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Risk factors in pregnancy for post-traumatic stress and depression after childbirth

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Objective The objective of this study was to find risk factors in pregnancy for post-traumatic stress and depression 1 month after childbirth. Furthermore, the relation between post-traumatic stress and depression was explored.

Design A prospective longitudinal study.

Setting Pregnant women in Linköping and Kalmar, Sweden.

Population A total of 1224 women were assessed in pregnancy, week 12–20 and 32, as well as 1 month postpartum.

Methods Post-traumatic stress and depression after delivery were assessed 1 month postpartum. Potential risk factors were assessed in early and late pregnancy. Variables measured during pregnancy were trait anxiety, depression, fear of childbirth, childbirth-related traumatic stress, stress coping capacity, social support, parity, educational level, age, gestation week, parity, educational level, civil status, previous psychological/psychiatric counselling, and previous experience of any traumatic events. Delivery mode was assessed from the medical records.

Main outcome measures Prevalence of post-traumatic stress (criteria A, B, C, D, E, and F according to Diagnostic and statistical manual of mental disorders, fourth edition (DSM-IV)) and depression (Beck's depression inventory).

Results One month postpartum, 12 (1.3%) women had post-traumatic stress (met symptom criteria B, C, and D for post-traumatic stress disorder according to Diagnostic and statistical manual of mental disorders, 4th edition [DSM-IV]). The most important risk factors in pregnancy were depression in early pregnancy (OR = 16.3), severe fear of childbirth (OR = 6.2), and 'pre'-traumatic stress (in view of the forthcoming delivery) in late pregnancy (OR = 12.5). The prevalence of depression was 5.6%. Post-traumatic stress and depression were positively related 1 month postpartum and were predicted by mainly the same factors.

Conclusions Risk factors for post-traumatic stress and depression after childbirth can be assessed in early pregnancy. Post-traumatic stress and depression also seem to share the same underlying vulnerability factors.

Keywords Depression, postpartum, post-traumatic stress, pregnancy, risk factors.

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Introduction

Post-traumatic stress disorder (PTSD) is characterised by persistent re-experiencing of the traumatic event, persistent avoidance of stimuli associated with the event, numbing of general responsiveness, and symptoms of increased arousal.[1] PTSD has also been recognised as a possible reaction to childbirth with a prevalence between approximately 2 and 7% at different time points after delivery.[2–8] Moreover, a recent study has shown that PTSD after childbirth is also a matter of concern in non-western countries.[9]

Except for extremely severe stressors (e.g. torture), only a small proportion of people who have been exposed to a traumatic event develop PTSD.[10–12] Although several studies have identified a dose–response relationship between severity of the stressor and PTSD, some have not.[13,14] However, it seems that severity as well as pre-trauma characteristics are involved in the development of PTSD. Thus, interest in the origin of PTSD has moved from trauma to pre-trauma characteristics.[15,16] For example, studies have shown that pre-trauma/personality characteristics such as depression, high trait anxiety, low stress coping, and low perceived social support are associated with the occurrence of post-traumatic symptomatology.[2,11,16–22] However, in these studies, pre-trauma characteristics have generally been collected and measured retrospectively, that is after the occurrence of the traumatic event. To perform prospective

studies on PTSD, one needs to know where or when a traumatic event might occur. Conveniently, childbirth is such an event where background variables can be assessed prospectively in pregnancy, and post-traumatic stress reactions can be studied after the potentially traumatic delivery.

In a previous study, a 5.8% incidence of 'pre'-traumatic stress was found among the pregnant women in the present sample.[23] Pre-traumatic stress was identified using the same symptom criteria as for PTSD according to DSM-IV[1] but in a future tense (i.e. in view of the forthcoming delivery). High trait anxiety, depression, low stress coping ability, and experiences of previous birth-related psychological/psychiatric counselling (i.e. the woman had earlier in life been in touch with a psychologist/psychiatrist for treatment or counselling) in late pregnancy were associated with "pre"-traumatic stress and fear of childbirth. Pre-traumatic stress and fear of childbirth, as well as the above-mentioned variables, may predict post-traumatic stress reactions after childbirth.

