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The prevalence of posttraumatic stress disorder in pregnancy and after birth: A systematic review and meta-analysis

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Abstract

Background: Previous reviews have provided preliminary insights into risk factors and possible prevalence of post-traumatic stress disorder (PTSD) postpartum with no attempt to examine prenatal PTSD. This study aimed to assess the prevalence of PTSD during pregnancy and after birth, and the course of PTSD over this time.

Methods: PsychINFO, PubMed, Scopus and Web of Science were searched using PTSD terms crossed with perinatal terms. Studies were included if they reported the prevalence of PTSD during pregnancy or after birth using a diagnostic measure.

Results: 59 studies (N = 24267) met inclusion criteria: 35 studies of prenatal PTSD and 28 studies of postpartum PTSD (where 4 studies provided prevalence of PTSD in pregnancy and postpartum). In community samples the mean prevalence of prenatal PTSD was 3.3% (95%, CI 2.44–4.54). The majority of postpartum studies measured PTSD in relation to childbirth with a mean prevalence of 4.0% (95%, CI 2.77–5.71) in community samples. Women in high-risk groups were at more risk of PTSD with a mean prevalence of 18.95% (95%, CI 10.62–31.43) in pregnancy and 18.5% (95%, CI 10.6–30.38) after birth. Using clinical interviews was associated with lower prevalence rates in pregnancy and higher prevalence rates postpartum.

Limitations: Limitations include use of stringent diagnostic criteria, wide variability of PTSD rates, and inadequacy of studies on prenatal PTSD measured in three trimesters.

Conclusions: PTSD is prevalent during pregnancy and after birth and may increase postpartum if not identified and treated. Assessment and treatment in maternity services is recommended.

Keywords: Perinatal; Post-traumatic Stress Disorder; Prevalence; Pregnancy; Birth; Postpartum.

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1. Introduction

Post-traumatic stress disorder (PTSD) may be a significant mental health concern for pregnant and postpartum women. The onset of PTSD can precede pregnancy or occur during the perinatal period (Howard et al., 2014). PTSD can be present in pregnancy as a result of traumatic events such as accidents, interpersonal violence or natural disasters (Anniverno, 2013). After birth, PTSD can develop following a difficult or traumatic birth during which women think they or their baby might die or be seriously hurt. If women have a history of PTSD it is also possible this can be re-triggered by events during pregnancy and birth (Halvorsen et al., 2013). A number of studies have shown that PTSD can have a negative impact on women, their relationship and birth outcomes (Nicholls and Ayers, 2007; Onoye et al., 2013; Shaw et al., 2014; Yonkers et al., 2014) and there are indications it may also affect infant emotion regulation and development (Bosquet Enlow et al., 2011; Parfitt et al., 2014).

Most research has assessed perinatal PTSD according to DSM-IV criteria where symptoms of PTSD are grouped into three clusters: (1) re-experiencing the traumatic event through nightmares, intrusive thoughts or flashbacks; (2) persistent avoidance of reminders of the event and numbing of general responsiveness; and (3) increased arousal such as hypervigilance, irritability, difficulty concentrating and other emotional dysregulation. To be diagnosed with PTSD a person must have at least one re-experiencing symptom, three avoidance symptoms and two symptoms of arousal. Symptoms must cause the person significant distress and impairment in occupational or social functioning (American Psychiatric Association, 2000).

Estimates of the prevalence of PTSD in pregnancy and after birth vary hugely. In pregnancy prevalence estimates range from 0% to 35% (Horsch et al., 2013; Mahenge et al., 2013) and after birth from 0% to 21% (Schwab et al., 2012; Verreault et al., 2012). This is a common problem in the epidemiology of mental health disorders where prevalence often

varies widely across studies and countries (Pringsheim et al., 2014). Variation in prevalence can be due to factors such as differences in sampling, measurement and cultural context. In perinatal PTSD research the use of high-risk clinical samples is likely to account for some of the variation because women with complications of pregnancy or birth are more likely to report PTSD compared to women in community samples. Differences in measurement are also important, in particular whether studies measure full diagnostic criteria or only symptoms. Self-report measures that do not measure full diagnostic criteria for PTSD might inflate prevalence estimates (Ayers et al., 2015). For example, studies have found that the prevalence of participants meeting the criteria for PTSD measured by a symptom scale decreased from 20% to 3% once stressor criteria and impact on functioning were added (Boals and Hathaway, 2010) and doubled when the criterion A2 (intense emotional response) was removed (Boorman et al., 2014). Similarly, self-report questionnaires may result in higher prevalence rates than clinical diagnostic interviews (Boals and Hathaway, 2010; Ruggiero et al., 2006).

Valid data on the prevalence of birth-related PTSD are important for many reasons. Clinically, it is important to know the true extent of perinatal PTSD to raise awareness and provide appropriate interventions. Economically and politically, accurate estimates of prevalence enable us to balance the cost of prevention and treatment against the public health consequences. Precise estimates of the prevalence of perinatal PTSD are therefore a scientific imperative. To date, three reviews have been published which include some information on postpartum prevalence (Andersen et al., 2012; Grekin and O'Hara, 2014; Olde et al., 2006). Two of these were qualitative reviews with no attempt at meta-analyses (Andersen et al., 2012; Olde et al., 2006). The most recent review included meta-analyses of prevalence and risk factors for postpartum PTSD. This review included 78 studies and the primary focus was on risk factors, however the mean prevalence was reported as 3.17% in community samples

and 15.7% in high-risk samples, confirming that prevalence rates are higher in high-risk samples (Grekin and O'Hara, 2014).

These reviews provide a useful overview of risk factors and possible prevalence of postpartum PTSD. However, a number of gaps remain. Firstly, PTSD in pregnancy has not been reviewed despite evidence that it occurs in a significant proportion of women and is associated with poor outcomes such as preterm birth (Shaw et al., 2014; Yonkers et al., 2014). Secondly, all the reviews included studies of prevalence that were based on symptom severity scores rather than full diagnostic criteria which may inflate estimates. Thirdly, the reviews did not distinguish between point prevalence (measured at one time point e.g. 6 weeks after birth) and period prevalence (measured in a time range e.g. 1-6 months after birth). Finally, there has been no attempt to look at changes in the prevalence of PTSD over time despite this being important in informing appropriate timing of screening and intervention. A review of PTSD prevalence in pregnancy and after birth provides an opportunity to examine the course of PTSD longitudinally across pregnancy and the postpartum period.

This review aimed to address these gaps in order to achieve a better understanding of the epidemiology of perinatal PTSD. The objective was to conduct a systematic review of the prevalence rates reported in community and high-risk samples that use full diagnostic measures of PTSD. The course of PTSD over time, comorbidity with depression, and methodological factors that might influence prevalence rates will also be examined. Methodological factors are type of sample (high-risk vs community) and measurement (self-report vs clinical interview). Based on the literature it was expected that: (1) studies recruiting women at high-risk of physical complications or mental health problems will have higher rates compared to those including participants at low-risk or community samples; (2) studies using clinical interviews will have lower rates in comparison with self-report

questionnaires; and (3) the prevalence of PTSD will be higher in pregnancy (due to the multiple traumatic events that this encompasses) compared to postpartum birth-related PTSD.

2. Methods

2.1.Search strategy

Systematic searches were conducted through electronic databases PsychINFO, Pubmed, Scopus and Web of Science to identify published studies on the prevalence of prenatal and postpartum PTSD up to December 2015. Search terms were a combination of PTSD terms (posttraumatic stress, post-traumatic stress, trauma*, PTSD) and childbirth-related terms (birth, pregnancy, partum, postpartum, prenatal, postpartum, stillbirth, miscarriage, gestation, partus, labour). Additional studies were identified through hand searching reference lists of retrieved articles and previous reviews. Fig. 1 shows the results of the systematic search. As can be seen, this returned a preliminary database of 14,654 papers. Titles and abstracts of these articles were reviewed in order to exclude irrelevant studies and were evaluated against the inclusion criteria. Where abstracts failed to provide sufficient information, the full article was reviewed. Full-texts were examined for eligibility for 659 papers and 59 studies met the inclusion criteria.

