<td>18.9</td>
<td>37.1</td>
<td>.38</td>
</tr>
<tr>
<td></td>
<td>6. diminished affect</td>
<td>11.0</td>
<td>30.6</td>
<td>.26</td>
</tr>
<tr>
<td></td>
<td>7. foreshortened future</td>
<td>6.1</td>
<td>14.3</td>
<td>.31</td>
</tr>
<tr>
<td></td>
<td>8. foreshortened future</td>
<td>3.3</td>
<td>16.1</td>
<td>.22</td>
</tr>
<tr>
<td>D - Hyperarousal</td>
<td>1. sleeping difficulties</td>
<td>26.6</td>
<td>63.1</td>
<td>.32</td>
</tr>
<tr>
<td></td>
<td>2. irritability</td>
<td>3.3</td>
<td>43.9</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>3. concentration problems</td>
<td>22.2</td>
<td>59.3</td>
<td>.25</td>
</tr>
<tr>
<td></td>
<td>4. hypervigilance</td>
<td>34.8</td>
<td>58.9</td>
<td>.46</td>
</tr>
<tr>
<td></td>
<td>5. exaggerated startle response</td>
<td>17.8</td>
<td>32.2</td>
<td>.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15.4</td>
<td>16.6</td>
<td>.49</td>
</tr>
<tr>
<td>E - Duration</td>
<td></td>
<td>44.2</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>F - Disability</td>
<td></td>
<td>13.8</td>
<td>3.3</td>
<td>.29</td>
</tr>
</tbody>
</table>

—, no item in PSS-SR regarding duration of symptoms

Percentages indicate the proportion of women meeting cut-off values of each instrument according to the criteria described in the methods section.
0.34–0.68). The three DSM-IV subdimensions (re-experiencing, avoiding, hyperarousal) could not be confirmed in this study, as scree plots indicated 2 relevant factors for both instruments. The results of subsequent varimax (orthogonal) rotation over two factors with Kaiser normalization are displayed in table 6. Previous studies have also challenged the three-dimensional structure of the DSM-IV symptoms. Occasionally, two underlying factors (intrusions/avoidance, hyperarousal/numbing)\cite{28,29} were found, whereas others reported four underlying factors.\cite{30-33} The present findings suggest that PTSD includes a cluster of symptoms shared with other diagnoses (dysphoria) as well as a more specific factor related directly to the effects of encountering traumatic experience is in line with current research on this topic.\cite{34} Possible effects of the specific formulation of questions may not be excluded though, as questions referring directly to the delivery load high on the first component (intrusions/avoidance), and questions not explicitly related to childbirth (referring to symptoms of depression and/or anxiety disorders) load high on the second component (hyperarousal/numbing). This would explain the different loadings of item D1 on the TES-B (component 1) and the PSS-SR (component 2), as the TES-B refers to insomnia due to thoughts about the delivery, whereas the PSS-SR just refers to sleeping difficulties regardless of their cause. The item pertaining to difficulty to remember aspects of the delivery (item C3) loads low on both components for TES-B and PSS-SR, and therefore warrants reconsideration, as has been noted before.\cite{30}

Additionally, the 17 TES-B items and 17 PSS-SR items were simultaneously entered for PCA. TES-B and PSS-SR items loading positively on the second component before rotation (table 6) were found to comprise component 1, and similarly, negative loadings yielded component 2.

**Qualitative analysis**
A careful comparison between instructions to participants, answer categories, cut-off values and phrasing of items is summarized in table 4. Nonetheless, some additional remarks are warranted.

The difference in cut-off values is assumed to be one of the major factors responsible for overall higher percentages of women meeting the symptom criteria on the PSS-SR compared to the TES-B. Interestingly though, in the Dutch version of the instruments, the phrasing of the second response alternative (1 on a 0-3 scale) of the PSS-SR is identical to the third response alternative of the TES-B (2, on a 0-3 scale) for a number of questions (namely: sometimes), as are the third answer of the PSS-SR and the fourth on the TES-B (often). Since some respondents may be guided in their response by the specific phrasing and others by the numerical value of a response, the effect of this difference is unclear.

One of the TES-B items for criterion A1 yielded particularly high scores: “the childbirth was a trying experience”. The item in the official Dutch translation of the TES-B uses the Dutch equivalent of “unpleasant”. Even though traumatic experiences will be trying or unpleasant, the opposite does not necessarily hold. From a linguistic point of view, the terms somehow and (very) much are not the
correct qualifications for items A1 and A2: the childbirth cannot be *much* trying, and ‘I felt *somehow* anxious’ does not make sense. It should be noted though that the Dutch translation contains a more accurate match of item and response categories.

Table 6. Principal Component Analysis TES-B and PSS-SR

<table>
<thead>
<tr>
<th>Item (symptom)</th>
<th>TES-B component</th>
<th>PSS-SR component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>component 1</td>
<td>component 2</td>
</tr>
<tr>
<td>B1. intrusions</td>
<td>.70</td>
<td>.26</td>
</tr>
<tr>
<td>B2. dreams</td>
<td>.69</td>
<td>.09</td>
</tr>
<tr>
<td>B3. flashbacks</td>
<td>.66</td>
<td>.13</td>
</tr>
<tr>
<td>B4. psychological distress</td>
<td>.75</td>
<td>.18</td>
</tr>
<tr>
<td>B5. physiological reactivity</td>
<td>.70</td>
<td>.20</td>
</tr>
<tr>
<td>C1. avoid thoughts / feelings</td>
<td>.75</td>
<td>.12</td>
</tr>
<tr>
<td>C2. avoid activities / places</td>
<td>.76</td>
<td>.14</td>
</tr>
<tr>
<td>C3. inability to recall</td>
<td>.24</td>
<td>.36</td>
</tr>
<tr>
<td>C4. diminished interest</td>
<td>.14</td>
<td>.74</td>
</tr>
<tr>
<td>C5. detachment / estrangement</td>
<td>.12</td>
<td>.73</td>
</tr>
<tr>
<td>C6. diminished affect</td>
<td>.35</td>
<td>.51</td>
</tr>
<tr>
<td>C7. foreshortened future</td>
<td>.48</td>
<td>.40</td>
</tr>
<tr>
<td>D1. sleeping difficulties</td>
<td>.64</td>
<td>.18</td>
</tr>
<tr>
<td>D2. irritability</td>
<td>.18</td>
<td>.69</td>
</tr>
<tr>
<td>D3. concentration problems</td>
<td>-.01</td>
<td>.71</td>
</tr>
<tr>
<td>D4. hypervigilance</td>
<td>.21</td>
<td>.75</td>
</tr>
<tr>
<td>D5. exaggerated startle response</td>
<td>.21</td>
<td>.68</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Items are placed in component with highest loading (bold)
Component 1: mainly delivery-related items, mainly intrusions/ avoidance
Component 2: mainly delivery-unrelated items, mainly hyperarousal/ numbing

The A criterion in the Dutch version of the PSS-SR<sup>38</sup> referred to feelings in the past week, instead of during delivery (which the DSM-IV lists). By using this phrasing, the item may well measure negative delivery attributions rather than emotions during the event. Secondly, the PSS-SR only refers to a ‘threat to self’, but disregards a ‘threat to others’ (in this case the baby) as a possible characteristic of the traumatic event. In addition to point II, this may be another explanation for the markedly
lower percentage of women meeting criterion A1 on the PSS-SR than on the TES-B (3.5% vs. 38.1%). Thirdly, the phrasing in the Dutch version of the PSS-SR referred to guilt/shame/anger instead of fear/helplessness/horror as the DSM-IV does.

For criteria BCD, the TES-B consistently uses qualitative descriptions of frequency (never/not at all, rarely, sometimes, often), whereas answer categories on the PSS-SR refer to either qualitative frequencies, or quantitative frequencies (number of times in the past week), or intensity of symptoms. The DSM-IV does not provide a solution, as it refers to symptoms being persistently present, which could be assessed with both measures of frequency (e.g., 2-4 times) and intensity (e.g., very much), even though these may yield very different outcomes.

The DSM-IV unequivocally excludes the possibility of symptoms being present before exposure to the traumatic event. This may yield problems, especially in retrospective studies, since it cannot be excluded that posttraumatic stress symptoms overlap with pre-existent PTSD, and/or signs of depression and anxiety, such as anhedonia and hypervigilance. Indeed, in the present sample 26% of the respondents fulfilling the requirements for criterion E reported a duration of (one or more of the) symptoms which is longer than the time between delivery and completing the questionnaire. In accordance with the DSM-IV, both instruments contain items stating explicitly that symptoms should be present after the delivery only. However, item C7 (foreshortened future) of the TES-B does not distinguish between ante- and post-partum feelings, whereas the PSS-SR adequately assesses whether the feeling of foreshortened future is ‘due to the delivery’. In formulating item D1 (insomnia), the TES-B adds ‘because of visions or thoughts of the delivery’, whereas the PSS-SR only asks if the respondent has sleeping problems. Since this is not uncommon with a newborn, it is not likely a sign of psychopathology. The TES-B formulation, however, that it should be visions or thoughts of the delivery that cause the insomnia, is not in line with the DSM-IV requirements, even more so because sleeping difficulties are regarded as a sign of hyperarousal instead of re-experiencing.

The PSS-SR does not measure DSM-IV criterion E, and considers criterion F to be met with a certain sum-score of the 17 symptom items, rather than explicitly asking for disability and impairment. This is also a point of concern, as omitting criteria E and F from PTSD questionnaires has been shown to have marked effects on the prevalence of PTSD measured. Furthermore, the absence of criterion E may have resulted in an overestimation of prevalence. It should be noted that, even though the PSS-SR is still frequently used, Foa et al. developed an instrument based on the PSS-SR that does contain all DSM-IV criteria (the Posttraumatic Diagnostic Scale).

It is interesting that a small proportion of women (1.8 percent on TES-B and 2.1 percent on PSS-SR) fulfill all DSM-IV criteria except A, implying that they suffer from PTSD symptoms but did not experience their childbirth as traumatic. A number of explanations could account for these findings, one being pre-existent PTSD, given that the point prevalence of PTSD in women is estimated at 0.37
percent.\textsuperscript{37} It might also be that the less severe an event is, the more vulnerability factors such as personality characteristics play a role in the development of PTSD.\textsuperscript{38} Alternatively, women might experience difficulties in remembering certain parts of the delivery (in this sample 22.7 percent on the TES-B and 25.2 percent on the PSS-SR), which they therefore do not recall as being traumatic.

Limitations

Although one could argue that the failure to exclude women with stillbirths and late pregnancy terminations could be a confounder, the unselected population of this study justifies the inclusion of all pregnancies, and the low proportion of women with stillbirth or termination (n=4) is not likely to influence results. The unselected population may be regarded as an advantage, as it does not restrict the outcomes of this study to particular patient groups. The retrospective nature of this study is one of its main limitations, since women with pre-existent PTSD could not be excluded from the analyses. The response rate (47\%) is considered acceptable, and the proportion of home deliveries in this study (20\%) is in line with the general Dutch population (23\%).\textsuperscript{39} As with much research involving self-report questionnaires, highly educated women are overrepresented in this sample and (non-western) immigrants are underrepresented.

Recommendations

Given the fact that both measures have their strengths and weaknesses, the decision which questionnaire is to be preferred needs some consideration. The cut-off value used in the TES-B corresponds better with the notion that symptoms should be ‘pervasive’; the phrasing of answer categories is more consistent; and all criteria are explicitly assessed. However, the formulation of criterion A1 (‘childbirth was a trying experience’) poses a low threshold. The PSS-SR is a validated questionnaire with good internal consistency, and adequate sensitivity and specificity. Moreover, it has a clearer factor structure than the TES-B. The original version of the PSS-SR\textsuperscript{16} does not contain criteria AEF. In the Dutch translation criterion A has been added, but it contains several aspects that are not in line with the DSM-IV requirements. Additionally, consistency in response categories for criteria BCD is lacking (frequency vs. intensity of symptoms). Furthermore, the absence of criterion E may result in an overestimation of prevalence.

On the basis of the qualitative analysis, the contents of an ‘ideal’ self-report measure for PTSD following childbirth have been formulated (see table 7). Additionally, two suggestions for phrasing of items can be made: (I) omission of the item ‘childbirth was a trying experience’ in the TES-B; and (II) in referring to difficulties sleeping (item C1), addition of the phrase ‘not due to being awoken by my baby’ instead of referring to the delivery (TES-B) or no explicit mentioning (PSS-SR).

Considering that quantitative analysis revealed limited agreement between the two instruments, comparison of research findings based on different instruments to assess the prevalence of PTSD following childbirth should be done with utmost caution.
As reported by Ayers et al., it is topic of debate whether PTSD should be seen as a dichotomy or a continuum. Even though the cases identified and percentages of women meeting specific criteria differ depending on the instrument used, we consider it of clinical relevance that many women clearly suffer from posttraumatic stress symptoms following childbirth even though they do not meet all DSM-IV criteria.

Table 7. Contents of ideal self-report questionnaire for measuring PTSD following childbirth

<table>
<thead>
<tr>
<th>Items part of</th>
<th>Instructions referring to</th>
<th>Answer categories relating to</th>
<th>Cut-off value per item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criterion A1</td>
<td>feelings during the delivery: life endangered, threat to physical integrity (self or baby)</td>
<td>intensity</td>
<td>≥ 2 (on 0-3 scale)</td>
</tr>
<tr>
<td>Criterion A2</td>
<td>emotions during the delivery: fear / helplessness / horror</td>
<td>intensity</td>
<td>≥ 2 (on 0-3 scale)</td>
</tr>
<tr>
<td>Criteria BCD</td>
<td>feelings and emotions during the past month; symptoms not present before delivery</td>
<td>intensity or frequency (consistent)</td>
<td>≥ 2 (on 0-3 scale)</td>
</tr>
<tr>
<td>Criterion E</td>
<td>duration of symptoms (BCD)</td>
<td>duration (in months)</td>
<td>≥ 1 month</td>
</tr>
<tr>
<td>Criterion F</td>
<td>impairment of daily functioning</td>
<td>intensity</td>
<td>≥ 6 on 1-10 scale (not at all impaired ↔ very much impaired)</td>
</tr>
</tbody>
</table>

CONCLUSIONS

Given the limited agreement (κ = .24) between the TES-B and PSS-SR, two widely used instruments for measuring PTSD following childbirth, comparison between studies using different instruments for measuring PTSD following childbirth should be done with utmost caution. The subdimensions identified with Principal Components Analysis were rather similar for TES-B and PSS-SR, but both measures failed to confirm the DSM-IV three symptom categories, as the identified subdimensions distinguished only between childbirth related factors (re-experiencing/avoidance) and more general symptoms of depression and anxiety (hyperarousal/numbing). The current study resulted in a number of recommendations for instruction to respondents, phrasing of items, answer categories and cut-off values, that may enhance the validity and comparability of instruments for measuring PTSD following childbirth.
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POSTTRAUMATIC STRESS FOLLOWING CHILDBIRTH IN HOMELIKE AND HOSPITAL SETTINGS

Claire Al Stramrood
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Leonard WAR Berger
Ad JJM Vingerhoets
Willibrord CM Weijmar Schultz
Maria G van Pampus

ABSTRACT

Objectives
To assess the prevalence of PTSD following childbirth in homelike versus hospital settings and to determine risk factors for the development of posttraumatic stress symptoms.

Methods
Multi-center cross-sectional study at midwifery practices, general hospitals and a tertiary (university) referral center. An unselected population of 907 women was invited to complete questionnaires on PTSD, demographic, psychosocial and obstetric characteristics two to six months after delivery. Prevalence of PTSD was based on women who met all criteria of the diagnostic and statistical manual of mental disorders, 4th edition (DSM-IV), whereas risk factors were determined using the severity (sum-score) of posttraumatic stress symptoms.

Results
PTSD following childbirth was found in 1.2% of the respondents (5/428 women, response rate 47%), while 9.1% of women (39/428) had experienced the delivery as traumatic. Posttraumatic stress symptoms were associated with unplanned cesarean section, low sense of coherence (coping skills) and high intensity of pain. Initial differences in posttraumatic stress symptoms between home and hospital deliveries disappeared after taking into account the (by definition) uncomplicated nature of home births.

Conclusions
In this Dutch study, 1 in 100 women had PTSD following childbirth, with no differences between home- and hospital deliveries after controlling for complications and interventions. Emergency cesarean section, severe labor pain and poor coping skills were associated with more posttraumatic stress symptoms.

Keywords: posttraumatic stress syndrome, childbirth, obstetrics, perinatal mental health, postpartum
INTRODUCTION

Posttraumatic stress disorder (PTSD) is an anxiety disorder that can develop following confrontation with a traumatic stressor. The most characteristic symptoms are re-experiencing the event, avoidance of stimuli associated with the event and hyperarousal.\textsuperscript{1} Over the past decade, increasing attention has been devoted to childbirth as a possible traumatic event.\textsuperscript{2,3}

Studies performed between one and six months postpartum estimated that the prevalence of PTSD following childbirth ranged from 0.0\% to 5.9\%\textsuperscript{2-13}, although according to experts, 1-2\% is a realistic estimate in developed countries.\textsuperscript{14} Comparison of the findings in different studies should be done with the utmost caution, due to variations in operationalization (e.g. use of a selection of DSM-IV criteria versus all of them, different questionnaires and scoring methods), timing of measurements and sample composition.\textsuperscript{15}

Previous studies have identified many obstetric, personality and psychosocial factors that contribute to the development of PTSD following childbirth, whereas demographic factors, such as age, marital status and educational level, were consistently found to be unrelated to PTSD following childbirth.\textsuperscript{2,5,9,10} Additionally, no associations were observed between parity and PTSD\textsuperscript{5,6,8-10}; especially after other variables had been taken into account, such as mode of delivery.\textsuperscript{1} Obstetric interventions (e.g. emergency caesarean section and instrumental vaginal delivery) increased the risk of posttraumatic stress symptoms, which suggests a dose-response relationship between the intensity of the event and the risk of developing PTSD.\textsuperscript{6,16} In contrast, other studies have shown that vulnerability to mental problems is a stronger predictor than the objective severity of the event. While the possible influence of personality characteristics such as more general state anxiety, trait anxiety and coping strategies is controversial\textsuperscript{6,8,10,17}, strong associations were consistently found between anxiety/depression during pregnancy and PTSD after childbirth.\textsuperscript{8,9,13} The perceived degree of support, care and communication from the staff who assisted in the birth played crucial roles in how women reflected on the experience.\textsuperscript{10} Moreover, (subjective) experience and appraisals of childbirth were reported to be chief determinants in the development of PTSD.\textsuperscript{2}

Obstetric health care in The Netherlands comprises a fairly unique echelon system. All healthy women with uncomplicated medical and obstetrical histories enter the primary care system, in which pregnancy and delivery are monitored by independent midwives. Only in case of (an increased risk for) complications or interventions during pregnancy or delivery (as defined by national guidelines\textsuperscript{18}), women are referred to a gynecologist/obstetrician in a general hospital (secondary care) or University referral center (tertiary care). The majority of women (66\%) eventually deliver in a hospital under supervision of a gynecologist.\textsuperscript{19} In primary care, women can choose to deliver at home (23\%), or in a homelike setting in a hospital or birth center (11\%).\textsuperscript{20} Referral during labor is not uncommon: 26\% of women who start labor in primary care are referred to secondary care during the course of labor. Delivery settings greatly influence women’s appraisals of childbirth: a
large Cochrane review concluded that, compared to conventional hospital settings, women who
delivered in a homelike setting reported higher satisfaction and had lower intervention rates.\(^{21}\) In a recent Dutch study, women who had received prenatal and/or perinatal care from midwives in primary care settings described their childbirth experience as more negative after (a) hospital deliveries (compared to home births), (b) referral during labor, (c) emergency cesarean sections and (d) instrumental vaginal deliveries.\(^{22}\) It is not yet known whether these women are more likely to develop posttraumatic stress symptoms after hospital births.

The Dutch echelon system provides excellent opportunities to compare the occurrence of posttraumatic stress symptoms between homelike settings and hospital settings. Our aim was to evaluate the prevalence of PTSD following childbirth in all three care settings in The Netherlands, especially in relation to differences in obstetric complication- and intervention rates between the echelons. In addition to a number of previously reported risk factors for PTSD following childbirth, we examined the possible relation between PTSD and sense of coherence (SOC) and desire for control (DFC). We anticipated that women with high DFC have more PTSD symptoms, because in a previous study, the prevalence of PTSD was higher among women who felt they had lost control during childbirth.\(^{10}\) SOC refers to the ability to perceive a stressor as comprehensible, manageable and meaningful.\(^{23}\) We expected that women with high SOC have fewer PTSD symptoms. High SOC is considered to be synonymous with effective coping mechanisms.

**METHODS**

**Design and setting**

This cross-sectional multi-center study was conducted on a consecutive sample of puerperal women in The Netherlands. Two general hospitals (Apeldoorn and Breda), one tertiary (university) referral center (Groningen), and four midwifery practices in these cities were involved in data collection. This study was approved by the Medical Ethics Committees of the participating hospitals.

Data were collected from women who had delivered between 1 July and 1 October 2007. The interval since data collection has enabled us to perform extensive (new) analyses and to explore the steadily increasing array of potential risk factors.

**Population**

Women who had delivered two to six months prior to the study were eligible for inclusion. The rationale for this timing was that the DSM-IV criteria require symptoms to be present for at least one month and the researchers wished to minimize the chances that women had experienced a subsequent pregnancy and/or childbirth. In order to obtain an adequately large sample, a written request was sent to all the eligible women, followed by a reminder to non-responders. A maximum of 200 women per hospital and 100 per midwifery practice was applied to ensure ratios of home/hospital and first/second/third echelon births that were comparable with those in the Dutch
population of childbearing women. Women who delivered after 16 weeks of gestation or longer were approached, including women with pregnancy terminations and still-births.

**Measures**
Participants were invited to complete a web-based questionnaire on the basis of anonymity in relation to their health care providers, which implied that participants would not be informed or contacted in the case of clinically significant symptoms. Variables and outcome measures (PTSD) were not mentioned explicitly in the invitation letter.

The Traumatic Event Scale-B (TES-B)² was used, which has been developed specially to diagnose PTSD following childbirth. In line with the DSM-IV, PTSD was considered to be present when a respondent reported at least 1 out of 5 re-experiencing symptoms (criterion B), 3 out of 7 avoidance symptoms (criterion C) and 2 out of 5 hyperarousal symptoms (criterion D). Respondents rated the 17 symptoms on a four-point scale (0 to 3); a minimum score of 2 (‘sometimes’) was considered to reflect the presence of a symptom. In line with previous research⁴-¹⁷, the sum-score of these 17 symptoms (range 0-51) was calculated to evaluate associations with the possible contributing factors mentioned below. Criterion A (traumatic experience) was met when a woman reported having felt fear, helplessness and/or horror during childbirth, and considered the childbirth a trying experience, or a threat to the physical integrity or life of herself and/or the child. The duration of symptoms (E criterion) should be at least one month, and women should rate the degree to which their life is influenced by the symptoms (criterion F) as higher than 5 on a 10-point scale. Women should meet all criteria (A-F) for a PTSD diagnosis.

A specially designed 30-item open-question and multiple choice questionnaire was administered to obtain data on demographic factors, obstetric background, logistic features of the delivery and aspects related to pregnancy and childbirth. The following pregnancy complications were recorded: hypertension, pre-eclampsia / HELLP-syndrome (hemolysis, elevated liver enzymes, low platelets), antenatal blood loss, intra-uterine death, congenital defects, preterm premature rupture of membranes (PPROM) and membranes ruptured longer than 24 hours. Delivery complications include: unplanned cesarean section, instrumental vaginal delivery, postpartum hemorrhage, manual placenta removal, suturing at operating theater, ICU admittance, meconium stained amniotic fluid, asphyxia, neonatal infection treated with antibiotics, NICU admittance, and perinatal death. In addition, several questions were included to address the woman’s expectations concerning delivery (fear of childbirth (FoC) and fear of pain (FoP)) and her appraisal of the delivery (delivery as expected, pain as anticipated, intensity of pain).

The Hospital Anxiety and Depression Scale (HADS)²⁴-²⁵, is a widely-used screening instrument for measuring depression and anxiety. It has been designed especially for the hospital (somatic patient) setting, disregarding all possible somatic components of depression and anxiety, in order to avoid confounding with symptoms of somatic conditions. The HADS contains seven items to measure
anxiety and seven to measure depression, which are rated on a four-point scale (0 to 3). In order to achieve optimal sensitivity and specificity (approximately 0.80), anxiety and depression were measured as a dichotomy with a cut-off point of 8 or more on both scales.26

Desire for control (DFC) was assessed using a validated 13-item questionnaire (with 7-point Likert scales) to derive a sum-score.27 The frequently used Sense of Coherence (SOC) Questionnaire developed by Antonovsky was administered to measure the SOC construct. It contains 20 statements that can be rated on 7-point Likert scales.28

Statistical methods
Data were analyzed with SPSS 14.0, using a significance level of .05. Exploration of the continuous data revealed that the TES-B sum-scores were not normally distributed. Therefore, Spearman’s rho, Kruskal-Wallis and Mann-Whitney U-tests were used to make non-parametric group comparisons. A set of interactions was entered into a linear regression model to examine whether SOC and DFC acted as moderators. Hierarchical multiple regression analysis (HMRA) investigated which factors were associated with posttraumatic stress symptoms. TES-B sum-scores were log-transformed to meet the assumptions of normality (TESlog = \log(\text{sum-score}+1)). Variables with a p-value of lower than .10 in the univariate analyses were included in the HMRA. Three variables were excluded from the HMRA due to multicollinearity; (1) FoP overlapped with FoC. Since FoP is a known component of FoC (rather than the other way around), FoP was excluded; (2) pain worse than expected overlapped with pain intensity. Since pain intensity is a continuous variable (scale 1-10) that is more detailed than pain as expected (i.e. 3 options: worse, less, and ‘as expected’), pain worse than expected was excluded; (3) complications delivery overlapped with some more specific complications (unplanned cesarean section, instrumental vaginal delivery, preterm delivery), complications delivery was excluded.

RESULTS
A total of 907 eligible women who had delivered between 1 July and 1 October 2007 were invited to participate; 428 of them completed the questionnaires. The total response rate was 47%, and the response rates per echelon (primary/secondary/tertiary) were comparable (43-50%). Owing to strict patient privacy laws, the patient files of the non-responders could not be examined.

Non-parametric binomial tests revealed the following (dis)similarities between our respondents and data from the entire Dutch population of childbearing women19: the proportions of deliveries in primary care and home births were similar (35.3% vs. 33.6% and 20% vs. 23%, respectively); the percentages of multiple pregnancies (2.1% vs. 2.0%), preterm births (gestational age of 37 weeks or less: 9.1% vs. 7.9%), cesarean sections (16.7% vs. 15.1%) and instrumental deliveries (8.7% vs. 9.7%) were comparable; non-western immigrants were underrepresented among our respondents.
(7.0% vs. 17.3%); at the time of delivery, fewer women were <25 years (5.6% vs. 11.7%) and more were >35 years (28.3% vs. 21.9%) than the national average; our sample comprised slightly more primiparous women (49.8%) than the national average (45.1%), while the proportion of women with hypertensive disorders (11.9 vs. 8.3%) was somewhat higher than would be expected from the national data. Table 1 presents an overview of the characteristics of our participants, including differences between the three echelons. In primary care, women are higher educated than in the second and third echelon. Pregnancy complications are much lower in primary care, as they are an indication for referral to or consultation of a gynecologist (secondary care). In tertiary care, hypertension and congenital defects are quite common (30.6% for both), as well as pre-eclampsia/HELLP syndrome (19.4%), PPROM (13.9%), preterm delivery (58.3%), NICU admittance (55.6%) and perinatal death (16.7%).

In total, 1.2% of the women (5/428) met all the DSM-IV criteria for PTSD. DSM-IV symptom criteria (B, C & D) were met by 3.7% of the respondents (16/428), while 9.1% of the women (39/428) had experienced the childbirth as traumatic (criterion A). Further details regarding the proportion of women scoring above cut-off scores for each set of items can be found in another article on the same study. Median sum-score on the 17 items was 4, with a mean of 6.3. A sum-score of 0 (i.e. no symptoms) was found in 17.5% of the women (75/428). Sum-scores were higher (p=.001) at 4-6 months after delivery than at 2 or 3 months after delivery.

As measured with the HADS, the prevalence rates of clinically significant anxiety and depression symptoms were 22.7% and 14.3%, respectively. Anxiety and depression scores did not differ between the three echelons of care (primary/secondary/tertiary). Pearson’s correlation between the TES-B and HADS sum-scores was 0.66. Women who met the cut-off point of 8 on the anxiety subscale had significantly higher TES-B sum-scores than those who did not (12.8 vs 4.4; p<0.001). Similarly, for depression these sum-scores were 11.1 and 4.4 (p<0.001).

