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History of Childhood Sexual Abuse and Risk of Prenatal and Postpartum Depression or Depressive Symptoms: An Epidemiologic Review

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Abstract

Purpose—The objective of this review is to summarize the literature (and to the extent possible, report the magnitude and direction of the association) concerning history of CSA and depression or depressive symptoms among pregnant and postpartum women.

Methods—Publications were identified through literature searches of seven databases (PubMed, EMBASE, PyscINFO, CINAHL, Web of Science, BIOSIS, and Science Direct) using keywords including “child abuse,” “depression,” “pregnancy,” “prenatal,” “pregnancy,” and “postpartum”.

Results—The literature search yielded seven eligible studies on the prenatal period and another seven studies on the postpartum period. All, but one prenatal study observed statistically significant positive associations of CSA with depression or depressive symptoms during pregnancy. Findings on the association of CSA with postpartum depression or depressive symptoms were inconsistent; pooled unadjusted and adjusted odds ratios were 1.82 (95% CI 0.92, 3.60) and 1.20 (95% CI 0.81, 1.76).

Conclusions—In sum, findings suggest a positive association of history of CSA with depression and depressive symptoms in the prenatal period. Findings on the postpartum period were inconsistent. Clinical and public health implications of evidence from the available literature are discussed, as are desirable study design characteristics of future research.

Keywords

Childhood sexual abuse; childhood trauma; depression; pregnancy; postpartum

INTRODUCTION

Definitions, prevalence and correlates of CSA

The immediate and long-term adverse health consequences of early life stress are well documented in the epidemiologic and psychiatric literature. One example of early life stress is childhood sexual abuse (CSA). Defined as developmentally inappropriate sexual activity

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

between a child and an individual who is in a relationship of power, trust, or responsibility to the child (World Health Organization 2003), CSA is a serious public health problem with an estimated global prevalence of 7.6% among boys and 18% among girls (Stoltenborgh et al. 2011). The World Health Organization reports a CSA prevalence range of 3.8–35% for boys and 8.4–67.7% for girls (Andrews et al. 2004). Available research documents strong associations of CSA with adverse psychiatric and physical health conditions in adulthood (Finestone et al. 2000; Kendler et al. 2000; Molnar et al. 2001). In pregnant women, exposure to CSA has been associated with psychiatric disorders (Benedict et al. 1999; Robertson-Blackmore et al. 2013), health risk behaviors (Grimstad and Schei 1999) and unfavorable pregnancy outcomes (Noll et al. 2007). For example, in a prospective cohort study, Noll and colleagues observed that preterm delivery rates were significantly higher among women with CSA history compared to their counterparts without CSA history (odds: 2.80 ± 1.44, $p < 0.05$) (Noll et al. 2007).

Definitions, prevalence and correlates of depression

Depression, the most prevalent mental disorder and a leading cause of disability globally, is perhaps the most extensively studied psychological sequelae of CSA. Over 350 million individuals worldwide experience depression, and it is thought that the majority of depression cases are undiagnosed and untreated (World Health Organization 2012). The fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), designates an individual as having major depressive disorder if he or she experiences at least five of nine symptoms that persist for two weeks or longer, for most of the day or nearly every day (American Psychiatric Association 2000). These symptoms include depressed mood, anhedonia, fatigue or loss of energy, clinically significant weight gain/loss or appetite disturbance, insomnia or hypersomnia, feelings of excessive guilt or worthlessness, psychomotor agitation or retardation, diminished ability to concentrate or think, and recurrent thoughts of death or suicide. The severity of symptoms determines the categorization of the disorder as mild, moderate or severe (American Psychiatric Association 2000). In the US, lifetime prevalence of major depressive disorder is estimated to be 16.6% (Kessler et al. 2005) with approximately 13% among men and 21% among women (Kessler et al. 1994).

Depression in pregnancy and postpartum

The fifth edition of the DSM defines postpartum depression as depression having peripartum onset, i.e., during pregnancy and within the first four weeks after delivery (American Psychiatric Association 2013). However, the definition is usually extended to include depression with onset within the first year following delivery (Skalkidou et al. 2012).