2.2.Inclusion and exclusion criteria

Papers had to report empirical research that included a quantitative measure of PTSD in women during pregnancy or after birth. Postpartum assessments of childbirth-related PTSD had to be at least 1 month after birth in order to meet the diagnostic criteria for PTSD and avoid confounding with acute stress disorder. Studies had to report the prevalence of PTSD and be in English. Studies must have used either clinical interviews or questionnaires that measure PTSD according to DSM diagnostic criteria. The clinical instruments used in included papers were Structured Clinical Interview (First, 1995) (k = 15); MINI International Psychiatric Interview (Sheehan et al., 1998) (k =13); the National

Women`s Study Posttraumatic Stress Disorder Module (Resnick et al., 1993) (*k* = 5); Diagnostic Interview Schedule (Robins et al., 1999) (*k* = 3); Psychiatric interview (*k* = 3); Anxiety Disorders Interview Schedule-Revised (Di Nardo et al., 1993) (*k* = 1); and the Composite International Diagnostic Interview (WHO, 1997) (*k* = 1). Studies using the following self-report measures were also included since they have different sections to assess all DSM-IV-TR criteria (A-F): Posttraumatic Diagnostic Scale (Foa et al., 1997) (*k* = 12); Traumatic Event Scale (Wijma et al., 1997) (*k* = 4); and m-Clinician Administered PTSD Scale (Blake et al., 1990) (*k* = 1). One study which used PTSD Symptom Scale (Foa et al., 1993) (*k* = 1) was additionally included in which authors underlined that PTSD cases were identified according to DSM-IV A-F criteria.

Dissertations were included; yet, papers relied on qualitative data or case studies as well as reviews, discussion papers, and conference abstracts were excluded. If studies reported PTSD beyond 14 months postpartum were also excluded. Studies reporting PTSD symptoms in relation to pregnancy loss such as spontaneous abortion, miscarriage or stillbirth were not included in order to avoid confounding with traumatic bereavement. When multiple papers reported data from the same sample, the most recent paper was included and the previous ones were excluded in order to avoid duplication. Authors of papers where the prevalence of PTSD was unclear were contacted via e-mail for further information (*k* = 11). Seven authors replied and data from these studies were included in analyses.

2.3.Data extraction and quality assessment

A data extraction form was developed to extract study characteristics and findings. Data were extracted for author, year of publication, country, type of study, inclusion and exclusion criteria, sample demographics, sample characteristics, recruitment method, type of PTSD assessment, PTSD prevalence, and comorbidity of postpartum PTSD and depression (if available). Studies were divided into high-risk or community samples in order to examine

how the prevalence of pre- and postpartum PTSD differs in samples with different levels of risk. Community samples were defined as those recruiting women from the general population e.g. maternity hospitals, antenatal clinics or childbirth educational classes. High risk samples were those which recruited women at high risk. This included women who experienced a difficult or traumatic birth, had emergency caesarean sections, severe fear of birth, a history of sexual/physical violence or childhood abuse, babies that were born very low birth weight, preterm, or diagnosed with fetal anomaly, or who had severe pregnancy complications such as hyperemesis gravida, pre-eclampsia or HELLP syndrome.

Methodological quality of studies was graded using rating criteria based on those used in previous reviews of perinatal research (Sawyer et al., 2012; Andersen et al., 2012). This rated study aims/hypotheses, inclusion and exclusion criteria, data collection, PTSD measure, sample representativeness, response rate, and analysis of differences between participants and nonparticipants. Each criterion was rated from 0 to 3 points with a minimum and maximum score range of 0-21. Scores reflect the quality of the articles for the purposes of this review rather than the original purpose of the study. Scores for methodological quality ranged from moderate to high and are shown for each study in Table 1.

2.4.Data Analysis

The analyses were carried out with a statistical package Comprehensive Meta-Analysis™ (Version 3.0; Borenstein et al., 2008). The outcome was the proportion of women who met full diagnostic criteria for PTSD either on a diagnostic questionnaire or a clinical interview. The effect size was, therefore, the prevalence of PTSD in pregnancy or after birth. For studies assessing PTSD either separately or combined for different populations (e.g. women with/out previous pregnancy loss), the combined prevalence of PTSD was calculated and reported. Prevalence rates for PTSD across studies were computed as mean percentages with 95% confidence intervals. To calculate the mean prevalence, studies investigating birth-

related PTSD were divided into three groups: those measuring PTSD in pregnancy, postpartum, or both. When a study concurrently assessed PTSD in pregnancy and after birth (Alcorn et al., 2010; Grigoriadis et al., 2011; Schwab et al., 2012), the sample size of the study was included in the calculations of means for both the prevalence of prepartum and postpartum PTSD.

Point prevalence rates were calculated separately for postpartum PTSD at 4-6 weeks, 3 months and 6 months postpartum. However, point prevalence of PTSD in pregnancy could not be assessed due to lack of studies reporting prevalence rates at different time points in pregnancy. For studies where data was reported on subsequent time points (Alcorn et al., 2010; Haagen et al., 2015; Kersting et al., 2004; Verreault et al., 2012; Zaers et al., 2008), the average mean was calculated for estimation of overall effect size by combining multiple outcomes within same study. This is a common method for dealing with sample size inflation inherent in longitudinal studies (Rosenthal and DiMatteo, 2001).

A random effects model was used as it is considered more accurate model if the effect size vary across studies and there is substantial heterogeneity between studies (Borenstein et al., 2009). Heterogeneity in variance across studies was tested with Q statistic and I^2. A significant Q statistic indicates that the individual effect sizes do not represent a common population mean and the effect size is considerably heterogeneous. The larger I^2 statistic also indicates a higher probability of heterogeneity. If such a case is observed, further investigation of moderator variables (where relevant) is encouraged (Borenstein et al., 2009). Moderator variables as well as methodological factors that might influence PTSD rates were explored to identify possible sources of heterogeneity.

Subgroup analyses were conducted to assess the effects of (1) sample type (community samples vs. high-risk samples) and (2) measure type (diagnostic questionnaires vs. clinical interviews) on prevalence of birth-related PTSD. These two variables were treated

as potential moderator variables depending on a significant *Q* statistic. Meta-regression was then performed to examine the impact of moderator variables on the effect size. Additional variables of study quality assessment, geographical location, and year of publication were tested to investigate whether the effect size is associated with variables suggested. Hence, studies were stratified into high and moderate quality studies based on the quality assessment score provided in Table 1: studies with a score of 12 to 16 were regarded as moderate quality and those with a score of >16 were identified as high quality. Geographical location was grouped by (1) Asia, (2) Africa, (3) North America, (4) South America, and (5) Europe/Australia. Studies conducted in Europe and Australia were combined into one variable due to inadequate number of studies carried out in Australia and overwhelmingly predominant white population in each region. Meta-regression was further conducted to determine whether there was a significant difference between groups. Potential publication bias was assessed by funnel plot and Egger`s test (Egger et al., 1997). For all analyses, *p* values <.05 were deemed as statistically significant.