Associations between each of the independent variables and the TES-B sum-scores (i.e. posttraumatic stress symptoms) are shown in table 2. Women with deliveries in primary care had significantly lower mean sum-scores (5.0) than those in secondary care (6.7) or tertiary care (9.3). Home deliveries were also associated with fewer PTSD symptoms than hospital deliveries, irrespective of whether the latter had been planned or followed referral during labor (mean TES-B sum-scores: 4.5, 6.8 and 7.0, respectively; p=.015). Among women delivering in primary care, there was no difference in TES-B sum-scores between women with planned homebirths and those with planned hospital births (4.5 vs. 5.7; p=.273). However, among women with planned home deliveries, those actually giving birth at home had fewer posttraumatic stress symptoms, than those who were referred to the hospital during labor (mean TES-B sum score 4.5 vs. 7.0; p=.024). Overall, no difference in posttraumatic stress symptoms was found between women with planned homebirths and women with planned hospital births (mean TES-B sum scores 4.7 vs. 6.8; p=.353).
Table 1. Population characteristics and differences between the three echelons of care

<table>
<thead>
<tr>
<th>Factor</th>
<th>Primary care (n = 151)</th>
<th>Secondary care (n = 241)</th>
<th>Tertiary care (n = 36)</th>
<th>χ² or K-W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td>n or M (± SD) % or range</td>
<td>n or M (± SD) % or range</td>
<td>n or M (± SD) % or range</td>
<td>χ² or K-W</td>
</tr>
<tr>
<td>Age (years)</td>
<td>32 (± 4) 17-45</td>
<td>32 (±4) 32 (±4)</td>
<td>32 (±5)</td>
<td>.173</td>
</tr>
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<td>Education</td>
<td>Upper level Secondary / University</td>
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<td>74.2 42.7</td>
<td>55.6 &lt;.001 *</td>
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<tr>
<td>Marital status</td>
<td>Married / co-habiting</td>
<td>413 96.5 96.0 96.7 97.2</td>
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<td></td>
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<td>Country of origin</td>
<td>The Netherlands</td>
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<td>Obstetric history</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscarriage / termination of pregnancy</td>
<td>103 24.1 14.6 28.2 36.1</td>
<td>.002 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primiparity</td>
<td>213 49.8 43.0 54.4 47.2</td>
<td>.088</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multiple pregnancy</td>
<td>9 2.1 0.0 2.1 11.1</td>
<td>&lt;.001 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy complications</td>
<td>198 46.3 17.2 58.1 88.9</td>
<td>&lt;.001 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delivery - medical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preterm delivery</td>
<td>&lt; 37 weeks gestation</td>
<td>39 9.1 1.3 6.6 58.3</td>
<td>&lt;.001 *</td>
<td></td>
</tr>
<tr>
<td>Postterm delivery</td>
<td>&gt; 42 weeks gestation</td>
<td>24 5.6 0.0 9.5 2.8</td>
<td>&lt;.001 *</td>
<td></td>
</tr>
<tr>
<td>Onset</td>
<td>Spontaneous</td>
<td>307 72.6 97.3 59.8 52.9</td>
<td>&lt;.001 *</td>
<td></td>
</tr>
<tr>
<td>Induction</td>
<td>82 19.4 2.7 28.9 26.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCS</td>
<td>34 8.0 0.0 11.3 20.6</td>
<td></td>
<td></td>
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</tr>
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<td>Mode</td>
<td>NVD</td>
<td>316</td>
<td>74.5</td>
<td>100.0</td>
</tr>
<tr>
<td>--------------</td>
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<td>-------</td>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td>IVD</td>
<td>37</td>
<td>8.7</td>
<td>0.0</td>
<td>15.1</td>
</tr>
<tr>
<td>UPCS</td>
<td>37</td>
<td>8.7</td>
<td>0.0</td>
<td>13.4</td>
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<tr>
<td>PCS</td>
<td>34</td>
<td>8.0</td>
<td>0.0</td>
<td>11.3</td>
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<td>Pain medication</td>
<td>101</td>
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<td>13.2</td>
<td>29.5</td>
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<tr>
<td>Delivery complications</td>
<td>189</td>
<td>44.6</td>
<td>15.2</td>
<td>56.5</td>
</tr>
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<td>IVD or UPCS</td>
<td>74</td>
<td>17.5</td>
<td>0.0</td>
<td>28.5</td>
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<tr>
<td>Suture at operating theater</td>
<td>12</td>
<td>2.8</td>
<td>2.6</td>
<td>2.5</td>
</tr>
<tr>
<td>Manual placenta removal</td>
<td>15</td>
<td>3.5</td>
<td>1.3</td>
<td>4.2</td>
</tr>
<tr>
<td>Postpartum hemorrhage (&gt;1 liter)</td>
<td>34</td>
<td>8.0</td>
<td>2.0</td>
<td>11.0</td>
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<td>Infection treated with antibiotics</td>
<td>7</td>
<td>1.7</td>
<td>0.7</td>
<td>2.1</td>
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<td>Mother admitted to ICU</td>
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<td>0.7</td>
<td>0.0</td>
<td>0.4</td>
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<td>Meconium-stained amniotic fluid</td>
<td>48</td>
<td>11.3</td>
<td>6.6</td>
<td>14.3</td>
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<tr>
<td>Asphyxia</td>
<td>25</td>
<td>5.9</td>
<td>2.0</td>
<td>8.4</td>
</tr>
<tr>
<td>Infant admitted to N(I)CU</td>
<td>67</td>
<td>15.8</td>
<td>3.3</td>
<td>17.6</td>
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<tr>
<td>Perinatal death</td>
<td>6</td>
<td>1.4</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>Location delivery</td>
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<td></td>
<td></td>
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<tr>
<td>Home</td>
<td>86</td>
<td>20.1</td>
<td>57.0</td>
<td>0.0</td>
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<td>Hospital</td>
<td>298</td>
<td>69.6</td>
<td>43.0</td>
<td>83.0</td>
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<td>Referral from home to hospital</td>
<td>44</td>
<td>10.3</td>
<td>0.0</td>
<td>17.0</td>
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</table>
Table 1. Continued

<table>
<thead>
<tr>
<th>Factor</th>
<th>Primary care (n = 151)</th>
<th>Secondary care (n = 241)</th>
<th>Tertiary care (n = 36)</th>
<th>χ² or K-W</th>
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<td>n or M (±SD)</td>
<td>% or range</td>
<td>n or M (±SD)</td>
<td>% or range</td>
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<td>Delivery - psychological</td>
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<tr>
<td>Fear of childbirth</td>
<td>3 (± 2.6)</td>
<td>1-10</td>
<td>2 (± 2.5)</td>
<td>4 (± 2.7)</td>
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<tr>
<td>Fear of pain</td>
<td>3 (± 2.5)</td>
<td>1-10</td>
<td>3 (± 2.6)</td>
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<tr>
<td>Delivery worse than expected</td>
<td>122</td>
<td>28.5</td>
<td>14.6</td>
<td>36.5</td>
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<tr>
<td>Pain worse than expected</td>
<td>148</td>
<td>34.6</td>
<td>24.5</td>
<td>41.5</td>
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<tr>
<td>Intensity of pain</td>
<td>7 (± 2.7)</td>
<td>1-10</td>
<td>6 (± 2.4)</td>
<td>7 (± 2.8)</td>
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<td>Sense of Coherence</td>
<td>35 (±10)</td>
<td>16-73</td>
<td>33 (±10)</td>
<td>35 (±10)</td>
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<tr>
<td>Desire for Control</td>
<td>90 (±14)</td>
<td>50-128</td>
<td>91 (±12)</td>
<td>90 (±15)</td>
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</table>

* p<.05

M, median; SD, standard deviation; χ², chi-square test; K-W, Kruskal-Wallis one-way analysis of variance; NVD, normal vaginal delivery; IVD, instrumental vaginal delivery; PCS, planned cesarean section; UPCS, unplanned cesarean section; ICU, intensive care unit; N(I)CU, neonatal (intensive) care unit
Table 2. Associations between independent variables and sum-scores on the TES-B

<table>
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<tr>
<th>Factor</th>
<th>Statistical measure</th>
<th>p-value</th>
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<tr>
<td>Demographics</td>
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<tr>
<td>Age yrs (&lt;25; 25-34; ≥35)</td>
<td>Kruskal-Wallis</td>
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<td>Educational level</td>
<td>Kruskal-Wallis</td>
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<td>Mann-Whitney</td>
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<td>Country of origin (The Netherlands vs. other)</td>
<td>Mann-Whitney</td>
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<td>Mann-Whitney</td>
<td>.306</td>
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<td>Pregnancy</td>
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<td></td>
</tr>
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<td>Parity (primiparity vs. multiparity)</td>
<td>Mann-Whitney</td>
<td>&lt;.001 *</td>
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<td>Multiple pregnancy</td>
<td>Mann-Whitney</td>
<td>.366</td>
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<tr>
<td>Complications</td>
<td>Mann-Whitney</td>
<td>.006 *</td>
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<tr>
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</tr>
<tr>
<td>Complications</td>
<td>Mann-Whitney</td>
<td>&lt;.001 *</td>
</tr>
<tr>
<td>Preterm delivery (&lt;37 weeks)</td>
<td>Mann-Whitney</td>
<td>.008 *</td>
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<td>Postterm delivery (&gt;42 weeks)</td>
<td>Mann-Whitney</td>
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<tr>
<td>Onset (spontaneous vs. induction; excl. PCS)</td>
<td>Mann-Whitney</td>
<td>.031 *</td>
</tr>
<tr>
<td>Mode (NVD, IVD, PCS, UPCS)</td>
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<td>&lt;.001 *</td>
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<td>Pain medication</td>
<td>Mann-Whitney</td>
<td>.161</td>
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<td>Suture at operating theater</td>
<td>Mann-Whitney</td>
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<td>Manual placenta removal</td>
<td>Mann-Whitney</td>
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</tr>
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<td>Postpartum hemorrhage (&gt;1 liter)</td>
<td>Mann-Whitney</td>
<td>.011 *</td>
</tr>
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<td>Infection treated with antibiotics</td>
<td>Mann-Whitney</td>
<td>.278</td>
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<td>Mother admitted to ICU</td>
<td>Mann-Whitney</td>
<td>.081</td>
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<td>Meconium-stained amniotic fluid</td>
<td>Mann-Whitney</td>
<td>.908</td>
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<td>Asphyxia</td>
<td>Mann-Whitney</td>
<td>.543</td>
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<tr>
<td>Infant admitted to N(l)ICU</td>
<td>Mann-Whitney</td>
<td>.001 *</td>
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<tr>
<td>Perinatal death</td>
<td>Mann-Whitney</td>
<td>.026 *</td>
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<tr>
<td>Delivery - logistics</td>
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<tr>
<td>Echelon (1st vs. 2nd or 3rd)</td>
<td>Mann-Whitney</td>
<td>.006 *</td>
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<tr>
<td>Location delivery (home vs. hospital or home/hospital)</td>
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<td>.013 *</td>
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Table 2. Continued

<table>
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<tr>
<th>Factor</th>
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<td><strong>Psychological</strong></td>
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<tr>
<td>Fear of childbirth</td>
<td>Spearman’s rho</td>
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<tr>
<td>Fear of pain</td>
<td>Spearman’s rho</td>
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<td>Pain (worse than expected)</td>
<td>Kruskal-Wallis</td>
<td>&lt;.001 *</td>
</tr>
<tr>
<td>Pain intensity (low - high)</td>
<td>Spearman’s rho</td>
<td>&lt;.001 *</td>
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<tr>
<td>Sense of Coherence</td>
<td>Spearman’s rho</td>
<td>&lt;.001 *</td>
</tr>
<tr>
<td>Desire for Control</td>
<td>Spearman’s rho</td>
<td>.454</td>
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</table>

* p<.05

Spearman’s rho, Spearman’s rank order coefficient; Mann-Whitney, Mann-Whitney U-test; Kruskal-Wallis, Kruskal-Wallis one-way analysis of variance; NVD, normal vaginal delivery; IVD, instrumental vaginal delivery; PCS, planned cesarean section; UPCS, unplanned cesarean section; ICU, intensive care unit; N(I)CU, neonatal (intensive) care unit; MW, midwife; GYN, gynecologist

Women who delivered in secondary or tertiary care experienced their childbirth more often as traumatic than those in primary care (12.1 vs. 3.4%). FoC and FoP were strongly correlated (Spearman’s rho=.78, p<.001) and higher levels were connected with higher TES-B sum-scores. No difference in the levels of FoC were found between women with planned home deliveries and those with planned hospital deliveries under the supervision of a midwife (average rating 3.2 vs 3.5; p=.429). The percentage of women reporting the delivery to be ‘worse than expected’ was higher among those with hospital deliveries (33%) and referral during labor (39%) than among women with home deliveries (9%; p<.001). The average rating of pain intensity (on a scale from 1-10) was significantly higher in women who received pain relief during labor (cesarean section excluded) than in those who did not (7.5 vs. 5.9; p<.001).

The relationship between age and posttraumatic stress symptoms proved to be non-linear; younger and older women reported less symptoms than the women around the age of thirty years. Primiparous women had higher scores than multiparous women, which indicates more posttraumatic stress symptoms. After controlling for the mode of delivery, the association between parity and posttraumatic stress symptoms was no longer significant. Higher sum-scores were found in women with pregnancy complications and/or delivery complications (p=.006 and p=.027, respectively). Analysis of the pregnancy complications listed in table 1 revealed that only preeclampsia/HELLP was independently associated with higher sum-scores (p=.044). TES-B sum-
scores were significantly higher in women with induced deliveries than in those with spontaneous onset and planned cesarean sections. Furthermore, mean sum-scores were lower in women with planned cesarean sections (5.1) or normal vaginal deliveries (5.7) than in those with instrumental vaginal deliveries (8.5) or unplanned cesarean sections (10.7).

There was no significant association between DFC and the PTSD sum-scores (Spearman’s rho=.04, p=.454). In contrast, a strong negative correlation (Spearman’s rho= −.59, p<.001) was found between SOC and the TES-B sum-scores. Linear regression analysis with the inclusion of interaction terms between SOC, DFC and other independent variables showed that SOC and DFC did not moderate the relationship between the independent variables and the sum-scores on the TES-B (data not shown).

Before performing a hierarchical multiple regression analysis on the variables with p-values lower than .10 in the univariate analysis, four variables were excluded to prevent multicollinearity. In step 1, predisposing factors and pregnancy-related factors were entered into the model, followed by possible components of traumatic childbirth (step 2) and psychological factors (expectations and appraisal) in step 3. This model explained 41% of the variance in the TES-B sum-scores. In the final model (table 3), significant predictors of high TES-B sum-scores were unplanned cesarean section, high intensity of pain and low sense of coherence.

**DISCUSSION**

The aims of the present study were twofold: to assess the prevalence of PTSD following childbirth in homelike versus hospital settings, and to determine risk factors for the development of posttraumatic stress symptoms. The overall prevalence of PTSD following childbirth in The Netherlands was found to be 1.2 percent, which was higher than the estimated point prevalence (0.37%) in the general population.²⁸ Compared to several previous studies on PTSD following childbirth,³⁶,³⁸,⁸,ⁱ⁰,¹² this rate can be considered fairly low, but it was based on the strict application of all the DSM-IV criteria. In contrast, several earlier studies⁷,⁹,¹³ based their prevalence rates on the percentage of women who met only the DSM-IV symptom criteria B, C and D (3.7% in the present study), or failed to include the stressor (criterion A).³,¹⁰ Although the TES-B is childbirth-specific and contains all of the DSM-IV criteria, some critical remarks have been made about the phrasing of its items. It is particularly questionable whether the use of “a trying experience” is equivalent to traumatic childbirth.¹⁵

After controlling for complications and interventions during delivery, significant differences in PTSD sum-scores between home- and hospital births were no longer observed. The finding that complications and interventions were associated with more posttraumatic stress symptoms does not necessarily imply a causal relationship. In the literature, anxious and depressed women were not only found to be at higher risk of PTSD following childbirth⁷,⁹,¹³, but psychological distress was
also associated with more complications during pregnancy and delivery. Therefore, in addition to complications leading to more posttraumatic stress symptoms, it could also be the other way around: psychological distress might also have been a causal factor in complications during pregnancy and delivery.

Table 3. Hierarchical Multiple Regression Analysis of the TES-B sum-scores\(^1\) (n=428)

<table>
<thead>
<tr>
<th>Model</th>
<th>(R^2)</th>
<th>(\Delta R^2)</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1: Predisposing- and pregnancy-related factors</strong></td>
<td></td>
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<tr>
<td>Country of origin</td>
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<tr>
<td>Primiparity</td>
<td>.059</td>
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<td></td>
</tr>
<tr>
<td>Preeclampsia / HELLP syndrome</td>
<td>.078</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>.039</td>
<td></td>
<td></td>
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<tr>
<td>Preterm delivery (&lt;37 wks gestation)</td>
<td>.044</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2: Characteristics of traumatic childbirth</strong></td>
<td>.058</td>
<td></td>
<td></td>
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<tr>
<td>Secondary/ tertiary care</td>
<td>-.089</td>
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<td>Hospital delivery</td>
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<td>Induction of labor</td>
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<td>Instrumental vaginal delivery</td>
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<tr>
<td>Unplanned cesarean section</td>
<td>.112</td>
<td>**</td>
<td></td>
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<tr>
<td>Postpartum hemorrhage (&gt;1 liter)</td>
<td>.055</td>
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<td>Manual placenta removal</td>
<td>.036</td>
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<tr>
<td>Perinatal death</td>
<td>.062</td>
<td></td>
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<tr>
<td>N(I)CU admittance (infant)</td>
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<td>ICU admittance (mother)</td>
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<td><strong>Step 3: Psychological factors</strong></td>
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<td>.294</td>
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<tr>
<td>Fear of childbirth (high)</td>
<td>.022</td>
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<tr>
<td>Delivery worse than expected</td>
<td>.014</td>
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<tr>
<td>Intensity of pain (high)</td>
<td>.113</td>
<td>*</td>
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</tr>
<tr>
<td>Sense of Coherence (low)</td>
<td>.531</td>
<td>**</td>
<td>***</td>
</tr>
</tbody>
</table>

\* p<.05; ** p<.01; *** p<.001
\(^1\)TES-B sum-scores were logarithmically transformed (\(\ln(\text{sum-score}+1)\)); \(R^2\), explained variance. Final step shown.
Many baseline differences (e.g. instrumental vaginal deliveries, cesarean sections, preterm deliveries) between women in primary, secondary and tertiary care can be explained by the fact that pregnancy or delivery complications/interventions are by definition referred to secondary/tertiary care. We found that women with hospital deliveries, tertiary care deliveries and referral during labor reported more PTSD symptoms. This may be due to the institutional nature of a hospital, which could be perceived as more intimidating or impersonal than home(like) settings. However, it is also possible that “broken expectations” have contributed to a negative or even traumatic birth experience, considering that women with hospital deliveries (including referral during labor) more often qualified the delivery as being ‘worse than expected’ than those with home deliveries. Additionally, the (by definition) uncomplicated nature of home births and primary care hospital deliveries (and subsequently higher intervention- and complication rates in hospitals), may explain the identified differences, rather than the hospital setting as such. Indeed, when controlling for complications and interventions during delivery, significant differences in PTSD sum-scores between the echelons, and between home- and hospital births no longer persisted.

In accordance with the findings reported by Söderquist et al.4, no significant difference in PTSD scores was observed between primiparity and multiparity after controlling for mode of delivery. Unplanned cesarean sections and (to a lesser extent) instrumental deliveries were identified as risk factors for PTSD in line with the conclusions drawn in previous studies.36,30 Complications that are often linked to preterm birth (e.g. N(I)CU admission, perinatal death, preeclampsia) were associated with more posttraumatic stress symptoms, which is in accordance with other studies.31,32

No relationship was found between pain medication and PTSD, which might have been due to the wide range of methods used to reduce pain: from the most effective method (epidural anesthesia)33,34 to methods with uncertain effects (e.g. acupuncture and transcutaneous electric nerve stimulation). Contrary to Czarnocka et al.10, our study revealed a strong association between the intensity of labor pain and the development of posttraumatic stress symptoms. This finding can be attributed to the fact that pain causes stress, leading to both mental and physiological responses.35 It may seem contradictory that intensity of labor pain is related to posttraumatic stress symptoms, but pain relief is not. Our data showed that women who received (any form of) pain medication reported significantly higher pain intensity scores. We could hypothesize that these women received pain medication exactly because they suffered from a lot of pain, and therefore report high pain intensity retrospectively. It could also be that women requesting pain medication are different (e.g. in personality or coping abilities) from women who managed to deliver without medication, and that this difference also plays a role in the development of posttraumatic stress symptoms. However, with the current data it is not possible to draw such conclusions.

Women with high scores on the FoC scale and/or who described labor (pain) as ‘worse than expected’ (negative cognitive appraisal) had more posttraumatic stress symptoms. These associations have
been reported before, although others did not find an association between FoC and PTSD. Due to the retrospective nature of our study, these findings should be interpreted with caution. It is possible that when given the choice (i.e. in primary care), women who have high scores on the FoC scale would prefer to give birth in a hospital. This might lead to the conclusion that the nature of hospital deliveries increases women’s FoC, whereas the real background of this connection lies in selection bias. This study dismissed the latter explanation, as no differences were found in FoC levels between women with planned homebirths and those with planned hospital deliveries under the supervision of a midwife. The average FoC rating was higher in the secondary/tertiary care than in primary care (4 vs. 2 on a 1-10 scale). Even when controlling for FoC, differences in posttraumatic stress symptoms between primary vs. secondary/tertiary care maintained, indicating that the differences in PTSD symptoms between the echelons are not merely due to differences in FoC.

Previous studies have demonstrated that women who felt that they had lost control during childbirth had more posttraumatic stress symptoms. Therefore, we analyzed whether women’s DFC played a moderating role. However, contrary to expectations, no association was found between DFC and posttraumatic stress symptoms. SOC and DFC did not moderate the relationship between the independent variables and the sum-score on the TES-B. Although SOC did not play a moderating role, it was strongly negatively associated with the TES-B sum-score (Spearman’s rho = –.59, p < .001), which signifies that women with high SOC have fewer posttraumatic stress symptoms. However, the precise nature of this association is not yet clear. Two previous studies have suggested that in specific situations, high SOC may prevent the development of posttraumatic stress symptoms after childbirth, whereas a third study failed to find a significant association in an unselected population. A recent meta-analysis concluded that SOC is relatively stable over time, but evidence has also been put forward that negative life events (such as traumatic delivery) can lower SOC scores. As pre-delivery SOC levels were unknown in our study population, we cannot draw any definite conclusions about the role of SOC in the development of posttraumatic stress symptoms.

To evaluate the course of PTSD, anxiety, depression and also SOC, prospective research is necessary, with baseline measurements prior to delivery. Future studies should focus on early identification of ‘vulnerable’ women and on the efficacy of interventions aimed at reducing the risk of developing PTSD and posttraumatic stress symptoms. Although complications cannot always be avoided, clear and open communication together with strong (perceived) support from staff appear to be major determinants in how women experience childbirth.

The retrospective nature of this study was one of its major limitations, because women with pre-existing PTSD could not be excluded from the analyses. In addition, owing to strict patient privacy laws and the lack of informed consent, the patient files of the non-responders could not be examined. In comparison to the national average, younger mothers, immigrant women and lower educated women were somewhat underrepresented. It could not be determined whether this
is due to selection bias within this sample (n=907), or a difference between this sample and the national average. Nonetheless, the responders were well in line with the national averages on a number of crucial variables. Due to the current sample size, the risk factor analyses had to be based on posttraumatic stress symptoms rather than on PTSD. Our analyses did not include some of the previously identified risk factors for PTSD following childbirth, such as anxiety and depression during pregnancy, (perceived lack of) support from the partner and staff during childbirth, intimate partner violence, previous abuse, or previous traumatic deliveries. It could be argued that the inclusion of women with stillbirths and late pregnancy terminations confounded our results, but our aim was to obtain data from an unselected population and these numbers were so small (n=4) that they are not likely to have influenced the results.

In summary, we can conclude that PTSD following childbirth is a serious condition that affects at least one in 100 women. Many more women were found to be suffering from one or more PTSD symptoms, although they did not meet all the DSM-IV criteria for PTSD. Rather than the institutional nature of a hospital per se, the higher intervention- and complication rates in hospitals and the broken expectations of women whose delivery did not go as planned, may well explain the differences in posttraumatic stress symptoms between the three echelons and between home- and hospital births. Even though the retrospective nature of this study does not allow us to draw definite conclusions about the direction of associations, posttraumatic stress symptoms were related to obstetric complications and interventions (such as unplanned cesarean section), low sense of coherence, and appraising the delivery and labor pain as being ‘worse than expected’.
REFERENCES


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POSTTRAUMATIC STRESS DISORDER, ANXIETY AND DEPRESSION FOLLOWING PREGNANCIES CONCEIVED THROUGH FERTILITY TREATMENTS

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Hinke H Haisma
Ad JJM Vingerhoets
Willibrord CM Weijmar Schultz
Maria G van Pampus
ABSTRACT

Objectives
To compare the postpartum prevalence of Posttraumatic Stress Disorder (PTSD), anxiety and depression in women who conceived via medically assisted conception (MAC) and women who conceived naturally.

Methods
All women (n=907) who delivered under supervision of four independent midwifery practices and three hospitals in the Netherlands during a 3 month period were asked to complete questionnaires on demographic, logistic, psychosocial and obstetric characteristics two to six months postpartum. In this cross-sectional study PTSD was measured with the Traumatic Event Scale-B; anxiety and depression were measured with the Hospital Anxiety and Depression Scale.

Results
The response rate was 47% (428 participants). No significant differences were found in the prevalence of PTSD (0.0% vs. 1.3%; odds ratio [OR]= 0.0 (95% confidence interval [CI]: 0 - 1)), anxiety (28.1% vs. 22.2%; OR=1.4 (CI: 0.6-3.1)) and depression (9.4% vs. 14.6% (OR= 0.6 (CI: 0.8-2.0)) between the 32 women who conceived via MAC and the 396 women who conceived naturally.

Conclusions
We did not find significant differences in the prevalence of PTSD, anxiety and depression between women who conceived via MAC and women who conceived naturally.

Keywords: anxiety, depression, IVF, MAC, postpartum, posttraumatic stress disorder
INTRODUCTION

In 2008, 3.2% of the 177,713 infants born in The Netherlands were born as a result of Medically Assisted Conceptions (MACs), such as Intrauterine Insemination (IUI), Ovulation Induction (OI), In Vitro Fertilization (IVF) and Intracytoplasmic Sperm Injection (ICSI). As in many Western societies, the number of women treated with and babies born after these fertility treatments in the Netherlands is increasing. In thirteen years time, the percentage of infants born after IVF or ICSI in the Netherlands has doubled, from 1.3% in 1996 to 2.6% in 2009.1,2

Conceiving and giving birth to a desired child is assumed to be a happy life-event, particularly for a woman who has a history of infertility and has expended much effort in becoming a mother. However, the potential burden of infertility and infertility treatment can make the transition from infertility to pregnancy and to motherhood complex and emotional time.3,4 It is known that infertility affects emotional well-being, satisfaction with life and self-esteem and that failed fertility treatment is associated with diminished life satisfaction, reduced self-confidence and substantial psychological distress.5 Several studies have reported high levels of distress, anxiety and depressive symptoms in women undergoing fertility treatment.3-5 Women who became pregnant as a result of IVF were more anxious during early pregnancy than those who conceived naturally.6-8 These differences were no longer reported in late pregnancy and early parenthood and the effects of a latent infertility crisis were not prominent when the children were 1 year old, suggesting that distress disappears when IVF-treatment results in continuing pregnancy.9-11 However, formerly infertile women may fear being judged for ‘complaining after they finally got what they wanted’ (i.e., a continuing pregnancy)7, possibly resulting in an underestimation of the prevalence of psychological problems in these women.12 Following stress-coping models on adjustment to chronic stressors,7 our study focuses on the following mental conditions: posttraumatic stress disorder (PTSD), anxiety and depression.

PTSD is an anxiety disorder that can occur following the experience or witnessing of a traumatic life-threatening event. The prevalence of PTSD following childbirth in the Netherlands is 1.2%13, which is in line with the 1-2% reported in other developed countries.14 To date, no studies have focused specifically on (symptoms of) PTSD in formerly infertile women during or after pregnancy.

Anxiety rates are generally higher in postpartum women than in the general population and one in eight women develops postpartum depression.15 Apart from the negative effects on the psychological well-being of the mother, anxiety and depression may also result in an impaired mother-infant relationship which can lead to negative effects on children’s emotional and behavioral development.16 Currently, little is known about the effects of MAC on postpartum well-being. A large systematic review17 presented an overview on how women adjust emotionally after IVF. Only 27 of the 706 studies had investigated the women’s emotional adjustment with standardized measures in relation to norm or control groups. None of these studies had explored
the postpartum prevalence of PTSD, anxiety or depression in women having conceived via IVF. Another systematic review\(^6\) revealed no differences in postpartum anxiety or depression between women who had conceived through IVF or ICSI and women who had conceived naturally. Recently, higher anxiety levels\(^{13}\) and more depressive symptoms\(^{24}\) have been demonstrated among the 25 women who conceived through fertility treatment at three months postpartum compared to 39 women who conceived naturally.

The aim of the current study is to investigate whether the prevalence rates of postpartum PTSD, anxiety and depression in women conceiving through MAC are higher than in women having conceived naturally.

**MATERIALS AND METHODS**

**Design and study population**

This study is part of a larger cross-sectional multi-center study on the prevalence of and risk factors for posttraumatic stress following childbirth in the Netherlands by Straamrood et al.\(^8\) The Netherlands has a rather unique echelon system in perinatal care. In primary care, pregnancy and delivery are monitored by a midwife or general practitioner and women can choose to deliver at home (23%), or in a homelike setting in a hospital or birth centre (11%)\(^26\) In case of (an increased risk for) complications or interventions during pregnancy or delivery, as defined by national guidelines\(^{26}\), women are referred to a gynecologist. The majority of women (66%) deliver under supervision of a gynecologist in a hospital (secondary care), or in an academic referral centre (tertiary care).\(^1\) This study was conducted in two general hospitals (Apeldoorn, Breda), one academic referral center (Groningen) and four midwifery practices in these same cities between November 2007 and January 2008. All women who gave birth between July and October 2007 at 16 weeks gestation or longer (including those who had a pregnancy termination or stillbirth) were invited to participate in the study. The study was approved by the Medical Ethics Committees of the three participating hospitals.

**Measures**

All 907 women who gave birth in the participating centers during the aforementioned time period, were invited to complete a 30-45 minute web based questionnaire, with questions on demographic factors, obstetric background, fertility history, logistic features of delivery and their mental well-being. Information about complications during pregnancy and delivery was obtained from medical histories. The following pregnancy complications were recorded: hypertension, preeclampsia / HELLP-syndrome (hemolysis, elevated liver enzymes, low platelets), antenatal blood loss, intrauterine death, congenital defects, preterm premature rupture of membranes and membranes ruptured longer than 24 hours. We considered the following as delivery complications: preterm delivery (<37 weeks), post term delivery (> 42 weeks), induction of labor, instrumental delivery, cesarean section, episiotomy, laceration, suturing in operating room, manual placenta removal,
postpartum hemorrhage (>1 liter), infection treated with antibiotics, patient admitted to Intensive Care Unit (ICU), meconium-stained amniotic fluid, asphyxia, infant admitted to N(I)CU, perinatal death and congenital malformations.

The Traumatic Event Scale-B (TES-B)27 and The Hospital Anxiety and Depression Scale (HADS)28 were used to screen for PTSD, anxiety and depression. The TES-B has been developed especially for measuring PTSD following childbirth. The internal consistency of the TES-B is good (Cronbach’s α coefficient was 0.87)29 Corresponding to the DSM-IV, at least 1 of 5 re-experiencing symptoms (criterion B), 3 of 7 avoidance symptoms (criterion C) and 2 of 5 hyperarousal symptoms (criterion D) should be present for the diagnosis PTSD to be considered. The 17 symptoms are rated on a four-point Likert-scale (0 to 3), where a minimum score of 2 (“sometimes”) is indicating a symptom to be present. The A criterion (traumatic experience) is met when women report to have felt fear, helplessness, or disgust during childbirth and when they also consider the childbirth as a trying experience or a threat to the physical integrity or life of themselves and/or the baby. The duration of symptoms (E criterion) should be at least one month, and women should rate the severity of the symptoms (criterion F) higher than 5 on a 10-point scale. To diagnose PTSD (dichotomized yes/no), all ABCDEF criteria have to be met. A sum score was calculated by adding the scores on the 17 symptom items.

