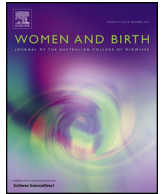




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# Posttraumatic stress disorder in partners following severe postpartum haemorrhage: A prospective cohort study

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### ABSTRACT

**Background:** Partners of women are increasingly present during childbirth and may be exposed to a traumatic experience. Since parents' mental health issues (i.e. posttraumatic stress disorder) have been shown to increase the risk of problems in the child's development, it is important to identify these risk factors. Partners often describe severe postpartum haemorrhage as traumatic.

**Aim:** Whether witnessing severe postpartum haemorrhage is a risk factor for developing posttraumatic stress disorder in partners.

**Methods:** In this prospective cohort study, we compared partners of women with severe postpartum haemorrhage ( $\geq 2000$  mL) and partners of women with  $\leq 500$  mL of blood loss (controls). Four weeks after birth partners were screened for posttraumatic stress disorder symptoms with a self-report questionnaire. Scores  $\geq 11$  were followed by a gold standard clinical interview to diagnose posttraumatic stress disorder.

**Findings:** We included 123 severe postpartum haemorrhage partners and 62 control partners. Partners of women with severe postpartum haemorrhage reported higher scores than control partners (median 3.0 (0.0–7.0) vs 2.0 (0.0–4.0),  $p = 0.04$ ) on symptoms of posttraumatic stress, but no significant difference in probable posttraumatic stress disorder diagnosis according to the self-report questionnaire was found. According to the clinical interview no partners were diagnosed with posttraumatic stress disorder. Severe postpartum haemorrhage was experienced as traumatic by the partners who felt excluded.

**Conclusion:** None of the partners developed posttraumatic stress disorder, revealing the resilience of young fathers. Because some partners reported severe postpartum haemorrhage as traumatic, we recommend sufficient information and support is provided during childbirth.

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### Statement of significance

#### Problem or issue

Partners of women who gave birth may be at risk for developing posttraumatic stress disorder after witnessing severe postpartum haemorrhage.

#### What is already known

There is very little research on the risk factors for developing posttraumatic stress disorder in partners. Premature birth appears to be a risk factor, but whether severe postpartum haemorrhage is a risk factor remains unknown. Parents'

mental health issues have been shown to increase the risk of problems with the child's future mental health.

#### What this paper adds

No significant difference in posttraumatic stress disorder between severe postpartum haemorrhage partners and controls was found, revealing the resilience of young fathers. However, we do recommend that sufficient information is provided during childbirth, since partners describe severe postpartum haemorrhage as a traumatic experience.

### 1. Introduction

Partners of women are increasingly present during labour and childbirth and are exposed to the same possible traumatic experience

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as the women giving birth.<sup>1</sup> Up to 4.9% of women giving birth develop a posttraumatic stress disorder (PTSD) and their partners might be at risk as well.<sup>2</sup> PTSD is a trauma and stressor-related disorder that may develop in response to experiencing or witnessing a traumatic event.<sup>3–5</sup> Symptoms of PTSD include re-experiencing, avoidance, negative alterations in cognitions and mood, and hyperarousal.<sup>6</sup> Parents' mental health issues have been shown to increase the risk of problems with the child's social-emotional, cognitive, language and brain development, as well as the formation of secure attachment and the child's future mental health.<sup>7</sup>

There is very little research on the risk factors for developing PTSD after childbirth in partners. Some studies show that partners are at increased risk of developing subthreshold PTSD after premature birth but until now, other risk factors have rarely been studied.<sup>8–10</sup> Subthreshold PTSD can be defined as posttraumatic stress symptoms that do not meet full PTSD criteria, but it is common and clinically relevant.<sup>11,12</sup>

Postpartum haemorrhage (PPH) is a common complication of childbirth, however, severe PPH ( $\geq 2000$  mL) is less common (0.5–1.4%).<sup>13,14</sup> PPH is often described as a traumatic experience by women and their partners. Therefore, witnessing a potentially life threatening complication such as PPH may cause PTSD. In a recently published study, Etheridge et al. report on the experiences of partners who perceived childbirth as traumatic.<sup>15</sup> In this study, symptoms of PTSD were screened using the Impact of Event Scale (IES), which does not provide information on the diagnosis of PTSD.<sup>15</sup> Besides this study, there is no literature reporting on the development of PTSD after witnessing PPH in partners. Using self-report questionnaires, PTSD cannot be diagnosed, but with the correct cut-off values, a diagnosis of probable PTSD is possible.<sup>16</sup> A diagnosis of PTSD can be made using the Clinical Administered PTSD Scale for DSM-5 (CAPS-5).