3. Results

3.1.Study characteristics

Fifty nine studies fulfilled the selection criteria. Studies were carried out between 1997 and 2015 and focused on prevalence of PTSD in pregnancy (*k* = 31) or after birth (*k* = 24). The remaining 4 studies looked at PTSD in both pregnancy and after birth. The majority of postpartum studies focused on birth as the traumatic event (25 studies out of 28). The remaining studies looked at postpartum PTSD related to any event (Grigoriadis et al., 2011;Tavares et al., 2012; Wenzel et al., 2005). The 59 studies originated from 23 countries, including European nations, UK, USA, Canada, Australia, Brazil, South Africa, Nigeria and Tanzania, Turkey, Greece, Malaysia, Iran and Israel. Studies were predominantly conducted in the USA (*k* = 18, 30.5%), followed by Sweden (*k* = 5, 8.5%) and the Netherlands (*k* = 4,

6.7%). Samples were all female and homogenous in terms of ethnicity with predominantly white women, with five exceptions of studies conducted in African countries (Adewuya et al., 2006a; Adewuya et al., 2006b; Busari, 2010; Mahenge et al., 2015; Spies et al., 2009). Characteristics of studies are presented in Table 1.

Sample sizes ranged from 20 to 1,581 with a total sample size of 24,267 women included in the review. Overall, 46 studies (78%) were based on community samples and 13 (22%) on high-risk samples. A range of diagnostic measures were used to identify PTSD in the studies with 41 studies (69.5%) using clinician-administered interviews and 18 (30.5%) using diagnostic self-report questionnaires.

3.2.Prevalence of PTSD in pregnancy

The prevalence of PTSD in pregnancy was assessed by 35 studies as illustrated in Fig. 2. PTSD during pregnancy arose from different events including interpersonal violence (Mahenge et al., 2013), a history of sexual or physical abuse (Cook et al., 2004), and pregnancy-related events such as a diagnosis of fetal anomaly (Horsch et al., 2013) or pregnancy complications (Annagur et al., 2013; Forray et al., 2009; Seng et al., 2013a). The results suggested that the risk of PTSD varied substantially from study to study (Fig. 2).

The prevalence of PTSD in pregnancy ranged from 0% to 40% (k = 35). PTSD in pregnancy was highest in samples of women with nausea, vomiting or hyperemesis gravida with a prevalence of 40% (Seng et al., 2013a), followed by women diagnosed with fetal anomaly 35% (Horsch et al., 2013) or with a history of childhood maltreatment 34.4% (Rowe et al., 2014). The mean prevalence for all studies was 4.6% with 95% confidence intervals of 3.42% to 6.14%. As predicted, the mean prevalence was significantly lower in community samples at 3.3% (k = 29, 95% CI, 2.44-4.54) than high-risk samples at 18.95% (k = 6, 95% CI, 10.62- 31.43). This difference between community and high-risk samples was significant (Q = 25.08, df = 1, p < .001) (Table 2).

In studies using clinical interviews the prevalence of PTSD in pregnancy ranged from 0% to 40% with a mean of 3.86%, (k = 26, 95% CI 2.72-5.46). In studies using questionnaires prevalence ranged from 0% to 35% with a mean of 7.27% (k = 9, 95% CI, 4.05-12.72). This difference was not significant (Q = 3.34, df = 1, p > .05), suggesting that the prevalence of PTSD in pregnancy does not differ by measure type.

3.3.Prevalence of PTSD during first postpartum year

PTSD after birth was reported by 28 studies where most studies (25 of 28) measured PTSD in relation to traumatic birth. The time period adopted in studies substantially varied from birth to 14 months postpartum (Fig. 3). The overall mean prevalence of PTSD after birth was 5.44% (k = 28, 95% CI, 3.62-8.1) and of PTSD due to birth was 5.9% (k = 25, 95% CI, 3.84-8.95) ranging from 0% to 43.1%.

Sampling had the same effect on prevalence rates as in pregnancy, with postpartum PTSD prevalence significantly higher in high-risk samples than community samples (Table 2). In community samples, the mean prevalence was 4.0% (k = 21, 95% CI, 2.77-5.71) compared to 18.54% in high risk samples (k = 7, 95% CI, 10.6- 30.38). This effect of sampling was significant (Q = 19.63, df = 1, p < .001).

The mean prevalence using clinical interviews was 7.22% (k = 17, 95% CI, 4.31 – 11.83) compared to 3.73% using questionnaires (k = 11, 95% CI, 2.0 - 6.86). The difference between clinical interviews and questionnaires measures was not significant (Q = 2.63, df = 1, p > .05).

3.4.Point prevalence of PTSD postpartum

Prevalence of PTSD at 4-6 weeks, at 3 months and 6 months postpartum is shown in Fig. 4, Fig. 5 and Fig. 6, respectively. Although the number of studies is small at some time points, results suggest that the prevalence of postpartum PTSD was 5.77% (k = 15, 95% CI,

3.75-8.79) at 4-6 weeks but drops to 1.44% (*k* = 4, 95% CI, 0.31-6.51) at 3 months and was highest in the six month at 6.79% (*k* = 5, 95% CI, 1.60-24.54).

The same pattern was also observed when the sample was divided in community samples vs. high-risk samples. In community samples postpartum PTSD decreased from 4.48% at 4-6 weeks (*k* = 11, 95% CI, 2.87-6.95) to 1.44% at 3 months (*k* = 4, 95% CI, 0.31-6.51) and increased to 4.9% at 6 months (*k* = 3, 95% CI, 1.09-19.44). In high-risk samples the mean prevalence for PTSD after birth rises from 12.64% at 4-6 weeks (*k* = 4, 95% CI, 6.23-23.98) to 16.61% at 6 months (*k* = 2, 95% CI, 2.61-59.69). However, it should be noted that all these estimates had wide 95% confidence intervals.

3.5.The course of PTSD during pregnancy and first postpartum year

The course of PTSD in pregnancy and over the first postpartum year is shown in Fig. 7. The overall mean prevalence of prenatal PTSD was 4.6% (*k* = 35, 95% CI, 3.42-6.14) and of postnatal PTSD was 5.44% (*k* = 28, 95% CI, 3.62-8.1). The difference between prevalence of PTSD in pregnancy and after birth was not statistically significant ($Q = 0.25$, $df = 1$, $p > .05$).

3.6.Testing methodological factors associated with the prevalence of PTSD in random-effects meta-regression

The meta-regression analysis was performed to investigate whether variables of quality assessment, geographical location, and year of publication has an impact on the effect size. Results did not demonstrate a statistically significant effect of the year of publication for both PTSD in pregnancy and after birth. With regard to quality assessment and geographical location of studies, however, the results yielded mixed findings. The findings suggested that prevalence of prenatal PTSD can differ by geographical location whereas no significant results were obtained for postpartum PTSD. A significantly higher prevalence of prepartum PTSD was identified in North America compared to Asia, Africa, South America and

Europe/Australia. No significant association was found between the methodological quality of studies and prepartum PTSD while a significant difference was observed between moderate and high quality studies for postpartum PTSD, with a lower prevalence of PTSD in high quality studies.

Meta-regression was also conducted to check whether the difference in prevalence rates observed in high-risk and community samples could be explained by the type of measure used. However, including type of measure in the model made no real difference and the p-value for the association between sample type and PTSD prevalence remained unchanged, indicating that the relationship between the sample type and effect size is not due to confounding by type of measurement.

3.7.Comorbidity of PTSD and depression

Depression can be comorbid with PTSD so this was also examined where reported. The mean prevalence for comorbidity of PTSD and depression was 44.1% in pregnancy (k = 6, 95% CI 34.38-54.22) and 17.72% after birth (k = 3, 95% CI, 1.93-70.28). These rates are based on a small number of studies – particularly postpartum where only three studies reported comorbidity - with a wide range from 6.64% to 71.54%. These results should therefore be interpreted with caution.