A large meta-analysis estimated that the prevalence (and 95% CI) of prenatal depression was 7.4% (2.2, 12.6%) in the first, 12.8% (10.7, 14.8%) second and 12.0% (7.4, 16.7%) third trimesters (Bennett et al. 2004). The prevalence of postpartum depression has been reported to be as high as 19.2% in the first three months following delivery (Gavin et al. 2005). Investigators have noted that the high prevalence of postpartum depression is driven by the high rates of relapse of prenatal depression after delivery (Cohen et al. 2006). Notably,

investigators have reported rates of relapse in pregnant women with a history of recurrent mood disorder to be as high as 43% (Cohen et al. 2006).

Psychiatric disorders during the prenatal and postpartum periods are of high clinical and public health significance because of their strong associations with adverse pregnancy, infant and parenting outcomes. For instance, a mature and diverse literature has documented associations of maternal psychiatric symptoms and disorders with adverse outcomes including shortened gestational length or preterm delivery (Seng et al. 2011; Sanchez et al. 2013; Yonkers et al. 2014), placental abruption (de Paz et al. 2011), preeclampsia (Qiu et al. 2007; Kim et al. 2013), and maternal health risk behaviors such as suicidality (Farber et al. 1996), cigarette smoking (Lopez et al. 2011) and substance use (Massey et al. 2011). Furthermore, maternal postpartum depression has been linked to emotional and behavioral difficulties in offspring (Cicchetti et al. 1998; Verbeek et al. 2012; Walker et al. 2013).

Although there have been several reviews on prenatal and postpartum depression (Varkukla et al. 2009; Patel et al. 2012; Sockol et al. 2013), and some reviews on the relationship between a maternal history of abuse and risk of prenatal or postpartum depression (Beydoun et al. 2012; Alvarez-Segura et al. 2014), to the best of our knowledge, no detailed systematic review has summarized or quantified the relationship between maternal history of CSA and depression or depressive symptoms during the prenatal and postpartum periods. Given this gap in the literature, and the high prevalence of history of early life sexual abuse (Andrews et al. 2004) and depression among women (Kessler et al. 1994), we undertook this systematic review and meta-analysis so as to summarize the literature concerning history of CSA with depression and depressive symptoms in pregnant and postpartum women.

MATERIALS AND METHODS

Search protocol

Published research papers were retrieved and included in this meta-analysis according to guidelines for Meta-analysis of Observational Studies in Epidemiology (MOOSE) (Stroup et al. 2000). The following seven online databases were searched from inception until August 2014: PubMed, EMBASE, PyscINFO, CINAHL, Web of Science, BIOSIS, and Science Direct. Key search terms included “childhood sexual abuse” “childhood trauma” “pregnancy” “postpartum” and “perinatal” (see Online Resource 1 for full list of search terms). The titles of all retrieved articles were screened to exclude non-pertinent papers and duplicates, after which study abstracts were read. Subsequently, relevant papers were identified for full reading. We also examined the bibliographies of retrieved papers to identify other potentially relevant publications.

Study eligibility criteria

For studies to be included in this review, they had to be: (a) full length papers published in peer-reviewed journals; (b) observational studies (prospective cohort, retrospective cohort, case-control and cross-sectional; i.e., not case series, case reports, letters to the editor, abstracts or review articles); (c) report quantitative summaries on the relationship between CSA and depression or depressive symptoms, e.g. counts, prevalence, odds ratios,

correlation coefficients; (d) relevant to the prenatal and/or postpartum period(s); (e) CSA had to have occurred at < 18 years of age or before adulthood; (f) have comparison groups who did not have the exposure and/or outcome; (g) study participants had to be ≥ 18 years at time of outcome assessment; and (h) studies in English. A summary of the inclusion and exclusion criteria is provided in Table 1.