The purpose of this study was to answer the following research questions: (1) Is severe PPH in women associated with self-report based PTSD symptom severity and probable PTSD in partners (using the PTSD Checklist for DSM-5 (PCL-5))? (2) Is severe PPH in women associated with PTSD diagnosis in partners as assessed by a clinical interview (CAPS-5)? (3) What makes an experience traumatic in partners of women with severe PPH? (4) Is there an linear association between PCL-5 scores in women and their partners?

## 2. Participants, ethics and methods

In this multicentre prospective cohort study (IPAD-study; Identification of PArEnts in Distress), we compared four groups of participants; (1) partners of severe PPH patients ( $\geq 2000$  mL of blood loss, PPH partners) and (2) control partners ( $\leq 500$  mL of blood loss), as well as (3) women who gave birth and experienced severe PPH (PPH patients) compared to (4) control women with blood loss  $\leq 500$  mL.<sup>17</sup> The manuscript concerning the outcome of the last two – Is experiencing severe PPH a risk factor for PTSD in women giving birth? – is published separately. Participants (both women and their partners) were recruited from eight hospitals in the region of Amsterdam, The Netherlands. One tertiary (university) hospital and six secondary hospitals were involved in data collection (respectively Amsterdam UMC, location University of Amsterdam and location Vrije Universiteit Amsterdam and OLVG East and West, Amsterdam; Spaarne Gasthuis, Haarlem and Hoofddorp; Westfriesgasthuis, Hoorn; Flevoziekenhuis, Almere). Data were collected from February 2015 until June 2017. Blood loss was measured according to the protocols in different hospitals. We defined severe PPH using a cut-off value of 2000 mL blood loss or more because of the physical impact of such an amount of blood loss.<sup>18</sup> The cut-off of 500 mL blood loss or less was chosen as this is being considered as a physiological birth in the Netherlands.

In the Netherlands, the prevalence of PTSD in the general postpartum population is 1.2%.<sup>9</sup> The sample size calculation was based on the women who gave birth and these data indicated that the prevalence among controls is 0.012. If the prevalence for PPH patients is 0.087 (we estimated an difference of 7.5%), we needed to study 130 PPH patients and 130 controls (totalling 260 women) to be able to reject the null hypothesis that the prevalences for PPH patients and controls are equal with probability (power) 0.8. Since we aimed to include partners of all participating women who gave birth, we decided on the same sample size for PPH partners and control partners.<sup>17</sup>

### 2.1. Procedures

A flow diagram is added to give an overview of the timeline of the study (Fig. 1). If childbirth was complicated by severe PPH, this PPH patient and two controls were asked to participate in the IPAD-study. PPH partners and control partners were asked to participate as well. Controls were defined as the birth before and after the severe PPH patient. Exclusion criteria were applied to all participants and were: (1) a known history of PTSD, (2) age younger than 18 and (3) not speaking English or Dutch. All participants received verbal and written information about the study by doctors or midwives, after which they were given the time needed to decide whether they wanted to participate, and provided written informed consent for participation. Two controls for each patient were selected because controls are often discharged soon after the birth, causing a lower inclusion rate.

Between four to six weeks postpartum, the digital version of the PCL-5 was sent to all participants, including questions about demographics and medical history (Appendix 1). PCL-5 scores were obtained from both women and their partners. Positive screening according to the PCL-5 was followed by the CAPS-5 to diagnose PTSD.

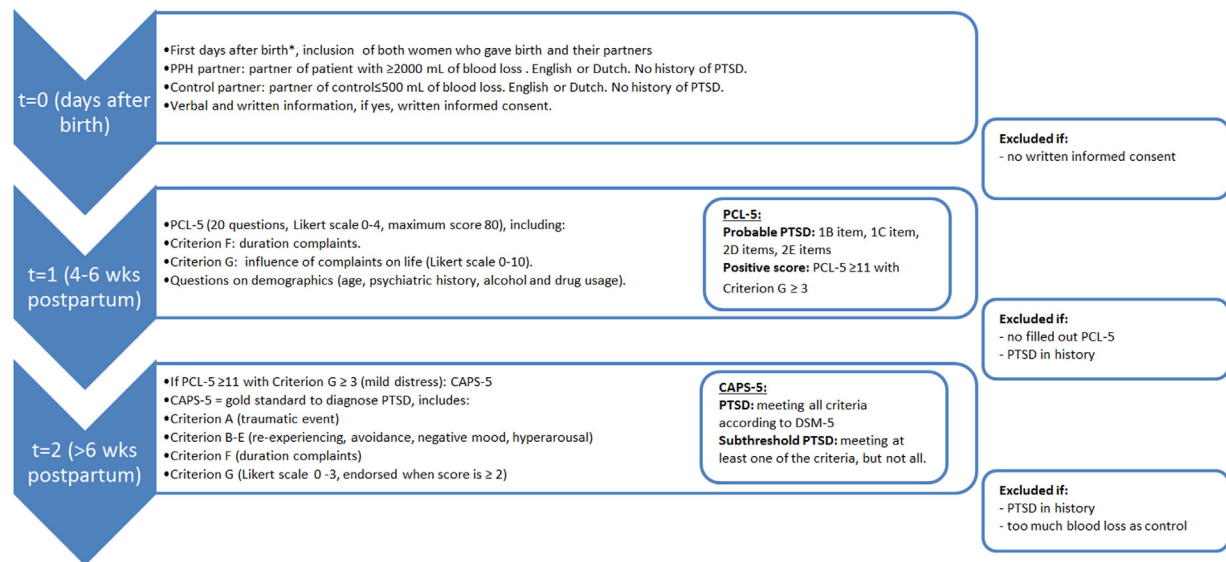
Data were collected from the added questions in the digital questionnaire (the PCL-5) and CAPS-5, and obstetric data from the hospital files of the women who gave birth.