Many more studies reported prevalence for depression alone, which showed the average prevalence for depression in studies in this review was 10% in pregnancy (k = 25, 95% CI, 6.60- 15.0). Subgroup analyses were run to compare the prevalence rate of depression in studies by risk group. The mean prevalence in community samples and high risk groups was 9.4% (k = 21, 95% CI, 5.82- 14.81) and 14.1% (k = 4, 95% CI, 4.73- 35.18), correspondingly. The rate of postpartum depression was, however, reported in fewer studies and found as 11.5% (k = 10, 95% CI, 6.20- 20.25). These rates are similar to those reported in reviews of perinatal depression (Gavin et al., 2005) suggesting some reliability.

3.8.Assessment of Publication Bias

Visual inspection of funnel plot suggested some asymmetrical distribution of study results in both pregnancy and postpartum periods indicating that publication bias is likely (see online supplementary material for Fig. 8 and Fig. 9). For the review of studies examining prenatal PTSD (n = 35), the presence of publication bias was confirmed by Egger`s test (p = .011). However, no bias was detected in meta-analysis of postpartum PTSD (n = 28; p = .194).

4. Discussion

The goal of this research was to determine, by means of a systematic review, the prevalence of PTSD in pregnancy and postpartum, and to examine how this is affected by sampling and measurement. While PTSD in pregnancy was assessed in relation to many events, it should be noted that postpartum PTSD was predominantly measured in relation to childbirth. The results show the prevalence of PTSD in pregnancy was 3.3% in community samples and 18.95% in high-risk samples. After birth, the prevalence of PTSD was 4.0% in community samples and 18.5% in high risk samples. Given the mean point prevalence of PTSD, the course of PTSD over the first six months after birth suggests it increases slightly in both community samples and high risk samples. These results are discussed below in relation to existing literature before looking at methodological issues and implications.

The prevalence of PTSD in pregnancy identified here is broadly consistent with population estimates. For example, the National Comorbidity Survey Replication in the United Sates reported a lifetime population prevalence of 9.7% for women (Kessler et al., 2005a; Kessler et al., 2005b). By restricting this review to studies of women of childbearing age who are pregnant a lower prevalence of 4.4% seems reasonably consistent with lifetime estimates. After birth, the prevalence of PTSD was 4.0% in community samples which is similar to the prevalence of 3.17% identified in the previous review (Grekin and O'Hara,

2014). The consistency between the prevalence rates identified in this and previous reviews indicates some reliability and validity in community samples despite different inclusion and exclusion criteria. However, prevalence rates in high-risk samples were higher in the current review at 18.5% compared to 15.7% in the previous review (Grekin and O'Hara, 2014).

The impact of measurement type on prevalence estimates was not detectable in either pregnancy or the postnatal period. The absence of a measurement-associated effect might be related to inclusion of studies using full diagnostic self-report questionnaires. Given the fact that they cover whole range of DSM-IV symptoms for PTSD, it is possible that both clinical interviews and self-report questionnaires have yielded comparable prevalence rates.

Although there was no evidence of significant change in prevalence of PTSD from pregnancy to postpartum period, the mean prevalence rates at different time points might provide some insight for the course of perinatal PTSD. The result of this review suggests that the mean PTSD rates are somewhat higher immediately after birth than in pregnancy. This might be due to difficult childbirth experiences triggering the development of a new episode of PTSD or exacerbating existing PTSD present in pregnancy. Alternatively, childbirth might be a trigger for women with a history of trauma and prior PTSD, which could then re-occur in the postpartum period. The current review included studies that used a diagnostic measure of PTSD and the majority of these assessed PTSD in relation to birth experiences, therein providing a precise estimate of the prevalence of PTSD due to birth. On the other hand, most of the studies did not control for PTSD in pregnancy or assess trauma history, which might confound true prevalence of PTSD postpartum. Very few studies examined PTSD in relation to the full range of traumatic events so it is possible that the overall postpartum PTSD prevalence rates found in this review are underestimated. Therefore, results should be interpreted with caution.

Analysis of the mean prevalence rates over the first six months postpartum also suggests PTSD increases in both community and high-risk samples. This pattern is consistent with some longitudinal studies of perinatal PTSD (Zaers et al., 2008) but inconsistent with PTSD in non-perinatal samples where significant decreases in PTSD are observed in the first five months after the traumatic event (Morina et al., 2014). This differing course of PTSD in postpartum women might be due to unique elements of the postpartum period which might delay symptom onset and/or prevent resolution, such as coping with a new baby and sleep deprivation. There is some evidence to support this. For example, a large study in Norway found that insomnia, low social support and negative life events at eight weeks postpartum were associated with continued PTSD symptoms two years postpartum (Garthus-Niegel et al., 2015). Additionally, a traumatic birth experience might interact with previous traumatic event(s), resulting in an increased risk for subsequent episodes of PTSD. However, analysis of the course of PTSD over time was based on a limited number of studies so conclusions must be cautious at this stage.

The present study identified interesting differences in prevalence rates of PTSD related to geographical origin and methodological quality level of studies. However, these results should be treated with a degree of caution. The highest prevalence rates for PTSD were reported for studies recruiting high-risk samples and the methodological factors - geographical origin and methodological quality- were "confounded" by sample type. Studies with high-risk samples were loaded on a certain subgroup (namely, North America or moderate quality studies) rather than two or more subgroups, which resulted in significant difference between groups.

4.1.Methodological issues

Strengths of this review include the focus on studies that used diagnostic measures and examination of the impact of sampling and measurement on PTSD prevalence. This is

the first review to examine the prevalence of PTSD in pregnancy as well as postpartum, and outline the course of perinatal PTSD over time. The methodology used adhered to the PRISMA guidelines for systematic reviews to ensure methodological rigor.

However, there are also a number of limitations that need to be considered before drawing conclusions. First of all, the focus on diagnostic criteria may under-estimate the public health burden of perinatal PTSD. For example, qualitative research indicates that many women who do not fulfil diagnostic criteria for PTSD still suffer significant symptoms and may potentially benefit from treatment (Ayers and Ford, 2014). Second, the course of PTSD in pregnancy could not be examined because of the few studies that looked at PTSD in different trimesters of pregnancy. When examining the course of postpartum PTSD, the wide distribution of assessment time points also made it difficult to compare results and produce a comprehensive picture of the course of postpartum PTSD. Third, there was wide variability in prevalence rates reported across studies. This could be due to various methodological differences, such as the use of different PTSD measures and heterogeneity of studied populations and geographical locations. Furthermore, the mean prevalence of perinatal PTSD in high-risk samples might be influenced by the particularly high prevalence rates reported in a few studies (Ammerman et al., 2012; Horsch et al., 2015; Muzik et al., 2013). Finally, this review might be affected by publication bias, which may arise from language restriction and the relative lack of publications from non-western countries. A total of 40 (72%) studies from Western countries and only 16 (28%) from non-western countries were represented in the present paper.

4.2.Implications

This review shows that between 4 and 6 percent of women report PTSD in pregnancy and after birth that fulfils diagnostic criteria, and that PTSD may increase postpartum if not identified and treated. In the UK, up to 700,000 women per annum give birth meaning

approximately 42,000 women could be affected every year if the prevalence is assumed to be 6%. The PTSD rates are even striking in high-risk samples. Given the association of PTSD with poor maternal and child outcomes there are therefore a number of significant implications for health services and clinical practice. Psychological assessment of pregnant and postpartum women for PTSD, particularly those with high-risk conditions is vital to identify and treat women with PTSD. Routine screening of high-risk perinatal women would be ideal and strongly recommended. This review suggests that although clinical interviews are the recognised gold standard for identifying PTSD, diagnostic self-report measures of prenatal and postpartum PTSD can be used with some degree of confidence because the prevalence rates identified were not widely different. Notably in clinical settings where the demand is high and clinicians' time is limited, using valid and reliable self-report questionnaires may provide a useful first step that supplements clinicians' assessment. Women identified as having high levels of symptoms could then be referred on for further mental health evaluation.