Data synthesis, quality assessment and statistical analyses

Information from each study was compiled using a data extraction sheet that included the first name of the author, publication year, country of sample origin, study design, recruitment procedures, description of the final sample size, and summary of findings on the relationship of CSA with depression or depressive symptoms (see Tables 2 and 3). The quality of the studies included in this review was assessed using The Newcastle-Ottawa Scale (NOS) for cohort studies (Wells et al. 1999) and a modified Newcastle-Ottawa Scale for cross-sectional studies (Herzog et al. 2013). The NOS assesses studies by taking into account the selection of study groups, the comparability of the groups, and exposure and outcome assessment. For the meta-analysis, odds ratio (OR) and 95% confidence interval (95% CI) were used as a measure of association. If a study did not report OR, but reported the prevalence of depression or depressive symptoms according to CSA groups, the OR was calculated, and the corresponding author was contacted for unpublished data whenever possible. We used the software, Comprehensive Meta-analysis (CMA) to generate summary ORs and 95% CIs (Borenstein et al. 2005). CMA has been reliably used in meta-analytic studies (Martinussen et al. 2005; Segerstrom et al. 2006; Bax et al. 2007). Given that the studies included in this review differed with regard to population samples, methods of exposure and outcome ascertainment, and potential confounders adjusted for, the ORs were pooled using the random effects model that included between study heterogeneity (i.e., the DerSimonian and Laird method) (DerSimonian and Laird 1986; Bax et al. 2007; IntHout et al. 2014). We report summary ORs and 95% CI for the relationship of maternal history of CSA with postpartum depression on forest plots. We estimated the I^2 statistics, where values of 25%, 50%, and 75% were considered to represent low, medium, and high heterogeneity, respectively. Due to variations in level of adjustment for confounding across studies, we conducted separate analyses for adjusted and unadjusted studies.

RESULTS

Figure 1 details the process by which relevant publications were selected. The literature search yielded 3,963 papers, of which 3,563 were duplicates or rejected on title review. The abstracts of the remaining 400 papers were read. After exclusion of non-pertinent abstracts, 54 publications were selected for full reading and data abstraction. Seven studies on prenatal depression and seven studies on postpartum depression met the eligibility criteria for inclusion in our systematic review (Tables 2 and 3). We provide a narrative review of all 14 studies. Only three prenatal studies provided information suitable and sufficient for meta-analysis. Due to this small number, we are unable to provide a quantitative summary for the relationship between CSA history and prenatal depression or depressive symptoms. Six postpartum depression studies had information suitable and sufficient for meta-analysis and thus were meta-analyzed. Two studies (Robertson-Blackmore et al. 2013; Bonacquisti et al.

2014) were counted twice as the authors observed women in both the prenatal and postpartum periods.

Prenatal Depression

The seven original articles reporting on the association between maternal history of CSA and prenatal depression or depressive symptoms (Benedict et al. 1999; Lang et al. 2006; Lev-Wiesel and Daphna-Tekoah 2010; Bublitz and Stroud 2012; Robertson-Blackmore et al. 2013; Bonacquisti et al. 2014; Leeners et al. 2014) were based on cross-sectional data. Five studies were from the USA, one from Germany, and one from Israel. For the majority of studies, women were recruited at hospital or clinic facilities. Two studies assessed depression (Robertson-Blackmore et al. 2013; Leeners et al. 2014) while the remaining five assessed depressive symptoms. Findings from all but one study (Bublitz and Stroud 2012) yielded results that were consistent with positive and statistically significant associations between maternal history of CSA and prenatal depression or depressive symptoms.