### 2.2. Assessment of probable PTSD

The PCL-5 is a 20-item self-report tool that assesses the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) symptoms of PTSD, namely B Criteria (re-experiencing), C Criteria (avoidance), D Criteria (negative alterations in cognitions and mood) and E Criteria (hyperarousal).<sup>16,19,20</sup> Respondents indicated how much they have been bothered by each PTSD symptom in the past month on a five-point Likert scale, ranging from 0 to 4 (0 = Not at all, 1 = A little bit, 2 = Moderately, 3 = Quite a bit, 4 = Extremely). The maximum score of the PCL-5 is 80.<sup>6,19,20</sup> A probable PTSD diagnosis can be made using the PCL-5; if a participant scored a question as at least 'moderately' (at least '2' on the five-point Likert scale) this question is endorsed (Fig. 1). When scoring at least 1 B item (questions 1–5), 1 C item (questions 6–7), 2 D items (questions 8–14) and 2 E items (questions 15–20), this resulted in a probable PTSD diagnosis.<sup>16</sup> When having a total score of  $\geq 32$  on the PCL-5, it is also likely someone had probable PTSD.<sup>6,19,20</sup>

Questions were added to explore duration of complaints (Criterion F, 0 = Zero weeks, 9 = Longer than eight weeks), functional significance (Criterion G, eleven-point Likert Scale, 0–10, 0 = Not at all, 10 = Extremely), co-morbidities, partners' search for treatment and partners' symptoms of depression, and use of antidepressant medication during their partners' pregnancy (Appendix 1).

It was not feasible to conduct the CAPS-5 with all participants, and thus, prior to the study, we excluded participants with low symptom levels on the PCL-5 who were unlikely to meet criteria for



**Fig. 1.** Flow diagram of timeline.

Flow diagram of the timeline of the study containing exclusion criteria to clarify the order of events.

\*First days after giving birth: As soon as the woman who gave birth and her partner were ready for receiving this kind of information. In case of the controls and their partners, this could be several hours after birth. In case of PPH patients and their partners, this could be several days.

CAPS-5: Clinical Administered PTSD Scale for DSM-5; mL: millilitre; PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage; PTSD: posttraumatic stress disorder.

a (subthreshold) PTSD diagnosis according to the CAPS-5. To be included, a sensitive-based cut-off was set, using a PCL-5 score of  $\geq 11$ , with a self-reported severity score of  $\geq 3$  (ranging 0–10), as to not miss any participants with probable (subthreshold) PTSD.

### 2.3. Assessment of (subthreshold) PTSD

Participants with a positive screening in the PCL-5 ( $\geq 11$ , combined with a severity score of  $\geq 3$ ), were asked to participate in a telephone interview in which the CAPS-5 questionnaire was completed.<sup>21,22</sup> We conducted telephone interviews to maximise the participation and response rate. It is known that people with PTSD avoid situations or places that may trigger flashbacks, such as a hospital. Also, young parents have less time and energy to participate in an extensive clinical interview.

The CAPS-5 is considered the gold standard for diagnosing PTSD. In addition to assessing the DSM-5 PTSD symptom criteria, extra questions targeted the onset and duration of symptoms (Criterion F), subjective distress and impact of symptoms on social and occupational functioning (functional significance, Criterion G), overall response validity, overall PTSD severity, and specifications for the dissociative subtype.<sup>21,22</sup> Clinical researchers were trained to conduct the CAPS-5. Blind assessment was not possible, due to the fact that Criterion A had to be known to conduct the CAPS-5. The assessor combined information about the intensity and frequency of each item and scored accordingly. To meet the criteria for PTSD, we used the criteria according to the DSM-5.<sup>6</sup>

PTSD was diagnosed when a participant met the criteria according to the CAPS-5; one should score at least one B Criterion symptom, one C Criterion symptom, two D Criterion symptoms and two E Criterion symptoms and, additionally, Criterion A, Criterion F and Criterion G should be met.<sup>6</sup> When a participant met at least one of the abovementioned criteria for PTSD according to the CAPS-5, but not all, in combination with a Criterion G score of  $\geq 2$  (maximum 3), this was defined as subthreshold PTSD (Fig. 1).<sup>23,24</sup>

To answer the third research question the answers of the CAPS-5 were transcribed and the most common answers were extracted.