5. Conclusion

This review aimed to determine the prevalence of PTSD in pregnancy and after birth among different samples using different measures. From the studies reviewed, three conclusions can be reached: firstly that perinatal PTSD is fairly common, affecting between 4 and 6% of women at different time points. This review therefore confirms that perinatal PTSD is common enough to be significant public health concern that warrants routine screening and treatment. Secondly, PTSD prevalence appears to increase between one and six months postpartum so it is important to increase awareness and provide ongoing assessment during this period. Finally, self-report questionnaire measures of PTSD provided broadly similar prevalence rates to clinical interviews so, although not the gold standard, they may be a useful first step for identifying perinatal PTSD.

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Table 1
Major Characteristics of Studies on Prevalence of Post-traumatic Stress Disorder in pregnancy and after birth

Author, year	Country	Sample size	Period	Measure	Sample type	Type of prevalence	Time points	Prevalence	Quality rating
Abedian et al. (2013)	Iran	122	PP	PCI	High-risk sample	Point prevalence	4-6 weeks	16.4%	15
Adewuya et al. (2006a)	Nigeria	876	PP	MINI	Community sample	Point prevalence	6 weeks	5.9%	20
Adewuya et al. (2006b)	Nigeria	172	Preg.	MINI	Community sample	Period prevalence	3rd trimester	0.6%	21
Alcorn et al. (2010)	Australia	933	Preg.	PDS	Community sample	Period prevalence	During pregnancy	8%	19
		866	PP			Point prevalence	4-6 weeks	3.6%	
		826					3 months	6.3%	
		776					6 months	5.8%	
Ammerman et al. (2012)	USA	90	PP	SCID	High-risk sample	Point prevalence	6 month	37.6%	15
Annagur et al. (2013)	Turkey	47	Preg.	SCID	High-risk sample	Period prevalence	1st trimester	0%	15
Borri et al. (2008)	Italy	1066	Preg.	SCID	Community sample	Period prevalence	2nd trimester	0.7%	16
Busari (2010)	Nigeria	682	Preg.	DIS	Community sample	Period prevalence	During pregnancy	5.6%	17
Caldwell (2002)	USA	193	Preg.	PDS	Community sample	Period prevalence	During pregnancy	14%	16
Cook et al. (2004)	USA	744	Preg.	DIS	Community sample	Period prevalence	During pregnancy	7.7%	17
Dornelas et al. (2013)	USA	194	Preg.	SCID	Community sample	Period prevalence	1st and 2nd trimester	8.4%	15

Abbreviations: PP, postpartum; PCI, Psychiatric Clinical Interview; MINI, MINI International Psychiatric Interview; Preg, pregnancy; PDS, Posttraumatic Diagnostic Scale; SCID, Structured Clinical Interview for DSM Diagnoses; DIS, Diagnostic Interview Schedule.

Table 1 (continued)
Major Characteristics of Studies on Prevalence of Post-traumatic Stress Disorder in pregnancy and after birth

Author, year	Country	Sample size	Period	Measure	Sample type	Type of prevalence	Time points	Prevalence	Quality rating
Fadzil et al. (2013)	Malaysia	175	Preg.	MINI	Community sample	Period prevalence	During pregnancy	0%	17
Farias et al. (2013)	Brazil	239	Preg.	MINI	Community sample	Period prevalence	1st trimester	1.7%	17
Ferri et al. (2007)	Brazil	930	Preg.	CIDI	High-risk sample	Period prevalence	During pregnancy	9.8%	15
Ford and Ayers (2011)	UK	109	PP	PDS	Community sample	Point prevalence	3 months	0.9%	18
Forray et al. (2009)	USA	76	Preg.	m-CAPS	Community sample	Period prevalence	During pregnancy	9.2%	14
Gamble and Creedy (2005)	Australia	347	PP	MINI	Community sample	Point prevalence	4 weeks	9.6%	21
Giannandrea et al. (2013)	USA	192	PP	SCID	Community sample	Point prevalence	Birth to 14 months postpartum	9%	15
Giardinelli et al. (2012)	Italy	590	Preg.	SCID	Community sample	Period prevalence	28-32th weeks prepartum	0.8%	16
Grigoriadis et al. (2011)	Canada	62	Preg.	MINI	Community sample	Period prevalence	During pregnancy	0%	16
		29	PP				4.8 months postpartum	0%	
Haagen et al. (2015)	Netherlands	348	PP	PSS-SR	Community sample	Point prevalence	3 months	0.6%	19
		284					10 months	0.3%	
Horsch et al. (2013)	UK	40	Preg.	PDS	High-risk sample	Period prevalence	During pregnancy	35%	16

Abbreviations: Preg, pregnancy; MINI, MINI Internation Psychiatric Interview; CIDI,Composite International Diagnostic Interview; PP, postpartum; PDS, Posttraumatic Diagnostic Scale; m-CAPS, modified Clinician Administered PTSD Scale; SCID, Structured Clinical Interview for DSM Diagnoses; PSS-SR, PTSD Symptom Scale - Self-Report Version.

Table 1 (continued)
Major Characteristics of Studies on Prevalence of Post-traumatic Stress Disorder in pregnancy and after birth

Author, year	Country	Sample size	Period	Measure	Sample type	Type of prevalence	Time points	Prevalence	Quality rating
Kersting et al. (2004)	Germany	53 49	PP	SCID	High-risk sample	Point prevalence	6 months 14 months	0% 0%	18
Kim et al. (2014)	USA	745	Preg.	SCID	Community sample	Period prevalence	During pregnancy	6.6%	19
Lesanics (2005)	USA	61	PP	SCID	Community sample	Period prevalence	4 to 21 weeks	1.6%	19
Mahenge et al. (2015)	Tanzania	1180	Preg.	PDS	Community sample	Period prevalence	During pregnancy	0%	13
Muzik et al. (2013)	USA	54	PP	NWS-PTSD	High-risk sample	Point prevalence	6 months	43.1%	17
Nerum et al. (2006)	Norway	86	Preg.	PIS	High-risk sample	Period prevalence	During pregnancy	8.1%	15
Polachek et al. (2012)	Israel	89	PP	PDS	Community sample	Point prevalence	4-6 weeks	3.4%	16
Quispel et al. (2015)	Netherlands	330	Preg.	SCID	Community sample	Period prevalence	During pregnancy	6%	19
Rogal et al. (2007)	USA	1100	Preg.	MINI	Community sample	Period prevalence	During pregnancy	3%	20
Rowe et al. (2014)	USA	32	Preg.	NWS-PTSD	High-risk sample	Period prevalence	1st and 2nd trimester	34.4%	17
Ryding et al. (1997)	Sweden	25	PP	DIS	High-risk sample	Point prevalence	4-6 weeks	0%	13
Schwab et al. (2012)	Austria	52	Preg.	PDS	Community sample	Period prevalence	3rd trimester	17%	16

Abbreviations: PP, postpartum; SCID, Structured Clinical Interview for DSM Diagnoses; Preg, pregnancy; PDS, Posttraumatic Diagnostic Scale; NWS-PTSD, National Women`s Study PTSD Module, PIS, Psychiatric Interview Schedule; MINI, MINI International Psychiatric Interview; DIS, Diagnostic Interview Schedule.