In a sample of 357 pregnant US women, Benedict and colleagues observed that maternal history of CSA was positively associated with prenatal depressive symptoms. Approximately 59% of CSA-exposed women compared with 42% of non-exposed women had a score of >15 on the Center for Epidemiologic Studies–Depression (CES-D) Scale ($p < 0.002$); and approximately 20% of CSA-exposed women and 7% of non-exposed women had CES-D score >30 ($p < 0.0004$) (Benedict et al. 1999). After adjustment for confounding by medical care payment source, past and current physical abuse/violence, past and current verbal abuse, negative life events, and alcohol and illegal drug use, the association between CSA history and CES-D score >30 was OR = 2.44 (95% CI 1.12, 5.31). Similarly, Bonacquisti and colleagues observed a statistically significant positive association between CSA and CES-D scores ($\beta = 0.17$, $p = 0.03$) after adjusting for HIV status, history of depression, and social support (Bonacquisti et al. 2014). In a sample of 44 pregnant women attending prenatal care clinics, Lang et al. observed a significant association between the Childhood Trauma Questionnaire score and Beck Depression Inventory score ($\beta = 0.35$, $p = 0.03$) (Lang et al. 2006). Leeners et al. observed a 24.7% prevalence of self-reported depression in women with CSA history compared to 1.8% in women without CSA history ($p < 0.001$) (Leeners et al. 2014). Lev-Wiesel et al. observed higher mean CES-D scale scores among pregnant women with CSA history (mean ± SD: 1.77 ± 0.47) as compared to women with no trauma history (mean ± SD: 1.60 ± 0.38) and women with trauma other than CSA (mean ± SD: 1.59 ± 0.41, $p < 0.05$) (Lev-Wiesel and Daphna-Tekoah 2010). Robertson-Blackmore and colleagues reported that a history of CSA was associated with prenatal depression assessed using the Structured Clinical Interview for DSM-IV (SCID) (OR = 2.47, 95% CI 1.27, 4.78, after adjusting for maternal age, educational attainment, ethnicity, and marital status) (Robertson-Blackmore et al. 2013). Finally, Bublitz et al. observed no statistically significant difference in mean scores on the Inventory for Depressive Symptoms among pregnant women with CSA history (mean ± SD: 14±12) compared to counterparts exposed to other forms of child abuse (mean ± SD: 14 ± 8) or no child abuse (mean ± SD: 12 ± 10), $p = 0.80$ (Bublitz and Stroud 2012).

Postpartum Depression

Seven original research papers reported on the association of maternal history of CSA with postpartum depression (Robertson-Blackmore et al. 2013) or depressive symptoms (Cohen et al. 2002; Roberts et al. 2004; Garabedian et al. 2011; Plaza et al. 2012; Dennis and Vigod 2013). For one study, postpartum information was obtained over email (Bonacquisti et al. 2014; personal communication). Two studies were from Canada, three from the USA, one from Spain and one from the UK. Five studies were prospective analyses, and two were cross-sectional (Table 3). Findings were inconsistent across these seven studies. Statistically significant positive associations were observed in four studies (Roberts et al. 2004; Plaza et al. 2012; Dennis and Vigod 2013; Bonacquisti et al. 2014); however, these studies only reported unadjusted ORs of depressive symptoms in relation to history of CSA. The ORs from the two studies (Garabedian et al. 2011; Robertson-Blackmore et al. 2013) that reported adjusted measures of association were not statistically significant. One study did not report adjusted OR and observed no significant association between CSA and depressive symptoms (Cohen et al. 2002).

In a prospective cohort study of 497 women, Dennis et al. observed a statistically significant association between history of CSA and depressive symptoms (EPDS score > 9) (unadjusted OR = 1.93, 95% CI 1.12, 3.35) (Dennis and Vigod 2013). Similarly, Plaza et al. observed increased odds of depressive symptoms using EPDS among women with history of CSA compared to those without such history (unadjusted OR = 2.58, 95% CI 1.12, 5.95) (Plaza et al. 2012). In a study of women residing in Avon, England, Roberts and colleagues observed higher mean EPDS scores within three years of childbirth for women with CSA history compared to women without CSA history (7.89 vs. 6.11, $p < 0.01$) (Roberts et al. 2004). In a cross-sectional study, 46.7% of postpartum women with CSA history had CES-D scores ≥ 16 compared with 20.9% of women without CSA history (unadjusted OR = 3.32, 95% CI: 1.45, 7.59) (Bonacquisti et al. 2014) (personal communication).

Conversely, three other studies documented no statistically significant associations of CSA with postpartum depression or depressive symptoms (Cohen et al. 2002; Garabedian et al. 2011; Robertson-Blackmore et al. 2013). In a prospective cohort study, CSA was not associated with postpartum depression (OR = 1.10, 95% CI 0.44, 2.77) after adjustment for maternal age, educational attainment, ethnicity, marital status, and prenatal depression) (Robertson-Blackmore et al. 2013). Garabedian and colleagues did not observe a significant association between CSA and postpartum depressive symptoms (OR = 1.22, 95% CI 0.80, 1.87) after they accounted for confounding by maternal age, current marital status, smoking status, history of alcohol and drug abuse, history of complicated pregnancy, and history of breastfeeding (Garabedian et al. 2011). Finally, in a study of 198 postpartum women, Cohen et al. observed that only 14.2% of women with CSA history had EPDS scores ≥ 9 as compared with 23.4% of women with no CSA history (unadjusted OR = 0.39, 95% CI 0.11, 1.38) (Cohen et al. 2002). As shown in Figure 2A, the pooled, summary unadjusted OR for postpartum depression given maternal history of CSA was 1.82 (95% CI 0.92, 3.60) for the four studies reporting unadjusted measures of association (Cohen et al. 2002; Plaza et al. 2012; Dennis and Vigod 2013; Bonacquisti et al. 2014) (Figure 2A). Notably, there was evidence of heterogeneity ($I^2 = 63.7\%$, $p = 0.04$) so this pooled OR should be interpreted