Not only post-traumatic stress may occur after childbirth. A better studied psychological reaction after childbirth is depression, with a prevalence of approximately 10%.[24] Moreover, the co-occurrence of post-traumatic stress and depression is well known.[2,6,7,25–27] One reason for the overlap between the two disorders is that post-traumatic stress and depression share some diagnostic features, such as a diminished interest in significant activities, feelings of detachment from others, a restricted range of affect, difficulty falling or staying asleep, and difficulty in concentrating.[1] Another reason for the overlap between the disorders is that a pre-existing depression increases a person's susceptibility to traumatic events.[28] The overlap between post-traumatic stress and depression after childbirth has been less studied.

The main focus of the present study was to find out how pre-trauma characteristics (in pregnancy) are related to the subsequent development of post-traumatic stress and depression after the delivery. The following hypotheses were raised:

1 Post-traumatic stress and depression after childbirth are positively related to pre-traumatic stress and severe fear of childbirth in late pregnancy.
2 Post-traumatic stress and depression after childbirth are positively related to high trait anxiety, depression, low stress coping ability, low perceived social support, experiences of previous birth-related psychological/psychiatric counselling, previous traumatic experiences, and self-reported psychological problems, as measured in early pregnancy.
3 Post-traumatic stress and depression after childbirth are positively related.

Methods

Participants

Participants were recruited consecutively among pregnant women who visited the Department of Obstetrics and Gynecology either in Linköping or in Kalmar, in South-East Sweden, for their first ultrasound examination during pregnancy. The ultrasound examination took place in gestation week 12–15 in Linköping and 16–20 in Kalmar. Inclusion criteria for the studied population were (1) speaking/understanding Swedish, (2) no plans for legal termination of pregnancy, and (3) absence of obstetric complications that needed specialist ultrasound examination.

Of 1974 eligible women, 1224 (62%) participated at time 1 (pregnancy week 12–20). At time 2 (pregnancy week 32), 273 women dropped out compared with time 1, leaving 951 women for analysis (78% of 1224). At time 3 (1 month postpartum), the number of participants was 908 (74% of 1224). A reminding letter was sent to nonparticipants after time 1, 2, and 3.

Procedure

The midwives registered all women who met the inclusion criteria and passed their names to the research group. The women were sent an invitation to participate in the study together with a set of questionnaires. Background variables were measured at time 1 and 2, and criterion variables at time 3. Data from the medical records (e.g. delivery mode) were only assessed in the Linköping sample.

Because there were no differences between the Linköping and Kalmar sample (except pregnancy week) (Tables 1 and 2), the two samples were analysed together.

Measures

The background data questionnaire comprised single questions regarding age, gestation week, parity, educational level, civil status, and experience of previous psychological/psychiatric counselling (i.e. the woman had earlier in life been in touch with a psychologist/psychiatrist for treatment or counselling) (in general or birth related), experience of previous traumatic events (and to specify what kind of event that was) and if the respondent had ever suffered from anxiety/panic, phobia, depression, psychoses/schizophrenia, or obsessive/compulsive behaviour or thoughts, or other not specifically defined psychological problems (Table 1). The questionnaire was used at time 1.

Trait anxiety was measured by means of the trait version of the State-Trait Anxiety Inventory (STAI) (minimum score = 20 and maximum score = 80).[29] Sum-scores (20 items) were dichotomised at the top 25th percentile, meaning that scores ≥37 were regarded as high trait anxiety and scores <37 as low. Internal consistency according to Cronbach's alpha[30] was 0.91. The STAI was used at time 1.