To determine if there was an association between PTSD symptom levels in women and their partners, we determined a linear trend line and the  $R^2$  between PCL-5 scores of women and their partners.<sup>17</sup> For this analysis, we only used data from women who formed a dyad with their partners.

When the CAPS-5 interview revealed a history of PTSD, participants were excluded from participation. Participants were also excluded when exclusion criteria were met, even if the PCL-5 was completed. When PTSD was diagnosed, participants were referred to their general practitioner, who arranged further referral to a specialized psychologist.

### 2.4. Statistical analysis

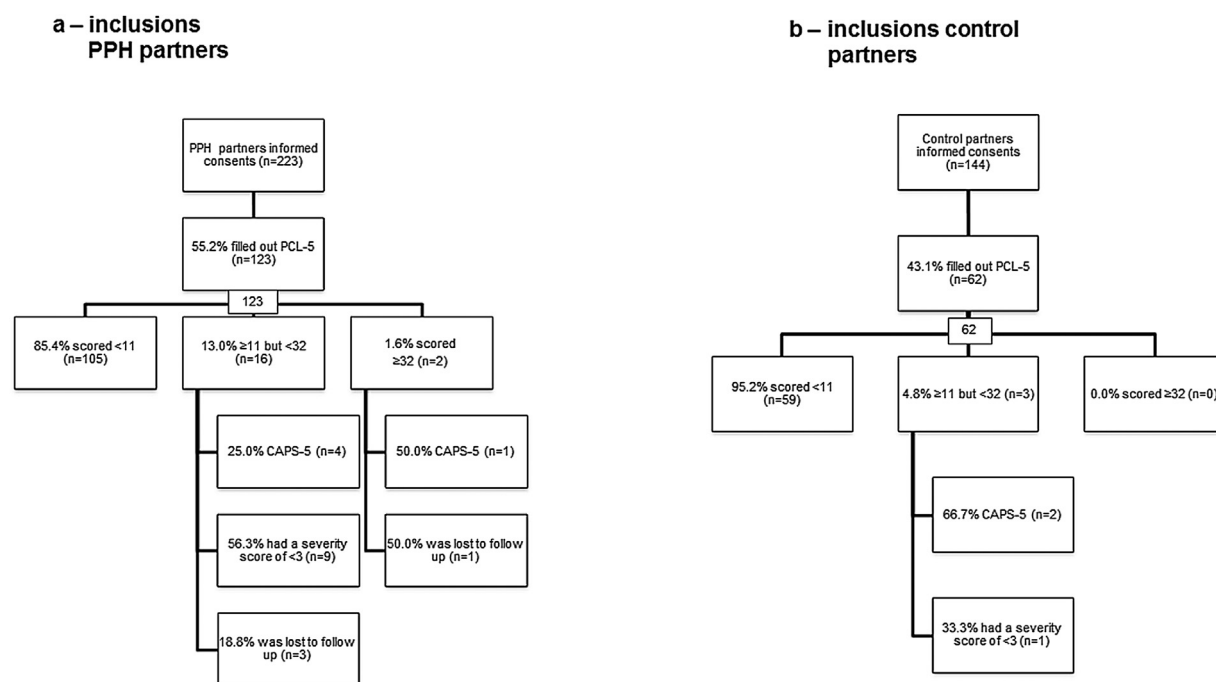
The primary outcome of this study was to determine whether there is a significant association between severe PPH and PTSD in partners. Demographic and birth-related data were collected from the women's patient files in the hospitals. Dichotomous data were compared using the Chi-square analysis ( $\chi^2$ ) or Fisher's exact test where applicable. Continuous data were compared either with t-tests or Mann-Whitney U. All tests were two-tailed and  $p < 0.05$  denoted significance. We calculated the correlation coefficient between PCL-5 scores in women and their partners with Microsoft Excel 2010. Other data were analysed using Statistical Package for the Social Sciences (SPSS, Version 22).

The study was approved by the MEC-U (Medical Research Ethics Committees United) and the Medical Ethics Committees of each participating hospital.