with caution. The pooled OR for the two studies reporting adjusted measures of association (Garabedian et al. 2011; Robertson-Blackmore et al. 2013) was 1.20 (95% CI 0.81, 1.76), with no evidence of heterogeneity (I^2 = 0.0%, p = 0.84) (Figure 2B). On balance, available evidence on the association of maternal history of CSA and risk of postpartum depression or depressive symptoms is equivocal at best.

DISCUSSION

In this review, we have summarized findings from 14 studies that examined the association of maternal history of CSA with prenatal and postpartum depression or depressive symptoms. To the best of our knowledge, this is the first review presenting both a narrative and quantitative summary on this topic. Six of seven prenatal studies observed a statistically significant positive association; however, this interpretation warrants some caution as only three (Benedict et al. 1999; Robertson-Blackmore et al. 2013; Bonacquisti et al. 2014) of the seven prenatal studies adjusted for potential confounders. The findings from studies focused on the relationship of maternal history of CSA and risk of postpartum depression were inconsistent, with four of five unadjusted studies reporting statistically significant associations. Of importance, the two studies that controlled for potential confounders found no evidence of statistically significant associations of CSA with postpartum depression or depressive symptoms. Thus the findings suggest that CSA history may be more strongly associated with prenatal depression or depressive symptoms than with postpartum depression or depressive symptoms. Some hypothesized mechanisms that may underlie the relationship between CSA and depression are discussed below.

Hypothesized mechanisms

In early life, a critical period of development, the brain and its neural systems are highly sensitive to transient and permanent alterations in morphology and function secondary to environmental, behavioral, and genetic influences (Penza et al. 2003; Pascual-Leone et al. 2011; Davidson and McEwen 2012; Oberman and Pascual-Leone 2013). Brain imaging studies have observed significant structural changes in individuals at risk of depression, particularly those exposed to childhood abuse (Rao et al. 2009; Frodl et al. 2011; Carballedo et al. 2012). Human and non-human primate studies have noted long-term aberrations in concentrations of corticotopin releasing hormone (CRH) and cortisol, two gluccorticoid hormones released by the hypothalamic-pituitary-adrenal (HPA) axis, after exposure to early life adversity (Bublitz and Stroud 2012; Dettmer et al. 2012; Feng et al. 2012; Yehuda et al. 2010; Hulme 2011). For example, Bublitz et al. observed higher cortisol awakening response at 35 weeks gestation among women with a history of CSA (mean ± SD: 6.58 ± 1.20), as compared with women who had no such history (mean ± SD: 1.80 ± 1.13), p = 0.009 (Bublitz and Stroud 2012). Although pregnancy is accompanied by profound changes in the neuroendocrine system, characterized by pituitary gland enlargement, and increases in pituitary peptide output (Glynn et al. 2013) and CRH production (Horan et al. 2000; Glynn et al. 2013), chronic overproduction of glucocorticoid hormones, particularly CRH, before and during pregnancy in women with early life stress, may play a role in higher rates of adverse pregnancy outcomes among these women (Horan et al. 2000). This hypothesis is supported by research linking elevated CRH concentrations with increased risk of

depression in postpartum (Yim et al. 2009; Hahn-Holbrook et al. 2013; Glynn and Sandman 2014).