Depression was measured with the Beck Depression Inventory (BDI).[31] Seven items (number 15–21) were excluded in the analysis because they refer to somatic symptoms, which may be related to pregnancy. A cutoff point at 13 has been recommended for mild depression when all items are

Table 1. Background data for subjects who participated at time 1 and 2, measured at time 1

Background variables	Linköping (n = 508), n (%)	Kalmar (n = 443), n (%)		P
Age (minimum–maximum: 15–45) (mean, SD)	28.7 ± 4.3	28.8 ± 4.7	t = 0.42, df = 948	0.67
Pregnancy week (mean, SD)	16.7 ± 2.6	20.0 ± 2.8	t = 18.4, df = 939	<0.0001
Parity				
Nulliparous	206 (41)	170 (38)	χ^2 = 0.47, df = 1	0.51
Parous	302 (59)	273 (62)		
Education				
Mandatory school	26 (5)	28 (6)	χ^2 = 7.9, df = 4	0.09
High school	194 (38)	202 (46)		
University <3 years	86 (17)	68 (15)		
University ≥3 years	115 (23)	78 (18)		
Other	87 (17)	65 (15)		
Civil status				
No partner	4 (1)	5 (1)	χ^2 = 0.33, df = 2	0.85
Has a partner but not cohabiting	10 (2)	8 (2)		
Married or cohabiting	494 (97)	429 (97)		
Experience of previous psychological/psychiatric counselling				
No	435 (86)	380 (86)	χ^2 = 6.8, df = 3	0.08
Yes, pregnancy/childbirth related	12 (2)	9 (2)		
Yes, in other situations	49 (10)	51 (11.5)		
Yes, in both cases	12 (2)	2 (0.5)		
Previous traumatic experiences (traumatic births excluded)				
No	368 (76)	315 (75)	χ^2 = 0.03, df = 1	0.88
Yes	117 (24)	103 (25)		
Previous traumatic birth experiences*				
No	289 (96)	251 (92)	χ^2 = 3.5, df = 1	0.08
Yes	13 (4)	22 (8)		
Previous psychological/psychiatric problems				
0. No previous problems	278	227		
1. Anxiety/panic	24	25		
2. Phobia	66	75		
3. Depressed mood	60	44		
4. Psychosis/schizophrenia	1	1		
5. Obsessive/compulsive behaviour	1	2		
6. Other	4	4		
Combinations of 1 and 2	12	11		
Combinations of 1 and 3	16	7		
Combinations of 2 and 3	18	13		
Combinations of 1, 2 and 3	16	18		
Other combinations	8	10		
Depression (at time 1)				
No	484 (95.3)	422 (95.3)	χ^2 = 0.0001, df = 1	>0.99
Yes	24 (4.7)	21 (4.7)		

*Only parous women included.

included.[32] Therefore, we calculated a corresponding score for the data we used (i.e. [13/21] × 14 = 8.66) (minimum score = 0 and maximum score = 42). Thus, the cutoff point was set at 9, meaning that a score ≥9 was counted as depression. Cronbach's alpha was 0.82 on the 14 BDI items. The BDI was used at time 1 and 3.

Stress coping capacity was obtained through the Stress Coping Inventory (SCI), which is developed (but not fully validated) to assess the individual's appraisal of her adaptive resources to deal with stressful situations.[33] In the SCI, the woman is instructed to rate how often she thinks she is able to cope with 41 stressful situations. The answers are rated on a

Table 2. Distribution of women with post-traumatic stress 1 month after delivery

Post-traumatic stress	Total, *n* (%)	Linköping, *n* (%)	Kalmar, *n* (%)	χ^2	*df*	*P*
PTSD criteria met (criteria A, B, C, D, E, and F) (*n* = 477 + 431)*	9 (1.0)	3 (.63)	6 (1.4)	1.4	1	0.32
BCD criteria met (criteria B, C, and D) (*n* = 477 + 431)*	12 (1.3)	6 (1.3)	6 (1.4)	0.04	1	>0.99

**n* in Linköping + Kalmar.

6-point Likert scale ranging from 'almost never' (1), 'rarely' (2), 'occasionally' (3), 'rather often' (4), 'very often' (5) to 'almost always' (6) (minimum score = 41 and maximum score = 246). Sum-scores ≤164 (the lower 25th percentile) were considered to represent low coping abilities and >164 good coping abilities. The SCI has previously been used in a study of psychological wellbeing after emergency caesarean section (EmCS) and was found to have sound reliability (Cronbach's alpha = 0.94 and split-half reliability = 0.93).[33] In the present study, Cronbach's alpha was 0.95. The SCI was used at time 1.