Table 1 (continued)
Major Characteristics of Studies on Prevalence of Post-traumatic Stress Disorder in pregnancy and after birth

Author, year	Country	Sample size	Period	Measure	Sample type	Type of prevalence	Time points	Prevalence	Quality rating
Schwab et al. (2012)	Austria	52	PP	PDS	Community sample	Point prevalence	4-6 weeks	21%	16
Seng et al. (2013a)	USA	25	Preg.	NWS-PTSD	High-risk sample	Period prevalence	1st and 2nd trimester	40%	15
Seng et al. (2014)	USA	1581	Preg.	NWS-PTSD	Community sample	Period prevalence	1st and 2nd trimester	8%	17
Seng et al. (2013b)	USA	566	PP	NWS-PTSD	Community sample	Point prevalence	4-6 weeks	6%	16
Shlomi Polachek et al. (2015)	Israel	101	PP	PDS	High-risk sample	Point prevalence	4-6 weeks	9.9%	15
Smaling et al. (2015)	Netherlands	162	Preg.	MINI	Community sample	Point prevalence	27-28 weeks prepartum	1.2%	15
Smith et al. (2006)	USA	948	Preg.	MINI	Community sample	Period prevalence	During pregnancy	3.5%	20
Smith et al. (2004)	USA	387	Preg.	MINI	Community sample	Period prevalence	During pregnancy	3%	17
Soderquist et al. (2009)	Sweden	908	PP	TES	Community sample	Point prevalence	4-6 weeks	1%	19
Soderquist et al. (2004)	Sweden	940	Preg.	TES	Community sample	Point prevalence	32 weeks prepartum	2.3%	19
Soderquist et al. (2002)	Sweden	1550	PP	TES	Community sample	Period prevalence	1-13 months postpartum	1.8%	17
Soltani et al. (2015)	Iran	100	PP	PCI	High-risk sample	Point prevalence	4-6 weeks	17%	15

Abbreviations: PP, postpartum; PDS, Posttraumatic Diagnostic Scale; Preg, pregnancy; NWS-PTSD, National Women`s Study PTSD Module; MINI, MINI International Psychiatric Interview; TES, Traumatic Event Scale; PCI, PCI, Psychiatric Clinical Interview.

Table 1 (continued)
Major Characteristics of Studies on Prevalence of Post-traumatic Stress Disorder in pregnancy and after birth

Author, year	Country	Sample size	Period	Measure	Sample type	Type of prevalence	Time points	Prevalence	Quality rating
Spies et al. (2009)	South Africa	129	Preg.	SCID	Community sample	Period prevalence	1st and 2nd trimester	3.1%	15
Spyridou et al. (2014)	Spain	67	Preg.	PDS	Community sample	Period prevalence	During pregnancy	1.5%	17
Spyridou et al. (2015)	Greece	50	Preg.	PDS	Community sample	Period prevalence	During pregnancy	0%	17
Stafford (2002)	USA	20	Preg.	SCID	Community sample	Period prevalence	During pregnancy	0%	14
		42	PP.			Point prevalence	4-6 weeks	4.8%	
Stramrood et al. (2011)	Netherlands	428	PP	TES	Community sample	Period prevalence	2 to 6 months postpartum	1.2%	14
Sutter-Dallay et al. (2004)	France	497	Preg.	MINI	Community sample	Period prevalence	3rd trimester	0%	16
Tavares et al. (2012)	Brazil	919	PP	MINI	Community sample	Period prevalence	1 to 3 months postpartum	3.6%	17
Uguz et al. (2010)	Turkey	309	Preg.	SCID	Community sample	Period prevalence	During pregnancy	0%	15
Verreault et al. (2012)	Canada	280	PP.	SCID	Community sample	Point prevalence	4-6 weeks	1.1%	19
		242					3 months	0.8%	
		206					6 months	0%	
Vossbeck-Elsebusch et al. (2014)	Germany	224	PP.	PDS	Community sample	Period prevalence	1 to 6 months postpartum	11.1%	14

Abbreviations: Preg, pregnancy; TES, Traumatic Event Scale, PP, postpartum; SCID, Structured Clinical Interview for DSM diagnoses; PDS, Posttraumatic Diagnostic Scale; MINI, MINI International Psychiatric Interview.

Table 1 (continued)
Major Characteristics of Studies on Prevalence of Post-traumatic Stress Disorder in pregnancy and after birth

Author, year	Country	Sample size	Period	Measure	Sample type	Type of prevalence	Time points	Prevalence	Quality rating
Wenzel et al. (2005)	USA	147	PP.	SCID	Community sample	Point prevalence	8 weeks	0%	19
Zaers et al. (2008)	Switzerland Germany	50 47	PP.	PDS	Community sample	Point prevalence	4-6 weeks 6 months	6% 14.9%	15
Zambaldi et al. (2011)	Brazil	400	PP	MINI	Community sample	Period prevalence	2 to 26 weeks postpartum	5.3%	12
Zar et al. (2002)	Sweden	453	Preg.	ADIS-R	Community sample	Point prevalence	28 weeks prepartum	13%	20

Abbreviations: PP, postpartum; PDS, Posttraumatic Diagnostic Scale; SCID, Structured Clinical Interview for DSM diagnoses; MINI, MINI International Psychiatric Interview; Preg, pregnancy; ADIS-R, Anxiety Disorder Interview Scheduled-Revise.

Table 2

Prevalence (%) of prenatal and postpartum Post-traumatic Stress Disorder (PTSD) in different populations

	Number of studies (*k*)	Sample size (*n*)	Mean prevalence	95% CI
PTSD in pregnancy				
Community sample	29	14104	3.3%	2.44 - 4.54
High-risk samples	6	1160	18.95%	10.62 - 31.43
PTSD after birth [a]				
Community sample	21	8511	4.0%	2.77 - 5.71
High-risk sample	7	542	18.5%	10.6 - 30.38

a Postpartum PTSD was measured in relation to the birth experience in most studies (25/28)