The HADS28 is a frequently applied self-rating instrument for anxiety and depression. It has been designed especially for the hospital (somatic patient) setting, disregarding possible somatic components of depression and anxiety, in order to avoid confounding with symptoms of somatic conditions. The HADS was found to perform well in assessing the symptom severity of anxiety disorders and depression in somatic and psychiatric patients, as well as in primary care patients and in the general population.30 Furthermore, it has equally good sensitivity and specificity as other commonly used self-rating screening instruments.31 The HADS contains seven items for measuring anxiety and seven for depression, which are rated on a four-point-Likert scale from 0 to 3. To achieve optimal sensitivity and specificity (approximately 0.80), anxiety and depression were categorized into dichotomous variables, with a cut-off point of 8 or more on both scales30 for clinically significant anxiety and depression. A sum score can be calculated for anxiety by adding the score on the seven items for measuring anxiety. Similarly, adding the seven items for depression yields a depression sum score. The total HADS sum score can be computed by adding the scores on the fourteen items on anxiety and depression.

Statistical Analysis
Analyses were carried out using the Statistical Package for the Social Sciences (SPSS), version 16. The demographic and obstetric history of women who had conceived through MAC (MAC group) and women who had conceived naturally (NC group) was compared by using Mann-Whitney U-tests for the continuous, not normally distributed, dependent variables and χ2-tests and Fisher’s exact tests for the categorical variables. Odds Ratios (ORs) were used to compare the prevalence of
PTSD, anxiety and depression in the MAC group to the NC group. Additionally, the effect of possible confounders was evaluated. A factor should be considered as a possible confounder if (a) it is associated with the exposing variable (MAC), (b) it is associated with one of more of the outcome variables (PTSD, anxiety, depression) and (c) the factor is known not to be part of the causal chain between exposing and outcome variables. Education, age, marital status, country of origin and the number of previous pregnancies were evaluated for a possible confounding effect on the comparison between the MAC and the NC-group. None of the variables were associated with both outcome and exposure at the p<0.10 level, and therefore no adjustment of the ORs was needed.

RESULTS

Of the 907 women invited to participate in the study, 428 completed the questionnaires (47%). Since information of the nonresponders is lacking, we compared data from the 428 participants to data from the entire Dutch population of childbearing women using nonparametric binomial tests. The percentages of home-births (20.1%) and deliveries in primary care setting (34.4%) in this study were comparable to that of the general population in the Netherlands (21.5% and 32.9%). Highly educated women and women >35 years were overrepresented in the sample, whereas non-western immigrants and women <25 years were underrepresented compared to the national average. There were more primiparous women (49.8%) than the national average (45.1%) and also more women with hypertension during pregnancy (11.4% vs. 7.6%). The proportion of women who conceived through fertility treatment in this sample was higher (7.5%) than to be expected from national data (3.2%).

From the 428 participants, 32 women had conceived through MAC (7.5%), and of those 15 women conceived via OI and IUI and 17 conceived via IVF/ICSI. The other 396 women had conceived naturally (NC group). The baseline characteristics of both groups are presented in table 1. No differences were found between the MAC group and NC group in education, marital status and country of origin, but the average age of the MAC group was significantly higher than the NC group (MAC: 33.7 years, NC: 31.7 years; p=.008). There were no differences in (a) the proportion of primiparous women, (b) the occurrence of terminations of pregnancy in history, (c) the proportion of women with complications during pregnancy or delivery and (d) the percentage of women delivering in a primary care setting. Of the recorded pregnancy and delivery complications, only the prevalence of hypertension was significantly different (MAC: 25.0%, NC: 10.4%; p=.012), especially in the IVF/ICSI group: 41.2% of these women had hypertension during pregnancy, compared to 10.2% of the women who conceived with other fertility treatment or naturally (OR= 6.2 (CI: 2.2-17.0)). In the MAC group more twins were born.
Table 1. Population characteristics and differences between groups

<table>
<thead>
<tr>
<th></th>
<th>MAC (%)</th>
<th>NC (%)</th>
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<tr>
<td></td>
<td>(n = 32)</td>
<td>(n = 396)</td>
<td>(n = 428)</td>
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<td><strong>Demographics</strong></td>
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<tr>
<td>Education</td>
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<td>50.0%</td>
<td>55.3%</td>
<td>54.9%</td>
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<td>Marital status</td>
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<td>100.0%</td>
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<td>96.5%</td>
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<td>Country of origin</td>
<td>The Netherlands</td>
<td>96.6%</td>
<td>92.7%</td>
<td>93.0%</td>
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<tr>
<td><strong>Pregnancy</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
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<td>Primiparity</td>
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<td>48.7%</td>
<td>49.8%</td>
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<tr>
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<tr>
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<td>50.0%</td>
<td>46.0%</td>
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<tr>
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<td>Hospital</td>
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</tr>
<tr>
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<td>13.6%</td>
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<td>45.2%</td>
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<td>Gynecologist</td>
<td>37.5%</td>
<td>29.5%</td>
<td>30.1%</td>
</tr>
<tr>
<td></td>
<td>Midwife and gynecologist / other</td>
<td>21.9%</td>
<td>25.3%</td>
<td>24.0%</td>
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<td>Delivery complications</td>
<td></td>
<td>35.5%</td>
<td>44.0%</td>
<td>43.4%</td>
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</tbody>
</table>

MAC= Medically Assisted Conception; NC=Natural conception; SD= standard deviation
* Chi-square or Fisher’s exact test: significant at p<.05 level

The prevalence of PTSD, the experience of a traumatic delivery, anxiety and depression in women after MAC compared to women who conceived naturally is summarized in table 2. The prevalence rates did not differ significantly between the groups. In addition, the mean TES-B sum score (MAC: 6.1, NC: 6.3; p=.866), the mean HADS anxiety sum score (MAC: 4.9, NC: 5.0; p=.851), the mean HADS depression sum score (MAC: 3.7, NC: 3.1; p=.405) and the mean total HADS sum score did not differ (MAC: 8.0, NC: 8.6; p=.458) between the two groups.
Table 2. Prevalence of PTSD, traumatic childbirth, anxiety and depression in the MAC and NC groups

<table>
<thead>
<tr>
<th></th>
<th>MAC (n = 32)</th>
<th>NC (n = 396)</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD</td>
<td>0.0%</td>
<td>1.3%</td>
<td>0.0 (0 - ∞)</td>
</tr>
<tr>
<td>Traumatic childbirth</td>
<td>6.3%</td>
<td>9.3%</td>
<td>0.6 (0.2-2.8)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>28.1%</td>
<td>22.2%</td>
<td>1.4 (0.6-3.1)</td>
</tr>
<tr>
<td>Depression</td>
<td>9.4%</td>
<td>14.6%</td>
<td>0.6 (0.8-2.0)</td>
</tr>
</tbody>
</table>

MAC= Medically Assisted Conception; NC=Natural conception; OR=Odds Ratio of MAC compared to NC; CI=Confidence Interval

DISCUSSION

The aim of this study was to obtain insight into the postpartum well-being of women after MAC. To this end, data were collected on PTSD, anxiety and depression two to six months postpartum in women who conceived after MAC and a control sample. We found similar rates of postpartum mental well-being in women who became pregnant through MAC and women who conceived naturally. In terms of demographic variables the groups were comparable, with one exception: the mean age of the MAC-group was higher, which is well known from previous research, because of several years of attempting to conceive before commencing fertility treatment. On the other hand, the occurrence of miscarriages, pregnancy terminations and ectopic pregnancies did not differ between the groups, nor did the proportion of women delivering in a primary care setting under supervision of a midwife.

The comparable baseline characteristics of the MAC-group and NC-group enabled us to focus primarily on potential differences in prevalence of PTSD, anxiety and depression between the groups. As opposed to Monti et al., we did not find significant differences between them MAC and NC groups in the prevalence of PTSD, anxiety and depression. Monti’s case control, longitudinal study used other tests (ASQ-IPAT Anxiety Scale; Edinburgh Postnatal Depression Scale) to screen for anxiety and depression. In contrast with the HADS, the ASQ-IPAT anxiety scale is rarely used in pregnant or postpartum women. Furthermore, the study of Monti et al. did not take PTSD in account, was carried out in a hospital setting, only included in patients who conceived through undefined Assisted Reproductive Technologies (ART), had a smaller sample size (ART: n=25; controls: n=39) and had a lower response rate (30%) than our study. Although the study of Monti et al. found more symptoms of anxiety and depression after fertility treatment than natural conception, the prevalence of anxiety and depression in the clinical range was not higher. Monti et al. not only fail to specify which techniques are included in their definition of ART, but also do not mention on which guidelines their inclusion criteria are based. Therefore comparison with the current study should be done with caution.
Contrary to other studies\textsuperscript{33-35} no differences between the MAC and NC group were found in the incidence and nature of complications during pregnancy and delivery except for hypertension in pregnancy. A prolonged time to achieve pregnancy due to underlying sub fertility (and not the use of MAC) is a known risk factor for obstetrical and perinatal complications.\textsuperscript{37} Considering that ‘time to achieve pregnancy’ was not part of our questionnaire, a possible explanation is that our NC group also included formerly infertile women (i.e. those trying unsuccessfully to conceive for over a year) who did eventually become pregnant without fertility treatment. These women have been reported to suffer more from mental problems\textsuperscript{10} than women without reduced fertility. This may (partly) explain why no difference in complications was found between the MAC- and NC-group.

**Definition of MAC and ARTs**

A general point of concern is that in literature fertility treatments are sometimes referred to as MAC and sometimes as ARTs. Since definitions vary, comparison between studies should be done with caution. Some studies included in their definition of ART all acts that (a) separate sexual intercourse and reproduction and (b) include at least one other party, including donor insemination with or without medical assistance.\textsuperscript{36} Other studies distinguish between less invasive ART (such as IUI) and more invasive ART (such as IVF and ICSI)\textsuperscript{10} or use the term without specification.\textsuperscript{23,24} Fertility societies\textsuperscript{3} only refer to ART when both eggs and sperm are handled, i.e. only for IVF and ICSI. MAC refers to a broader range of fertility treatments\textsuperscript{9}, and all fertility treatments used in this study (IVF, ICSI, OI, IUI) may be referred to as MAC.

**Strengths**

One of the strengths of our study is the unselected population, which enables generalization to childbearing women in the Netherlands. Additionally, considering the absence of financial remuneration and the substantial time-investment required, we consider the response rate (47\%) acceptable. The proportion of deliveries in primary care and home births in this study resemble the general population. The present study made use of outcome measures defined in terms of PTSD, anxiety and depression with proven reliability and validity and compared with norm groups. This study makes a distinction between symptoms of anxiety and depression, and meeting diagnostic criteria for a mental disorder. While some anxiety and depressive symptoms are common after childbirth (perhaps almost universal as most new mothers worry about the wellbeing of their baby and feel somewhat overwhelmed and unprepared for the challenges of caring for a newborn), major depressive disorder, PTSD and anxiety disorders, meeting diagnostic criteria are less common.

**Limitations**

There are limitations that must be considered in the interpretation of the results. In this study, more women conceived through fertility treatment (7.5\%) than in the general population (3.2\%), possibly because formerly infertile women are more willing to participate in these studies. Highly educated women were overrepresented in the sample, mainly in the first echelon, whereas nonwestern immigrants were underrepresented. Another limitation of the present study resides in
its retrospective design. We have taken special care to avoid sources of bias (unselected population) and we have evaluated the effect of possible confounders. Since we have used an existing database and we did not select the MAC group in advance, we dealt with a relatively small sample size. Post hoc power analysis showed that a difference in the prevalence of symptoms (PTSD, anxiety, depression) of 20% in our sample could have been detected with a power of 80%. Since the difference in prevalence rates proved <20%, a larger sample is recommended for future research, also because trends observed in the current study may prove to be significant differences when applying a larger sample size. The current results can be interpreted in two ways. On the one hand, the prevalence of PTSD, anxiety and depression in both groups did not differ significantly. Hence, there is no indication for extra or special psychological care postpartum for all women who gave birth following fertility treatment. On the other hand, the percentages of anxious (22.7%) and/or depressed (14.3%) women in both the MAC and the control groups are relevant in practice and should have clinical implications.

Studies show that the potential psychological burden of infertility and infertility treatment is cumulating the longer the infertility continues and the more the amount of (invasive) treatments increases. The lack of information about the time to achieve pregnancy and the number of fertility treatments women in the MAC group have undergone are limitations in this study. There is clear evidence that MAC results in more pregnancy and perinatal complications than natural conception. Other than hypertension, no difference in complications was found between the groups in this study, which is likely to be due to the relatively small number of women with MAC.

This is the first study to investigate the prevalence of PTSD following childbirth in women who conceived though MAC as compared to childbearing women without fertility problems and adds to the existing knowledge on the occurrence of anxiety and depression postpartum in formerly infertile women. Future studies should consider the time to achieve pregnancy, as research shows that increased risks for obstetrical and perinatal complications in formerly infertile women can be attributed to the underlying infertility and not to the use of fertility treatment. Another factor to consider is the emotional adjustment during the transition from infertility via pregnancy to motherhood and the role of support by family, friends and professionals in this process. Previously infertile women may tend to feel especially guilty complaining about pregnancy and motherhood when they have longed for it, thus, feeling a lack of entitlement to complain, now that have finally gotten what they have wanted for so long.

Often women who finally become pregnant after a period of infertility are considered to have “succeeded” in their fertility treatments and, as a result, are not paid as much attention from the medical community. On the other hand, sometimes there is unwarranted concern that new mothers after infertility may be more fragile than other mothers. In the Netherlands, the Obstetric Indication List (a screening system for identifying “physiological” and “pathological” pregnancies) considers the pregnancy and birth after subfertility as normal, with no indication
of an increased obstetric risk. Although it is important to consider the unique needs of this group of women, our study indicates that previously infertile new mothers experience mental well-being similar to their fertile counterparts with no more referral to the second or tertiary care setting.

In conclusion, in this study no significant differences were found in the prevalence of PTSD, anxiety and depression between women who conceived through fertility treatment and women who conceived naturally. Only the prevalence of hypertension was higher in the IVF/ICSI group. Since we dealt with a relatively small sample size, further research on a larger scale with additional attention to the time to achieve pregnancy and the needs, demands and consumption of prenatal and postnatal care of previously infertile women is desired.
REFERENCES


POSTTRAUMATIC STRESS DISORDER FOLLOWING PREECLAMPSIA AND PPROM:
A PROSPECTIVE STUDY WITH 15 MONTHS FOLLOW-UP

Claire Al Stramrood
Ineke Wessel
Bennard Doornbos
Jan G Aarnoudse
Paul P van den Berg
Willibrord CM Weijmar Schultz
Maria G van Pampus

ABSTRACT

Objectives
A prospective longitudinal evaluation of the prevalence of and risk factors for posttraumatic stress disorder (PTSD) in women with preeclampsia (PE) or preterm premature rupture of membranes (PPROM) compared to uncomplicated pregnancies.

Methods
Participating women completed PTSD and depression questionnaires during pregnancy, 6 weeks, and 15 months postpartum. Data regarding psychiatric history and indices of obstetric care were collected from patient charts.

Results
We included 57 PE, 53 PPROM, and 65 healthy pregnant women, of whom 137 also participated in the 15-month follow-up (PE 70%, PPROM 48%, and controls 95%; P<.001). At 6 weeks postpartum, the prevalence of PTSD, but not depression, following childbirth was significantly higher in patients than in controls (14% vs 3%; p=.023). A history of depression, depressive symptoms during pregnancy, and infant death were significantly associated with symptoms of postpartum PTSD. The maternal condition seems to be of less decisive value, as there was no difference between the prevalence of PTSD after PE and PPROM (11% vs 17%; p=.324). At 15 months postpartum, 11% of women with PE had PTSD, some of which did not have PTSD 6 weeks postpartum. The low response rate in the PPROM group at 15 months postpartum does not allow for definite conclusions.

Conclusions
Pregnancies complicated by PE or PPROM are associated with PTSD in a substantial number of women. Especially women with proven vulnerability for psychological problems are at risk of developing PTSD postpartum, as are women whose children died in the perinatal period.

Keywords: preeclampsia, PPROM, preterm, posttraumatic stress disorder, depression
INTRODUCTION

Psychological problems in women during pregnancy and after childbirth are not uncommon. Approximately 1% to 2% of women develop a posttraumatic stress disorder (PTSD) following childbirth\(^1\), while 1 in 8 are depressed during pregnancy or postpartum.\(^2\) These conditions affect not only the women involved but may also impair secure attachment of the infant and affect the partner relationship.\(^3\) Posttraumatic stress disorder is an anxiety disorder that may develop following confrontation with a traumatic stressor. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), symptoms consist of re-experiencing the stressful situation, avoidance of reminders of that situation, and a persistent hyper-aroused state. The diagnosis of PTSD additionally requires that the threat elicited a subjective response of intense fear, horror, or helplessness; that the symptoms persist for at least a month; and that the symptoms impair daily life functioning.\(^4\) Posttraumatic stress disorder commonly co-occurs with major depressive disorder.\(^5,6\)

Little is known about the prevalence, course, and risk factors for PTSD following complicated pregnancies. A dose-response relationship between the intensity of the event and the risk of developing PTSD has been proposed.\(^7\) Accordingly, one may hypothesize that the prevalence of PTSD is higher among women with complicated pregnancies. Complications are often associated with interventions and lengthy hospitalization of the infant. Pregnancy may be complicated by conditions that are potentially life threatening for the fetus (e.g., preterm premature rupture of membranes [PPROM]) or both mother and fetus (e.g., preeclampsia [PE]). Very few studies have so far investigated PTSD following childbirth in a subgroup of women with PE, PPROM, or premature delivery. The prevalence of PTSD following PE was estimated at 28% in an exploratory retrospective study in Dutch patients with PE.\(^8\) Three studies with sample sizes ranging from 30 to 80 women showed higher PTSD rates in women with premature delivery compared to those with uncomplicated pregnancies.\(^9\)\(^-\)\(^11\)

Several studies suggest that vulnerability for psychological problems (i.e., diagnosed psychiatric disorders in self or direct relatives, a history of self-reported mental symptoms, extreme fear of childbirth) and personality traits are the strongest predictors for (symptoms of) PTSD following childbirth.\(^8,12,13\) A very limited number of studies have investigated the long-term course of PTSD following childbirth, and their findings are inconclusive; some report a decrease in symptoms\(^14\), while other researchers found little change over time.\(^10,12,15,16\)

In addition to studies with long-term follow-up being scarce, no study has yet followed women beyond 14 months following delivery. Data from long-term prospective studies may allow for identification of women vulnerable for developing PTSD following pregnancy complications, as well as identifying women with chronic PTSD who could benefit from treatment.
We, therefore, prospectively examined the prevalence and risk factors for PTSD and depression following PE and PPROM at 6 weeks and 15 months postpartum, and compared these to uneventful pregnancies. To increase the clinical relevance of the results, we used a naturalistic cohort and practical instruments that can easily be used to identify women at risk in clinical practice. We hypothesized that the prevalence of PTSD would be higher in women with pregnancy complications than in controls. Considering the association of PTSD with previous depression and the comorbidity between PTSD and depression, we expected to find that a history of depression and depression in pregnancy would be strong risk factors for PTSD following childbirth. Additionally, we expected that among those women with PTSD shortly after delivery, many would still experience the condition at 15 months following childbirth.

METHODS

Design and Setting
In this longitudinal study, pregnant women with PE, including those with severe PE (i.e., Hemolysis, Elevated Liver Enzymes, Low Platelets (HELLP) syndrome) and PPROM were recruited in the obstetric clinic of the University Medical Center Groningen, The Netherlands (2005-2008). Preeclampsia and HELLP were defined according to the criteria of the International Society for the Study of Hypertension in Pregnancy (ISSHP). Preterm premature rupture of membranes was defined according to the American Congress of Obstetricians and Gynecologists (ACOG) practice bulletin on PROM. Healthy controls with uneventful pregnancies were recruited in an independent midwifery practice (2005-2006) by means of posters announcing the study. Based on a previous study, we assumed a moderate effect size (w = .30). Combined with an α of .01 and a desired power (β) of .80, a minimal sample size (for the 3 groups combined) of 155 was required to detect a significant difference in PTSD levels between PE, PPROM, and controls.

Many pregnancies and deliveries in The Netherlands are monitored by independent midwives. In case of (an increased risk of) complications or interventions during pregnancy or delivery (as defined by national guidelines), women are referred to a gynecologist in a general hospital or academic referral center. The majority of women (66%) deliver under supervision of a gynecologist in a hospital. When under supervision of an independent midwife, women can choose to deliver at home (23%), or in a homelike setting in a hospital or birth center (11%). Referral during labor is not uncommon: 26% of women are referred to a gynecologist during labor.

Population
All women hospitalized with PE or PPROM were asked to participate in the study, unless their condition was so critical (as assessed by the clinician admitting them) that (a) they needed an immediate cesarean section, (b) they received magnesium sulfate infusions, or (c) they were too ill to complete questionnaires. Additional exclusion criteria in all groups were current multiple pregnancy, a history of intrauterine fetal death, and current alcohol or drugs dependence. Furthermore, women with
preexisting medical conditions (diabetes mellitus, hypertension, cardiovascular or renal diseases, systemic lupus erythematosus) were excluded, as these women would be likely to anticipate pregnancy complications due to their preexisting condition. All women had singleton pregnancies, were native Dutch speakers, and gave written informed consent. Approval was obtained from the Medical Ethics Committee of the University Medical Center Groningen.

Procedure
On admission, the hospitalized women were informed about the study and were asked to consider their participation within 24 hours. Following signed consent, they were contacted by one of the researchers and tested as soon as possible to minimize the loss of participants due to delivery before testing. Participants were tested during pregnancy (t₁), 6 weeks postpartum (t₂), and 15 months postpartum (t₃). In order to obtain comparable intervals between t₁ and t₂ in the patient and control groups, participants in the control group were tested in the 38th week of pregnancy.

Measures
At t₁, participants completed a brief self-report measure of general demographic information. Data regarding current and past obstetric status were collected from the medical record. Information regarding psychiatric history was obtained in an interview. The questions were derived from the screening questions of the Structured Clinical Interview for DSM-IV (SCID)²⁴,²⁵ and were used to determine whether there was an indication for a previous depressive episode or previous posttraumatic stress symptoms. Questions were “In the past, did you ever experience one or more periods in which you felt depressed or down for most of the day or in which you lost interest in activities you usually enjoy?”; and “Have you ever witnessed or experienced a traumatic situation (such as experiencing or witnessing a life-threatening situation, physical or sexual abuse, a disaster or serious accident) and has this experience affected you afterward (e.g., with nightmares or intrusive thoughts)?” Interviewers were blind to questionnaire results. At t₂ the participants were asked about the well-being of their children, and whether they had sought counseling for mental problems during the past years. During all 3 test sessions, the PTSD Symptom Scale self-report questionnaire (PSS-SR)²⁶ and the Beck Depression Inventory, second edition (BDI-II)²⁷, were completed.

The PSS-SR is a questionnaire containing 17 items corresponding to the 17 PTSD symptoms described in the DSM IV. These items are rated using 4-point scales asking for the frequency or intensity with which each symptom occurred over the past month (0 = never/not at all, 1 = once a week/a little bit, 2 = 2-4 times a week/somewhat, 3 = more than 5 times a week/very much). The PSS-SR sum score ranges from 0 to 51. The retest reliability has been calculated .74.²⁸ In the present sample, the internal consistency was good (α = .86 at t₁, α = .94 at t₂, and α = .89 at t₃). The PSS-SR that was administered at t₁ asked for PTSD symptoms in the preceding month that were related to any stressful event experienced before that still bothered the participants. At t₂ and t₃, the PSS-SR referred to PTSD symptoms in the preceding month that were specifically related to pregnancy and the perinatal period. In addition, at t₃, the participants rated the extent to which they had felt fear,
helplessness, or horror during the pregnancy-related event they experienced as most shocking on three 100 mm Visual Analogue scales (VAS). In the present study, PTSD diagnosis at \( t_2 \) was based on a symptom profile reflected by the PSS-SR and VAS scores that was consistent with the DSM-IV criteria. For this, we used the criteria as used in the study of Engelhard et al.\(^8\) More specifically, pregnancy-related PTSD was considered present when participants (a) scored 80 or more on 1 of the VAS for horror, fear, and/or helplessness at \( t_2 \) (subjective stress, DSM-IV A2 criterion); (b) reported at least 1 re-experiencing, 3 avoidance, and 2 hyperarousal symptoms on the PSS (DSM-IV B,C, and D criterion, respectively). Symptoms were considered present if an item was rated 2 (2-4 times a week) or more; (c) obtained a total PSS-SR score of 18 or higher (severity, DSM-IV F criterion). It should be noted that the duration criterion of 4 weeks (DSM-IV E criterion) was met because follow-up assessments were at 6 weeks and 15 months postpartum. At \( t_1 \) and \( t_2 \), the same criteria were used except for the VAS scores. Women with PTSD at \( t_2 \) but not at \( t_1 \) were only considered a case when they met criterion A2 at \( t_2 \).

The BDI-II\(^{27}\) is a self-report measure of depressive symptoms during the preceding 2 weeks. It consists of 21 items containing 4 statements that reflect increasing symptom severity (scoring 0-3 per item). The sum score ranges from 0 to 63. The BDI-II is found to have good psychometric properties.\(^{27-29}\) The internal consistency in the current sample was good (\( \alpha=.88 \) at \( t_1 \), \( \alpha=.91 \) at \( t_2 \), and \( \alpha=.89 \) at \( t_3 \)). A cutoff score of 20 or more was used, corresponding with moderate depression according to the BDI manual.\(^{27}\)

**Statistical Analysis**

Data were analyzed with Statistical Package for the Social Sciences (SPSS) 16.0, using a significance level of .05 (2-tailed). Group comparisons involved 3 groups: (1) PE, (2) PPROM, and (3) control (uneventful pregnancies). For the dichotomous data, \( \chi^2 \) analyses were used. Comparing participants to non-responders was done using nonparametric binomial tests. Exploration of the continuous data revealed that the PSS and BDI sum scores were not normally distributed. Therefore, for group comparisons non-parametrical Spearmans rho, Kruskal-Wallis, and Mann-Whitney U tests were used. In order to identify risk factors for PTSD and depression in the patient groups, hierarchical multiple regression (HMR) analyses were performed on the PSS and BDI sum scores. Where appropriate, non-normally distributed variables were square root transformed (SQRT) to meet assumptions of normality, linearity, and homoscedasticity. Variables with a \( p \)-value lower than .10 as found in univariate analyses were included in the multiple regression analysis.
RESULTS

Patient Characteristics
A total of 197 women were willing to participate when approached during pregnancy. In all, 193 women were included at \( t_1 \) (Figure 1): 4 women did not meet the inclusion criteria (1 preexistent hypertension, 1 chronically ill, 1 drug dependence, and 1 previous intrauterine fetal death). At \( t_2 \) (6 weeks postpartum), 175 women completed the questionnaires, of whom 22 with HELLP, 35 with PE, 53 with PPROM, and 65 healthy pregnant women. A total of 18 women in the patient group dropped out after the first measurement: 4 women explicitly stated it was because they lost their infant in the postpartum period, 14 women did not specify a reason for their withdrawal. Comparison of these 18 women to the 110 patients who did take part at \( t_2 \) revealed that the age \((p=.023)\) and educational level \((p=.039)\) of the 18 non-responders was slightly lower than that of the participants, but employment- and single parenthood rates were comparable. Additionally, no significant differences were observed in obstetric characteristics (proportion of women with primiparity, normal vaginal deliveries, cesarean deliveries, deceased infants, infants hospitalized at 6 weeks of age, extreme prematurity [<32 weeks gestation]) and psychological variables (proportion of women with depression and/or PTSD in history and/or pregnancy).

![Figure 1. Overview of participation and drop-out.](image)

PE indicates preeclampsia; PPROM, preterm premature rupture of membranes.

At 15 months after delivery \( (t_3) \), 137 women completed the third set of questionnaires. This yielded a total response rate of 71%, with significant differences between the groups: PE 70%, PPROM 48%, and controls 95% \((p<.001)\). For each of the 3 groups, potential discrepancies between women completing all 3 measurements and those only participating at \( t_1 \) and \( t_2 \) were evaluated. The same demographic, obstetric, and psychological variables as mentioned for the non-responder analysis at
t₃ were used, with the addition of the proportion of women with PTSD and depression at t₃. Women with PE who did not participate at t₃ were more often single (18% vs 0%; p=.034) and their children were less frequently hospitalized at 6 weeks of age (22% vs 50%; p=.031) than women with PE taking part at t₃. Women with PPROM not taking part in the 15-month follow-up had lower levels of education (p<.001) and reported more depression in history (47% vs 26%; p=.007) and during pregnancy (24% vs 3%; p<.001) as compared to women with PPROM taking part at t₃. No significant differences were found between the 3 controls not participating at t₃, as compared to the 62 healthy controls completing all 3 measurements.

Demographic and obstetric characteristics of the 175 women participating at t₃ are shown in table 1. The patient and control groups differed in all obstetrical indices, as expected. The differences between the patient groups were not significant. As the HELLP and PE groups did not differ in their obstetric characteristics, they were pooled into 1 group for further analysis, labeled PE.