The Social Contact Questionnaire (SCQ) was specifically developed for this study and examined participants' perceived social support from partner, family, and friends. The questionnaire consists of 18 statements (e.g. 'I can share my problems with my partner'). Subjects are asked to mark the frequency on a 5-point scale ranging from 'seldom' (1), 'sometimes' (2), 'often' (3), 'very often' (4) to 'almost always' (5) (minimum score = 18 and maximum score = 90). Sum-scores were dichotomised at the lower 25th percentile, that is scores ≤64 were regarded as low social support and >64 as high. Cronbach's alpha was 0.88. The SCQ was used at time 1 and 3.

The Traumatic Event Scale (TES) was used to measure post-traumatic stress symptoms related to the delivery, before and after the childbirth. The TES has been developed in accordance with the DSM-IV criteria for PTSD and comprises the stressor criterion (criterion A) and all symptom criteria for PTSD[1] as well as criteria E and F. In this study, the forthcoming and the recent delivery were specified as the event of interest (criterion A). A more detailed description has been presented previously.[4] After criterion A, statements comprising the 17 DSM-IV PTSD symptoms follow (criteria B, C, and D), i.e. intrusive thoughts, avoidance and numbing, and arousal. Subjects were asked to report the frequency of the symptoms described in the statements by marking one of four answers 'never/not at all' (1), 'rarely' (2), 'sometimes' (3), or 'often' (4). Symptoms were regarded as present from 3 and above. Cronbach's alpha was 0.88 (for the 17 symptom items). The TES was used at time 2 and 3. Hereafter, post-traumatic stress is referred to as meeting criteria BCD for PTSD.

The Wijma Delivery Experience/Expectancy Questionnaire (W-DEQ) measures fear of childbirth by means of a woman's cognitive appraisal of the delivery, asking her about her expectancies before (version A), and experiences after childbirth (version B).[34,35] This self-assessment graphic rating scale has 33 items and six scale steps per item, ranging from 'not at all' (0) to 'extremely' (5). The sum-score varies from a minimum score of 0 to a maximum of 165. The higher the score, the more negative the appraisal of the delivery, that is fear of childbirth. In this study, sum-scores ≥85 were considered as severe fear of childbirth according to Ryding *et al.*[33] Cronbach's alpha was 0.95 (W-DEQ, version A, sum-score). The W-DEQ was used at time 2 and 3.

Delivery mode was assessed from the medical records and categorised as normal vaginal delivery (NVD), elective caesarean section (ElCS), instrumental vaginal delivery (IVD), or EmCS.

Participants versus nonparticipants

A random sample of the 750 women in the Linköping population who did not participate in the first assessment ($n = 166$ women) was compared on available data from medical records with those who did. No statistical difference was found regarding age, parity, reports of previous traumatic birth experience (as written in the medical record), and delivery mode ($t = 1.17$, $df = 1389$, $P = 0.24$; $\chi^2 = 2.0$, $df = 1$, $P = 0.27$; $\chi^2 = 0.025$, $df = 1$, $P > 0.99$; $\chi^2 = 5.1$, $df = 3$, $P = 0.18$, respectively).

Women who during pregnancy (time 1) had post-traumatic stress, depression, high trait anxiety or severe fear of childbirth dropped out of the study more often than other women ($\chi^2 = 19.7$, $df = 1$, $P < 0.0001$; $\chi^2 = 15.9$, $df = 3$, $P = 0.001$; $\chi^2 = 13.9$, $df = 3$, $P = 0.01$; $\chi^2 = 6.0$, $df = 1$, $P = 0.01$). Twenty (36%) of 55 women with post-traumatic stress in late pregnancy dropped out of the study. Of all 70 women with depression at time 1, 31 (44%) did not continue the study to time 3. Of those 39 who did continue, 23 still had depression at time 3. Twenty-three percent of those with severe fear of childbirth at time 2 (late pregnancy) did not continue the study to time 3.