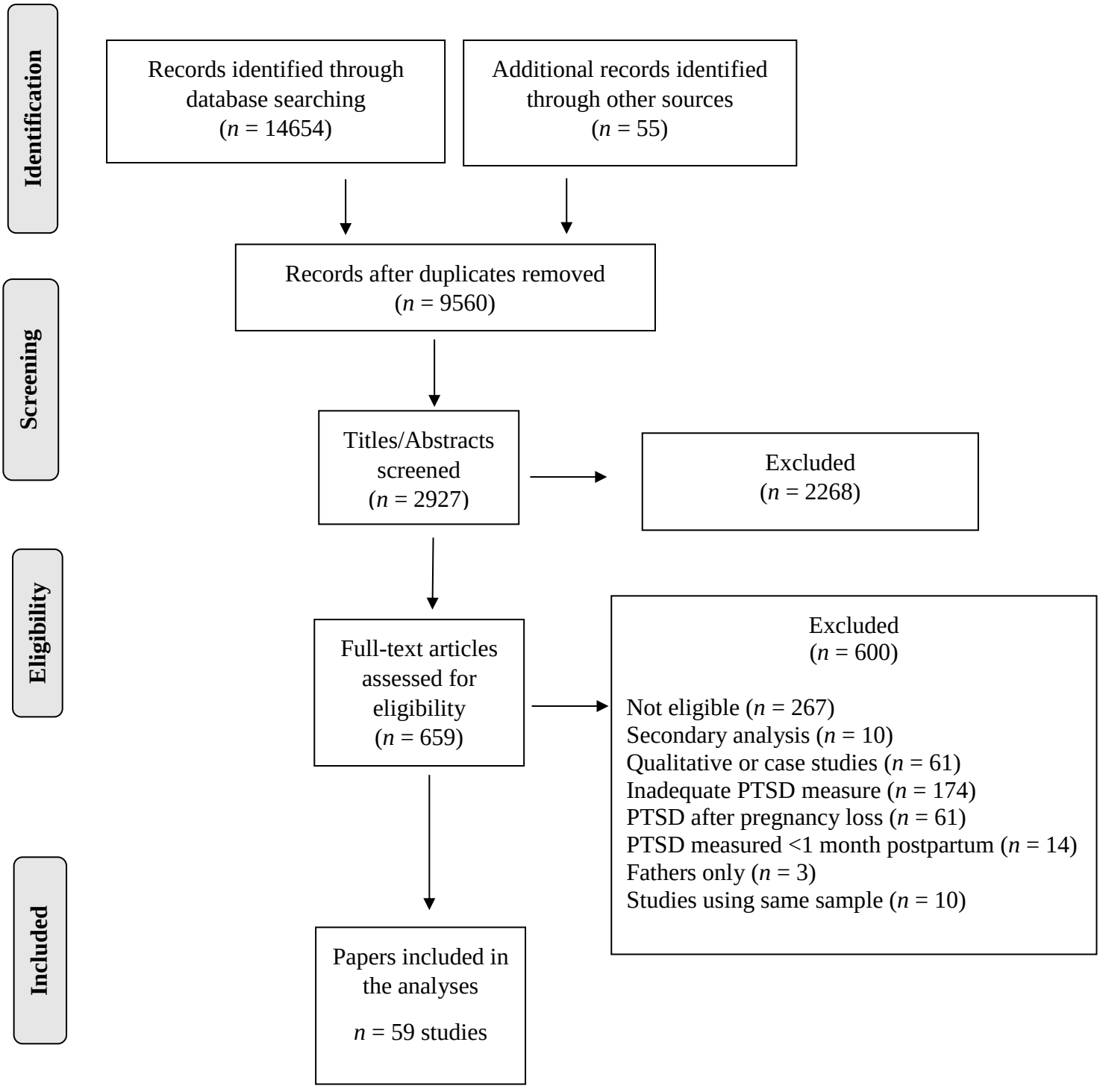

Fig.1. Flow chart of systematic research

Study name	Sample type	Event rate	Lower limit	Upper limit
Adewuya et al. (2006a)	community sample	0.006	0.001	0.040
Alcorn et al. (2010)	community sample	0.080	0.065	0.100
Borri et al. (2008)	community sample	0.007	0.003	0.014
Busari (2010)	community sample	0.056	0.041	0.076
Caldwell (2002)	community sample	0.140	0.098	0.196
Cook et al. (2004)	community sample	0.077	0.060	0.098
Dornelas et al. (2013)	community sample	0.082	0.051	0.130
Fadzil et al. (2013)	community sample	0.003	0.000	0.044
Farias et al. (2013)	community sample	0.017	0.006	0.044
Forray et al. (2009)	community sample	0.092	0.045	0.181
Giardinelli et al. (2012)	community sample	0.008	0.004	0.020
Grigoriadis et al. (2011)	community sample	0.008	0.000	0.115
Kim et al. (2014)	community sample	0.066	0.050	0.086
Mahenge et al. (2013)	community sample	0.000	0.000	0.007
Quispel et al. (2015)	community sample	0.061	0.039	0.092
Rogal et al. (2007)	community sample	0.028	0.020	0.040
Schwab et al. (2012)	community sample	0.173	0.093	0.300
Seng et al. (2014)	community sample	0.079	0.067	0.093
Smaling et al. (2015)	community sample	0.012	0.003	0.048
Smith et al. (2004)	community sample	0.026	0.014	0.047
Smith et al. (2006)	community sample	0.035	0.025	0.049
Soderquist et al. (2004)	community sample	0.023	0.015	0.035
Spies et al. (2009)	community sample	0.031	0.012	0.080
Spyridou et al. (2014)	community sample	0.015	0.002	0.098
Spyridou et al. (2015)	community sample	0.010	0.001	0.138
Stafford (2002)	community sample	0.024	0.001	0.287
Sutter-Dallay et al. (2004)	community sample	0.001	0.000	0.016
Uguz et al. (2010)	community sample	0.002	0.000	0.025
Zar et al. (2002)	community sample	0.013	0.006	0.029
	community sample	0.033	0.024	0.045
Annagur et al. (2013)	high-risk sample	0.010	0.001	0.146
Ferri et al. (2007)	high-risk sample	0.098	0.080	0.119
Horsch et al. (2013)	high-risk sample	0.350	0.219	0.508
Nerum et al. (2006)	high-risk sample	0.081	0.039	0.161
Rowe et al. (2014)	high-risk sample	0.344	0.202	0.521
Seng et al. (2013a)	high-risk sample	0.400	0.230	0.597
	high-risk sample	0.189	0.106	0.314

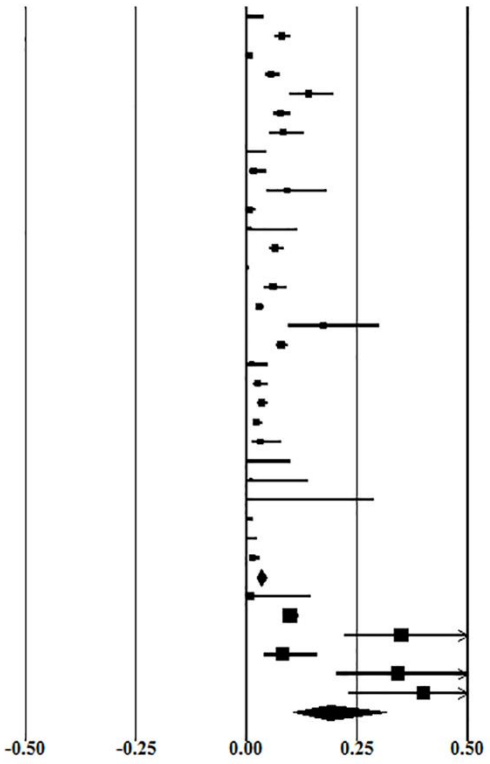

Fig.2. Prevalence of PTSD in pregnancy by sample type.

Study name	Time point	Sample type	Event rate	Lower limit	Upper limit
Adewuya et al. (2006b)	4-6 weeks	community sample	0.059	0.046	0.077
Alcorn et al. (2010)	Combined	community sample	0.051	0.038	0.068
Ford and Ayers (2011)	3 months	community sample	0.009	0.001	0.062
Gamble and Creedy (2005)	4-6 weeks	community sample	0.095	0.068	0.131
Giannandrea et al. (2013)	Birth to 14 months	community sample	0.089	0.056	0.138
Grigoriadis et al. (2011)	4.8 months pospartum	community sample	0.017	0.001	0.217
Haagen et al. (2015)	Combined	community sample	0.004	0.001	0.024
Lesanics (2005)	4 to 21 weeks	community sample	0.016	0.002	0.107
Polachek et al. (2012)	4-6 weeks	community sample	0.034	0.011	0.099
Schwab et al. (2012)	4-6 weeks	community sample	0.212	0.121	0.343
Seng et al. (2013b)	4-6 weeks	community sample	0.060	0.043	0.083
Soderquist et al. (2002)	1 month to 13 months	community sample	0.018	0.013	0.026
Soderquist et al. (2009)	4-6 weeks	community sample	0.010	0.005	0.019
Stafford (2002)	4-6 weeks	community sample	0.048	0.012	0.171
Stramrood et al. (2011)	2 months to 6 months	community sample	0.012	0.005	0.028
Tavares et al. (2012)	1 month to 3 months	community sample	0.036	0.026	0.050
Verreault et al. (2012)	Combined	community sample	0.006	0.001	0.039
Vossbeck-Elsebusch et al. (2014)	1 month to 6 months	community sample	0.112	0.077	0.160
Wenzel et al. (2005)	4-6 weeks	community sample	0.003	0.000	0.052
Zaers et al. (2008)	Combined	community sample	0.096	0.037	0.223
Zambaldi et al. (2011)	2 weeks to 26 weeks	community sample	0.053	0.034	0.079
		community sample	0.040	0.028	0.057
Abedian et al. (2013)	4-6 weeks	high-risk sample	0.164	0.108	0.241
Ammerman et al. (2012)	167.2 days pospartum	high-risk sample	0.389	0.294	0.493
Kersting et al. (2004)	Combined	high-risk sample	0.010	0.001	0.136
Muzik et al. (2013)	6 months	high-risk sample	0.431	0.304	0.569
Ryding et al. (1997)	4-6 weeks	high-risk sample	0.019	0.001	0.244
Shlomi Polachek et al. (2015)	4-6 weeks	high-risk sample	0.099	0.054	0.174
Soltani et al. (2015)	4-6 weeks	high-risk sample	0.170	0.108	0.257
		high-risk sample	0.185	0.106	0.304

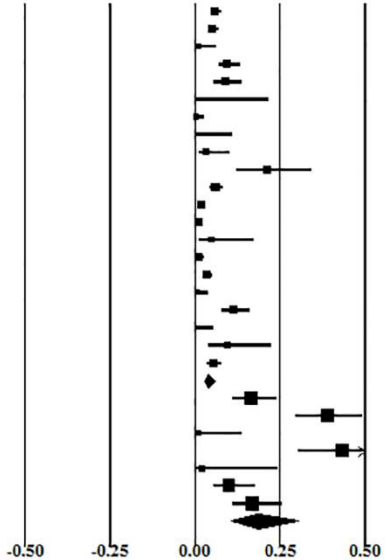

Fig.3. Prevalence of PTSD after birth by sample type.