### Table 1. Demographic, psychiatric & obstetric characteristics of women participating at t₃ (n=175)

<table>
<thead>
<tr>
<th>Demographic characteristics</th>
<th>PE (n = 57)</th>
<th>PPROM (n = 53)</th>
<th>Control (n = 65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age y (SD)*</td>
<td>29.4 (5.1)</td>
<td>30.7 (4.8)</td>
<td>31.9 (3.9)</td>
</tr>
<tr>
<td>Married or co-habiting n (%)</td>
<td>54 (100%)</td>
<td>47 (92%)</td>
<td>61 (95%)</td>
</tr>
<tr>
<td>Completed college or University n (%)*</td>
<td>19 (34%)</td>
<td>19 (36%)</td>
<td>54 (83%)</td>
</tr>
<tr>
<td>Not employed n (%)</td>
<td>5 (9%)</td>
<td>10 (19%)</td>
<td>6 (9%)</td>
</tr>
<tr>
<td>Psychiatric history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported history of depression n (%)</td>
<td>22 (39%)</td>
<td>18 (34%)</td>
<td>17 (26%)</td>
</tr>
<tr>
<td>Reported history of PTSD n (%)</td>
<td>7 (13%)</td>
<td>13 (25%)</td>
<td>9 (14%)</td>
</tr>
<tr>
<td>Obstetric characteristics</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Primipara **</td>
<td>43 (80%)</td>
<td>25 (49%)</td>
<td>48 (74%)</td>
</tr>
<tr>
<td>Hospitalization mother d (SD) *</td>
<td>9.4 (9.1)</td>
<td>18.6 (22.2)</td>
<td>0</td>
</tr>
<tr>
<td>Cesarean delivery n (%) *</td>
<td>43 (77%)</td>
<td>15 (28%)</td>
<td>6 (9%)</td>
</tr>
<tr>
<td>Gestational Age wk+dy (SD) *</td>
<td>31+3 (3.9)</td>
<td>31+3 (3.2)</td>
<td>40+5f (1.0)</td>
</tr>
<tr>
<td>Birth weight g (SD) *</td>
<td>1506 (846)</td>
<td>1686 (638)</td>
<td>3703 (500)</td>
</tr>
<tr>
<td>10-min APGAR score (SD) *</td>
<td>7.5 (2.1)</td>
<td>7.7 (2.2)</td>
<td>9.4 (1.0)</td>
</tr>
<tr>
<td>Death of infant n (%) *</td>
<td>7 (12.3%)</td>
<td>5 (9.4%)</td>
<td>0</td>
</tr>
<tr>
<td>Infant hospitalized at t₃ n (%) *</td>
<td>24 (43%)</td>
<td>20 (39%)</td>
<td>0</td>
</tr>
</tbody>
</table>

Demographic characteristics and psychiatric history collected at t₁
Obstetric characteristics collected at t₃
* Significant difference between control group and patient groups
** Significant difference between PPROM and all other groups
Prevalence
At \( t_1 \), 12% of women met the symptom criteria for PTSD (PE 21%; PPROM 14%; and controls 2%; \( p=.003 \)). Figure 2 shows the prevalence of PTSD related to pregnancy and childbirth at \( t_2 \) and \( t_3 \). Pearson \( \chi^2 \) tests indicated significant differences between the 3 groups in the prevalence of PTSD at both time points (\( t_2 \): \( p=.039 \); \( t_3 \): \( p=.018 \)): the prevalence of PTSD was significantly higher in the patient group (PE and PPROM combined) than in the control group (\( t_2 \): \( \chi^2= 5.194, p=.023 \); \( t_3 \): Fisher exact test \( p=.032 \)). There were no significant differences in the prevalence of PTSD between the PE and the PPROM group (\( t_2 \): \( \chi^2= 0.972, p=.324 \); \( t_3 \): Fisher exact test \( p=.391 \)). Figure 3 shows the prevalence of depression at \( t_1 \), \( t_2 \), and \( t_3 \). The 3 groups did not differ significantly with respect to the prevalence of depression at either of the 3 time points.

At \( t_2 \), 9 (53%) of the 17 women with PTSD also had a co-morbid depression. Further exploration of the data using non-parametric Mann-Whitney U tests revealed that at \( t_2 \), symptoms of PTSD and depression were associated with depression in history, depression at \( t_1 \), and PTSD at \( t_2 \) but not to a history of PTSD (all independent variables dichotomized). Women with PTSD and depression in history, during pregnancy (\( t_1 \)) and at 6 weeks postpartum (\( t_2 \)) reported more symptoms of PTSD and depression at \( t_2 \).

Of the 17 women with PTSD at \( t_2 \), 8 did not participate at \( t_3 \). Of the 9 women who did participate at \( t_3 \), 2 still met the criteria for PTSD at 15 months follow-up. In all, 7 women no longer met the PTSD criteria at \( t_3 \), 4 of whom had sought professional counseling. Additionally, 4 new cases of PTSD (3 in the PE group and 1 in the PPROM group) were identified at \( t_3 \), that is, women who did not meet the criteria for PTSD at \( t_3 \).

Risk Factors
As the death of an infant in the postpartum period is extremely stressful and can induce “grief-associated depressive symptoms”\(^4\), we investigated the effect of the death of the infant on the prevalence of depression and PTSD at \( t_2 \). The results, summarized in table 2, indicate that the prevalence of depression and PTSD, as well as sum scores on the PSS-SR and BDI were significantly higher in women who had lost their infants (all \( p's<.01 \)). In order to evaluate whether removing the 12 women whose infants had died would influence the differences in prevalence rates, we repeated the \( \chi^2 \) tests for PTSD at \( t_2 \) for \( n=163 \). Prevalence rates decreased from 10.5% to 6.0% in the PE group and from 17.0% to 14.6% in the PPROM group. As a consequence, initial differences between patients and controls in the prevalence of PTSD at \( t_2 \) did not persist (\( p=.062 \)). However, the difference between women with PPROM and controls was significant (Fisher exact test 2-tailed: \( p=.035 \)).
Figure 2. Prevalence of PTSD related to pregnancy and childbirth at t₁ and t₃

Figure 3. Prevalence of depression at t₂, t₂ and t₃
Table 2. Number (%) of women with PTSD and Depression, and PSS-SR, BDI sum-scores (median, 25th-75th quartile) in women with pregnancy complications, as a function of the death of their infants (as measured at t_3).

<table>
<thead>
<tr>
<th></th>
<th>Living infant (n = 98)</th>
<th>Infant died (n = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTSD *</td>
<td>10 (10%)</td>
<td>5 (42%)</td>
</tr>
<tr>
<td>Depression*</td>
<td>7 (7%)</td>
<td>5 (42%)</td>
</tr>
<tr>
<td>PSS-SR score *</td>
<td>10.0 (6.0-17.2)</td>
<td>24.4 (18.2-37.5)</td>
</tr>
<tr>
<td>BDI score*</td>
<td>8.5 (5.0-12.4)</td>
<td>16.1 (9.8-30.2)</td>
</tr>
</tbody>
</table>

* Significant difference between women with a living infant and women whose infant died between t_1 and t_3.

Finally, we evaluated the patient group for the contribution of psychological and obstetric risk factors to the PSS-SR and BDI scores at t_3 using 2 hierarchical linear regression analyses. Demographic variables age and education were not included, as no significant associations were found at t_3 between age and PTSD (independent samples t test, p=.532) or between education and PTSD (χ² test, p=.473). As we hypothesized that a history of depression and BDI scores during pregnancy would be the strongest risk factors for PTSD and depression postpartum (see introduction), these variables were entered in the first step (history of depression was dichotomized). In the second step, variables indicative of the well-being of both mother and infant were added, that is, death of infant between t_1 and t_3, hospital admission of the infant at t_3, birth weight, diagnosis of the mother (PE vs PPROM), and cesarean delivery. We also added gestational age at delivery and length of hospitalization of the mother to the model. However, maternal hospitalization strongly correlated with the obstetric diagnosis of the mother and gestational age strongly correlated with birth weight, infant death, and infant hospitalization, which induced multicollinearity. Gestational age at delivery and maternal hospitalization were therefore removed from the model. BDI and PSS-SR scores were skewed and therefore square root transformed (SQRT).

The model for SQRT PSS-SR explained 29% of the variance in the first step (p<.001), and an additional 10% in the second step (p=.004), resulting in a model explaining 39% of the variance (p<.001). Significant risk factors were a high SQRT BDI score at t_1 (β=.33, p<.001), indication for a previous depressive episode (β=.23, p=.007) and the death of the infant (β=.29, p=.001). The other indicators for maternal or infant well-being in this period did not significantly contribute to the model. The model for SQRT BDI explained 38% of the variance in the first step (p<.001) and addition of the second step increased R² with 6% (p=.032), yielding a total of 44% (p<.001). As with PTSD, significant risk factors in the model for depression were the SQRT BDI at t_3 (β=.42, p<.001), indication for a previous depressive episode (β=.30, p<.001) and death of the infant (β=.21, p=.008).
DISCUSSION

In this unique prospective study on psychological problems in women with pregnancies complicated by PE or PPROM, the prevalence of PTSD was found to be 11% (PE) and 17% (PPROM) at 6 weeks postpartum, which is significantly higher than following uneventful pregnancies in the control group (3%). Additionally, this is the first study to follow women up to 15 months postpartum, and we found that (at t₃) as much as 11% of women with PE met the criteria for PTSD, compared to none of the controls. The low response rate in the PPROM group at 15 months postpartum does not permit definite conclusions. The prospective design of this study allowed for identification of risk factors for posttraumatic stress symptoms and depressive symptoms. Risk factors were found to be a self-reported history of depression, a high BDI score during hospitalization, and infant death in the postpartum period. These risk factors together explained 39% and 44% of the variation in posttraumatic stress and depressive symptoms, respectively.

Our results should be considered in the light of several strengths and weaknesses. This is the first study reported to follow women longer than 14 months postpartum. Furthermore, among the limited studies on PTSD following PE, no articles with prospective designs have been published yet. Additionally, this study is one of the few studies focused at PTSD after preterm delivery and has a considerably larger sample size than previous studies (n = 175 vs. 30-80). Additional strengths include the use of a control group with uneventful pregnancies, and the assessment of both depression and PTSD with validated questionnaires. Furthermore, DSM-IV criteria A2, B, C, D, E, and F have been used, which is a stricter and more precise application of the DSM-IV than in many other studies.

In retrospect, a number of procedural limitations of this study may be identified. Even though inclusion and exclusion criteria were clear, systematic reporting of women not willing to participate would have strengthened our assertion of having selected representative groups of women with PE, PPROM, and uncomplicated pregnancies. Additionally, the use of self-report questionnaires and the retrospective assessment of adversity/treat experienced during hospitalization may have influenced results. The response rate in the PPROM group at 15 months follow-up (48%) was significantly lower than among women with PE (70%) and controls (95%; p < .001). Moreover, selective dropout occurred in the PPROM group, as women with PPROM not taking part in the 15-month follow-up reported more depression in history (47% vs 26%; p = .007) and during pregnancy (24% vs 3%; p < .001), which may well have caused an underestimation of the prevalence rates of PTSD and depression at t₃ in the PPROM group. All in all, it should be concluded that the data on women with PPROM at 15 months follow-up are inconclusive. Finally, considering that the mean gestational age at delivery in the patient groups was 31 weeks, one may argue that the controls should have been assessed earlier than at 38 weeks’ gestation. However, it was considered desirable to obtain comparable intervals between t₁ and t₃ in patient and control groups. Therefore, like most patients with PE and PPROM,
participants in the control group also had to be tested toward the end of the pregnancy.

The prevalence of PTSD in our sample (at t₁) was somewhat lower than that found by Engelhard et al. who reported a prevalence of 28% PTSD following preterm PE and preterm birth at 14 months postpartum. Engelhard et al. retrospectively assessed posttraumatic stress symptoms fairly long after the index event occurred. This might have resulted in an overestimation of symptoms, explaining the higher prevalence reported. In the present study, the majority of women with PTSD at 15 months postpartum developed (clinically relevant) symptoms after the t₁ measurement (6 weeks postpartum). This calls for long/longer follow-up in future studies relating to this topic and awareness among clinicians that women may also develop PTSD (symptoms) several months after childbirth. The prevalence of PTSD at t₁ did not differ significantly between women with PE or PPROM, suggesting that PTSD is associated with the sequence of events accompanying preterm birth more than with the specific maternal condition, confirming our hypothesis. These findings are in accordance with those of Engelhard et al., reporting no difference in incidence of PTSD in women with PE or preterm birth.

Since the prevalence of depression following complicated and uneventful pregnancies did not differ between the groups, depression does not seem to be a specific reaction to pregnancy complications. It should be noted that the sample size for this study was based on detecting differences between groups of a medium effect size. Indeed, this turned out to be the case for our primary outcome measure, PTSD. The observed effect size for depression was small (i.e., smaller differences between the 3 groups). In order to detect such small differences, based on the current results, future studies should recruit large sample sizes (i.e., n = 1388). The slight decrease in depressive symptoms in the postpartum period has been reported before in uncomplicated pregnancies and is probably related to a decrease in the level of worrying following the birth of a healthy infant. The prevalence of depression in the postpartum period in women with living children is within the normal range for depression in the postpartum period (period incidence of 7.1%).

The scores of BDI and PSS-SR sum were already high at t₁. Although the time period specified in questionnaires includes several weeks prior to the onset of obstetric symptoms (i.e., 2 weeks and 1 month for BDI and PSS-SR, respectively), it cannot be excluded that stress of the hospitalization has influenced t₁ symptom reports. Furthermore, it should be noted that, contrary to the PSS-SR administered during pregnancy, the PSS-SR questionnaire administered postpartum specifically referred to the peripartum period, signifying that prevalence rates of PTSD at t₁ and t₂ as found with the PSS-SR cannot be compared.

Significant risk factors for both PTSD and depression postpartum were high BDI scores during hospitalization, a self-reported previous depressive episode and the death of the infant in the postpartum period. In our study, risk factors such as cesarean delivery and hospitalization of the
infant during follow-up did not significantly contribute to the regression models. These findings are in line with the recent study of Söderquist et al., who reported that experiencing depressive symptoms early in pregnancy is the main risk factor for PTSD following uncomplicated pregnancies. Previous studies reporting associations between obstetric interventions and PTSD also indicated that psychological characteristics were much stronger risk factors for PTSD than the obstetrical characteristics, which is in line with our findings. Therefore, we think that there is not one single obstetrical variable that is both necessary and sufficient for causing PTSD. Probably the whole constellation of events accompanying a complicated pregnancy (e.g., maternal hospitalization, cesarean section, long-term infant hospitalization, and infant death) may put women who are already vulnerable at risk of developing PTSD. About 40% of the women who had lost their children developed depression and/or PTSD, compared to 10% in the women whose children survived. These findings extend the existing data on PTSD and depression following pregnancy loss and stillbirth to perinatal death and illustrate the major impact of losing a child in the postpartum period. For future research, we suggest to extend the list of potential risk factors for PTSD following childbirth to endocrine and immunological factors that could possibly mediate the relationship between PE/PPROM and PTSD (e.g., hypothalamic-pituitary-adrenal [HPA] axis dysregulation or increased concentrations of inflammatory cytokines).

Regarding clinical practice, we hope the current findings will encourage gynecologists to be more alert on psychological problems in women with PE or PPROM. At various points in time, women “at risk” may be identified; next to asking for a history of depression (or other mental disorders) during pregnancy, all women hospitalized for PE or PPROM could be requested to complete a standard depression screening instrument (e.g., BDI-II or Edinburgh Postnatal Depression Scale), as depression during pregnancy proved a risk factor for PTSD and depression postpartum in the women with PE/PPROM in this study; rather than focusing on the physical condition, current mental well-being, and experience of the delivery will hopefully become an integral part of the 6-week postpartum appointment. However, it may be too early for the implementation of large-scale screening programs for PTSD following childbirth. Even though effective treatments for postpartum depression have been well researched, this is not the case for PTSD: the effects of debriefing/counseling are questionable, only one case report is available using cognitive-behavioral therapy and one using eye-movement desensitization and reprocessing (EMDR). The fact that there is limited evidence concerning the optimal management of women with PTSD following childbirth calls for a large study investigating possible treatment options.

In conclusion, this study shows that pregnancy complications can trigger posttraumatic stress symptoms in a substantial number of women. Especially women with proven vulnerability for psychological problems (through previous episodes of depression or depression during pregnancy) are at risk of developing PTSD, as are women whose children died in the perinatal period. Several women with PTSD at 6 weeks postpartum do no longer meet the criteria 15 months after childbirth, which is promising. However, this study also demonstrates that other women developed late onset
PTSD following complicated childbirth. We suggest that clinicians be aware of these pathologic responses, not only to improve maternal mental health, but also because PTSD and depression influence maternal-infant attachment and infant development.11,39 This study suggests that not the pregnancy complication itself (PE/PPROM), but the whole constellation of events accompanying a complicated pregnancy, in particular preterm delivery, may induce PTSD in vulnerable women.
REFERENCES


Fathers with PTSD and depression in pregnancies complicated by preterm preeclampsia or PPROM

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ABSTRACT

Objectives
To assess prevalence and risk factors for posttraumatic stress disorder (PTSD) and depression in fathers after early preeclampsia (PE) or preterm premature rupture of membranes (PPROM).

Methods
Partners of patients hospitalized for PE or PPROM and partners of healthy controls completed PTSD (PSS-SR) and depression (BDI-II) questionnaires during pregnancy (t₁) and six weeks postpartum (t₂). 85 of the 187 eligible men participated (51 partners of patients, 34 partners of controls) at t₁, and 66 men participated both time points.

Results
No significant differences were found between partners of patients and partners of controls in symptoms of PTSD and depression (t₁: p=.28 for PTSD and p=.34 for depression; t₂: p=.08 for PTSD and p=.31 for depression). For partners of patients, correlation between PTSD and depression sum-scores was .48 (p<.001) at t₁ and .86 (p<.001) at t₂. Within-couple correlation was low and not significant during pregnancy, but strong postpartum (PSS-SR: r=.62, p<.001; BDI-II: r=.59, p<.001). Higher paternal age was associated with more symptoms of PTSD and depression postpartum in partners of patients. Symptoms of PTSD and depression during pregnancy predicted the occurrence of PTSD symptoms following childbirth in partners of patients.

Conclusions
Symptoms of PTSD and depression occurred at a similar rate in partners of women with PE or PPROM and partners of healthy pregnant controls. Symptoms of PTSD and depression during pregnancy predicted the occurrence of PTSD symptoms following childbirth. Increased paternal age predicted more symptoms of PTSD and depression postpartum. At six weeks postpartum, a strong association was found between men and women in symptoms of PTSD and depression.

Keywords: PTSD; depression; fathers; postpartum; preeclampsia; PPROM
INTRODUCTION

Depression affects roughly 12% of women during pregnancy and 7% postpartum, whereas posttraumatic stress disorder (PTSD) following childbirth and pregnancy occurs after 1 to 2% of deliveries. Next to affecting the well being of the woman, both postpartum depression (PPD) and PTSD may impair secure attachment of the infant and affect the partner relationship. Contrary to a commonly held belief, the birth of a child can trigger the onset of mental problems and psychiatric illnesses in fathers as well, and their mental well being is known to affect the parent-child relationship, and child behavioral and emotional development.

Whether or not prevalence rates of depression are similar in men and women is under debate, as various studies find contradictory results. A substantial amount of research has been carried out regarding postpartum depression in men, and a recent meta-analysis estimated the prevalence at 10.4%. The strongest predictor for paternal depression is maternal postpartum depression, as it affects 24-50% of the partners of women with postpartum depression.

A limited number of recent studies have investigated the occurrence of PTSD following childbirth in men. PTSD is an anxiety disorder that may develop following confrontation with a traumatic stressor, with three categories of characteristic symptoms: re-experiencing of the event, avoidance of stimuli associated with the event, and hyperarousal. The DSM-IV states that in order to qualify for PTSD, a traumatic event may also be witnessed (as partners do) rather than experienced (by the pregnant woman), but the actual experience of “threat to own life” is considered a strong predictor for the development of PTSD. In a retrospective study by Bradley et al., 199 fathers of healthy newborns who were present during the hospital birth were assessed six weeks following childbirth. No men were found to have PTSD, although 12% reported symptoms on at least one of the three PTSD symptom categories. Clinically significant symptoms of depression and anxiety were found in 8 and 7% of fathers, respectively. Skar et al. included both mothers and fathers, and found significant levels of acute distress and intrusive symptoms (DSM-IV criterion C as measured with the Impact of Events Scale (IES) during the first four days after delivery. Symptoms were more frequent in women than in men, but no full constellation of PTSD symptoms was found in any subject. In a study by Ayers et al., 5% of women and men scored above the recommended cut-off for both avoidance and intrusion on the IES. Even though the similar rates in men and women are not in line with other literature, it is of interest that the six cases were two couples and two individuals, suggesting a concordance between couples, as is known from studies on postpartum depression. A recent study by Iles et al. found that symptoms of PTSD were significantly related within couples, and that dissatisfaction with partner support and less secure attachment were associated with higher levels of posttraumatic stress and depression postpartum.

In women, several studies showed significantly higher PTSD rates after preterm delivery (due to various causes) compared to uncomplicated pregnancies. Only one prior study has thus far
looked at PTSD in partners of women with severe pregnancy complications. Pierrehumbert et al.\textsuperscript{13} assessed PTSD in parents of infants born prematurely (25-33 weeks gestation). Both mothers and fathers were found to have more posttraumatic stress (symptoms) than parents of healthy infants born at term. In this retrospective study, parents were assessed 18 months after delivery. This is long, considering that the chance of other causes for PTSD increases with time, subsequent pregnancies and deliveries may have occurred in the mean time, and the longitudinal course of PTSD following childbirth is not sufficiently clear. Furthermore, the perinatal PTSD questionnaire (PPQ) used in Pierrehumbert’s study does not contain all DSM-IV criteria for PTSD, which has been noted as a point of concern.\textsuperscript{35} In a study involving the current sample that we published recently\textsuperscript{10}, 14% of women hospitalized for preeclampsia (PE) or preterm premature rupture of membranes (PPROM) fulfilled the DSM-IV criteria for PTSD on the PTSD Symptom Scale self report questionnaire (PSS-SR)\textsuperscript{12} at six weeks postpartum, and 11% were at least moderately depressed based on the Beck Depression Inventory, second edition (BDI-II).\textsuperscript{33} These data, as well as the identified risk factors for women (history of depression, depressive symptoms during pregnancy, perinatal mortality), made us inquire into the mental wellbeing of partners of women with pregnancy complications.

The present study included three main research questions with corresponding hypotheses: (1) What is the occurrence of symptoms of PTSD and depression during pregnancy and postpartum, in partners of women with complicated pregnancies, as compared to partners of women with uneventful pregnancies. Based on the findings of our study of women with PE/PPROM and healthy pregnant controls\textsuperscript{30}, we hypothesized that partners of patients would report more symptoms of PTSD and depression than partners of controls; (2) Is there a relation between symptoms of PTSD and depression in women and men? We hypothesized a moderate to strong correlation between partners, both during pregnancy and postpartum; (3) Which factors predict the occurrence of symptoms of PTSD and depression in partners of patients at six weeks postpartum? Based on previous studies conducted among women, we hypothesized that demographic factors would not be related to psychiatric symptoms, but obstetric factors and symptoms of PTSD and depression during pregnancy would predict the occurrence of symptoms in men postpartum.

**METHODS**

**Design and setting**
In this longitudinal study, pregnant women with PE or HELLP syndrome (hemolysis, elevated liver enzymes, low platelets), and women with PPROM took part. PE was defined according to the American Congress of Obstetricians and Gynecologists’ (ACOG) practice bulletin on preeclampsia and eclampsia\textsuperscript{34}: a systolic blood pressure of 140 mm Hg or more, or a diastolic blood pressure of 90 mm Hg or more, in a previously normotensive woman after 20 weeks gestation, combined with the presence of 0.3 g or more of protein in a 24-hour urine specimen.\textsuperscript{35} HELLP syndrome was defined as aspartate aminotransferase (AST) and/or alanine aminotransferase (ALT) > 50 IU/L, and platelets < 100 * 10⁹/L, and lactate dehydrogenase > 600 IU/L. Preterm premature rupture of membranes
(PPROM) was defined according to the ACOG practice bulletin on PROM\(^ {36}\): rupture of membranes prior to the onset of labor and before 37 weeks of gestation. The female patients were recruited in the obstetric clinic of a University hospital in The Netherlands during a three year period. Healthy female controls with uneventful pregnancies were recruited in a community midwifery practice by means of posters announcing the study. Results of the mothers (patients and controls) have been published previously.\(^ {30}\)

Population
All women hospitalized for PE and PPROM were asked to participate in the study, unless their condition was so critical (as assessed by the clinician admitting them) that (a) they needed an immediate cesarean section, (b) they received magnesium sulfate treatment, or (c) they were too ill to complete questionnaires. Additional exclusion criteria were current multiple pregnancy, a history of intrauterine fetal death, and current alcohol or drugs dependence (of the pregnant woman). Furthermore, women with preexisting medical conditions (diabetes mellitus, hypertension, cardiovascular or renal diseases, systemic lupus erythematosus) were excluded, as these women would be likely to anticipate pregnancy complications due to their preexisting condition. Partners of patients and partners of controls were invited to take part in the study, though women could also take part if their partner refused. No further exclusion criteria were applied for the partners. Participants had to be fluent in Dutch and give written informed consent. Approval was obtained from the Medical Ethics Committee (Institutional Review Board) of the University Medical Center.

Procedure
Upon admission, patients and their partners were informed about the study and were asked to consider their participation within 24 hours. Female controls and their partners could sign up for the study through their community midwife. Following signed informed consent, they were contacted by one of the researchers and asked to complete questionnaires as soon as possible in order to minimize the loss of participants due to delivery before testing. Participants were tested during pregnancy (\(t_1\)) and six weeks postpartum (\(t_2\)). In order to obtain comparable intervals between \(t_1\) and \(t_2\) in the patient- and control groups, female controls and their partners were tested in the 38th week of pregnancy.

Measures
At \(t_1\), all participants (male and female) completed a brief self-report measure of general demographic information, and answered questions about previous psychiatric history: (a) whether they had ever had “one or more periods of feeling depressed or down for most of the day, during which they were not interested in activities that they enjoyed before”, indicating depressive symptoms; (b) whether they had “ever experienced something traumatic” (including some examples) and “whether this influenced them afterwards, for example through nightmares or flashbacks”, indicating posttraumatic stress symptoms. Data regarding current and past obstetric status were collected from the medical record of the female patients and controls.
During both test-sessions, the PTSD Symptom Scale self report questionnaire (PSS-SR)\(^{32}\) and the Beck Depression Inventory, second edition (BDI-II)\(^{31}\), were completed. The PSS-SR is a frequently used self report measure of PTSD symptoms. The questionnaire contains 17 items corresponding to the 17 PTSD symptoms described in the DSM-IV (criteria B, C and D). These items are rated using 4-point scales asking for the occurrence of each symptom over the past month (0 = never/not at all, 1 = once a week/a little bit, 2 = two to four times a week/somewhat, 3 = more than five times a week/very much). Symptoms were considered present if an item was rated 2 or 3. The PSS-SR sum-score ranges from 0 to 51. The PSS-SR that was administered at \(t_2\) asked for PTSD symptoms in the preceding month that were related to any stressful event experienced before that still bothered the participants. At \(t_2\), the PSS-SR referred to PTSD symptoms in the preceding month that were specifically related to pregnancy and the perinatal period. In addition, at \(t_2\), the participants rated the extent to which they had felt fear, helplessness, or horror during the pregnancy-related event they experienced as most shocking on three 100 mm (3.9 inch) Visual Analogue Scales (VAS). Using visual analogue scales is a reliable method to assess pain, anxiety and mood disorders that is frequently used in both research and hospital settings.\(^{37,39}\) The 100 mm strip depicts a linear continuum from experiencing no pain or a certain emotion (0), to experiencing the worst imaginable pain or most intense emotion (100). Recent research concludes that VAS scales approximate an interval-scale level, and therefore have superior psychometric properties as compared to ordinal-scale categorical measures such as Likert scales.\(^{40}\) In the present study, PTSD diagnosis at \(t_2\) was based on a symptom profile reflected by the PSS-SR and VAS scores that were consistent with the DSM-IV criteria. For this, we used the criteria as used in the study by Engelhard et al.\(^{22}\) More specifically, pregnancy-related PTSD was considered present when participants (a) scored 80 or more on one of the VAS for horror, fear, and/or helplessness at \(t_2\) (subjective stress, DSM-IV A2 criterion); (b) reported at least one re-experiencing, three avoidance, and two hyperarousal symptoms on the PSS (DSM-IV, B, C, and D criterion, respectively); (c) obtained a total PSS-SR score of 18 or higher (severity, DSM-IV F criterion). It should be noted that the duration criterion of four weeks (DSM-IV E criterion) was met because follow-up assessment was at six weeks and postpartum. The test-retest reliability has been calculated \(\alpha=.74.\)\(^{32}\) The PSS-SR has been validated in the Netherlands in a non-pregnant population, with \(\alpha=.93\), sensitivity between .80 and .90, and specificity between .84 and .88.\(^{41}\) The BDI-II\(^{33}\) is a self-report measure of depressive symptoms during the preceding two weeks. It consists of 21 items containing four statements that reflect increasing symptom severity (scoring 0-3 per item). The sum-score ranges from 0 to 63. A cut-off score of 20 or more was used, corresponding with moderate depression according to the BDI manual.\(^{33}\) The BDI-II is one of the most frequently used depression instruments in clinical psychological settings, and found to have good psychometric properties in both clinical samples and the general population.\(^{33,42,44}\) The Dutch version has been validated in non-pregnant patient groups.\(^{45,46}\) As opposed to some other depression questionnaires, the BDI includes all DSM-IV symptom criteria, and allows for differentiation between somatic and non-somatic symptoms.
Statistical analysis
Data were analyzed with SPSS 16.0, using a significance level of .05 (two-tailed). For the dichotomous data, \( X^2 \) analyses were used. Exploration of the continuous data revealed that the PSS and BDI sum-scores were not normally distributed. Therefore, non-parametrical Spearman’s rho, Kruskal-Wallis and Mann-Whitney U-tests were used. In order to identify risk factors for PTSD and depression at \( t_2 \), stepwise multiple regression analyses (SMRA) were performed on the PSS and BDI sum scores. Where appropriate, non-normally distributed variables were square root transformed (SQRT) to meet assumptions of normality, linearity, and homoscedasticity. Due to the relatively small sample size (and therefore low number of variables desired in the SMRA), we only included variables with a p-value lower than .05 as found in univariate analyses in the SMRA. In order to evaluate the contribution of mental well being of female patients and their partners at \( t_2 \) to the PSS-SR and BDI scores, a stepwise model was created, entering factors known at \( t_1 \) in the first step, followed by factors known at \( t_2 \) in the second step. Two sets of variables showed multicollinearity: PSS-SR and BDI scores at \( t_2 \) in partners of patients, and PSS-SR and BDI scores at \( t_2 \) in female patients. Therefore, the PSS-SR scores of female patients and partners of patients at \( t_2 \) were excluded from the depression model and similarly, the BDI scores of female patients and partners of patients at \( t_2 \) were excluded from the PTSD model.

RESULTS
Patient characteristics
At \( t_1 \), 193 females (patients and controls) were included in the study, of whom six did not have a partner. Of the 187 eligible partners (all male), 85 agreed to participate at \( t_1 \) (45%). Non-responder analysis (using t-tests, chi square and Fisher’s exact tests) demonstrated that women whose partners did and did not participate were comparable for demographic factors (age, education, marital status), obstetric factors (primiparity, cesarean rate, gestational age at delivery, perinatal mortality) and symptoms of PTSD and depression in history, at \( t_1 \) and at \( t_2 \).