Statistics

Odds ratio and chi-square test (with Fisher's exact *P* value) were used in the analyses. The odds ratio was interpreted as an estimation of the relative risk. The TES sum-scores, instead of a dichotomy, were used in an analysis of variance (ANOVA)

for the additional analysis of delivery mode and post-traumatic stress. ANOVA was used because there were too few cases of post-traumatic stress in relation to delivery mode since delivery mode was assessed only in the Linköping sample.

Results

Post-traumatic stress and depression 1 month postpartum

Twelve (1.3%) women of all participants had post-traumatic stress 1 month after the delivery (criteria B, C, and D for PTSD) (Table 2). Nine of those 12 women met all PTSD criteria (criteria A, B, C, D, E, and F). Seven of the 12 women were multiparous and 5 nulliparous. Depression was found in 5.6% of all participants 1 month after the delivery.

Predictors in pregnancy of post-traumatic stress and depression after childbirth

Hypothesis 1 was supported. Women with pre-traumatic stress or severe fear of childbirth in late pregnancy were found to have an increased risk of having post-traumatic stress as well as depression 1 month after the delivery (Table 3). Of those 12 women with post-traumatic stress after the delivery, 6 had severe fear of childbirth and 5 had pre-traumatic stress in late pregnancy.

Hypothesis 2 was partly supported. Previous experience of psychological/psychiatric counselling related to pregnancy/childbirth and self-reported previous psychological/psychiatric problems were associated with an increased risk of having post-traumatic stress or depression 1 month after childbirth (Table 4). Previous traumatic experiences in general and a previous traumatic delivery were neither associated with an increased risk of having post-traumatic stress nor to having depression 1 month after childbirth. Furthermore, depression in early pregnancy was associated with an increased risk of having post-traumatic stress or depression 1 month after the delivery (Table 4). Low stress coping was found to be a risk factor for post-traumatic stress but not for depression (Table 4). High trait anxiety was associated with an increased risk of having a depression but not for post-traumatic stress (Table 4).

Table 3. Odds ratios of having post-traumatic stress and depression 1 month after delivery

Late pregnancy variables	Post-traumatic stress, OR (95% CI)*	Depression, OR (95% CI)*
Severe fear of childbirth	6.2 (1.5–26.0)	3.5 (1.7–7.0)
Pre-traumatic stress	12.5 (2.9–53.7)	6.9 (3.0–16.1)
Multiparity	0.8 (0.2–3.2)	1.4 (0.7–2.9)

*Odds ratio, adjusted for all included variables.

Table 4. Odds ratios of having post-traumatic stress and depression 1 month after delivery

Early pregnancy variables	Post-traumatic stress, OR (95% CI)*	Depression, OR (95% CI)*
Psychological characteristics		
High trait anxiety	0.3 (0.0–2.2)	4.3 (1.8–10.6)
Depression	16.3 (2.0–134.6)	13.2 (5.7–31.0)
Low stress coping	4.4 (1.1–18.1)	1.8 (0.8–4.0)
Low perceived social support	1.0 (0.2–4.2)	1.6 (0.8–3.5)
Multiparity	1.0 (0.3–3.2)	1.6 (0.8–3.4)
Events		
Previous psychological counselling related to pregnancy/childbirth	5.6 (1.0–30.4)	3.9 (1.6–9.8)
Self-reported previous psychological problems	3.4 (1.0–11.6)	3.6 (1.9–6.8)
Multiparity	1.0 (0.3–3.2)	1.6 (0.9–3.1)

*Odds ratio, adjusted for all variables within 'psychological characteristics' and 'events'.