Clinical Trial Registration: NL50273.100.14

## 3. Results

We obtained 223 informed consents from PPH partners and 144 informed consents from control partners. The PCL-5 questionnaire was completed by 55.2% ( $n = 123$ ) of the PPH partners compared to 43.1% ( $n = 62$ ) of the control partners (Fig. 2a and 2b). After reaching the defined sample size of 260 of the participating



**Fig. 2.** Inclusion diagrams PPH partners and controls.

Flowchart of the inclusions in our study.

CAPS-5: Clinical Administered PTSD Scale for DSM-5; PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage.

women for the primary outcome of the IPAD-study, inclusion of partners was stopped regardless of the lower response rate.

**Table 1** presents an overview of the baseline characteristics. Pain relief during childbirth (43.3% vs 59.7%), third stage of labour (55 vs 9 min) and length of hospital stay postpartum (3 vs 2 days) were significantly different between groups.

The amount of alcohol usage was similar in both PPH partners (n = 89, 72.4%) and control partners (n = 41, 66.1%,  $p = 0.38$ ; **Table 1**). The percentage of daily users of alcohol was 13.5% (n = 12) in PPH partners and 12.1% (n = 5) in control partners. Only PPH partners

used drugs (n = 3, 2.4%), which was not significantly different between groups ( $p = 0.55$ ).

The median score of the PCL-5 was 3.0 (0.0–7.0) in PPH partners and 2.0 (0.0–4.0,  $p = 0.04$ ) in control partners (**Table 2**). A probable PTSD diagnosis could be made according to the PCL-5 in seven (5.7%) PPH partners and in zero (0.0%) of the control partners ( $p = 0.10$ ; **Table 2**).

Eighteen PPH partners scored  $\geq 11$  in the PCL-5, of whom nine had a severity score of  $< 3$  and were thus not eligible for the CAPS-5 (**Fig. 2a** and **b**). Three control partners scored  $\geq 11$ , of whom one had

**Table 1**  
Baseline characteristics.

Baseline characteristics	PPH partners (n = 123)	Control partners (n = 62)	p-Value
Male <sup>d</sup>	122 (100.0)	62 (100.0)	1.00
Age <sup>d</sup>	35.4 ± 5.0	35.9 ± 7.5	0.64
Completed college or university <sup>d</sup>	60 (49.6)	29 (46.8)	0.72
Psychiatric history	2 (1.6)	4 (6.5)	0.10
History postpartum haemorrhage <sup>d</sup>	15 (12.5)	3 (5.1)	0.12
Duration pregnancy (wk + day) <sup>d</sup>	40 + 1 (38 + 4–41 + 0)	39 + 3 (38 + 1–40 + 6)	0.28
Primigravida <sup>d</sup>	68 (55.7)	35 (56.5)	0.93
Pain relief during birth <sup>a</sup>	52 (43.3)	37 (59.7)	0.04
Assisted delivery <sup>d,b</sup>	31 (25.8)	17 (28.8)	0.67
Delivered during shift <sup>d,c</sup>	63 (53.4)	29 (50.9)	0.76
Third stage of labour <sup>a</sup>	55 (10–83)	9 (6–13)	<0.001
Total blood loss <sup>a</sup>	2500 (2000–3000)	300 (200–350)	<0.001
Length of hospital stay postpartum <sup>a</sup>	3 (2–4)	2 (1–3)	<0.001
Alcohol use after delivery	89 (72.4)	41 (66.1)	0.38
Days between PCL-5 and delivery	54.5 (39.3–73.0)	56.0 (41.0–72.5)	0.95

All variables are shown in n (%), mean ± SD or median (25–75%). All differences were analysed using  $\chi^2$ ,  $t$ -test or Mann–Whitney U, except if stated otherwise below. History postpartum haemorrhage, duration pregnancy, primigravida, pain relief during delivery, assisted delivery, delivered during shift, third stage of labour, total blood loss and length of hospital stay postpartum relate to the women who delivered.

PPH: postpartum haemorrhage.

<sup>a</sup> Significant difference between PPH partners and control partners.

<sup>b</sup> Assisted delivery: ventouse, forceps or caesarean section.

<sup>c</sup> Delivered during shift: deliveries between 16:00 and 08:00.

<sup>d</sup> Due to incomplete data, measurements were based on: male PPH partners n = 122, control partner n = 62; age PPH partners n = 120, control partners n = 62; completed college or university PPH partners n = 121, control partners n = 62; history PPH partners n = 120, control partners n = 59; duration pregnancy PPH partners n = 120, control partners n = 59; primigravida PPH partners n = 122, control partners n = 62; assisted delivery PPH partners n = 120, control partners n = 59; delivered during shift PPH partners n = 118, control partners n = 57.