At \( t_2 \), 66 men completed questionnaires, whereas 19 men declined further participation (see figure 1). No significant differences were found between partners of controls participating at both \( t_1 \) and \( t_2 \) versus partners of controls only participating at \( t_1 \). Between partners of patients participating at both \( t_1 \) and \( t_2 \) versus those only participating at \( t_1 \), the only significant difference was that the 37 full participants reported fewer PTSD symptoms at \( t_1 \) than the 14 men who dropped out after \( t_1 \) (p=.021). In absolute numbers, the three partners of patients with PTSD during pregnancy and the two partners of patients with depression during pregnancy, did not participate at \( t_2 \). No differences were found in demographic, obstetric and psychological characteristics between men whose partner had PE and men whose partner was hospitalized with PPROM, except that primiparity and cesarean section were more common among women with PE than PPROM. Further analyses have therefore
been performed with the two groups combined. Demographic and obstetric characteristics of the 66 men participating at t₂, including differences between partners of patients and partners of controls, are shown in table 1.

Figure 1. Overview of participation and drop out (n=)

\( t_1 \) = during pregnancy
\( t_2 \) = 6 weeks postpartum

Table 1. Characteristics of partners participating at \( t_1 \) (n= 66)

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Partners of patients (n=37)</th>
<th>Partners of controls (n=29)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>mean (SD) 31 (5.3)</td>
<td>34 (3.5) *</td>
</tr>
<tr>
<td>Higher education</td>
<td>% (N/total) 33 (12/36)</td>
<td>90 (26/29) *</td>
</tr>
<tr>
<td>Employed</td>
<td>% (N/total) 100 (35/35)</td>
<td>97 (28/29)</td>
</tr>
<tr>
<td>Psychiatric history</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported history of depression</td>
<td>% (N/total) 25 (9/36)</td>
<td>35 (10/29)</td>
</tr>
<tr>
<td>Reported history of PTSD</td>
<td>% (N/total) 14 (5/36)</td>
<td>24 (7/29)</td>
</tr>
<tr>
<td>Previous treatment for psychiatric problems</td>
<td>% (N/total) 11 (4/37)</td>
<td>24 (7/29)</td>
</tr>
<tr>
<td>Current treatment for psychiatric problems</td>
<td>% (N/total) 0 (0/37)</td>
<td>17 (5/29) *</td>
</tr>
<tr>
<td>Obstetric characteristics (females)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primipara</td>
<td>% (N/total) 64 (23/36)</td>
<td>72 (21/29)</td>
</tr>
<tr>
<td>Cesarean section</td>
<td>% (N/total) 59 (22/37)</td>
<td>3 (1/29) *</td>
</tr>
<tr>
<td>Gestational age (weeks)</td>
<td>mean (SD) 31+6 (3+2)</td>
<td>40+5 (0+6) *</td>
</tr>
<tr>
<td>Infant death</td>
<td>% (N/total) 8 (3/37)</td>
<td>0 (0/29)</td>
</tr>
</tbody>
</table>

Demographics and psychiatric history collected at \( t_1 \), obstetric characteristics collected at \( t_2 \).

* \( p \leq 0.05 \)
Prevalence of symptoms of PTSD and depression

No significant differences were found between partners of patients and partners of controls in symptoms of PTSD and depression. At $t_1$, the mean sum-score on the 17 PSS-SR items was 6.9 for partners of patients and 4.6 for partners of controls ($p=.28$), and the mean sum-score on the 21 BDI-II items was 7.0 for partners of patients and 5.6 for partners of controls ($p=.34$); at $t_2$, the mean sum-score on the 17 PSS-SR items was 6.5 for partners of patients and 3.1 for partners of controls ($p=.08$), and the mean sum-score on the 21 BDI-II items was 5.6 for partners of patients and 3.9 for partners of controls ($p=.31$). In partners of patients, the correlation between PTSD and depression sum-scores was .48 ($p<.001$) during pregnancy, and .86 ($p<.001$) postpartum. For partners of controls, the correlation between PTSD and depression sum-scores was .60 ($p<.001$) during pregnancy, and .73 ($p<.001$) postpartum. No men met the DSM-IV criteria for both disorders simultaneously.

Relation between paternal and maternal symptoms

Within-couple correlation of PTSD and depression symptom severity was low and not significant during pregnancy (PSS-SR: $r=.24$, $p=.159$; BDI-II: $r=.17$, $p=.303$), but strong postpartum (PSS-SR: $r=.62$, $p<.001$; BDI-II: $r=.59$, $p<.001$).

Tables 2 and 3 display the associations between symptoms of PTSD/depression in partners of patients at $t_2$ and several demographic, obstetric and psychiatric factors. In partners of patients, PTSD and depressive symptoms postpartum ($t_2$) were associated with PTSD and depression at $t_1$, with concurrent PTSD and depression (at $t_1$) in their female partners, but not with a history of depression or PTSD in either female patients or their partners. Furthermore, lower gestational age at delivery, infant death and higher paternal age were associated with more symptoms of PTSD and depression at $t_2$, whereas parity and mode of delivery were unrelated to PTSD/depression postpartum in partners of patients.

Evaluation of possible risk factors

Finally, we evaluated the partners of patients for the contribution of risk factors to the PSS-SR and BDI scores at $t_2$ using two stepwise multiple regression analyses. All variables with a $p$-value of 0.05 or lower in the univariate analyses (table 3) were included.

Table 4 shows the SMRA for PTSD symptoms (PSS-SR sum scores) of partners of patients at $t_2$. The model for SQRT PSS-SR at $t_2$ explained 53% (adjusted $R^2$) of the variance in the PSS-SR sum scores in the first step (Sig. $F$ change <.001), while the second step was not significant (sig. $F$ change = .074). Significant predictors of high paternal PSS-SR sum-scores at $t_2$ were PSS-SR and BDI sum-scores in men at $t_1$ and higher paternal age (table 4).
Table 2. Spearman’s Rho correlations between PTSD/depressive symptoms and demographic, obstetric and psychiatric characteristics for partners of patients participating at $t_1$ (n=37)

<table>
<thead>
<tr>
<th></th>
<th>PTSD symptoms</th>
<th></th>
<th>Depressive symptoms</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>($r$)</td>
<td>$p$</td>
<td>($r$)</td>
<td>$p$</td>
</tr>
<tr>
<td><strong>Demographic and obstetric variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>.376</td>
<td>.026 **</td>
<td>.367</td>
<td>.030 **</td>
</tr>
<tr>
<td>Gestational age (weeks)</td>
<td>-.471</td>
<td>.003 **</td>
<td>-.423</td>
<td>.009 **</td>
</tr>
<tr>
<td><strong>Psychiatric history (partners of patients)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD symptoms $t_1$</td>
<td>.456</td>
<td>.005 **</td>
<td>.411</td>
<td>.012 **</td>
</tr>
<tr>
<td>Depressive symptoms $t_1$</td>
<td>.558</td>
<td>&lt;.001 ***</td>
<td>.671</td>
<td>&lt;.001 ***</td>
</tr>
<tr>
<td>PTSD symptoms $t_2$</td>
<td>---</td>
<td></td>
<td>.858</td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms $t_2$</td>
<td>.858</td>
<td>&lt;.001 ***</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td><strong>Psychiatric history (female patients)</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD symptoms $t_1$</td>
<td>.357</td>
<td>.030 **</td>
<td>.179</td>
<td>.289</td>
</tr>
<tr>
<td>Depressive symptoms $t_1$</td>
<td>.149</td>
<td>.378</td>
<td>.075</td>
<td>.657</td>
</tr>
<tr>
<td>PTSD symptoms $t_2$</td>
<td>.624</td>
<td>&lt;.001 ***</td>
<td>.531</td>
<td>&lt;.001 ***</td>
</tr>
<tr>
<td>Depressive symptoms $t_2$</td>
<td>.625</td>
<td>&lt;.001 ***</td>
<td>.586</td>
<td>&lt;.001 ***</td>
</tr>
</tbody>
</table>

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

Table 3. Associations between PTSD/depressive symptoms and demographic, obstetric and psychiatric characteristics for partners of patients participating at $t_2$ (n=37)

<table>
<thead>
<tr>
<th></th>
<th>PTSD symptoms</th>
<th></th>
<th>Depressive symptoms</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$p$</td>
<td></td>
<td>$p$</td>
<td></td>
</tr>
<tr>
<td><strong>Demographic and obstetric variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Higher/lower education (partners)</td>
<td>.245</td>
<td></td>
<td>.045 **</td>
<td></td>
</tr>
<tr>
<td>Primipara</td>
<td>.585</td>
<td></td>
<td>.791</td>
<td></td>
</tr>
<tr>
<td>Cesarean section</td>
<td>.926</td>
<td></td>
<td>.652</td>
<td></td>
</tr>
<tr>
<td>Infant death</td>
<td>.016 **</td>
<td></td>
<td>.011 **</td>
<td></td>
</tr>
<tr>
<td><strong>Psychiatric history (partners of patients)</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PTSD symptoms in history</td>
<td>.232</td>
<td></td>
<td>.089</td>
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</tr>
<tr>
<td>Depressive symptoms in history</td>
<td>.226</td>
<td></td>
<td>.199</td>
<td></td>
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<tr>
<td><strong>Psychiatric history (female patients)</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD symptoms in history</td>
<td>.494</td>
<td></td>
<td>.888</td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms in history</td>
<td>.133</td>
<td></td>
<td>.515</td>
<td></td>
</tr>
</tbody>
</table>

* $p<.05$

Mann Whitney U-tests: comparison between those with and without the characteristic
Table 4. Stepwise Hierarchical Multiple Regression Analysis of PTSD symptoms in partners of patients at $t_2^\dagger$ (n=37)

<table>
<thead>
<tr>
<th></th>
<th>Adj. $R^2$</th>
<th>$\Delta R^2$</th>
<th>Beta</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1: Factors known at $t_1$</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.533</td>
<td>0.553</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms at $t_1$ (partners)</td>
<td>.338</td>
<td>.017 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD symptoms at $t_1$ (partners)</td>
<td>.289</td>
<td>.030 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD symptoms at $t_1$ (patients)</td>
<td>.208</td>
<td>.104</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paternal age</td>
<td>.343</td>
<td>.009 **</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p<.05$; ** $p<.01$
$\dagger$PSS-R sum-scores were logarithmically transformed ($^{10}\log$(sum-score+1)); $R^2$, explained variance.

Table 5. Stepwise Hierarchical Multiple Regression Analysis of depressive symptoms in partners of patients at $t_2^\dagger$ (n=37)

<table>
<thead>
<tr>
<th></th>
<th>Adj. $R^2$</th>
<th>$\Delta R^2$</th>
<th>Beta</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 2: Factors known at $t_1$ and $t_2$</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.643</td>
<td>.546</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 1: Factors known at $t_1$</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms at $t_1$ (partners)</td>
<td>.252</td>
<td>.061</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTSD symptoms at $t_1$ (partners)</td>
<td>.171</td>
<td>.155</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education (lower/higher)</td>
<td>.166</td>
<td>.147</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paternal age</td>
<td>.253</td>
<td>.034 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2: Factors known at $t_2$</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gestational age at delivery</td>
<td>.015</td>
<td>.908</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perinatal infant death</td>
<td>.256</td>
<td>.053</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms at $t_2$ (patients)</td>
<td>.221</td>
<td>.134</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p<.05$
$\dagger$BDI-II sum-scores were logarithmically transformed ($^{10}\log$(sum-score+1)); $R^2$, explained variance. Final step shown.

Table 5 shows the SMRA for depressive symptoms (BDI-II sum scores) of partners of patients at $t_2$. The model for SQRT BDI explained 55% (adjusted $R^2$) of the variance in BDI sum scores in the first step (Sig. F change < .001) and an additional 9.7% in step 2 (Sig. F change = .023). The only significant predictor of high BDI sum-scores at $t_2$ was higher paternal age (table 5).
DISCUSSION

Considering that women with PE and PPROM are more prone to developing PTSD than women with uncomplicated pregnancies\(^\text{39}\), the aim of this study was to investigate whether this difference was also found in their partners. We found no significant differences between partners of patients and partners of controls. On the other hand, symptoms of PTSD and depression in men and women often co-occurred at 6 weeks postpartum, which adds to the emerging evidence that fathers should not be overlooked when it comes to the psychological impact of pregnancy and childbirth.

Strengths of the study include its prospective longitudinal design, a population that has not often been researched (partners of women with pregnancy complications), and the fact that a representative group of males was willing to participate at \(t_1\). Differences between partners of patients and partners of controls (table 1) were in part as expected, as more cesarean sections and a lower gestational age were found in the patient group. However, partners of controls were on average older and higher educated than partners of patients. Partners of controls also more often indicated current psychiatric treatment than partners of patients (0/37 vs. 5/29; \(p=0.013\)). This discrepancy may either be due to a higher prevalence of mental health problems in this group, or fewer (personal or financial) barriers in seeking treatment. While we cannot say with certainty, the fact that partners of patients and partners of controls groups report a similar percentage of a history of depression and PTSD is indicative for a difference in treatment-seeking behavior. In all cases of current treatment, men already received treatment prior to the birth of their child for a range of indications including depression, OCD and psychosis. Contrary to expectations\(^\text{47}\), psychiatric history was not strongly associated with symptoms of depression or PTSD postpartum in this study. Interestingly, older fathers reported significantly more symptoms of depression and PTSD at \(t_2\) as shown in the SMRA, which is a finding that cannot easily be explained based on previous research and therefore may warrant additional investigation.

Unfortunately, the sample of partners was fairly small (n=85 at \(t_1\) and n=66 at \(t_2\)), and partners of patients who dropped out of the study after \(t_1\) had more PTSD symptoms (on average) than partners of patients who participated during both time points. Both factors may at least partially explain why no differences were found between partners of patients and partners of controls in prevalence rates and sum-scores of PTSD and depression, and they could possibly have resulted in an underestimation of prevalence rates at \(t_2\). On the other hand, one could also argue that the drop-out of those with more symptoms at \(t_1\) means that symptoms at \(t_2\) are not merely the result of pre-existing psychopathology. One may hypothesize that, related to “avoidance” as one of the symptom categories of a PTSD diagnosis, the men with PTSD at \(t_1\) declined further participation in the study because reflecting on the birth of their child and the early postpartum period was too confronting for them. Interestingly enough, both for PTSD and depression, prevalence rates are not significantly higher (or even lower) postpartum than during pregnancy. This too may be an effect of selective drop out, and it is also important to note that the \(t_1\) findings should not be seen as baseline...
measurements, as female patients and their partners were likely to be already stressed due to the hospitalization and imminent preterm birth. A larger study may reveal whether the trend observed in this study (more PTSD symptoms in partners of patients than in partners of controls) is found significant with a higher number of participating patients and partners. One may also consider to include baseline measurements and a longer follow-up, as we know from the literature that women may also develop PTSD later than six weeks postpartum, and the highest incidence of male postpartum depression seems to be three to six months postpartum.15

The prevalence of PTSD in partners of patients was found to be 6% at t1 and 3% at t2, and 0% among partners of controls both in pregnancy and postpartum. Other studies of postpartum PTSD in men found prevalence rates varying from 0 to 5%.10,19,21 In our current study, the prevalence of depression among fathers was 4% in pregnancy and 5% postpartum, which is lower than the 10% recently estimated in a large meta-analysis.15 While this may have to do with our population, it could also be due to our strict adherence to the cut-off value listed in the BDI-II manual (sum score ≥20) for moderate or severe depression.33 If we would have also included mild depression (cut-off value of 10) as many previous studies did\textsuperscript{13,48,50}, the prevalence of depression in men would be 33% (partners of patients) and 12% (partners of controls) in pregnancy and 14% (partners of patients) and 7% (partners of controls) postpartum. While the benefits of the BDI have previously been mentioned, one may also consider using a questionnaire that has been specifically designed for the pregnancy and postpartum period, such as the Edinburgh Postnatal Depression Scale (EPDS).51 Even though the EPDS does not include all DSM-IV criteria, it is frequently used and has also been validated for males.52

The lower prevalence rates of PTSD and depression in men than in women found in this study are in accordance with some studies, but not in line with some other studies that found similar rates.10,13,19,21 Intuitively, one may assume that women will experience more symptoms, as (a) the lifetime prevalence rates of PTSD and depression are higher in women than in men\textsuperscript{53,54}; (b) women are 2.3 times more likely to develop PTSD following a traumatic event than men\textsuperscript{55}; (c) postpartum depression in men may develop following the onset of depression in women\textsuperscript{52}; (d) women have actually experienced pregnancy, labor (pain) and obstetric interventions, while men have merely witnessed, and therefore effects of a different magnitude may be found. The association we found between symptoms of depression and PTSD is well known from literature.47,56 Furthermore, the strong within-couple correlation of PTSD and depression symptom severity that was observed postpartum is in line with the findings of previous research that men’s and women’s responses after childbirth are strongly interlinked in the case of PTSD\textsuperscript{14}, and 24-50% of the partners of women with postpartum depression also get postpartum depression.\textsuperscript{16}

Instead of solely focussing on the new mother, these findings call for a system-oriented approach, evaluating the well being of woman and partner. For future studies we would therefore recommend to always include fathers, and consider the dyad rather than individuals, as partners’ symptoms of
PTSD and depression postpartum are strongly associated. Early identification and intervention could possibly prevent families from entering a downward spiral, with potentially adverse consequences for the partner relationship and parent-infant bonding, and avoidance of future pregnancies.57 In summary, this study is one of the first to provide data on PTSD and depression in partners of women with severe pregnancy complications. Contrary to expectations, no differences were found in the occurrence of symptoms of PTSD and depression between partners of patients and partners of controls. Higher paternal age was associated with more symptoms of PTSD and depression in partners of patients. In both groups, we observed significant overlap between symptoms of PTSD and depression, as well as between partners.
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PART III

TREATMENT
EYE-MOVEMENT DESSENSITIZATION AND REPROCESSING FOR THE TREATMENT OF POSTTRAUMATIC STRESS FOLLOWING CHILDBIRTH

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Janneke van der Velde
Bennard Doornbos
K Marieke Paarlberg
Willibrord CM Weijmar Schultz
Maria G van Pampus

Birth 2012 Mar; 39(1):70-6
ABSTRACT

Objectives
No standard intervention with proved effectiveness is available for women with posttraumatic stress following childbirth because of insufficient research. The objective of this paper was to evaluate the possibility of using eye-movement desensitization and reprocessing (EMDR) treatment for women with symptoms of posttraumatic stress disorder (PTSD) following childbirth. The treatment is internationally recognized as one of the interventions of choice for the condition, but little is known about its effects in women who experienced the delivery as traumatic.

Methods
Three women suffering from posttraumatic stress symptoms following the birth of their first child were treated with EMDR during their next pregnancy. Patient A developed posttraumatic stress symptoms following the lengthy labor of her first child that ended in an emergency cesarean section after unsuccessful vacuum extraction. Patient B suffered a second degree vaginal rupture, resulting in pain and inability to engage in sexual intercourse for years. Patient C developed severe preeclampsia postpartum requiring intravenous treatment.

Results
Patients received EMDR treatment during their second pregnancy, using the standard protocol. The treatment resulted in fewer posttraumatic stress symptoms and more confidence about their pregnancy and upcoming delivery compared with before the treatment. Despite delivery complications in Patient A (secondary cesarean section due to insufficient engaging of the fetal head); Patient B (second degree vaginal rupture, this time without subsequent dyspareunia); and Patient C (postpartum hemorrhage, postpartum hypertension requiring intravenous treatment), all three women looked back positively at the second delivery experience.

Conclusions
Treatment with EMDR reduced posttraumatic stress symptoms in these three women. They were all sufficiently confident to attempt vaginal birth rather than demanding an elective cesarean section. We advocate a large-scale, randomized controlled trial involving women with postpartum PTSD to evaluate the effect of EMDR in this patient group.

Keywords: eye-movement desensitization and reprocessing, posttraumatic stress disorder, childbirth, pregnancy, postpartum
INTRODUCTION

Posttraumatic stress disorder (PTSD) following childbirth is a serious condition affecting roughly 1 to 2 percent of childbearing women in developed countries. An additional 22 to 40 percent experience some posttraumatic stress symptoms without meeting all the criteria for the disorder. The article by Beck et al. in the September 2011 issue of Birth adds to the existing evidence about prevalence and risk factors. Previous studies indicated that women with posttraumatic stress following childbirth usually do not recover spontaneously. For those with the disorder (or clinically relevant symptoms), a subsequent pregnancy may act as a trigger, with possible negative consequences. Symptoms of hyperarousal may influence the fetal environment and development through their effect on the hypothalamic-pituitary-adrenal-axis. Furthermore, symptoms of avoidance may include denial of pregnancy, avoidance of care, or both. Women could also greatly fear the upcoming delivery, which is associated with more cesarean sections. Thus far, unfortunately, there is no standard intervention with proved effectiveness for women with posttraumatic stress following childbirth because of insufficient research into the topic.

In international guidelines on the management of PTSD, trauma-focused cognitive behavioral therapy (CBT) and eye-movement desensitization and reprocessing (EMDR) are recommended as the treatments of choice for trauma victims. EMDR is a technique that consists of a structured treatment protocol (table 1). The patient focuses on her or his traumatic memories, thoughts, and emotions, while engaging in bilateral stimulation (eye movements, tones, or hand tapping). The aim is to reduce stress and to replace negative perceptions of the traumatic event with more positive cognitions. Despite a lack of research into treatment of PTSD following childbirth, a recent review described three possible treatment options; seven studies, of which six were randomized controlled trials, have evaluated the effect of debriefing or counseling. Their conclusions varied from effective, to no significant effect, to even a possible negative effect of the intervention on posttraumatic stress symptoms. One case report was published describing positive effects of CBT on the reduction of posttraumatic stress in two women. Thus far, one pilot study has been published using EMDR for the treatment of posttraumatic stress following childbirth, with promising results. Sandström et al. conducted a pilot study among four women (one in her second pregnancy and three nonpregnant). Although two women did not complete the treatment, the intervention proved effective in reducing posttraumatic stress symptoms in all four women, and its long-term effects remained in three of four women at 1 to 3 years following treatment.
The proved effectiveness of EMDR in non-childbirth-related populations calls for further evaluation among women with posttraumatic stress following childbirth. Whether the treatment should be used with pregnant women has been topic of debate; Shapiro recommends caution since possible hyperarousal and increased stress after the treatment may negatively affect the mother and fetus.9 We present three cases of women with posttraumatic stress following childbirth. They were referred by their perinatologist to a health psychologist with certification for EMDR treatment, who diagnosed posttraumatic stress following childbirth. The three women were treated during the subsequent pregnancy. The procedure used in this article is the Dutch translation of Shapiro’s protocol.13 Other than reducing posttraumatic stress symptoms, treatment during pregnancy in this study was also aimed at increasing confidence and positive perceptions about the upcoming delivery.

METHODS

The three cases describe women who were in their second pregnancy when they were referred by their perinatologist to a health psychologist, because the former suspected (symptoms) of posttraumatic stress following childbirth. The health psychologist proposed EMDR treatment after confirming the diagnosis. Posttraumatic stress symptoms described by the women are listed in table 2. All treatments were carried out according to the protocol in table 1, unless mentioned otherwise. A description of the assessment stage (step 3 in the protocol) for each woman is listed in table 3, including the key image they visualized, their negative cognition, the corresponding positive cognition and initial rating of the subjective units of distress (SUD). In line with the protocol, the treatment session continued until the SUD was 0 and the validity of cognition (VoC) was 7.

THREE CASES

Patient A

Patient history

Patient A was a 29-year-old gravida 1 para 0 with a steady partner, with no medical history and insignificant family history. During pregnancy she reported frequent headaches and insomnia. Because she had developed pregnancy-induced hypertension, labor was induced using oxytocin infusion followed by artificial rupture of the membranes. During the course of labor she requested and received epidural analgesia. When she reached full dilatation, 17 hours into labor, the cardiotocogram showed persistent bradycardia and the 5th fetal scalp blood sample indicated fetal distress. The subsequently performed vacuum extraction was unsuccessful, and the patient was taken to the operating room for an emergency cesarean section. A healthy infant was born at 38 4/7 weeks gestation with an Apgar score of 8 and 9 after 1 and 5 minutes, respectively.
<table>
<thead>
<tr>
<th>Stage</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Preparation</td>
<td>Developing a therapeutic and trusting relationship between patient and clinician, explanation of the theoretical background and actual steps in EMDR.</td>
</tr>
<tr>
<td>3. Assessment</td>
<td>The patient visualizes the target incident and formulates a negative cognition about herself related to the traumatic experience. Subsequently, she formulates a positive cognition she would like to believe about herself, and quantifies this on a scale from 1 to 7 (validity of cognition, VoC). Then, the patient describes the emotions associated with the target event and scales the disturbance on an 11-point scale (subjective units of distress, SUD). Finally, she is asked to scan her body for the location of sensations of distress.</td>
</tr>
<tr>
<td>4. Desensitization</td>
<td>While the patient focuses on the distress she experiences, bilateral stimulation is applied for several seconds to minutes (depending on the patient’s reaction). Subsequently, she is asked to clear her mind and describe what thought or feeling comes to mind. Several sets of bilateral stimulation are repeated until she repeatedly reports similar thoughts and the SUD is 0.</td>
</tr>
<tr>
<td>5. Installation</td>
<td>The positive cognition is revisited in relation to the original disturbing image, and its validity of cognition is rated. Sets of bilateral attention are applied until the positive thought is experienced as being totally valid (6-7 on the validity of cognition scale).</td>
</tr>
<tr>
<td>6. Body Scan</td>
<td>Patient closes her eyes, concentrates on the target experience, and mentally scans her entire body. If sensations are reported, short sets of bilateral stimulation are applied until the sensation subsides or a positive feeling is experienced.</td>
</tr>
<tr>
<td>7. Closure</td>
<td>Explanation of the session by the therapist, including guidance on dealing with uncomfortable feelings after the session.</td>
</tr>
<tr>
<td>8. Reevaluation</td>
<td>Reevaluation takes place at the beginning of the following session.</td>
</tr>
</tbody>
</table>

EMDR = eye-movement desensitization and reprocessing; SUD = subjective units of distress; VoC = validity of cognition

Two and a half years later, during her second pregnancy, Patient A described her first delivery as “a bruise”; she felt that obstetric staff had failed her, and that she had been unable to stand up for herself and take care of her baby.

**Intervention**

Four sessions took place: intake, two treatments, and a closing session. No indications of psychiatric disorders were present other than posttraumatic stress. After the second session, a future template was applied with respect to the upcoming delivery. Patient A imagined being able to stand up for
herself when entering the delivery room. The session ended with her expressing the feeling, “I am brave and I am a good mom.”

**Follow-up**

After the treatment, Patient A no longer reported physical symptoms when passing the hospital, and felt more relaxed and less emotional. In addition, she was no longer blaming staff for the proceedings of the first delivery, felt she did a good job giving birth, and was proud of having completed the treatment. For her second delivery, she did not prefer a cesarean section over vaginal birth or vice versa, as long as she “would end up psychologically undamaged.” At 39 4/7 weeks of gestation, spontaneous labor started. She progressed to 7 cm dilatation with epidural analgesia and oxytocin augmentation. Because of insufficient engagement of the fetal head, a secondary cesarean section was performed, resulting in the birth of a healthy infant (Apgar score 9/10 after 1 and 5 minutes, respectively), with a birthweight of 3030 g. Patient A looks back positively on this birth.

**Patient B**

**Patient history**

Patient B was a 21-year-old primigravida in a steady relationship, with an unplanned but desired pregnancy. Her medical history included hypothyroidism (Hashimoto’s disease) for which she used levothyroxine. Because she preferred female caregivers only, she decided to have her pregnancy checkups at an independent midwifery practice rather than the hospital. She did not report any negative sexual experiences. The family medical history is unknown, as she was adopted as an infant.

At 31 1/7 weeks gestation, she was admitted to the obstetrics unit for imminent preterm delivery, but she was diagnosed with cholestasis. At 39 3/7 weeks gestation, ultrasound examination revealed unilateral hydronephrosis, and therefore labor was induced. After 3 hours of labor, she reached full dilatation, and 49 minutes later, after using the McRoberts maneuver for shoulder dystocia, a healthy infant was born (Apgar score 9/10) with a birthweight of 3450 g. During the course of delivery, a second degree rupture occurred, with bilateral tearing of the vaginal mucosa and skin up to the anal sphincter.

After the delivery she could not stand up straight for 3 weeks. Two years after giving birth, Patient B reported continuing pain at the site of the sutures, and impossibility to insert tampons and engage in sexual intercourse with vaginal penetration. The latter resulted at times in hyperventilation with panic attacks consistent with DSM-IV disorders criteria. She did not report incontinence, and mentioned a satisfying intimate and sexual relationship with her partner. She was taking oral contraceptives, thinking that she was not ready for another pregnancy. Gynecological examination revealed well-healed skin at the rupture site and overactive pelvic floor musculature, for which she received pelvic floor physical therapy. During her second pregnancy, 4 years after the first delivery, Patient B described the first birth as “one big trauma”: her greatest fear (episiotomy or rupture requiring sutures) had become reality, and she felt that staff had not taken her seriously. She had
not looked at her vagina and vulva since the delivery, thinking they were ruined and would never heal. In fact, she was avoiding everything that was related to the perinatal period, not wanting to talk or even think about it.

**Intervention**

After four sessions of clinical interview and counseling, two treatments took place. The treatment could not be carried out according to protocol because Patient B was very anxious to visualize the situation. She did feel calmer after the session. At the end of the second session she was unable to rate the SUD, but mentioned that the image was “much further away.”

**Follow-up**

After the two treatment sessions, Patient B felt calmer, less alone, and was more confident about how to handle the upcoming birth. She requested an elective cesarean section at first, but felt confident enough to attempt vaginal delivery. Before the birth she had prepared a birth plan, in which she outlined her wishes about the labor and delivery. At 39 5/7 weeks’ gestation, labor started spontaneously, and she progressed to full dilatation in less than 2 hours, resulting in the birth of a healthy infant (Apgar score 9/9) 15 minutes later. Again, a second-degree rupture occurred, which was sutured. Nonetheless, no dyspareunia occurred this time, and she reported looking back positively at the birth.