Post-traumatic stress and depression after childbirth were positively associated ($\chi^2 = 63.5$, $df = 1$, $P < 0.0001$). Seven of the 51 women with depression also had post-traumatic stress 1 month postpartum. Seven of the 12 women with post-traumatic stress also had depression 1 month postpartum. Thus, hypothesis 3 was supported.

Additional analysis of postpartum post-traumatic stress and delivery mode

After the delivery, post-traumatic stress (sum-scores) was related to delivery mode ($F(1, 432) = 4.9$, $P = 0.002$). Women who had an EmCS showed more post-traumatic stress (sum-scores) than those who had an NVD or an ElCS ($P = 0.01$; $P = 0.03$, Scheffé *post hoc* test) (sum-scores of post-traumatic stress was used because there were too few cases of post-traumatic stress in relation to delivery mode since delivery mode was assessed only in the Linköping sample).

Discussion

Prevalence of post-traumatic stress postpartum

Twelve (1.3%) women had post-traumatic stress 1 month after delivery. Of these, nine (1.0%) met all the DSM-IV criteria for PTSD. Recently, a similar prevalence was reported by Czarnocka and Slade,[2] who found that 1.3% of the women in their sample met symptom criteria BCD for PTSD 6 weeks postpartum (the delivery specified as the traumatic event). A higher rate was reported by Ayers and Pickering,[5] who found a prevalence of 6.9% (criteria BCD) 6 weeks postpartum. However, the rates presented by Ayers and Pickering dropped

to 2.8% after excluding women who already met criteria for PTSD and/or depression during pregnancy. Theoretically, their study is important because it shows that the delivery itself can result in the development of PTSD.

Possibly, the use of different measures and different cutoff scores accounts for the different rates of post-traumatic stress postpartum. For example, Czarnocka and Slade used the Post-traumatic Stress Disorder Questionnaire in which answer alternatives regarding the symptoms are counted as valid from 4 and above on a 1–7 scale (1 = not at all, 7 = always). Our measure, the TES, uses a scale ranging from 1 to 4 (1 = not at all/never; 4 = often), where 3 and above are counted as symptomatic. Ayers *et al.* used the Post-traumatic Stress Disorder Symptom Scale,[5] where symptom frequencies are rated on a 4-point scale from 'not at all' (0) to 'very much' (3). As suggested by Dunmore *et al.*,[37] Ayers *et al.* chose to use a sum-score of 18 or above for a PTSD classification, considered to be more conservative than the original classification. If we had used the same cutoff score as Ayers and Pickering, our prevalence would have been 3.2%.

Different studies have assessed post-traumatic stress at different time points and have used different study designs that could account for different rates of post-traumatic stress.[2,4–7,22] However, it is not yet evident that rates of post-traumatic stress vary significantly between the different time points postpartum. For example, Ayers and Pickering[5] showed lower rates of post-traumatic stress at 6 months than after 3 months. In contrast, van Son *et al.*[22] showed no decrease between 3 and 12 months postpartum. Also, most studies have had a retrospective design (except Ayers and Pickering[5] and van Son *et al.*[22] who made measurements in late pregnancy). One problem with retrospective studies is that the respondents' self-reports of pre-birth variables possibly are affected by their current psychological state.[14] No previous studies have used a prospective design where pre-birth variables have been measured in early pregnancy.

Although different rates have been presented, it can be concluded that, after childbirth, approximately 1 to 7% of the women giving birth develop post-traumatic stress reactions as in PTSD. Thus, considering the number of births every year in the western countries these studies refer to, a considerable number of women will develop post-traumatic stress after childbirth. A recent study in a non-western country showed a prevalence of post-traumatic stress of 5.9%.[9] This shows that post-traumatic stress is a matter of interest in both western and non-western societies.

Predictors of post-traumatic stress after childbirth

The analyses showed that certain psychological characteristics, both in early pregnancy and in late pregnancy, were associated with post-traumatic stress after childbirth. In early pregnancy, these risk factors for post-traumatic stress postpartum were previous psychological problems, a history of psychological counselling related to childbirth, depression, and low stress coping.