**Table 2**  
Outcomes of the PCL-5 and CAPS-5.

Outcomes PCL-5 and CAPS-5	PPH partners (n = 123)	Control partners (n = 62)	p-Value
PCL-5 median overall score <sup>a</sup>	3.0 (0.0–7.0)	2.0 (0.0–4.0)	0.04
Probable PTSD <sup>d</sup> according to PCL-5 <sup>b</sup>	7 (5.7)	0 (0.0)	0.10
PCL-5 mean score Criterion B <sup>a</sup>	1.2 ± 2.2	0.2 ± 0.7	<0.001
PCL-5 mean score Criterion C <sup>a</sup>	0.5 ± 1.1	0.05 ± 0.2	<0.001
PCL-5 mean score Criterion D <sup>a</sup>	1.6 ± 2.6	0.8 ± 1.4	<0.001
PCL-5 mean score Criterion E	2.0 ± 2.8	1.7 ± 2.0	0.40
PCL-5 Criterion B score ≥ 1 <sup>a</sup>	22 (17.9)	1 (1.6)	<0.001
PCL-5 Criterion C score ≥ 1	8 (6.5)	0 (2.7)	0.05
PCL-5 Criterion D score ≥ 2 <sup>a</sup>	11 (8.9)	0 (0.0)	0.02
PCL-5 Criterion E score ≥ 2 <sup>a</sup>	12 (9.8)	4 (6.5)	0.45
PTSD according to CAPS-5 <sup>c</sup>	0 (0.0)	0 (0.0)	
Subthreshold PTSD according to CAPS-5 <sup>c</sup>	3 (2.5)	0 (0.0)	0.55

All variables are shown in n (%), mean ± SD or median (25–75%). All differences were analysed using  $\chi^2$ , t-test or Mann–Whitney U, except if stated otherwise below.

<sup>d</sup>Subthreshold PTSD according to CAPS-5: when a participant met at least one, but not all, of the criteria as described above.

CAPS-5: Clinical Administered PTSD Scale for DSM-5; Criterion B: re-experiencing; Criterion C: avoidance; Criterion D: negative thoughts and feelings; Criterion E: hyperarousal; PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage; PTSD: posttraumatic stress disorder.

<sup>a</sup> Significant difference between PPH partners and control partners.

<sup>b</sup> Fisher's exact test.

<sup>c</sup> Administered CAPS-5 PPH partners n = 5 control partners n = 2.

<sup>d</sup> Probable PTSD according to PCL-5: when a participant scored a question as at least 'moderate' (at least two points on the four point Likert scale) this symptom was endorsed, where after the DSM-5 diagnostic rule according to the DSM-5 was followed.

a severity score of <3. Consequently, nine PPH partners and two control partners were eligible for the CAPS-5. Of these, four (of nine) PPH partners and no (of two) control partners were lost to follow up.

In total, seven CAPS interviews (5 PPH partners and 2 control partners) were conducted. During the CAPS-5, no PTSD was diagnosed in either group (Table 2). In PPH partners, three (2.5%) participants did meet criteria for subthreshold PTSD while in control partners this was 0.0% (p = 0.55; Table 2). One PPH partner who scored highest on the PCL-5 (total score 36, severity score 4) was lost to follow-up with the CAPS-5. The second highest PPH partner score (total score 33, severity score 7), did appear to have subthreshold PTSD, but had previously been diagnosed with an anxiety disorder, something which might explain why he met Criteria D and E.

Table 3 shows an overview of the situations PPH partners (n = 5) described as traumatic during the CAPS-5. Three of the PPH partners elaborated that they got really scared after they saw panic in the caregivers' eyes. Also, staying behind in the delivery room during their partners surgery was described as frightening. Furthermore, not daring to ask what was going on during the acute moments had a big impact. According to the PCL-5, Criterion B (re-experiencing) was the most common Criterion partners experienced (n = 22, 17.9%; Table 2).

In the main study concerning women, we included 187 PPH patients and 121 controls, where we found higher median PCL-5 scores in PPH patients (5.0) than in controls (4.0, p = 0.005). Women who formed the dyad with their partners were then selected, i.e. 123 PPH patients and 62 control patients, for analysis to compare the scores between women and their partners. Fig. 3

and 4 show the relationship between the PCL-5 scores of PPH partners and controls and the related women. Fig. 3 shows the descending scores of the PCL-5 scores in PPH partners and controls, coupled to the scores of the related women. When plotting a linear trend line, the  $R^2$  of the women is 0.09, which means 9% of the variability is explained by the scores of the PPH partners and controls. In conclusion, if PPH partners and controls have a higher PCL-5 score, this does not consequently lead to a higher PCL-5 score in the related women. In Fig. 4, this assumption was tested the other way around. It shows the descending scores of the women with the coupled scores of the PPH partners and controls. The  $R^2$  of the PPH partners and controls is 0.09. However, it is evident the women score higher than the PPH partners and controls (Fig. 4).