**Patient C**

**Patient history**

Patient C was a 25-year-old gravida 1 para 0 in a stable relationship. Her family history included two teen brothers who died of an inherited cardiac condition (arrhythmogenic right ventricular dysplasia) in her presence. She had cardiology checkups every 3 years, with no cardiac abnormalities, and according to the cardiologist, no special precautions were necessary related to a pregnancy or childbirth. Patient C prepared a birth plan. The pregnancy progressed without significant problems or complications, and at 39 4/7 weeks gestation, labor started spontaneously. After artificial rupture of membranes and an expulsion stage of 105 minutes, a healthy infant was born, who did well (Apgar score 8/10).

During the first day postpartum, Patient C developed symptomatic preeclampsia, with headache, feeling shaky, hyperreflexia, and elevated liver enzymes (aspartate aminotransferase 112 U/l). She was admitted to the obstetric high care unit, received intravenous magnesium sulphate for 4 days and labetalol tablets for 3 weeks. She reported that the postpartum events had a great impact on both herself and her husband (partly due to her family history), and she still had difficulty concentrating 2 years after the childbirth. During the second pregnancy, 2 1/2 years after the first delivery, Patient C described that she still had flashbacks of the hospitalization postpartum, and that she tried to put away her emotions because she was afraid she might “go crazy.”
Intervention
After the intake, four treatment sessions took place, the second of which involved the postpartum experience. At the end of this session, a future template was applied with respect to blood pressure measurements and upcoming visits to the cardiologist. The other treatments concerned the death of her brothers, hospitalization of her father, and fear of cardiac problems, which will not be further discussed. She displayed tendencies of obsessive-compulsive disorder (e.g., checking her pulse to see if her heart was still beating), but did not meet all the DSM-IV disorders criteria.

Follow-up
After the treatment, Patient C no longer reported posttraumatic stress symptoms, her anxiety was no longer debilitating, she felt calmer and better able to allow her emotions. During the second pregnancy, no complications occurred. At 39 O/7 weeks gestation, she went into spontaneous labor and gave birth to a healthy boy (Apgar score 10/10). Postpartum hemorrhage occurred (1100 ml), and due to postpartum hypertension, she had to take antihypertensive medication (labetalol). She looked back at the birth in a positive way.

DISCUSSION
In all three women who were suffering from posttraumatic stress following childbirth, EMDR during pregnancy resulted in stress reduction, fewer posttraumatic stress symptoms, and more confidence toward the upcoming delivery of their second child. Despite complications during their second deliveries (secondary cesarean section in Patient A, second-degree vaginal rupture in Patient B, and postpartum hemorrhage and hypertension in Patient C), all three women had a positive experience of the second birth.

For several years, these women were suffering from posttraumatic stress symptoms related to a previous delivery, which is in line with research indicating that spontaneous recovery from posttraumatic stress following childbirth is uncommon. These findings, although based on only three cases, are in line with previous findings by Sandström et al12 and with studies on the effects of EMDR in non-childbirth-related trauma.14 The study by Sandström et al. allows for more quantitative conclusions than our study does, as their design included the use of structured questionnaires2 to measure the severity of posttraumatic stress symptoms before and after treatment. Nonetheless, their study is also based on a limited number of patients (four), two of whom did not complete the treatment sessions. In our sample, each patient was referred by the same perinatologist (M. van Pampus) to the health psychologist with extensive experience with EMDR (J. van der Velde), which controls for inter-observer bias. Even though a clinical interview was held with each woman to evaluate whether she suffered from PTSD, for research purposes it would have been valuable also to have used standardized instruments to quantify the effects of treatment. We noticed that all three women mentioned that they felt they had not been taken seriously by hospital staff during the first
Table 2. Symptoms present in each patient during the clinical interview that preceded EMDR

<table>
<thead>
<tr>
<th>Patient</th>
<th>Criterion B Re-experiencing</th>
<th>Criterion C Avoidance and Numbing</th>
<th>Criterion D Hyperarousal</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Sweating, experiencing hot flushes, and crying when passing by the hospital</td>
<td>Trying to avoid thoughts or conversations associated with the delivery</td>
<td>Overwhelmed by emotions when hearing another woman’s childbirth story</td>
</tr>
<tr>
<td>B</td>
<td>Intense distress at exposure to internal or external cues that symbolize or resemble an aspect of the delivery (sometimes with panic attacks)</td>
<td>Not looking at vagina and vulva; avoiding activities, thoughts, and conversations that arouse recollections of the delivery</td>
<td>Irritability; outbursts of anger</td>
</tr>
<tr>
<td>C</td>
<td>Flashbacks of the hospitalization postpartum; physical reactions when thinking about blood pressure measurements</td>
<td>Avoiding activities, places, and conversations associated with delivery. Trying to put away emotions to prevent herself from crying; avoiding hospital programs on television; unable to look at photos of son’s birth</td>
<td>Difficulty concentrating; exaggerated startle response; anxious, nervous, sad, and insecure; headache and light-headedness</td>
</tr>
</tbody>
</table>

Table 3. Description of the treatment for each patient (assessment stage)

<table>
<thead>
<tr>
<th>Session</th>
<th>Patient A</th>
<th>Patient B</th>
<th>Patient C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Image</td>
<td>Seeing my baby and dismay about having to take care of it</td>
<td>Lying in the hospital bed, wanting to call the nurse but the alarm was not working</td>
<td>Seeing the head of the baby being born</td>
</tr>
<tr>
<td>Negative cognition</td>
<td>I am weak and selfish</td>
<td>I am helpless</td>
<td>I am helpless</td>
</tr>
<tr>
<td>Positive cognition</td>
<td>I am strong</td>
<td>I can handle it</td>
<td>I can handle it</td>
</tr>
<tr>
<td>Subjective units of distress</td>
<td>9</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

birth. Lack of (perceived) support, communication, and care by staff members are known risk factors for the development of posttraumatic stress.2,15,16 Even though research on interventions to increase self-confidence and empowerment are scarce, the results of using a birth plan (as did Patients B and C) are promising.17,18

As has been mentioned before, it may be more beneficial to perform the treatment before rather than during a subsequent pregnancy, not only because some researchers claim that treating during
pregnancy could increase stress that may be harmful, but also because entering a pregnancy with untreated PTSD may have negative effects on fetal development and maternal well-being, and prevent women from seeking adequate care. In practice, however, many women with posttraumatic stress following childbirth do not mention symptoms until during a subsequent pregnancy. In that case, the available time to treat birth-related trauma in the face of an upcoming delivery is limited. EMDR (as opposed to, for example, cognitive behavioral therapy) is often a brief (and therefore relatively inexpensive) intervention with immediate effect. In addition, insisting on a cesarean section is not uncommon (estimate 7-22%) among women with extreme fear of childbirth or posttraumatic stress following childbirth. In our sample, none of the women demanded an elective cesarean section after the treatment. The possibility that such a brief intervention could avoid unnecessary (and expensive) elective cesarean sections, with significant maternal morbidity, would be another argument in favor of using the treatment for women with posttraumatic stress following childbirth.

Treating women with this disorder before a subsequent delivery (and preferably even before another pregnancy) would require timely identification. Even though the prevalence of PTSD following childbirth is low compared with, for example, postpartum depression, it may therefore be worthwhile to screen women for PTSD at their postpartum checkup to prevent future suffering from symptoms for years and to avoid the emergence of symptoms in a subsequent pregnancy.

CONCLUSIONS

Treatment with EMDR reduced PTSD symptoms in these three women, and hence appears to be an effective intervention. Furthermore, all three women were confident enough to attempt vaginal birth rather than demanding an elective cesarean delivery. We suggest a large-scale, randomized controlled trial involving women with PTSD following childbirth, as diagnosed using validated quantitative questionnaires. Such a study could allow for solid conclusions on the use of EMDR for the treatment of posttraumatic stress following childbirth.
REFERENCES


GENERAL DISCUSSION AND RECOMMENDATIONS
GENERAL DISCUSSION AND RECOMMENDATIONS

The results of the studies presented in this thesis allow for a number of conclusions regarding posttraumatic stress disorder (PTSD) following pregnancy and childbirth, related to assessment issues, study design, specific populations, and treatment options. In addition, this final part of the thesis contains suggestions for future research and recommendations to improve care for women with (symptoms of) PTSD following childbirth, in particular related to possible prevention strategies.

Establishing if a new mother suffers from PTSD is less easy than is generally assumed, and prevalence rates of PTSD are closely linked to the instrument used to screen for the disorder. As has been pointed out in chapter 3, a marked discrepancy was found between the cases of PTSD following childbirth that were identified with the TES-B and the PSS-SR (κ = 0.24), even though a strong association was found between the two instruments (Spearmans ρ = 0.78). In comparing these two questionnaires, large differences in operationalization were identified: inclusion of all or some criteria in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)\(^2\), formulation of questions, answer categories, cut-off values and instructions to respondents. It was also pointed out that studies on PTSD following childbirth use a variety of instruments, with very different psychometric properties. Notably, some questionnaires do not include all DSM-IV criteria, causing them to measure symptoms of PTSD, rather than the full set of criteria as described in the DSM-IV. In clinical settings, recognition of suffering and possible treatment options should not be limited to women with full-blown PTSD, but for research purposes it is important to use uniform and unambiguous definitions of PTSD, in order to allow comparison between studies.

Chapter 5 demonstrated that the rates of PTSD, depression and anxiety are similar in women who conceived spontaneously and those who underwent medically assisted conception. At the same time, with the relatively small sample size in mind, it was noted that trends observed may prove to be significant differences with a larger number of subjects. At present, this means there is no indication for extra or special psychological care postpartum for women who gave birth after fertility treatments. Chapter 6, on the other hand, revealed that the constellation of events associated with preterm delivery, often including hospitalization during pregnancy, admittance of the infant to the neonatal intensive care unit and sometimes perinatal death may be highly traumatic. In fact, 14% of women with preterm preeclampsia (PE) or preterm premature rupture of membranes (PPROM), delivering on average 9 weeks before term, met the DSM-IV criteria for PTSD, compared to 3% in women with uncomplicated pregnancies. While an increased prevalence of PTSD among women with severe preeclampsia was to be expected based on previous research\(^2,3\), the actual percentage of women with PPROM who reported full blown PTSD (17%) was highly surprising, and is cause for concern. These findings also indicate that the delivery itself is not necessarily the (most) traumatic event for every woman presenting with PTSD postpartum, but that the trauma may also be related to sudden hospitalization or neonatal complications. This study has made the prevalence of PTSD in women with hypertensive disorders of pregnancy explicit, and has added PPROM to the list of
conditions with increased risks of impaired mental well being. These findings justify screening for PTSD among all women with preterm delivery, and follow up consults to evaluate mental well being for an extended period of time.

Chapter 7 demonstrated that the focus of research and care should not only be on mother and child, but should be extended to the partners (fathers) as well. While full PTSD after a complicated pregnancy (preeclampsia or PPROM) was not as frequent in men as in women, it did become clear that symptoms of PTSD in women and their partners are strongly associated. One may hypothesize that, for a new mother, a healthy, mentally stable, supportive partner could make the difference between adequate coping or a downward spiral leading to an overall negative delivery experience or even PTSD. Women with PTSD following childbirth frequently indicate that their partners are unsupportive, do not fully understand what they have experienced, and fail to see the extent of their suffering. Several studies have shown that perceived lack of support from their partner is associated with a negative delivery experience and symptoms of PTSD. Research among depressed women revealed a marked discrepancy between the support they desire during the postpartum period and that which they perceive to have actually received from their partner. This is by no means to say that partners of women with PTSD are insufficiently supportive, but rather that there is a difference between the desired and experienced support by these women. Care providers should therefore also pay attention to the well being and experience of the partner, the strengths and weaknesses in the relationship between both partners, and the role the partner plays in ensuring stability of the family as a whole.

Both studies the formed the basis of this thesis have excluded women with insufficient proficiency of Dutch from participation, as adequate command of Dutch was warranted to complete the written questionnaires. This is not unlike most studies, especially those using self-reports. However justified and practically unavoidable, this leads to exclusion of subgroups of women, in particular those from immigrant populations with lower socio-economic status. Future research should target at these particular women. A review of the literature on PTSD following childbirth revealed a striking lack of studies in developing countries. Apart from 2 studies in Nigeria and Brazil, and a handful in the United States, Canada and Australia, most research on this topic has been conducted in Western and Northern Europe. A more diverse geographical dispersion of research would allow for comparison between different countries and health care systems, as well as possibly differentiate between risk factors for the development of PTSD following childbirth in different models of care.

In addition, very little is known about the development of children of mothers suffering from PTSD following childbirth. One study has found that the intensity of the posttraumatic reactions of the parents is an important predictor of sleeping and eating problems in prematurely born infants, but systematic research into mother-infant bonding and long term development is lacking thus far.

Despite the wealth of research into prevalence of and risk factors for PTSD following childbirth, no standard intervention with proven effectiveness is currently available for women with posttraumatic
stress following childbirth to date due to a lack of research. Several possible interventions are available, including pharmacotherapy, debriefing, trauma-focused cognitive behavioral therapy (CBT) and eye-movement desensitization and reprocessing (EMDR). In international guidelines on the management of PTSD, CBT and EMDR are recommended as the treatments of choice for trauma victims. 17,18

Chapter 8 described a remarkable improvement in 3 women who were treated for posttraumatic stress following childbirth during their next pregnancy, which is in line with the conclusions of the single other study published thus far on EMDR as a treatment for PTSD following childbirth. 19 To date, one qualitative case series has been published evaluating the effects of CBT20, describing a reduction of posttraumatic stress in two women. No studies have yet evaluated the effectiveness of pharmacological treatments for PTSD following childbirth. These must be evaluated, as studies in non-childbearing populations present evidence of dysfunction in norepinephrine, serotonin, glutamate and HPA axis systems, and antidepressants have proven to be effective in reduction of symptoms. Several studies have investigated the effects of debriefing/counseling on PTSD following childbirth, using diversity in approaches ranging from individual to group interventions, from single to multiple sessions, and with varying inclusion criteria. Results have been inconclusive both in unselected populations and in women at risk of developing PTSD following childbirth. Taking into account the fact that debriefing has not been proven effective in the prevention of PTSD in other populations21, this intervention warrants further research in women with traumatic delivery experiences, and currently has no place in standard treatment protocols.

Recommendations

- to exercise utmost caution when comparing studies using different instruments for the measurement of PTSD following childbirth.
- to ensure the use of instruments that include all DSM-IV criteria when designing future research.
- to be explicit in research designs and publications about measurement of full or partial PTSD.
- to screen for PTSD in all women with very premature delivery (<32 weeks gestation)
- to explicitly involve partners in clinical and research settings, in particular in case women are experiencing PTSD symptoms.
- to include non-native speakers, in particular ethnic minorities, in research and screening for PTSD following childbirth and other psychiatric disorders (e.g. depression and anxiety during pregnancy and postpartum).
- to increase the number of studies into PTSD following childbirth in countries outside Western and Northern Europe.
- to extend the follow up period of studies and to investigate possible long-term effects of maternal and paternal PTSD on child development.
• to investigate the effectiveness of EMDR in larger samples of women with PTSD following childbirth, both in pregnant and non-pregnant women; to opt for EMDR in case the time to treat PTSD following childbirth is limited, for example during a subsequent pregnancy.

• to investigate the effectiveness, format and optimal timing of pharmacological interventions, CBT and debriefing in women with traumatic delivery experiences and PTSD following childbirth; to offer therapeutic interventions to all women with PTSD following childbirth, based on the best available evidence, local availability of resources and preference of the women involved, until a standard intervention with proven effectiveness is available.

In summary, while much progress has been made during the past 15 years in the identification of symptoms, risk factors and consequences of PTSD following childbirth, there is still a long way to go and many advances in the treatment, prevention, awareness and organization of care need to be made. This chapter has indicated a number of recommendations for future research as well as clinical practice based on the conclusions of this thesis.
REFERENCES


ENGLISH SUMMARY

Chapter 1: Scope of the Thesis
The studies presented in this thesis have been conducted in order to evaluate:

- instruments used to assess PTSD following childbirth with both quantitative (reliability analysis and factor analysis) and qualitative (comparison of operationalization) techniques.
- the prevalence of and risk factors for posttraumatic stress (disorder) following childbirth
  - after home and hospital deliveries in The Netherlands
  - in women who conceived after fertility treatment
  - in women whose pregnancy was complicated by preeclampsia (PE) or preterm premature rupture of membranes (PPROM)
  - in partners of women with PE and PPROM
- whether eye-movement desensitization and reprocessing (EMDR) is an effective treatment for posttraumatic stress following childbirth.

Chapter 2: General Introduction
Posttraumatic stress disorder (PTSD) is an anxiety disorder that can develop following confrontation with a traumatic stressor. The most characteristic symptoms of PTSD are re-experiencing the event, avoidance of stimuli associated with the event and hyperarousal. Since the late 1990's, research has been published on childbirth as a possible traumatic event that could lead to the development of posttraumatic stress (disorder).

In order to place the topic of this thesis, PTSD following childbirth, in a context with other psychiatric disorders, to understand the similarities and differences in underlying mechanisms and to consider the effects of possible co-morbidity, the introduction provided an overview of psychiatric disorders during the peripartum period. These comprise mood disorders, including major depressive disorder, bipolar disorder and puerperal psychosis; and anxiety disorders, including obsessive-compulsive disorder (OCD), fear of childbirth, and posttraumatic stress disorder (PTSD). These conditions have characteristics and symptoms that are specific to pregnancy and puerperium, frequently have their onset or an increased prevalence during pregnancy or postpartum, or often intensify during the peripartum period. A comprehensive overview of the main characteristics and symptoms of each condition, diagnostic tools, prevalence, risk factors, and possible consequences has been provided. A variety of psychotherapeutic and pharmacological interventions have been discussed, which may be used depending on the type and severity of the disorder, potential risk to the fetus or neonate, and possible co-morbidity. In clinical practice, awareness, recognition and prompt referral are key to prevention of adverse effects on maternal well-being, infant development and mother-child bonding.
PART I: IDENTIFICATION, PREVALENCE AND RISK FACTORS

Chapter 3: Assessment
In this part of the thesis, the Traumatic Event Scale-B (TES-B) and the PTSD Symptom Scale - Self Report version (PSS-SR), two instruments frequently used to assess PTSD following childbirth, have been evaluated with both quantitative and qualitative techniques.

Assessment of internal consistency yielded similar results for the TES-B and PSS-SR (Cronbach’s α = .87 and .82, respectively). Factor analysis revealed two rather than three DSM-IV symptom categories for both instruments: childbirth related factors (re-experiencing/ avoidance) and symptoms of depression and anxiety (numbing/ hyperarousal). We found considerable overlap between the scales in reported posttraumatic stress symptoms, as indicated by a strong association between the TES-B and the PSS-SR sum-scores (Spearman’s rho = .78). However, agreement between the instruments on the identification of actual PTSD cases was low (kappa = .24). We identified large differences in operationalization between TES-B and PSS-SR, i.e. in the formulation of questions, answer categories, cut-off values and instructions to respondents.

Therefore, we recommended that comparison between studies using different instruments for measuring PTSD following childbirth should be done with utmost caution. An ‘ideal’ instrument for the assessment of PTSD following childbirth was proposed.

Chapter 4: Prevalence and risk factors
This multi-center cross-sectional study, which took place at midwifery practices, general hospitals and a tertiary (university) referral center in The Netherlands, evaluated the prevalence of PTSD following childbirth after home and hospital deliveries, and examined risk factors for the development of posttraumatic stress following childbirth. 428 women complete questionnaires on PTSD, anxiety and depression, as well as demographic, psychosocial and obstetric characteristics two to six months after delivery. PTSD following childbirth was found in 1.2% of the respondents (5/428 women), while 9.1% of women (39/428) had experienced the delivery as traumatic.

The prevalence rates of clinically significant anxiety and depression symptoms were 22.7% and 14.3%, respectively. Posttraumatic stress symptoms were associated with unplanned cesarean section, low sense of coherence (coping skills) and high intensity of pain. Initial differences in posttraumatic stress symptoms between home and hospital deliveries disappeared after taking into account the (by definition) uncomplicated nature of home births.
PART II: SPECIFIC POPULATIONS

Chapter 5: After medically assisted conception
Women undergoing fertility treatments frequently report psychiatric symptoms, but little is known about postpartum mental problems in women who conceived through Medically Assisted Conception (MAC). We compared the postpartum prevalence of PTSD, anxiety and depression in 32 women who conceived through MAC and 392 women who conceived naturally.

No significant differences were found between the two groups in the prevalence of PTSD (0.0% vs. 1.3%; OR= 0.0 (CI: 0 - ∞)), anxiety (28.1% vs. 22.2%; OR=1.4 (CI: 0.6-3.1)) and depression (9.4% vs. 14.6% (OR= 0.6 (CI: 0.8-2.0)). Although it is important to consider the unique needs of this group of women, our study indicates that previously infertile new mothers experience mental well-being similar to their fertile counterparts with no more referral to the second or tertiary care setting.

Chapter 6: After preterm pre-eclampsia and PPROM
This prospective longitudinal study evaluated the prevalence of and risk factors for PTSD in women with preeclampsia (PE) or preterm premature rupture of membranes (PPROM) compared to uncomplicated pregnancies. Participating women completed PTSD and depression questionnaires during pregnancy, 6 weeks, and 15 months postpartum. We included 57 women with PE, 53 with PPROM, and 65 healthy pregnant women, of whom 137 also participated in the 15-month follow-up (PE 70%, PPROM 48%, and controls 95%; p<.001).

At 6 weeks postpartum, the prevalence of PTSD, but not depression, following childbirth was significantly higher in patients than in controls (14% vs 3%; p=.023). The maternal condition seemed to be less relevant, as there was no difference between the prevalence of PTSD after PE and PPROM (11% vs 17%; p = .324). A history of depression, depressive symptoms during pregnancy, and infant death were significantly associated with symptoms of postpartum PTSD. At 15 months postpartum, 11% of women with PE had PTSD, some of which did not have PTSD 6 weeks postpartum. The low response rate in the PPROM group at 15 months postpartum did not allow for definite conclusions.

It is likely that the whole constellation of events accompanying a complicated and preterm pregnancy (e.g. maternal hospitalization, cesarean section, long term infant hospitalization, infant death) puts women vulnerable for mental problems at risk for developing PTSD.

Chapter 7: Partners
The partners of the women with PE, PPROM and uncomplicated pregnancies also took part in the study on PTSD and depression following complicated pregnancies. Our aim was to evaluate the prevalence of and risk factors for PTSD following childbirth and depression in partners of women with PE, PPROM and uneventful pregnancies, and to investigate the relationship between symptoms in male and female counterpart. 85 of the 187 eligible men participated, 66 completed the questionnaires at both t1 (during pregnancy) and t2 (6 weeks postpartum).
At \( t_1 \), the prevalence rates of PTSD and depression were 6% and 4% for partners of patients, and 0% and 3% for partners of controls. At \( t_1 \), the prevalence rates were 3% (PTSD) and 5% (depression) for partners of patients, and 0% for both PTSD and depression among partners of controls. Contrary to expectations, no significant differences were found between partners of patients and partners of controls in symptoms of PTSD and depression (\( t_1 \): p=.28 for PTSD and p=.34 for depression; \( t_2 \): p=.08 for PTSD and p=.31 for depression). For PP, the correlation between PTSD and depression sum-scores was .48 (p<.001) at \( t_1 \), and .86 (p<.001) at \( t_2 \). Additionally, within-couple correlation of PTSD and depression symptom-severity was low and not significant during pregnancy, but strong postpartum (PSS-SR: r=.62, p<.001; BDI-II: r=.59, p<.001). In PP, PTSD and depressive symptoms at \( t_2 \) were associated with symptoms of PTSD and depression at \( t_1 \), maternal PTSD and depression at \( t_2 \), with lower gestational age at delivery, perinatal mortality and higher paternal age.

In case of PE or PPROM, these findings call for a system-oriented approach, evaluating the well being of not only of the new mother, but also of her partner.

**PART III: TREATMENT**

Chapter 8: EMDR

We evaluated the possibility of using eye-movement desensitization and reprocessing (EMDR) treatment for women with symptoms of posttraumatic stress disorder following childbirth. The treatment is internationally recognized as one of the interventions of choice for the condition, but little is known about its effects in women who experienced the delivery as traumatic. Three women suffering from posttraumatic stress symptoms following the birth of their first child were treated with EMDR during their next pregnancy. The treatment resulted in fewer posttraumatic stress symptoms and all three women were sufficiently confident to attempt vaginal birth rather than demanding an elective cesarean section. Despite delivery complications in each of the patients, they looked back positively at the second delivery experience.

**PART IV: CONCLUSION**

Chapter 9: General discussion and recommendations

Based on the findings and conclusions of the studies that formed the basis of this thesis, a number of recommendations for future research and clinical practice have been formulated.

Following comparison between two frequently used instruments to screen for PTSD following childbirth, we suggested to use caution in comparing studies using different instruments for the measurement of PTSD following childbirth. When designing future research we recommended to ensure the use of instruments that include all DSM-IV criteria, and to be explicit about measurement of full or partial PTSD.
The findings of the study among women with preterm preeclampsia or PPROM allowed for the advice to screen for PTSD in all women with very premature delivery (<32 weeks gestation). Both for research purposes and in clinical settings, we advised to include partners, to extend the follow-up period of women’s mental well being, and to incorporate evaluation of infant development, in particular in at-risk populations. With regard to study design, we suggested to ensure that non-native speakers (especially ethnic minorities) are included in research and to increase the number of studies into PTSD following childbirth conducted in countries outside Western and Northern Europe.

The promising findings of the pilot study on EMDR as a brief and effective treatment for posttraumatic stress following childbirth led us to recommend to conduct larger studies on the effects of EMDR in this specific population.
11

NEDERLANDSE SAMENVATTING
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**Hoofdstuk 1: Onderwerp van het proefschrift**
De studies die in dit proefschrift worden gepresenteerd, zijn opgezet:

- om de meetinstrumenten te evalueren die worden gebruikt om te screenen op PTSS na de bevalling. Hierbij werden zowel kwantitatieve (betrouwbaarheidsanalyse en factoranalyse) als kwalitatieve (vergelijking van operationalisering) technieken gebruikt.
- om de prevalentie van, en risicofactoren voor, het ontwikkelen van (een) posttraumatische stress (stoor""""ns) na de bevalling te onderzoeken
  - na thuis- en ziekenhuisbevallingen in Nederland
  - bij vrouwen die na vruchtbaarheidsbehandeling zwanger zijn geworden
  - bij vrouwen van wie de zwangerschap werd gecompliceerd door pre-eclampsie (PE) of voortijdig breken van de vliezen (preterm premature rupture of membranes, PPROM)
  - bij partners van vrouwen met PE en PPROM
- om eye-movement desensitization and reprocessing (EMDR) te bestuderen als mogelijke behandeling voor posttraumatische stress na de bevalling.

**Hoofdstuk 2: Algemene inleiding**
Posttraumatische stress stoornis (PTSS) is een angststoornis die kan ontstaan na het meemaken van een traumatische gebeurtenis. De meest kenmerkende symptomen van PTSS zijn herbeleving van de gebeurtenis, vermijding van situaties die doen herinneren aan de traumatische gebeurtenis, en verhoogde prikkelbaarheid. Sinds medio jaren ’90 zijn er wetenschappelijke publicaties waarin wordt aangegeven dat de bevalling ook een traumatische gebeurtenis kan zijn die mogelijk leidt tot het ontwikkelen van een posttraumatische stress stoornis of -klachten.

Teneinde het onderwerp van dit proefschrift, PTSS na de bevalling, in een context te plaatsen met andere psychische aandoeningen, om de overeenkomsten en verschillen in onderliggende mechanismen te begrijpen, en om inzicht te krijgen in de gevolgen van eventuele co-morbideiteit, is in de algemene inleiding een overzicht gegeven van psychiatrische stoornissen die relatief vaak voorkomen tijdens de zwangerschap en postpartum. Dit betreffen stemmingsstoornissen, waaronder de depressieve stoornis, bipolaire stoornis en puerperale (kraambed) psychose, en angststoornissen, waaronder obsessief-compulsieve stoornis (OCS), angst voor de bevalling, en posttraumatische stress stoornis (PTSS). Deze aandoeningen hebben alle kenmerken en symptomen die specifiek zijn voor de zwangerschap en het kraambed, ontstaan vaak of vaker in de peripartum periode, of kennen een heftiger beloop tijdens de zwangerschap en/of postpartum.

Er is een uitgebreid overzicht gegeven van de belangrijkste kenmerken en symptomen van elke aandoening, diagnostiek, prevalentie, risicofactoren, en de mogelijke gevolgen. Ook wordt het
aanbod aan psychologische en farmacologische interventies besproken. De keuze voor een behandeling is voorts afhankelijk van het type en de ernst van de aandoening, het potentiële risico voor de foetus of pasgeborene, en eventuele co-morbiditeit. In de klinische praktijk zijn bewustwording, herkenning en snelle doorverwijzing cruciaal voor het voorkomen van negatieve effecten op het welzijn van de vrouw, de ontwikkeling van de baby en de moeder-kind binding.

DEEL I: IDENTIFICATIE, PREVALENTIE EN RISICOFACTOREN

Hoofdstuk 3: Screening

In dit hoofdstuk van het proefschrift zijn de Traumatische Event Scale-B (TES-B) en de PTSD Symptom Scale - Self Report (PSS-SR) met elkaar vergeleken. Deze twee instrumenten worden vaak gebruikt om te screenen op PTSS na de bevalling. Zij werden geëvalueerd met zowel kwantitatieve als kwalitatieve technieken.

De TES-B en PSS-SR toonden een vergelijkbare mate van interne consistentie (Cronbach’s α = .87 en .82, respectievelijk). Factoranalyse liet voor beide instrumenten zien dat de symptomen van PTSS in twee (in plaats van de huidige drie) categorieën kunnen worden ingedeeld: bevallingsgerelateerde factoren (herbeleving / vermijding) en symptomen van depressie en angst (emotionele afstomping / verhoogde prikkelbaarheid). We vonden een aanzienlijke overlap tussen de instrumenten in de door vrouwen gerapporteerde symptomen van PTSS, zoals blijkt uit de sterke samenhang tussen de TES-B en de PSS-SR somscores (Spearmans ρ = .78). Echter, de detectie van vrouwen die aan alle DSM-IV criteria voldeden (“cases”) verschilde behoorlijk tussen de twee instrumenten (kappa = .24), hetgeen is toe te schrijven aan verschillen in o.a. de formulering van items, antwoordcategorieën, afkapwaarden en instructies aan de respondenten.

Om deze reden is aanbevolen om de grootst mogelijke voorzichtigheid te betrachten bij het vergelijken van studies die screenen op PTSS na de bevalling en die daarvoor verschillende meetinstrumenten gebruiken. Een voorstel is gedaan voor een ‘ideaal’ instrument voor het screenen op PTSS na de bevalling.