Similarly to our results, the relation between depression in pregnancy and post-traumatic stress postpartum was shown by Ayers and Pickering[5] and van Son *et al.*[22]

Regarding the role of stress coping on psychological functioning, our results are in accordance with Nikcevic *et al.*,[38] who in a study of anxiety and depression after early pregnancy loss found that lower personal coping resources (self-esteem and self-efficacy) were significantly associated with anxiety and depression, although they measured all variables on the same occasion. Also, Czarnocka and Slade reported, in a retrospective study, that women with post-traumatic stress after childbirth felt significantly less confident about being able to cope during labour and delivery than those without such symptoms.[2]

Both severe fear of childbirth and pre-traumatic stress in late pregnancy were associated with an increased risk of post-traumatic stress. Therefore, women who in pregnancy reported severe fear of childbirth or pre-traumatic stress could be viewed as more vulnerable than those who did not. Among such vulnerable women, a less severe event may produce post-traumatic stress just as a more severe event may cause post-traumatic stress among those who are not as vulnerable. Yehuda[12] suggests that background or vulnerability factors may be more or less predictive depending on the 'objective' severity of the traumatic event. She proposes that the role of vulnerability factors may be more important in the development of PTSD after a less severe traumatic event (e.g. a minor motor vehicle accident) than after a more severe one (e.g. purposeful torture).[12] This might also apply to the childbirth experience.

Altogether, the results of our study are mainly in accordance with previous studies of post-traumatic stress, both after childbirth and after other traumata.[2,5–7,11,16–18,20,22] However, there is a big difference in design between our and the other studies; our study is prospective as it assessed background variables in early and late pregnancy, that is before the potentially traumatic event. Earlier studies have found previous mental health problems and psychological variables to be associated with post-traumatic stress but actually measured symptoms of, for example, depression and trait anxiety after the traumatic event occurred.

Prevalence and predictors of a depression after childbirth

Depression was found in 5.6% (51) of the women 1 month postpartum. Various rates of postpartum depression have been reported previously. For example, Righetti-Veltema *et al.*[39] found a prevalence of 10.2% 3 months postpartum in an unselected sample of 570 women using the Edinburgh Postnatal Depression Scale (EPDS). In another study of 465

women, 27 (5.8%) became clinically depressed between 1 and 4 months postpartum.[40] White *et al.*[6] reported a prevalence of 10.2% (EPDS scores ≥13) at 6 weeks postpartum (n = 400). Also using the EPDS, Leeds and Hargreaves[7] found a prevalence of depression on 21.5% among 102 women between 6 and 12 months postpartum. Another study, van Son *et al.*,[22] found a lower prevalence of depression (6%) at 3 months postpartum using the EPDS. Possibly, the low response rate (21%) in Leeds and Hargreaves' study can explain why their study found such a high prevalence.

In our study, post-traumatic stress and depression after childbirth had mainly the same predictors (measured in early pregnancy), that is a history of psychological counselling related to childbirth, self-reported previous psychological problems, and a depression. High trait anxiety in early pregnancy was associated with an increased risk of depression but not for post-traumatic stress postpartum. In late pregnancy, fear of childbirth and pre-traumatic stress were found to be risk factors for both depression and post-traumatic stress postpartum.

Righetti-Veltema *et al.*[39] found multiparity, deleterious life events, and depressive mood during pregnancy to predict postpartum depression. In Chaudron's *et al.*[40] study, maternal age, depression during pregnancy, thoughts of death and dying at 1 month postpartum, and difficulty falling asleep at 1 month postpartum were found to predict depression at 4 months postpartum. However, Chaudron's *et al.* study was not prospective, but their predictions were based on assessments made 1 month postpartum.

It is not surprising that the rates of depression are higher than those of post-traumatic stress postpartum. Our study measured post-traumatic stress that was related to the childbirth only, not to any other event. Conversely, depression was not linked to a certain event. In most other studies of post-traumatic stress, it is the other way around, that is post-traumatic stress is the most common reaction to a traumatic event, followed by depression.[27] This is not the case in our study probably because we have a sample where a majority experienced the childbirth as a positive event.