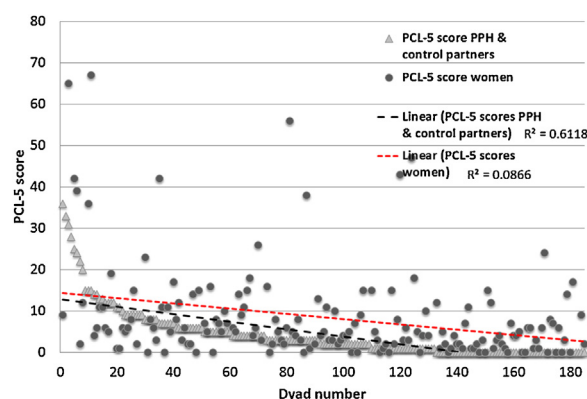
#### 4. Discussion

In this study we examined whether witnessing severe PPH was associated with increased PTSD symptoms, probable self-reported PTSD, clinical interview based PTSD diagnosis, and subthreshold PTSD. PPH partners scored significantly higher on the symptom Criteria than the control partners. Criterion B (re-experiencing) was the most prevalent Criterion according to the PCL-5. However, both groups reported low PTSD symptom levels and using a probable diagnosis of PTSD according to the PCL-5, there was no significant difference between the PPH and control partners. Of the partners included in the CAPS-5 interviews none fulfilled the criteria for a PTSD diagnosis including functional impairment. Due to the small and uneven sample size, these results should be interpreted with care. To answer the question what kind of an experience is traumatic during childbirth complicated by severe

**Table 3**  
CAPS-5 most common answers.

Situation	Frequency	Quote
Panic in caregivers eyes	3 of 5 PPH partners	'The doctors were panicking. I was very scared I would lose her.'
Unwanted memories	3 of 5 PPH partners	'I keep thinking about the birth. Actually, every time I see small children; it makes me sad.'
Staying behind in delivery room	2 of 5 PPH partners	'The moment the doctors ran out with my wife, I stayed behind with our little daughter. I was alone for 20 minutes. The nurse eventually came in to tell me everything was going to be fine, but I will never forget the panic in her eyes.'
Didn't dare to ask what was going on	1 of 5 PPH partners	'There were six people standing around her bed. I didn't want to ask any questions because I didn't want to worry my wife.'

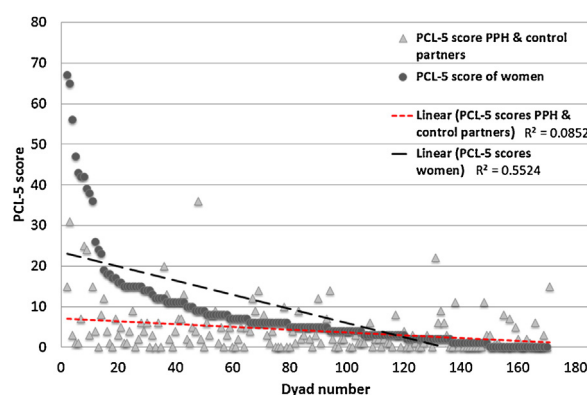
Quotes from CAPS-5 interviews, total number of PPH partners = 5.



**Fig. 3.** PCL-5 total scores of PPH & control partners compared with their partners (women). Shows the descending scores of the PCL-5 scores in PPH partners and controls, coupled to the scores of their partners (women). PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage.

PPH we report on several quotes of the partners. Partners most often indicated feeling excluded, not knowing what was going on and panic in the caregivers eyes as traumatic experiences. Lastly, in this study, within dyads, no relationship was demonstrated between PCL-5 scores between the women who gave birth and their partners.

Our results are consistent with several previous studies, where no difference in PTSD was found in partners of women who gave birth compared to controls.<sup>9,25</sup> However, Etheridge et al. reported that some partners experience PPH as traumatic in a qualitative study where a self-report instrument (IES) was used.<sup>15</sup> It could be hypothesized, that partners do experience severe PPH as traumatic, but they tend to not express their negative emotional feelings when asked for in an interview during this 'happy' period.<sup>25</sup> Complaints fitting subthreshold PTSD may be underreported during the interviews, since a high score on the PCL-5 does indicate experiencing PTSD-like symptoms. Another explanation may be that partners of women who experienced severe PPH have the feeling they are less permitted to express distress and emotions, since they have not actually experienced it themselves. Also, partners may have the feeling they have to take care of their family and are therefore more likely to suppress their own feelings.<sup>25</sup> The most parsimonious explanation may be that women are being



**Fig. 4.** -PCL-5 total scores of partners (women) compared with PPH partners and controls. Shows the descending scores of the PCL-5 scores in women, coupled to the scores of PPH partners and controls. PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage.