Study name	Time point	Event rate	Lower limit	Upper limit
Abedian et al. (2013)	4-6 weeks	0.164	0.108	0.241
Adewuya et al. (2006b)	4-6 weeks	0.059	0.046	0.077
Alcorn et al. (2010)	4-6 weeks	0.036	0.025	0.050
Gamble and Creedy (2005)	4-6 weeks	0.095	0.068	0.131
Polachek et al. (2012)	4-6 weeks	0.034	0.011	0.099
Ryding et al. (1997)	4-6 weeks	0.019	0.001	0.244
Schwab et al. (2012)	4-6 weeks	0.212	0.121	0.343
Seng et al. (2013b)	4-6 weeks	0.060	0.043	0.083
Shlomi Polachek et al. (2015)	4-6 weeks	0.099	0.054	0.174
Soderquist et al. (2009)	4-6 weeks	0.010	0.005	0.019
Soltani et al. (2015)	4-6 weeks	0.170	0.108	0.257
Stafford (2002)	4-6 weeks	0.048	0.012	0.171
Verreault et al. (2012)	4-6 weeks	0.011	0.003	0.033
Wenzel et al. (2005)	4-6 weeks	0.003	0.000	0.052
Zaers et al. (2008)	4-6 weeks	0.060	0.019	0.170
	Overall	0.058	0.038	0.088

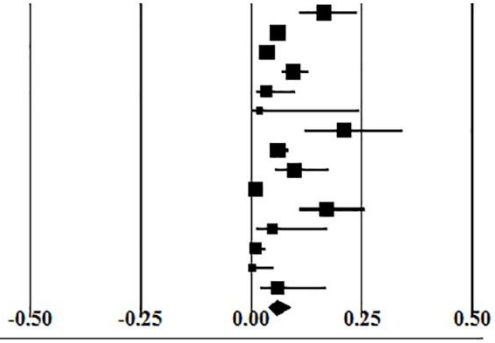

Fig.4. Prevalence of PTSD at 4-6 weeks postpartum.

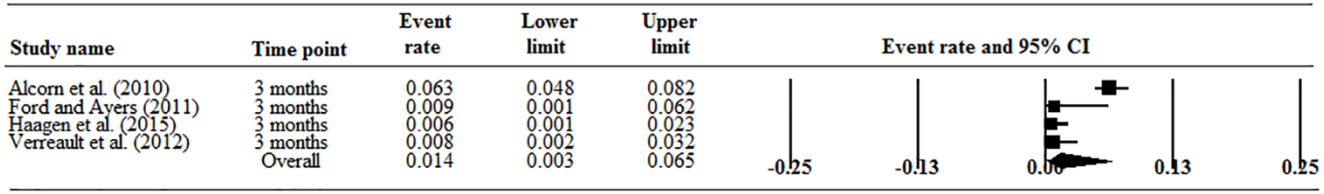

Fig.5. Prevalence of PTSD at 3 months postpartum.

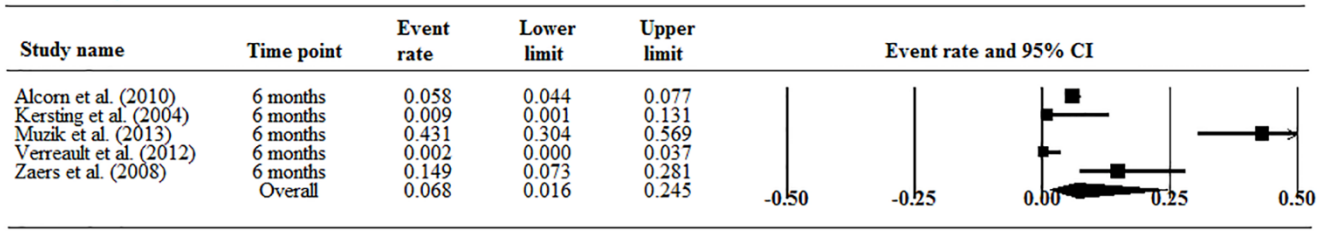

Fig.6. Prevalence of PTSD at 6 months postpartum.

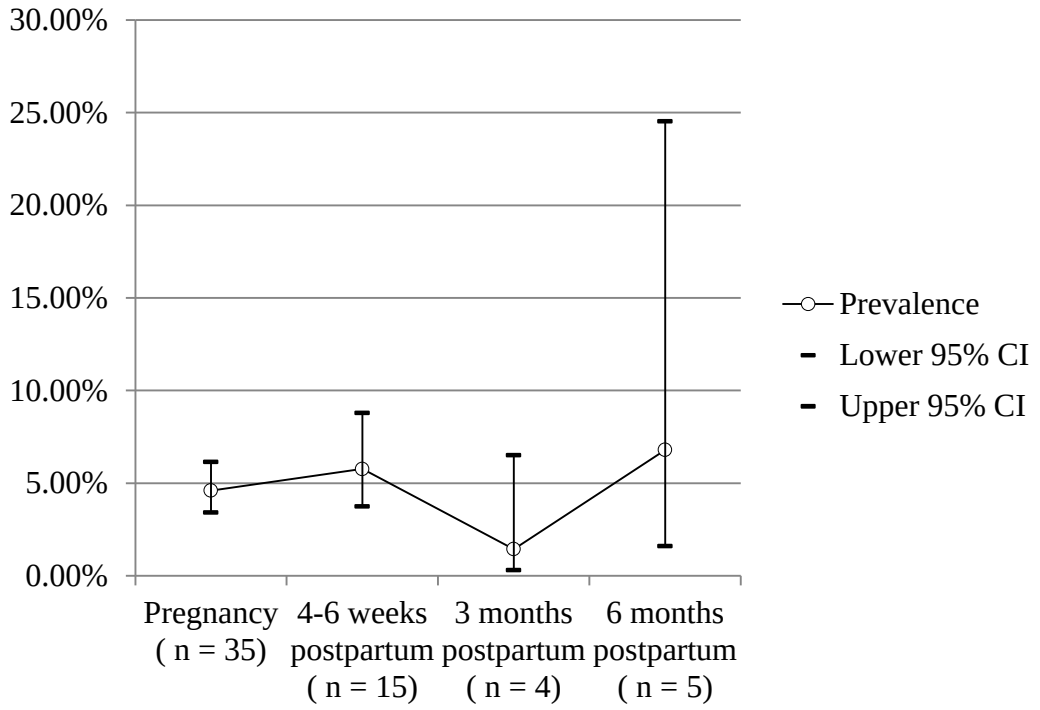

Fig. 7. Prevalence of PTSD during perinatal period. Combined estimate was obtained for different time points where more than one study results were available.