Overlap between post-traumatic stress and depression

Seven of the 12 women with post-traumatic stress also had depression 1 month postpartum. A similar overlap has been shown by White *et al.*[6] who found a correlation of 0.63 between scores of post-traumatic stress and depression. Also, Leeds and Hargreaves[7] showed an overlap between depression and post-traumatic stress.

The overlap of post-traumatic stress and depression among postpartum women can be compared with the results of Breslau *et al.*,[26] who investigated whether traumatic events in general increased the risk of depression independent of their effects on PTSD. They found that exposure to trauma increased the risk of depression in persons who developed PTSD but not in those who did not develop PTSD. Finally, Breslau *et al.* suggest that depression and PTSD have the same background factors or vulnerabilities and that it might be a mistake to regard PTSD and depression as being entirely separate reactions to traumatic events.

In another study, Shalev *et al.*[27] studied the overlap of PTSD and depression following traumatic events in women recruited from a general hospital's emergency room. They interpreted their results as showing that PTSD and depression are independent sequelae of traumatic events. However, the authors stated that PTSD and depression have similar prognoses and interact to increase distress and dysfunction. Co-morbid depression occurred in 44.5% of women with PTSD 1 month and in 43.2% at 4 months after the trauma. Co-morbidity was associated with greater symptom severity and lower levels of functioning.

As mentioned before, studies of post-traumatic stress generally shows that post-traumatic stress is the most common reaction to a traumatic event, followed by depression.[27] In the context of childbirth, the situation is different since most of the births are regarded as a positive event.

Post-traumatic stress and delivery mode

Post-traumatic stress (sum-scores) was found to be related to delivery mode where women who had an EmCS showed more post-traumatic stress than those who had an NVD or an ElCS. This result is in concordance with a previous cross-sectional study of 1550 women.[41] The authors showed that post-traumatic stress was significantly related to the experience of an EmCS or an IVD. However, it is important to point out that, numerically, most women with a PTSD symptom profile were found in the NVD group. This implies that a NVD can be experienced as traumatic, just as an emergency caesarean or an instrumental delivery is not necessarily traumatic.

Dropouts

The drop-out pattern shows an inherent methodological problem with prospective studies, especially when repeated assessments are made. For example, of the women who participated only in time 1 and 2, 13.8% had pre-traumatic stress in late pregnancy. Of those who participated in all three assessments, the rate was 4.4% in late pregnancy. Thus, it is clear that women with pre-traumatic stress were more likely to dropout of the study than those without pre-traumatic stress. Likewise, women with depression dropped out of the study more often than those without. Ten percent of those who participated only in the first and second assessment had depression in pregnancy compared with 3.9% of those who remained in the study. Thus, the rates presented in this study may be underestimated.

Conclusions

In our study, 1.3% of 908 women were found to meet symptom criteria B, C, and D for PTSD. The prevalence of depression was 5.6%. Women with depression and those with post-traumatic stress postpartum seem to share common vulnerability factors. One clinical implication of the study is that it is possible to identify women who are at risk already during pregnancy. Therefore, it might be possible to meet the needs of this risk group before and during childbirth. Further research is needed to investigate the longitudinal course and long-term consequences of post-traumatic stress.

Disclosure of interest

No conflict of interest is present.

Contribution to authorship

J.S. has been active in planning and designing the study. He has also collected and statistically analysed all data as well as writing the main part of the manuscript. B.W. has been engaged in the planning and designing of the study. She has also contributed in the writing of the manuscript. G.T. has been active in the planning of the study as well as making data collection possible. He has also contributed in the shaping of the manuscript. K.W. has been engaged in the planning and designing of the study. He has also been active in the writing process as well as in analysing the data.

Details of ethics approval

The study was approved on 17 September 1996 by the regional ethics committee in Linköping, Sweden (Dnr 96207).

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