transferred to the operation theatre quickly and thereby their partners miss the majority of the blood loss, all the more, because witnessing a traumatic event leads to less PTSD than actually experiencing the traumatic event.<sup>3,26</sup>

When partners receive an inadequate amount of information during childbirth, this leads to a negative birth experience.<sup>27,28</sup> Previous research has shown that if partners experience childbirth negatively, this has a subsequent effect on their emotional well-being.<sup>29</sup> Furthermore, when the partner is distressed, this may have a negative subsequent effect on the mother, so clinicians need to be aware of this.<sup>30,31</sup> Providing sufficient information, showing empathy and other forms of support during childbirth is being perceived as supportive.<sup>27</sup>

No relationship was demonstrated between PCL-5 scores between the women who gave birth and their partners. However, in earlier research with different measurements (IES and PSS-SR) and a larger group of participants (n = 372), this relationship has been found.<sup>9,31</sup>

In literature, men do report more alcohol use after a traumatic event, but no significant difference between PPH partners and control partners was found.<sup>32</sup> Unfortunately, we do not have any data on alcohol usage before childbirth.

In several studies intrusion and avoidance were found to score highest of all the Criteria, though in our study partners scored highest on re-experiencing.<sup>33</sup> This may be explained by the different measurements used, but may also originate in the fact only PPH partners were screened and not specifically the whole spectrum of complicated childbirth.

The main strengths of this study are its prospective design and the usage of validated questionnaires (PCL-5 and CAPS-5). The PCL-5 is superior to other self-report measurements since it is a self-report questionnaire based on the DSM-5 and it includes all different symptom criteria at the basis of a PTSD diagnosis.<sup>34</sup> Furthermore, the CAPS-5 is the gold standard to diagnose PTSD and was only administered by trained clinicians. Also, we used a telephone interview to administer the CAPS, in order to lower the threshold to participate. The cut-off value to administer the CAPS-5 was highly sensitive, in order to not miss any participants with subthreshold PTSD.

This study is limited because of its small sample size. Unfortunately, the defined sample size of 130 PPH partners and 130 control partners was not reached. It is known that women are two times more likely to develop PTSD and generally have more symptoms than men (100% was male in our study), therefore, our sample sizes for the partners may have been too small.<sup>32,35–37</sup> Because of the low rates of help seeking in case of mental health problems in the postpartum population due to shame, guilt and difficulties with problem identification during a period that is supposed to be a happy event, less PTSD symptoms may be expressed and thus real prevalence of (subthreshold) PTSD may be higher.<sup>25,38,39</sup> Due to a high amount of dropout in the PPH partners who potentially have higher PTSD symptoms a sample bias may have been introduced. We may have missed partners with PTSD who were avoiding this topic. Because of the big difference in sample size between the PPH partners and control partners, this may have influenced the detection of significant effects and makes it hard to draw firm conclusions. Furthermore, we cannot be completely sure that scores on the PCL-5 are solely due to childbirth since we did not explore Criterion A. However, the partners who completed the CAPS-5 who did have some symptoms, all indicated this was because of witnessing a traumatic childbirth. Another limitation may have been the administration of the CAPS-5 by phone, since the clinician could not observe the participants and may miss emotions. Also, the CAPS-5 could not be blinded and therefore the interviewer knew if the partner witnessed the severe PPH or not.

## 5. Conclusion

In this prospective cohort study, both partners of women with severe PPH and control partners of women with little blood loss reported low levels of PTSD symptoms, but severe PPH partners reported higher scores than control partners. No significant association was found between witnessing severe PPH and probable PTSD or PTSD diagnosis in partners, revealing the resilience of young fathers in dealing with the adverse side of this event. Due to the small and uneven sample size, these results should be interpreted with care. Nonetheless, some partners did indicate they experienced severe PPH as traumatic. Partners expressed feelings of being left out, not knowing what was going on and panic in the caregivers eyes as the most traumatizing parts of childbirth complicated by severe PPH. In conclusion, although not diagnosed with a clinical disorder as PTSD, PPH partners showed significantly more symptoms compared to controls, and thus we need to be aware partners may experience severe PPH as traumatic. Therefore, providing sufficient information, support and staying composed during complicated childbirth is important. Future studies on the current topic with larger sample sizes should shed light on the mental health consequences of this frequent complication during childbirth not only in mothers but also in partners.

## Ethical statement

Ethical approval was granted by the ethical committee 'Verenigde Commissies Mensgebonden Onderzoek' (VCMO) on the 27th of January 2015. Clinical Trial Registration: NL50273.100.14.

## Conflict of interest

None declared.

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## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.wombi.2019.06.016>.

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