Hoofdstuk 4: Prevalentie en risicofactoren

In deze multi-center cross-sectionele studie, die plaatsvond in verloskundigenpraktijken, algemene ziekenhuizen en een universitair centrum in Nederland, werd de prevalentie van PTSS na de bevalling na thuis- en na ziekenhuisbevallingen onderzocht, en werden de risicofactoren voor het ontwikkelen van posttraumatische stress na de bevalling geëvalueerd. 428 vrouwen vulden vragenlijsten in over PTSS, angst en depressie, evenals demografische, psychosociale en obstetrische kenmerken twee tot zes maanden na postpartum.
PTSS na de bevalling werd gevonden in 1.2% van de respondenten (5/428 vrouwen), terwijl 9.1% van de vrouwen (39/428) aangaf dat zij de bevalling als traumatisch had ervaren. De prevalentie van klinisch significante symptomen van angst en depressie waren respectievelijk 22.7% en 14.3%. Symptomen van PTSS hingen samen met een ongeplande keizersnede, een lage ‘sense of coherence’ (copingvaardigheden) en een hoge ervaren intensiteit van de baringspijn. Initieel verschillen in posttraumatische stresssymptomen tussen thuis- en ziekenhuisbevallingen verdwenen na correctie voor het (per definitie) ongecompliceerde karakter van thuisbevallingen.

**DEEL II: SPECIFIEKE GROEPEN**

*Hoofdstuk 5: Zwangerschap na vruchtbaarheidsbehandeling*

Vrouwen die vruchtbaarheidsbehandelingen (hebben) ondergaan rapporteren veelvuldig psychische klachten, maar er is weinig bekend over mogelijke psychische problemen postpartum bij vrouwen die zwanger zijn geworden na geassisteerde voortplantings-technieken. We vergeleken de prevalentie van PTSS, angst en depressie postpartum bij 32 vrouwen die door middel van vruchtbaarheidsbehandeling zwanger waren geworden en 392 vrouwen die spontaan zwanger waren geworden.

Er werden geen significante verschillen gevonden tussen de twee groepen in de prevalentie van PTSS (0.0% versus 1.3%; OR = 0.0 (CI: 0 - ∞)), angst (28.1% versus 22.2%; OR = 1.4 (CI: 0.6 -3.1)) en depressie (9.4% versus 14.6% (OR = 0.6 (CI: 0.8-2.0). Hoewel het belangrijk is om oog te hebben voor de bijzondere behoeften van vrouwen die zwanger zijn geworden na geassisteerde voortplantingstechnieken, blijkt uit deze studie dat het psychisch welbevinden van deze voormalig subfertiele vrouwen niet significant verschilt van dat van vrouwen die spontaan zwanger zijn geworden, en dat zij ook even vaak in de tweede of derde lijn bevallen.

*Hoofdstuk 6: Zwangerschappen gecompliceerd door vroege pre-eclampsie en PPROM*

In deze prospectieve, longitudinale studie is de prevalentie van, en risicofactoren voor, PTSS onderzocht bij vrouwen met vroege pre-eclampsie (PE) of voortijdig breken van de vliezen (preterm premature rupture of membranes, PPROM) in vergelijking met vrouwen met ongecompliceerde zwangerschappen. Deelnemende vrouwen vulden vragenlijsten in over PTSD en depressie tijdens de zwangerschap, 6 weken en 15 maanden na de bevalling. Er werden 57 vrouwen met PE, 53 met PPROM en 65 gezonde zwangere vrouwen geïncludeerd, van wie er 137 ook hebben deelgenomen aan de lange termijn follow-up (PE 70%, PPROM 48%, controles 95%, p<.001).

6 weken postpartum was de prevalentie van PTSS significant hoger in de PE/PPROM-groep dan in de controlegroep (14% versus 3%, p=.023), terwijl er voor depressie geen verschil werd gevonden tussen de groepen. Welke complicatie de vrouw had bleek minder relevant, omdat er geen verschil
werd gezien in de prevalentie van PTSS tussen de vrouwen met PE en PPROM (11% versus 17%, p=.324). Een voorgeschiedenis van depressie, depressieve klachten tijdens de zwangerschap en overlijden van het kind hingen samen met symptomen van PTSS na de bevalling. 15 maanden postpartum voldeed 11% van de vrouwen met PE aan de criteria voor PTSD, en sommigen hiervan waren nieuwe ‘cases’. De lagere respons in de PPROM groep 15 maanden na de bevalling maakte het niet mogelijk om aan die getallen conclusies te verbinden.

Waarschijnlijk vormt de hele constellation van gebeurtenissen waar zwangerschapscomplicaties en vroegegeboorte mee gepaard gaan (o.a. ziekenhuisopname van de moeder, (spoed)keizersnede, langdurige ziekenhuisopname of overlijden van de baby) een verhoogd risico op het ontwikkelen van PTSS na de bevalling vooral bij die vrouwen die aanleg hebben voor psychische problemen

**Hoofdstuk 7: Partners**

Ook partners van vrouwen met PE/PPROM (patiënten) en van vrouwen met ongecompliceerde zwangerschappen (controles) namen deel aan het onderzoek over PTSS en depressie na zwangerschapscomplicaties. Het doel was om de prevalentie van, en de risicofactoren voor, PTSS na de bevalling en depressie te evalueren bij partners van vrouwen met PE, PPROM en ongecompliceerde zwangerschappen, en om de relatie tussen de symptomen bij vrouwen en bij hun partners te onderzoeken. 85 van de 187 partners namen deel, waarbij 66 mannen zowel op \( t_1 \) (tijdens de zwangerschap) als \( t_2 \) (6 weken na de bevalling) gegevens verstrekten.

Op \( t_1 \) was de prevalentie 6% (PTSS) en 4% (depressie) voor de partners van de patiënten, en 0% (PTSS) en 3% (depressie) voor de partners van vrouwen zonder zwangerschapscomplicaties. Op \( t_2 \) was de prevalentie 3% voor PTSS en 5% voor depressie onder de partners van patiënten, en 0% voor zowel PTSS als depressie voor de partners in de controlegroep. In tegenstelling tot onze verwachtingen, werden geen significante verschillen gevonden tussen partners van patiënten en partners in de controlegroep (\( t_1 \): p=.28 voor PTSS en p=.34 voor depressie; \( t_2 \): p=.08 voor PTSS en p=.31 voor depressie). Voor partners van patiënten was de correlatie tussen de PTSS en depressie somscores 0.48 (p<.001) op \( t_1 \) en 0.86 (p<.001) op \( t_2 \). Daarnaast was de correlatie tussen de somscores van vrouwen en hun partner op de PTSS- en depressievragenlijsten laag en niet significant tijdens de zwangerschap, maar sterk postpartum (PSS-SR: r =0.62, p<.001; BD-II: r = 0.59, p<.001). Voor partners van patiënten bleken symptomen van PTSS en depressie op \( t_2 \) samen te hangen met symptomen van PTSS en depressie op \( t_1 \), PTSS en depressie bij de vrouw op \( t_2 \) met een kortere zwangerschapsduur op moment van bevallen, perinatale sterfte en hogere leeftijd van de partner.

Deze bevindingen pleiten in geval van PE en PPROM voor een systeemgerichte aanpak met niet alleen aandacht voor het welzijn van de nieuwe moeder maar ook voor het welzijn van haar partner.
DEEL III: BEHANDELING

Hoofdstuk 8: EMDR
We evaluateerden eye-movement desensitzation and reprocessing (EMDR) als mogelijke behandeling voor vrouwen met (symptomen van) PTSS na de bevalling. EMDR wordt internationaal erkend als een van de interventies van eerste keus bij PTSS, maar er is weinig bekend over de effecten van EMDR bij vrouwen die de bevalling als traumatisch hebben ervaren. Drie vrouwen die symptomen van PTSS rapporteerden na de geboorte van hun eerste kind kregen EMDR tijdens hun volgende zwangerschap. De behandeling resulteerde in minder posttraumatische stresssymptomen, en alle drie de vrouwen hadden voldoende vertrouwen om een vaginale baring aan te durven. Ondanks opnieuw complicaties tijdens de daarop volgende bevalling keken al deze vrouwen positief terug op die tweede bevalling.

DEEL IV: CONCLUSIE

Hoofdstuk 9: Algemene discussie en aanbevelingen
Op basis van de bevindingen en conclusies van de studies die de basis van dit proefschrift vormden, zijn een aantal aanbevelingen geformuleerd voor toekomstig onderzoek en voor de klinische praktijk.

Op basis van de vergelijking van twee vaak gebruikte screeningsinstrumenten voor PTSS na de bevalling, is geadviseerd om voorzichtigheid te betrachten bij het vergelijken van studies waarbij verschillende vragenlijsten worden gebruikt. Bij de opzet van toekomstig onderzoek wordt geadviseerd om gebruik te maken van instrumenten die alle DSM-IV criteria omvatten, en om expliciet te maken of een posttraumatische stress stoornis wordt gemeten of alleen een aantal symptomen daarvan.

De bevindingen van de studie onder vrouwen met vroege pre-eclampsie en PPROM leidden tot het advies om in elk geval te screenen op PTSS bij alle vrouwen met een ernstige vroeggeboorte (<32 weken zwangerschap). Tevens wordt geadviseerd om in de toekomst partners te betrekken in zowel de opzet van onderzoek als in de klinische praktijk, om de periode waarin het psychisch welbevinden postpartum wordt vervolgd uit te breiden, en om de evaluatie van de ontwikkeling van het kind mee te nemen in onderzoek, in het bijzonder in risicopopulaties. Er is verder voorgesteld meer onderzoek te doen onder vrouwen die de dominante taal niet machtig zijn (veelal immigranten) en om het onderzoek naar PTSS na de bevalling uit te breiden naar landen buiten West- en Noord-Europa.

De veelbelovende resultaten van de pilot-studie naar EMDR als een korte, doeltreffende behandeling voor PTSS na de bevalling leidde tot de aanbeveling om grotere studies op te zetten naar de effecten van EMDR in deze specifieke populatie.
PART V

APPENDICES
APPENDIX A:
ON THE PREVENTION OF PTSD FOLLOWING CHILDBIRTH
ON THE PREVENTION OF PTSD FOLLOWING CHILDBIRTH

No effective strategies have yet been identified to prevent women from developing PTSD following childbirth. Prevention may take place on several different levels during pregnancy, delivery, and postpartum, and may target education, changing mindsets, identification of women at risk, optimizing the labor and delivery environment and postpartum detection of PTSD following childbirth. This additional chapter provides suggestions for future research regarding prevention of PTSD and the organization of antepartum and postpartum obstetric care.

The experience of labor and delivery is closely linked to women’s expectations and mindset. With the idea in mind that good preparation guarantees a smooth labor and delivery and uneventful puerperium, asking for an epidural to cope with pain during labor, or unsuccessfully attempting to breastfeed may easily lead to a sense of failure. Similarly, it is well known among Dutch obstetricians and midwives that primiparous women receiving antepartum care from community midwives who desire a homebirth have approximately 50% chance of being referred to the hospital (obstetrician led unit) during labor. If not well informed, a sense of failure, disappointment, and a negative appraisal of the delivery by these women should not come as a surprise to caregivers. Perhaps changing this attitude is even more difficult than treatment and prevention of PTSD, but a lack of knowledge and unrealistic expectations play a crucial role in how women look back at their delivery experience. Educating childbearing women is also important when it comes to the occurrence and symptomatology of mental disorders. Being aware that approximately 7-13% of women has a depression during pregnancy or postpartum, 7.5% has extreme fear of childbirth, and 1-2% develops PTSD, may break the taboo that is associated with peripartum psychiatric disorders, and knowing that others are experiencing similar feelings might reduce feelings of loneliness. Similarly, being able to recognize symptoms of depression and PTSD may facilitate early treatment seeking behavior. It would be interesting to research the level of factual knowledge about pregnancy, childbirth, common complications and mental disorders, among childbearing women. Subsequent education could then effectively target common knowledge gaps. Furthermore, it may be investigated whether a better knowledge about what to expect during pregnancy and delivery is associated with a more positive appraisal, and whether increasing this knowledge also leads to more positive experiences.

Professionals dealing with childbearing women should also be aware of risk factors, treatment options and prevention strategies for common psychiatric disorders during pregnancy and postpartum. This extends beyond obstetricians and midwives, to psychiatrists, psychologists, general practitioners, pediatricians, occupational physicians, and labor and delivery nurses, and nurses and doctors at well-child clinics (in Dutch: consultatiebureaus). Continued medical education of professionals should include the correction of a set of common misperceptions. The DSM-IV explicitly states that trauma is a subjective experience, and it is important to realize that a ‘difficult’ birth from a medical perspective does not necessarily lead to negative appraisal by the
laboring woman. More importantly, a delivery that was ‘normal’ from an obstetrical point of view or without complications may still have been experienced as traumatic by the parturient, and medical emergencies are therefore no prerequisite for the development of PTSD. One of the most essential notions is that, in absolute numbers, PTSD following childbirth is most common among women with spontaneous vaginal deliveries. Furthermore, a doctors delay may occur when PTSD is mistaken for postpartum depression. There is some overlap in symptoms (notably those listed in the DSM-IV as criterion C (emotional numbing) and D (hyperarousal)), and half of women with PTSD following childbirth also meet the criteria for a depressive episode. Nonetheless, the causative (traumatic) event is evident in PTSD and associated with symptoms of re-experiencing and avoidance (DSM-IV criteria B and C). Obstetric care professionals may not explicitly ask for symptoms of compromised mental well being, because they are lacking the knowledge, time, effective screening instruments, affinity with psychopathology, referral options, or a combination of these. Even if brought up by the patient or professional, somatic symptoms of depression and anxiety (changes in sleep pattern and appetite, difficulties concentrating, diminished energy levels) may easily be misinterpreted as components of physiological pregnancy discomfort. Future research may be directed at evaluating the applicability and effectiveness of self-report screening instruments in obstetric care settings, and the effects of educating obstetric professionals about common psychiatric disorders on the accurate detection of these disorders.

Primary prevention means identifying women ‘at risk’ during (or even before) pregnancy, and developing interventions aimed to reduce this risk. As has been outlined in chapter 4, research into risk factors for the development of PTSD following childbirth is extensive and, in terms of pre-delivery factors, mainly psychological aspects have been identified. Neither demographic factors such as age, marital status and educational level, nor parity have been associated with PTSD following childbirth. While the possible influence of personality characteristics and psychological factors such as state and trait anxiety is controversial, strong associations have consistently been found between anxiety/depression during pregnancy and PTSD after childbirth. Women with a history of childhood sexual abuse are at increased risk for developing symptoms of PTSD postpartum. Both should be part of the antepartum intake, as well as previous delivery experiences. In addition to face to face contact, easily administrable self-report questionnaires for depression and anxiety are readily available. Women with low coping skills may also be identified during pregnancy. In chapter 4 of this thesis, a strong association (r=0.59) was found between PTSD symptoms and poor coping (sense of coherence). However, the precise nature of this association (causal or correlational) cannot be inferred due to the retrospective study design; it is uncertain whether a high sense of coherence may prevent the development of posttraumatic stress symptoms after childbirth. Although sense of coherence is considered relatively stable over time, negative life events (such as traumatic delivery) nevertheless appear to lower sense of coherence. Future studies should thus include the development of strategies to improve women’s coping skills. Two approaches worth mentioning in this respect are mindfulness based interventions and birth.
plans. Mindfulness based stress reduction programs result in fewer symptoms of depression, anxiety, stress and negative affect, and higher degrees of self-compassion, positive affect, and mother-child attachment. Future research should aim to further investigate the use of mindfulness training in larger RCTs, and include traumatic delivery experiences and PTSD in its outcome measures. A birth plan is a written communication tool prepared by a pregnant woman, which involves her preferences for the management of labor and delivery, addressing, for example, who will attend the birth, desired birthing positions, options for pain relief, and communication. Contrary to common misconception, it is not intended to be (and should not be written as) a list of demands or restrictions that is handed to the professional the moment labor commences. Rather, it is a communication tool that promotes empowerment, facilitates a pro-active attitude of the pregnant woman and her partner, and may enhance women’s delivery experiences, add perceived control, clarify thoughts, and improve communication with health care providers. There is also evidence that women with birth plans have decreased rates of emergency cesarean sections, increased rates of epidural analgesia and increased rates of first and second degree perineal tears. Future RCTs that include traumatic delivery experiences and PTSD in their outcome measures are needed to evaluate the possible preventive power of birth plans.

Secondary prevention involves creating optimal circumstances during labor and delivery, thereby reducing the risk of a negative delivery experience. Involvement in decision making and the perceived degree of support, care, and communication from the staff who assist during labor play crucial roles in the way women reflect on the experience, and supersede the influences of age, socioeconomic status, ethnicity, childbirth preparation, the physical birth environment, pain, immobility, medical interventions, and continuity of care. Nonetheless, delivery settings do substantially influence women’s appraisals of childbirth: Compared to conventional hospital settings, women who delivered in a homelike (‘alternative’ institutional) setting reported higher satisfaction about the birthing process and had lower intervention rates. With continuous support during labor, women are more likely to have spontaneous vaginal births, have fewer cesarean sections and instrumental deliveries, shorter labors, are less likely to have intrapartum analgesia or to report dissatisfaction, and are less likely to have a baby with a low five-minute APGAR score, without increased complications of any kind. It should be investigated whether continuous support during labor also reduces the prevalence of traumatic delivery experiences and PTSD following childbirth. Further analyses suggested that support provided by someone who was not hospital staff or from the woman’s social network, such as a ‘doula’ (i.e. supportive lay woman), was most effective. Surprisingly, data on the cost-effectiveness of continuous support during labor are lacking until now. It would be worth investigating whether the expected savings due to a reduced number of cesarean sections and epidurals are sufficient to compensate for the costs of one-on-one support by increasing the number of labor and delivery staff (nurses, midwives and doctors) and/or investments in the availability of doulas.
Tertiary prevention implies creating an organizational framework that is able to promptly identify women with a traumatic delivery experience and those with (symptoms of) PTSD, which is able to offer treatment and prevention strategies for PTSD following childbirth. Easily administered self-report questionnaires are also available to screen for PTSD (TES-B) and delivery experience (WDEQ-B). In women who are diagnosed with postpartum depression, questions regarding the delivery experience should always be asked, since half of the women with PTSD following childbirth also suffers from depression. A challenge in detecting PTSD following childbirth lies not only in the knowledge women and professionals have about the condition, but also in the way postpartum care is structured. In the Netherlands, antepartum care is provided by community midwives in case of uneventful pregnancies and obstetricians in case of complications. A similar division of care, based on national and regional guidelines for referral, determines who assists labor and delivery. Postpartum, however, monitoring and follow up is much more scattered, increasingly infrequent, and highly focused on the infant rather than on the mother. During the first week after delivery, both in case of a midwife-led and an obstetrician-led birth, women receive care from a maternity nurse and midwife at home, unless there is a medical reason to remain hospitalized. Hereafter, the next and only postpartum visit, if taking place at all, is usually at 6 weeks postpartum, even though women may also develop PTSD after an extended period of time, and only first report a traumatic delivery or present with PTSD in a subsequent pregnancy. In this case, the symptoms they experience could have a substantial impact on their quality of life and may cause fear regarding future pregnancies and deliveries in the mean time. When pregnant again, there is little time to apply adequate treatment. It would be important to realize for midwives and obstetricians that women’s mental well-being and appraisal of the delivery are just as important to evaluate as their physical condition. Particularly in case of (unexpected) complications or interventions and in women with a history of mental problems, special attention must be devoted to the mothers’ mental status. The single question “How did you experience labor and childbirth?” may provide an opportunity for women to express questions and concerns, as well as negative or even traumatic experiences. Unfortunately, these questions are not always easily answered, especially if the postpartum follow-up is not with the obstetric care professional who was actually present at the birth of the child. An additional complicating factor is that the delivery notes that are used in the communication between obstetric care professionals tend to follow a standardized format that quite often solely addresses the factual proceedings of labor and delivery, without encouraging remarks on the well being of the laboring women and her experiences, with the consequence that this information is often omitted. While debriefing follows a structured protocol aimed at preventing the development of an acute stress reaction (and subsequently PTSD), general counseling or ‘birth review’ is a less structured intervention in which information is provided (what happened and why). Often, women are left with questions, frustrations and fear related to what exactly took place during their delivery and why, while they may benefit from the explanations they received afterwards regarding the course of labor and rationale for certain interventions. A common example is the feeling of failure when a lengthy labor ends in an (emergency) cesarean section. It can make a crucial difference for the
mother if she receives a clear explanation that this was unavoidable due to fetal malpresentation, suspected fetal distress or failed induction—in other words: bad luck—rather than that she herself is to blame, implying a failure as a woman and mother.

In the postpartum period, not only obstetricians and midwives, but also maternity nurses, neonatal unit nurses, pediatricians, general practitioners, occupational physicians and doctors/nurses/health visitors at infant well-child clinics play a key role in identifying women with (symptoms of) PTSD following childbirth and other postpartum psychiatric conditions. General practitioners usually know the family situation, are aware of a woman’s medical and mental health history, and often present less of a threshold to visit for mental health issues than psychologists and psychiatrists. General practitioners should therefore be included in correspondence regarding the medical and mental well being of women during pregnancy and postpartum, be included in multi-disciplinary teams improving care for these women, but may also adopt an active role themselves in the detection of psychopathology during and after pregnancy. Considering the organization of care, it should be investigated whether routine screening for PTSD following childbirth (and depression) during the postpartum period can be performed by GP’s or at the well-child centers, and what the optimal timing of this screening is. Prevention may also include limiting future harm once PTSD has been established. Among others, this means prompt referral once women report a traumatic delivery experience or PTSD symptoms with or without subsequent fear of childbirth during a subsequent pregnancy. Different studies have found that fear of childbirth is associated with longer duration of labor and increases the likelihood of PTSD, preterm birth and emergency cesarean section. To what extent the decision regarding mode of delivery lies with the pregnant woman is controversial and topic of much debate. In the absence of reliable data and as a starting point for future discussions, it would be useful to investigate the actual number of demanded and honored cesarean sections on maternal request. A planned cesarean section may be the best option for some women, and may be recommended from a medical point of view in case of a previous cesarean delivery. In the Netherlands, obstetricians usually discuss the risks and benefits of a planned cesarean section versus a vaginal birth after cesarean (VBAC) with the pregnant woman, may add their own preference or recommendation, and leave the final decision to the patient; Cesarean delivery on maternal request without a previous cesarean section may be refused, as the Dutch Association for Obstetricians and Gynecologists does not consider it a medical indication. Conversely, a national guideline in the United Kingdom published in 2011 recommends that obstetricians should offer a planned cesarean section upon request of the pregnant woman “if after discussion and offer of support (including perinatal mental health support for women with anxiety about childbirth), a vaginal birth is still not an acceptable option”. Regardless of the decision to opt for planned cesarean section or attempt vaginal birth after cesarean (VBAC), it is a missed opportunity when women with fear of childbirth, which can be treated, are not referred for treatment.
Recommendations

- to invest in educating pregnant women about what they can realistically expect in terms of course, interventions and outcome of labor and delivery, and on the prevalence and symptoms of mental health problems in the peripartum period; to investigate the effects of educating childbearing women on the experience and appraisal of pregnancy and delivery.

- to invest in educating professionals on characteristics, prevalence, risk factors, treatment and prevention of psychiatric disorders during pregnancy and postpartum, and raising awareness that (a) trauma is a subjective experience, and medical complications are not a prerequisite for the development of PTSD following childbirth; (b) in absolute numbers, PTSD following childbirth is most common among women with spontaneous vaginal deliveries; (c) PTSD and postpartum depression are two distinct disorders; to investigate whether educating obstetric care professionals leads to more accurate detection of psychiatric disorders during pregnancy and postpartum.

- to include a history of psychopathology, negative sexual experiences and current depression and anxiety as measured with self-report questionnaires in standard antepartum care

- to focus future research on the development of techniques to improve women’s coping skills, including mindfulness based stress reduction and the use of birth plans.

- to increase awareness among obstetric professionals that their communication, attitude and empathy during labor and delivery is crucial in women’s appraisal of the delivery experience.

- to invest in continuous support during labor (either by increasing the number of nurses or by employing/financing ‘Doulas’); to investigate its effects on the prevalence of traumatic delivery experiences and PTSD following childbirth, and to investigate the cost-effectiveness of one-on-one labor support.

- to include evaluation of how women look back at the delivery as an integral part of the postpartum follow-up, next to their physical recovery and well being of the child, both through directly addressing this and by using standardized questionnaires when indicated.

- to integrate aspects related to women’s experience of labor and delivery in the delivery notes that are used in the communication between obstetric care professionals; to facilitate opportunities postpartum for women to visit the obstetric professional that was assisting their delivery for a birth review, in order to ask questions regarding the course of birth and to discuss their delivery experience.

- to research the possible involvement of professionals at well-child clinics and general practitioners in the screening for postpartum psychopathology in mothers.

- to increase awareness among health care professionals of the need for prompt referral for treatment, in case women report a traumatic delivery experience, (symptoms of) PTSD or fear of childbirth during a subsequent pregnancy, regardless of the planned mode of delivery.
• to integrate guidelines for structurally monitoring women’s mental well being during pregnancy and after delivery, including indications for intervention and referral, into local and national obstetric protocols.

In summary, while much progress has been made during the past 15 years in the identification of symptoms, risk factors and consequences of PTSD following childbirth, there is still a long way to go and many advances in the treatment, prevention, awareness and organization of care need to be made. This addition to the thesis has indicated a number of recommendations for future research as well as clinical practice. It is crucial to educate pregnant women on occurrence and symptoms of mental illnesses in the peripartum period and what to realistically expect during pregnancy and delivery. This logically requires promoting continued medical education regarding psychopathology, and increasing awareness on the vital role obstetric care professionals play in how women experience labor and delivery. While it is unrealistic to think that PTSD following childbirth can be completely eliminated, further research into treatment and prevention of PTSD following childbirth should be encouraged, such that the adverse effects of factors that can be influenced by professionals and women themselves is minimized.
REFERENCES


APPENDIX B:
PTSS NA DE BEVALLING:
NEDERLANDSE TOELICHTING VOOR LEKEN
PTSS NA DE BEVALLING: NEDERLANDSE TOELICHTING VOOR LEKEN

Zwangerschap, bevalling en kraamperiode zouden een bijzondere, mooie tijd moeten zijn. Helaas ervaren niet alle vrouwen de beloofde ‘roze wolk’, bijvoorbeeld door zwangerschapscomplicaties of onregelmatige zorgen en problemen. Ook psychologische problemen zijn niet ongewoon: meer dan 10 procent van de vrouwen is depressief tijdens de zwangerschap of daarna. Sommige vrouwen hebben de periode rondom de bevalling als zo traumatisch ervaren dat ze last hebben van o.a. nachtmerries, flashbacks en concentratieproblemen. Wanneer deze klachten aanhouden kan er sprake zijn van een posttraumatische stressstoornis (PTSS). Dat heeft niet alleen effect op het welbevinden van de moeder, maar kan ook gevolgen hebben voor bijvoorbeeld de moeder-kind-binding. In dit proefschrift wordt beschreven wat PTSS is, wanneer het voorkomt, wat de gevolgen zijn en wat er aan te doen is.

Wat is PTSS

PTSS kan optreden na een schokkende gebeurtenis, bijvoorbeeld oorlogsgeweld of verkrachting, maar ook na een traumatische bevalling. Voor sommige vrouwen is de bevalling, de zwangerschap of de kraamperiode zo traumatisch geweest, dat zij zich op dat moment heel angstig of hulpeloos voelden. Zij hadden het idee dat hun eigen leven of dat van hun kind in gevaar was. Eén op de zes vrouwen kijkt helaas niet positief terug op de periode rond de bevalling. Toch krijgen zij gelukkig niet allemaal PTSS klachten, en heeft slechts een klein deel van de vrouwen (1 tot 3 procent) echt PTSS.

Redenen om aan PTSS te denken (een psychiater of psycholoog kan de diagnose stellen) zijn wanneer (1) de traumatische gebeurtenis steeds weer opnieuw wordt beleefd (bijv. nachtmerries, flashbacks, of hyperventileren wanneer men aan het ziekenhuis denkt), en (2) iemand veel moeite doet om zaken die gerelateerd zijn aan de gebeurtenis te vermijden (niet over de bevalling willen praten, niet meer zwanger willen worden), en (3) er sprake is van bijvoorbeeld concentratie- of slaapproblemen, snel schrikken, gemakkelijker boos worden, erg op je hoede zijn en somberheid.

Natuurlijk is het niet ongewoon voor een jonge moeder om af en toe slapeloze nachten te hebben, en om af en toe nog terug te denken aan de soms spannende tijd voorafgaand aan de bevalling, de weeën, of opname van de baby op de kinderafdeling of neonatale intensive care (NICU). Voor sommige vrouwen heeft de periode rondom de bevalling echter zo’n grote indruk gemaakt dat het een negatieve invloed heeft op hun dagelijks functioneren thuis, op het werk, of in de relatie tot partner of kind.

Risicofactoren

Ook vrouwen die een bevalling ‘volgens het boekje’ hebben gehad, thuis of in het ziekenhuis, waar medisch gezien geen complicaties of onverwachte situaties zijn opgetreden, en van wie het kind het prima doet, kunnen PTSS krijgen. Desondanks zal het geen verrassing zijn dat vrouwen
wel vaker PTSS krijgen na problemen of ingrepen, zoals een spoedkeizersnede of gebruik van de vacuümpomp. Ook in het geval van complicaties tijdens de zwangerschap, zoals bij pre-eclampsie (zwangerschapsvergiftiging), HELLP syndroom of te vroeg gebroken vliezen en wanneer er ook gevolgen zijn voor het kind, zoals bij vroegeboorte, opname, ziekte, of overlijden, komt PTSS veel vaker voor. Vroegeboorte kan zowel oorzaak voor stress als gevolg van stress zijn. Dit maakt het leggen van oorzaakelijke verbanden erg ingewikkeld.

Ongeacht de medische aspecten, zijn er nog talloze andere zaken die bepalen hoe iemand de bevalling heeft ervaren. Dit kan variëren van het gevoel geen controle over de situatie en/of geen invloed op beslissingen te hebben, tot het gevoel onvoldoende steun van partner of hulpverleners te krijgen. Ook deze zaken kunnen bijdragen aan een negatieve, en soms zelfs traumatische ervaring van de bevalling.

Er zijn echter ook andere factoren die een grote en wellicht nog wel belangrijkere rol spelen maar die weinig met de bevalling zelf te maken hebben. Wie in het verleden depressieve klachten, een angststoornis, of andere psychiatrische problemen heeft gehad, loopt een grotere kans om na de bevalling PTSS te ontwikkelen. Daarbij komt PTSS vaak voor in combinatie met depressie. Gemiddeld 1 op de 8 vrouwen is depressief tijdens zwangerschap of na de bevalling, dus lang niet elke zwangere of pas bevallen vrouw ervaart de verwachte roze wolk. Daarbij verschilt de mate waarin mensen met stressvolle situaties omgaan, en ervaren sommige mensen nu eenmaal meer stress, bijvoorbeeld door problemen in de relatie of met geld.

**Gevolgen voor moeder en kind**

Het ligt voor de hand dat een psychiatrische aandoening niet alleen effect heeft op het functioneren van de persoon in kwestie, maar ook op de relatie met partner, kinderen, vrienden of collega’s. Kinderen van ouders met psychiatrische aandoeningen (waaronder PTSS) hebben een grotere kans om zelf problemen te ontwikkelen, deels vanwege genetische factoren, maar ook vanwege omgevingsfactoren als financiële- of relatieproblemen. Bovendien hebben factoren als stress tijdens de zwangerschap een verband met gedragsproblemen bij het kind. Er zijn aanwijzingen dat succesvolle behandeling van psychische problemen bij ouders positieve effecten kan hebben op de ontwikkeling van het kind, met name waar het gedragsproblemen van het kind betreft.

Naast PTSS is er vaak sprake van depressie na de bevalling (ook wel: postnatale depressie). Er zijn verschillende onderzoeken die een negatief effect vinden van PTSS en depressie op de moeder-kindbinding en op lange termijn kunnen hechtingsproblemen ontstaan. Moeders merken dat zij niet de band met of gevoelens voor het kind hebben die zij of anderen van ze verwachten; Ze reageren overmatig beschermend of juist afwierend naar het kind toe of associëren het kind met negatieve gevoelens over de bevalling. Bovendien kunnen moeders die psychische problemen hebben het soms moeilijk vinden om goed te herkennen wat hun baby nodig heeft en staan ze minder open
voor de communicatie die hun baby probeert te hebben. Specifiek bij te vroeg geboren kinderen blijkt de mate van slaap- en eetproblemen rond 18 maanden niet alleen samen te hangen met de ernst van de vroeggeboorte, maar ook met PTSS bij de ouders. Vooral bij postpartum depressie (en minder bij PTSS) worden er meer problemen gezien in de relatie met de partner.

Naast gevolgen voor moeder, kind, en op lange termijn de moeder-kind-binding en partnerrelatie, kan PTSS reden zijn voor een vrouw om niet opnieuw zwanger te willen worden, uit angst een vergelijkbare ervaring door te maken. Bij vrouwen die een eerdere bevalling als traumatisch hebben ervaren, kan een nieuwe zwangerschap veel stress veroorzaken en de bevalling heftige herinneringen oproepen. Van (veel) stress tijdens zwangerschap en bevalling is bekend dat het allerhande negatieve effecten kan hebben, waardoor het belangrijk is een eerdere traumatische gebeurtenis tijdig te benoemen. Sommige vrouwen wensen (of eisen) een keizersnede bij een volgende bevalling, omdat zij het niet (meer) aandurven om vaginaal te bevallen of spoedsituaties proberen te voorkomen.

Voorkomen is beter dan genezen
 Het is belangrijk dat PTSS na de bevalling tijdig onderkend wordt om zo snel mogelijk een eventuele behandeling te beginnen om negatieve gevolgen zoveel mogelijk te beperken. Wie eenmaal PTSS klachten heeft ontwikkeld, kan gebea zijn bij EMDR of cognitieve gedragstherapie. EMDR (eye movement desensitization and reprocessing) is een kortdurende therapie waarbij het terughalen van de traumatische gebeurtenis gecombineerd wordt met specifieke sets oogbewegingen en/of geluiden, wat er toe dient te leiden dat de gebeurtenis langzaam haar emotionele lading en kracht verliest. Bij cognitieve gedragstherapie richt de behandeling zich op het veranderen van de negatieve manier waarop we situaties, gevoelens en gedachten interpreteren en waar we ons gedrag op baseren. In het geval van (drei)gende) hechtingsproblemen kan video-hometraining helpen waarbij onder begeleiding van een gespecialiseerd verpleegkundige of pedagogisch medewerker specifiek wordt gelet op de moeder-baby interactie en gerichte aanwijzingen kunnen worden gegeven.

Er ligt een belangrijke taak bij artsen en verloskundigen in het identificeren (tijdens de zwangerschap of daarvoor) van vrouwen die een groter risico lopen op PTSS of depressie na de bevalling. Dan gaat het met name om vrouwen die tijdens de zwangerschap al depressief zijn of angstklachten hebben, al dan niet samenhangend met de bevalling, of die in het verleden psychologische problemen hebben gehad. Het herkennen van dergelijke klachten is niet altijd eenvoudig. Vrouwen aarzelen zelf vaak met het ter sprake brengen van klachten omdat zij zich niet ‘in blije verwachting’ voelen. Wanneer zij het wel ter sprake brengen, zijn hulpverleners snel geneigd om klachten als slapeloosheid, concentratieproblemen en eetlustvermindering toe te schrijven aan lichamelijke klachten die bij de zwangerschap passen – soms ten onrechte. Ook wanneer vrouwen een eerdere bevalling als traumatisch hebben ervaren, zouden zij dit tijdens de volgende zwangerschap al moeten aankaarten. Er kan dan desgewenst actie worden ondernomen in de vorm van een doorverwijzing.
APPENDICES

daar een psycholoog, psychiater, EMDR-therapeut of haptonomisch zwangerschapsbegeleider en/ of het opstellen van een geboorteplan en het maken van duidelijke afspraken over bijvoorbeeld pijnstilling tijdens de bevalling en begeleiding van kraamperiode.

Mede omdat vrouwen achteraf vaak zelf aangeven dat de bevalling of de pijn erger was dan verwacht, is het belangrijk dat vrouwen realistische verwachtingen hebben ten aanzien van de bevalling. Zo wordt bij 10 procent van de vrouwen een vacuümpomp of forceps (tang) gebruikt en 15 procent krijgt een keizersnede, slechts een kwart van de vrouwen bevalt de eerste keer onder leiding van de verloskundige (thuis of poliklinisch) en meer dan 10% van de zwangere vrouwen is depressief na de bevalling. Deze cijfers zijn niet bedoeld om angst te zaaien of de bevalling te medicaliseren, maar om vrouwen voorbereid te laten zijn, voor zover dat mogelijk is, en eventuele ingrepen en problemen minder als persoonlijk falen te laten zien.

Helaas zijn complicaties vaak niet te voorzien, en zijn ingrepen als een spoedkeizersnede over het algemeen niet te voorkomen. Soms gebeuren er toch onvoorziene dingen, zoals wanneer een vrouw plotseling veel te vroeg bevalt van een kindje dat pas na lange tijd opname naar huis kan. Veel aandacht gaat naar de baby uit, niet alleen van hulpverleners, familie en vrienden, maar ook van de ouders, waardoor er verwerking van alle gebeurtenissen in die eerste fase vaak weinig terecht komt. Goede begeleiding en nazorg op de langere termijn, niet alleen op de NICU/couveuseafdeling, maar zeker ook door gynaecoloog, verloskundige, huisarts en later consultatiebureau zijn daarbij onontbeerlijk.

Conclusie
Zwangerschap, bevalling en kraamperiode zijn een bijzondere tijd, waar veel vrouwen gelukkig met een positief gevoel op terug kijken. Helaas ervaart niet iedereen de beloofde ‘roze wolk’, bijvoorbeeld door complicaties bij moeder of kind, door een heel negatieve ervaring van de bevalling, of door depressieve- of angstklachten bij vrouwen die dat vaak eerder hebben gehad. Sommige vrouwen ontwikkelen na de bevalling PTSS (klachten), wat gevolgen kan hebben voor moeder-kind-binding en/of eventuele volgende zwangerschappen. Vroegtijdige herkenning van vrouwen met een groter risico op PTSS zou al in de zwangerschap moeten plaatsvinden en aandacht voor het mentaal welbevinden van een jonge moeder verdient, naast medische aspecten en welzijn van het kind, een vanzelfsprekende plaats in de nazorg na de bevalling.

Dit is een aangepaste versie van een artikel dat is gepubliceerd in het tijdschrift van de Vereniging van Ouders van Couveusekinderen (oktober 2009) en van de Stichting HELLP syndroom (december 2009).

Met medewerking van dr. K.M. Paarlberg.
APPENDIX C:
LIST OF ABBREVIATIONS
### LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ACOG</td>
<td>American Congress of Obstetricians and Gynecologists</td>
</tr>
<tr>
<td>ADHD</td>
<td>attention deficit hyperactivity disorder</td>
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<tr>
<td>AITD</td>
<td>auto-immune thyroid disorder</td>
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<tr>
<td>ALT</td>
<td>alanine aminotransferase</td>
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<tr>
<td>ART</td>
<td>assisted reproductive technologies</td>
</tr>
<tr>
<td>AST</td>
<td>aspartate aminotransferase</td>
</tr>
<tr>
<td>BD</td>
<td>bipolar disorder</td>
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<tr>
<td>BDI-II</td>
<td>Beck Depression Inventory, second edition</td>
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<tr>
<td>CBT0</td>
<td>cognitive behavioral therapy</td>
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<tr>
<td>CI</td>
<td>confidence interval</td>
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<tr>
<td>CIDI</td>
<td>composite international diagnostic interview</td>
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<tr>
<td>CS</td>
<td>cesarean section</td>
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<tr>
<td>DFC</td>
<td>desire for control</td>
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<tr>
<td>DSM-IV</td>
<td>diagnostic and statistical manual of mental disorders, 4th edition</td>
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<tr>
<td>DTS</td>
<td>Davidson Trauma Scale</td>
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<tr>
<td>EA</td>
<td>epidural analgesia</td>
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<tr>
<td>ECT</td>
<td>electro-convulsive therapy</td>
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<tr>
<td>EMDR</td>
<td>eye-movement desensitization and reprocessing</td>
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<td>EPDS</td>
<td>Edinburgh Postnatal Depression Scale</td>
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<td>FFT</td>
<td>family focused therapy</td>
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<tr>
<td>FoC</td>
<td>fear of childbirth</td>
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<tr>
<td>FoP</td>
<td>fear of pain</td>
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<tr>
<td>GHQ-28</td>
<td>general health questionnaire</td>
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<tr>
<td>GYN</td>
<td>gynecologist</td>
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<tr>
<td>HADS</td>
<td>hospital anxiety and depression scale</td>
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<tr>
<td>HELLP</td>
<td>hemolysis, elevated liver enzymes, low platelets</td>
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<tr>
<td>HMR(A)</td>
<td>hierarchical multiple regression (analysis)</td>
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<tr>
<td>HPA-axis</td>
<td>hypothalamic-pituitary-adrenal - axis</td>
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<tr>
<td>ICC</td>
<td>intraclass correlation coefficients</td>
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<tr>
<td>ICSI</td>
<td>intracytoplasmic sperm injection</td>
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<tr>
<td>ICU</td>
<td>intensive care unit</td>
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<tr>
<td>IES</td>
<td>impact of event scale</td>
</tr>
<tr>
<td>IIC</td>
<td>inter-item correlations</td>
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<tr>
<td>IUI</td>
<td>intrauterine insemination</td>
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<tr>
<td>IVD</td>
<td>instrumental vaginal delivery</td>
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<tr>
<td>IVF</td>
<td>in vitro fertilization</td>
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<tr>
<td>IPT</td>
<td>interpersonal therapy</td>
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</tbody>
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APPENDICES

ISSHP  International Society for the Study of Hypertension in Pregnancy
K-W  Kruskall-Wallis one-way analysis of variance
M  median
MAC  medically assisted conception
MDD  major depressive disorder
MINI  mini international neuropsychiatric interview
MW  midwife
n  number
NC  natural conception
NICU  neonatal intensive care unit
NVD  normal vaginal delivery
OCD  obsessive-compulsive disorder
OI  ovulation induction
OR  odds-ratio
PCA  principal components analysis
PCS  planned cesarean section
PE  preeclampsia
POP-unit  psychiatric-obstetric-pediatric unit
PP  puerperal psychosis
PPD  postpartum depression
PPHN  persistent pulmonary hypertension of the newborn
PPQ  perinatal PTSD questionnaire
PPROM  preterm premature rupture of membranes
PSS-I  PTSD symptom scale - interview version
PSS-SR  PTSD symptom scale - self report version
PTSD  posttraumatic stress disorder
PTSD-I(Q)  posttraumatic stress disorder interview (questionnaire)
r  correlation coefficient
r²  explained variance
RCT  randomized controlled trial
SCID (NP)  structured clinical interview for DSM-IV disorders  (non-patient version)
SD  standard deviation
SMRA  stepwise multiple regression analysis
SOC  sense of coherence
SPSS  statistical package for the social sciences
SQRT  square-root (transformed)
SSRI  selective serotonin reuptake inhibitor
SUD  subjective units of distress
TES-B  traumatic event scale - B
TPO  thyroperoxidase
TSH  thyroid stimulating hormone
UPCS  unplanned cesarean section
VAS  visual analogue scale
VBAC  vaginal birth after cesarean
VoC  validity of cognition
WDEQ  Wijma delivery expectations/experiences questionnaire
$X^2$  chi-square
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LIST OF PUBLICATIONS

Fathers with PTSD and depression in pregnancies complicated by preterm preeclampsia or PPROM
Archives of Gynecology and Obstetrics 2013; 287(4):653-61

Case consultation: Traumatized pregnant woman
Forgash C, Leeds A, Stramrood CAI, Robbins A

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Stramrood CAI, van der Velde J, Doornbos B, Paarlberg KM, Weijmar Schultz WCM, van Pampus MG
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Warmelink JC, Stramrood CAI, Paarlberg KM, Haisma HH, Vingerhoets AJJM, Weijmar Schultz WCM, van Pampus MG
Journal of Reproductive Medicine 2012 Mar-Apr; 57(3-4):115-22

Posttraumatic stress following childbirth in homelike- and hospital settings
Stramrood CAI, Paarlberg KM, Huis in ’t Veld EMJ, Berger LWAR, Vingerhoets AJJM, Weijmar Schultz WCM, van Pampus MG

Posttraumatic stress disorder following preeclampsia and PPROM; A prospective study with 15 months follow-up
Stramrood CAI, Wessel I, Doornbos B, Aarnoudse JG, van den Berg PP, Weijmar Schultz WCM, van Pampus MG

Measuring posttraumatic stress following childbirth: A critical evaluation of instruments
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Kapur R, Stramrood CAI, Schutgens REG, van Asbeck BS

Neonatal phrenic nerve injury due to traumatic delivery
Stramrood CAI, Blok CA, van der Zee DC, Gerards LJ
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DANKWOORD & CURRICULUM VITAE
APPENDICES

DANKWOORD

Naast brainstormen over hypothesen en onderzoeksvragen, je artikelen in Journals gepubliceerd krijgen, en voordrachten geven op congressen, is promoveren ook: je eigen artikel herhaaldelijk herschrijven, dagen klussen achter SPSS, en een hoop routinematig werk doen. Ik heb dit enerverende traject tot een succesvol einde kunnen brengen dankzij mijn inspirerende promotoren en copromotoren, en dankzij een solide basis van familie en vrienden.

Mijn bijzondere groep promotoren en copromotoren,
de vrijheid die jullie mij hebben gegeven om dit promotietraject vorm te geven, zowel qua inhoud als planning, is voor mij van onschatbare waarde geweest. Daarbij is de mogelijkheid om mijn eigen stijl en werkwijze te ontwikkelen, jullie enthousiasme, en de altijd constructieve feedback voor mij bijzonder motiverend geweest. Ik ben jullie zeer erkentelijk voor hoe relaxed jullie zijn omgegaan met mijn wisselende productiviteit en mijn soms haast onmogelijke verzoeken tot snelle feedback in verband met een of andere deadline. Daarnaast hebben jullie mij in de gelegenheid gesteld om zonder voorwaarden of verwachtingen in alle rust te ontdekken of ik ook de praktijk van de door ons onderzochte aandoeningen (en de rest van de obstetrie en gynaecologie) wilde leren kennen.

Mijn co-promotoren,

dr. K.M. Paarlberg

dr. M.G. van Pampus

Lieve Marieke, zonder jou was dit boekje er niet geweest. Vanaf het moment dat ik in 2007 tijdens mijn co-schap gynaecologie in het Gelre ziekhuis vroeg of ik bij jou onderzoek kon doen, heb je me onder je hoede genomen. Je introduceerde mij bij de groep die PTSS na de bevalling in Nederland wilde onderzoeken. Waar het in eerste instantie de bedoeling was dat ik een stukje van het onderzoek zou uitvoeren, kreeg ik, mede dankzij jouw steun, een steeds meer coördinerende rol. Het vertrouwen dat je mij al die jaren hebt gegeven is voor mij heel bijzonder geweest. Ik heb enorme bewondering voor je optimisme, discipline, passie voor je vak en de psychosomatiek, en je inzet om de zorg voor kwetsbare zwangere vrouwen te verbeteren. Je inhoudelijke kennis van het onderzoeksonderwerp gecombineerd met je gedetailleerde feedback zijn voor mij van grote betekenis geweest. Ik vond het fijn dat je ook op persoonlijk vlak mijn mentor bent geweest. Met trots ben ik jouw eerste promovenda.

Lieve Marieille, ik bewonder je tomeloze energie en hoe je eindeloos veel onderzoek weet te combineren met een drukke praktijk. Het was fijn om te kunnen sparren over de organisatorische en praktische aspecten die komen kijken bij het doen van onderzoek, en om een copromotor te hebben die op een doortastende wijze de voortgang bewaakte. Jouw verzoek om regelmatige updates was
een gouden greep om mij te helpen mijn motivatie op peil te houden. Ik kijk met veel plezier terug op onze brainstormsessies in Rome, Athene en Orlando, en op de gezellige avondjes bij jou thuis in Amsterdam. Deze waren een welkome afwisseling van mijn soms wat eentonige dagen achter de computer, en dus ging ik altijd vol vertrouwen en met nieuwe ideeën weer naar huis. Ik ben blij dat we alweer allerlei plannen hebben om onze samenwerking voort te zetten.

Mijn promotoren,

*prof. dr. W.C.M. Weijmar Schultz*
*prof. dr. A.J.J.M. Vingerhoets*
*prof. dr. P.P. van den Berg*

Beste Willibrord, door jouw schat aan ervaring, heldere kijk op zaken, wijsheid en out-of-the-box denken heb je zowel het kader geschapen voor dit promotietraject, als ook regelmatig een verassende wending gegeven aan de interpretatie van resultaten en ideeën voor toekomstig onderzoek. De gelegenheid die je mij hebt geboden om deel te nemen aan talloze interessante cursussen en inspirerende congressen was zeer nuttig voor mijn persoonlijke en professionele ontwikkeling, en minstens zo waardevol voor mijn motivatie. Van het team promotoren en copromotoren met zeer gevaccineerde kwaliteiten en persoonlijkheden had ik mij geen fijnere aanvoerder kunnen wensen.

Beste Ad, wat was ik elke keer weer blij met post uit Tilburg. Jouw kritische en zorgvuldige commentaar kwam steeds op het juiste moment en is bijzonder waardevol geweest voor de kwaliteit van de gepubliceerde artikelen. Jouw inbreng vanuit de psychologie was altijd nét even vanuit een andere invalshoek of visie, en heeft mij aangemoedigd om over de grenzen van mijn vakgebied te blijven kijken.

Beste Paul, bedankt voor je vertrouwen in mijn promotietraject en voor het creëren van de condities om dit promotieonderzoek te realiseren binnen de afdeling Gynaecologie/Obstetrie van het UMCG.

Mijn bijzondere waardering gaat uit naar alle vrouwen die geheel belangeloos hebben deelgenomen aan de onderzoeken die de basis vormen van dit proefschrift, ‘Hoe bevalt het’, de HAPP studie, en de EMDR pilot-study. Jullie bereidheid om, in een voor jullie hectische periode, nauwkeurig uitgebreide vragenlijsten in te vullen, al dan niet in combinatie met het maken van psychologische testen en afstaan van lichaamsmateriaal, maakt dat we een grote stap vooruit hebben kunnen maken in onze kennis over PTSS na de bevalling.

Zeer hartelijk dank ook aan de verloskundigen en medewerkers van de Verloskundige Stadspraktijk Groningen, Verloskundigenpraktijk Doevendorf in Apeldoorn, Verloskundigenpraktijk Vita in Breda en het Verloskundig Centrum in Breda voor jullie enthousiaste deelname aan de studies.
APPENDICES

Betrokken bij het ‘Hoe bevalt het’-onderzoek:
Leonard Berger, wat fijn dat je jouw schat aan klinische ervaring en enthousiasme hebt ingezet bij het opzetten van het PTSS onderzoek en het betrekken van de Bredase verloskundigenpraktijken en het ziekenhuis. Het was bijzonder prettig met je samen te werken.
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Catja Warmelink, jouw uithoudingsvermogen gecombineerd met de overvloedige feedback van Mariëlle en mij heeft geresulteerd in het artikel over psychische problemen na geslaagde vruchtbaarheidsbehandelingen. Een mooie opstap voor je eigen promotieonderzoek, ik wens je veel succes hiermee.

Dr. Hinke Haisma, dank voor de bijdrage aan het fertilitéitsartikel.

Dr. Eric van Sonderen, mijn deelname aan jouw cursus ‘measuring concepts in quantitative research’ gaf mij de kennis en vaardigheden om de twee PTSS vragenlijsten grondig te kunnen vergelijken, en jouw inbreng bij dit artikel was onmisbaar.

Prof. dr. Klaas Wijma, ik ben je erkentelijk voor het mogen gebruiken van de Traumatic Event Scale-B voor het onderzoek.

Betrokken bij de HAPP-studie:

Dr. Ineke Wessel, ik was erg blij met de mogelijkheid om aan te sluiten bij het onderzoek dat door jou en Mariëlle is opgezet en uitgevoerd. Het was fijn dat je elke keer een zeer uitgebreide en duidelijke reactie stuurde wanneer ik vragen had over het analyseren en interpreteren van de data.

Dr. Bennard Doornbos, ik heb met zeer veel genoegen met je samengewerkt. Je bent een gedreven onderzoeker, wiens doordachte visie zeer waardevol is geweest bij het schrijven van de HAPP artikelen. Ik hoop van harte dat onze onderzoekspaden elkaar in de toekomst opnieuw zullen kruisen.

Prof. dr. Jan Aarnoudse, dank voor de medewerking aan het artikel over de vrouwen met vroege pre-eclampsie en PPROM.

Het HAPP onderzoek had niet uitgevoerd kunnen worden zonder de inzet van Lida Uulkeman, research nurse, en de bijdragé van een groot aantal onderzoeksmedewerkers en studenten aan de dataverzameling: Esther Caninus, Marloes van Geenen, Marije Jansen, Lotte van Nierop, Ellen Nijkamp, Sippe Overwijk, Dineke Schilstra, Esther Sportel, Rita Timmer en Anna Roos Zandstra. Allen zeer hartelijk dank!

Dr. Janneke van der Velde, voor het plan om de effectiviteit van EMDR als behandeling van posttraumatische stress na de bevalling te onderzoeken was de samenwerking met jou als ervaren clinicus essentieel. Onze pilotstudie vormt hopelijk de basis van toekomstig EMDR onderzoek onder vrouwen met PTSS na de bevalling.
Dr. Mijke Lambregtse - van den Berg, je gedegen kennis en scherpe analyse door een psychiatrische bril waren zeer waardevol bij het schrijven van de review over psychopathologie tijdens zwangerschap en postpartum. Ik ben blij dat onze samenwerking zich op beleidsvlak voortzet bij het LKPZ.

De leden van de leescommissie, prof.dr. A. Franx, prof.dr. M.E.C. Spaanderman, hartelijk dank voor de bereidheid om zitting te nemen in de beoordelingscommissie. Ik was zeer verheugd met het commentaar dat ik mocht ontvangen. professor P. Slade, PhD, as one of the most knowledgeable researchers in the field of PTSD following childbirth, I am very honored by your willingness to be a member of the manuscript committee. Thank you for critically evaluating the scientific value of my thesis.

Zonder het scheppen van de juiste randvoorwaarden was dit proefschrift er niet geweest. Graag bedank ik de Werkgroep Psychosomatische Obstetric en Gynaecologie van de NVOG voor het financieel ondersteunen van het ‘Hoe bevalt het’ onderzoek. Daarnaast gaat mijn grote dank uit naar de Staf Obstetric in het UMCG voor de creatieve manier waarop jullie voor mij dit promotietraject hebben mogelijk gemaakt.

Collega onderzoekers uit Groningen, ik denk dat we elkaar meer hebben gezien op congressen dan in het UMCG. Wie weet komen we elkaar in de toekomst vaker tegen in de kliniek!

Gynaecologen, arts-assistenten, verloskundigen en verpleegkundigen in het St. Elisabeth ziekenhuis te Tilburg, ik heb genoten van de Brabantse gezelligheid. Acht maanden EZ heeft zijn sporen achter gelaten: de pro-active support of labor zit dankzij jullie in mijn systeem.

Gynaecologen, arts-assistenten, verloskundigen en verpleegkundigen in het Meander Medisch Centrum te Amersfoort, ik ben met veel plezier aan mijn opleiding begonnen, dank voor de leerzame en leuke start als AIOS. Jitze, ik heb het erg getroffen met jou als opleider; dank dat je me er regelmatig aan herinnert om de lat voor mijzelf niet te hoog te leggen.
CURRICULUM VITAE

Claire Stramrood was born on May 11, 1983 in Apeldoorn, the Netherlands. After obtaining her high school diploma in 2000, she commenced her studies at University College Utrecht, the international Honors College of Utrecht University. She majored in Social Science (Psychology and Law), and did a minor in Science (Biomedical sciences). She graduated cum laude in 2003. During her studies she played an active role within the University College Student Association (UCSA), including as treasurer of the board and chair of the anniversary committee. In 2004, the students granted her honorary membership of the UCSA and she received the annual Alumni Award. From 2006 to 2010 she was President of the University College Alumni Association (UCAA).

In 2004, Claire started Medical School at Utrecht University’s 4-year mastersprogram SUMMA. She was class representative and member of the education advisory committee. She did her clinical rotations at Gelre Teaching Hospital in Apeldoorn, where she gained interest in gynecology and became involved in research in psychosomatic obstetrics and gynecology. For her scientific internship she coordinated a national study on PTSD following childbirth in the Netherlands.

From 2009 to 2013 Claire worked as a PhD candidate at the department of Obstetrics and Gynecology of the University Medical Center Groningen. Her research focused on prevalence, risk factors and treatment of posttraumatic stress following pregnancy and childbirth.

For the articles she published and work she presented at (inter)national conferences, she received several awards, including from the American Psychosomatic Society (2010 & 2011), the Society for Gynecologic Investigation (2010), the Working Group Psychosomatic Obstetrics and Gynecology of the NVOG (2009) and the Graduate School of Medical Sciences / SHARE (2011 & 2012).

Claire combined her doctoral research with various other positions, including school doctor in Nieuwegein and Utrecht, and Mathematics teacher / teacher trainer at the exam preparation courses of Leiden University. Since 2010 she is a Psychology instructor at the summer programs of Johns Hopkins University’s Center for Talented Youth, and she recently joined the board of the Dutch National Center for Psychiatry and Pregnancy (LKPZ).

After having worked as a Ob/Gyn intern at the St. Elisabeth Hospital in Tilburg for eight months, Claire started her Ob/Gyn Residency in October 2012 at the Meander Medical Center in Amersfoort (supervisor: Dr. M.J. Duk).

Claire’s hobbies include playing drums, piano and hockey. She enjoys painting with bright colors and glitter. She prefers to spend her holidays in the USA, and has crossed half the states thus far.
Claire Stramrood werd geboren op 11 mei 1983 in Apeldoorn. Na het behalen van haar Gymnasium diploma, ging zij in 2000 studeren aan University College Utrecht, het internationale Honors College van de Universiteit Utrecht. Hier koos zij een major in Social Science (psychologie en rechten), met een minor in Science (biomedische richting). Zij studeerde in 2003 cum laude af. Tijdens haar studie was zij bestuurlijk actief binnen de University College Student Association (UCSA), onder andere als penningmeester van het bestuur en voorzitter van de lustrumcommissie. In 2004 werd zij door de studenten benoemd tot erelid van de UCSA en kreeg zij de jaarlijkse Alumni Award uitgereikt. Hierna was zij van 2006 tot 2010 voorzitter van de University College Alumni Association (UCAA).

In 2004 begon Claire aan de 4-jarige Geneeskunde-master SUMMA aan de Universiteit Utrecht. Zij was o.a. jaarvertegenwoordiger en lid van de opleidingscommissie. Haar co-schappen deed zij in het Gelre Ziekenhuis in Apeldoorn, waar haar interesse voor de gynaecologie werd gewekt en zij kennismaakte met onderzoek in de psychosomatische obstetrie en gynaecologie. Voor haar wetenschappelijke stage coördineerde zij een landelijk onderzoek naar PTSS na de bevalling in Nederland.

Van 2009 tot 2013 was Claire als arts-onderzoeker verbonden aan de afdeling Obstetrie en Gynaecologie van het Universitair Medisch Centrum Groningen. Hier deed zij onderzoek naar prevalentie, risicofactoren en behandeling van posttraumatische stress na zwangerschap en bevalling.


Haar promotieonderzoek combineerde Claire met verschillende nevenfuncties, onder andere arts jeugdgezondheidszorg in Nieuwegein en Utrecht, en docent Wiskunde/ docent-trainer bij de examencursussen van de Universiteit Leiden. Daarnaast is zij sinds 2010 docent Psychologie bij de summer programs van Johns Hopkins University’s Center for Talented Youth, en is zij recent toegelaten tot het bestuur van het Landelijk Kenniscentrum Psychiatrie en Zwangerschap (LKPZ).

Na 8 maanden als ANIOS gynaecologie/obstetrie te hebben gewerkt in het St. Elisabeth Ziekenhuis te Tilburg, is Claire in oktober 2012 begonnen aan de opleiding tot gynaecoloog in het Meander Medisch Centrum te Amersfoort (opleider Dr. M.J. Duk).

In haar vrije tijd speelt Claire drums, piano en hockey. Zij schildert graag met felle kleuren en glitter. Haar vakanties brengt zij het liefst door in de VS, waar ze inmiddels de helft van de staten heeft doorkruist.