Investigators have also observed inflammatory and epigenetic pathway similarities between individuals who experienced childhood adversity and individuals with depression (Kiecolt-Glaser et al. 2011; Bertone-Johnson et al. 2012; Slopen et al. 2012; Drury et al. 2014). Research links shortened telomere length, a molecular marker of premature aging, with exposure to psychosocial stressors including childhood adversity (Kiecolt-Glaser et al. 2011; Drury et al. 2014). Shortened telomere lengths have also been documented in depressed individuals compared to non-depressed controls (Hartmann et al. 2010; Karabatsiakis et al. 2014; Verhoeven et al. 2014). Of note, Karabatsiakis et al. observed that women with depression had a telomere length shortening of CD8+ cytotoxic T lymphocytes that was equivalent to a mean age difference of 27.9 (SD: 25.3) years compared to women without depression (Karabatsiakis et al. 2014).

Finally, some investigators have noted that pregnant women with a history of sexual abuse may re-experience memories of their abuse during procedures of routine pregnancy care (Leeners et al. 2006) and labor (Courtois and Courtois Riley 1992; Waymire 1997). The reactivation of such memories may increase the risk of depression. To the best of our knowledge, no study has prospectively examined the relationship between a history of CSA and incident prenatal or postpartum depression. Of the few studies on postpartum depression, none have been able to establish that the women did not have depression and depressive symptoms during the prenatal period. Although exact mechanisms are not fully understood, noted similarities in biological aberrations in individuals with adverse childhood events and depression may yield important clues about the relationships and these clues may give way to identification and development of strategies and protocols that may be implemented during prenatal care to help mitigate the risk of prenatal and postpartum depression.

Strengths and Limitations

Strengths of this review include an extensive systematic search of available literature on seven online databases, use of established MOOSE guidelines, a narrative summary of the findings, and to the extent possible, a presentation of summary quantitative estimates of the relationship of CSA with depression and depressive symptoms in postpartum women. Despite these strengths, some limitations should be considered in the interpretation of findings from this study. First, instruments used to assess CSA and depressive characteristics varied across the 14 studies and could have accounted for heterogeneity in research findings. Second, the primary objective of the majority of the studies was not to examine the association between CSA and depression. Hence, important potential confounders, mediators and moderators of the CSA-depression relationship (e.g., adult exposure to abuse, frequency of abuse, age at time of abuse, relationship of victim to perpetuator) were unaccounted for, limiting causal inference from most available studies. Third, most studies lacked information on maternal pre-pregnancy depression status, and so were unable to establish the incidence of depression or depressive symptoms during the prenatal or postpartum periods. Fourth, all the studies were conducted in high-income

countries, which limits generalizability of findings to middle- and low- income countries, which may differ with regards to the burden of CSA among pregnant and postpartum women.

Implications

CSA and depression are two public health problems with major impact on women's health. Globally, approximately 1 in 5 girls are exposed to CSA (Stoltenborgh et al. 2011); and depression is the most common mental disorder among women, with up to 20% of women experiencing major depression during their lifetime (Kessler et al. 1994). Prenatal and postpartum mental disorders, such as depression, are associated with adverse pregnancy outcomes (de Paz et al. 2011; Kim et al. 2013; Sanchez et al. 2013) and with emotional disturbance in offspring (Verbeek et al. 2012; Walker et al. 2013), thus the burden of maternal depression has implications on the physical and cognitive development of the next generation.

Findings from studies included in this review suggest that women with a history of CSA may be significantly more likely to experience depression or depressive symptoms during pregnancy whilst the association with postpartum depression may be somewhat more equivocal. Given the significance of the topic, noted gaps and limitations of the available evidence and the high prevalence of CSA and depression among women globally, we maintain that large multi-national longitudinal studies with systematic exposure and outcome assessment are needed to provide higher quality information about the incidence and progression of depressive symptoms and depression in prenatal and postpartum women given history of early life stressors, access to social support and other buffers of stress across the life course. In addition, there is need for studies that incorporate biochemical and molecular risk markers that will facilitate exploration of mechanistic hypotheses and prognostic indicators of morbidity and response to treatment. Finally, given that all available studies were conducted in high-income countries, studies examining the implications of the CSA-depression relationship in middle- and low-income countries are needed.

CONCLUSION

In conclusion, our systematic review and meta-analysis contribute to the existing literature on the effects of CSA on the mental health of women of reproductive age by summarizing current knowledge on the relationship of CSA with depression and depressive symptoms in pregnant and postpartum women, and providing suggestions for improving literature on this topic.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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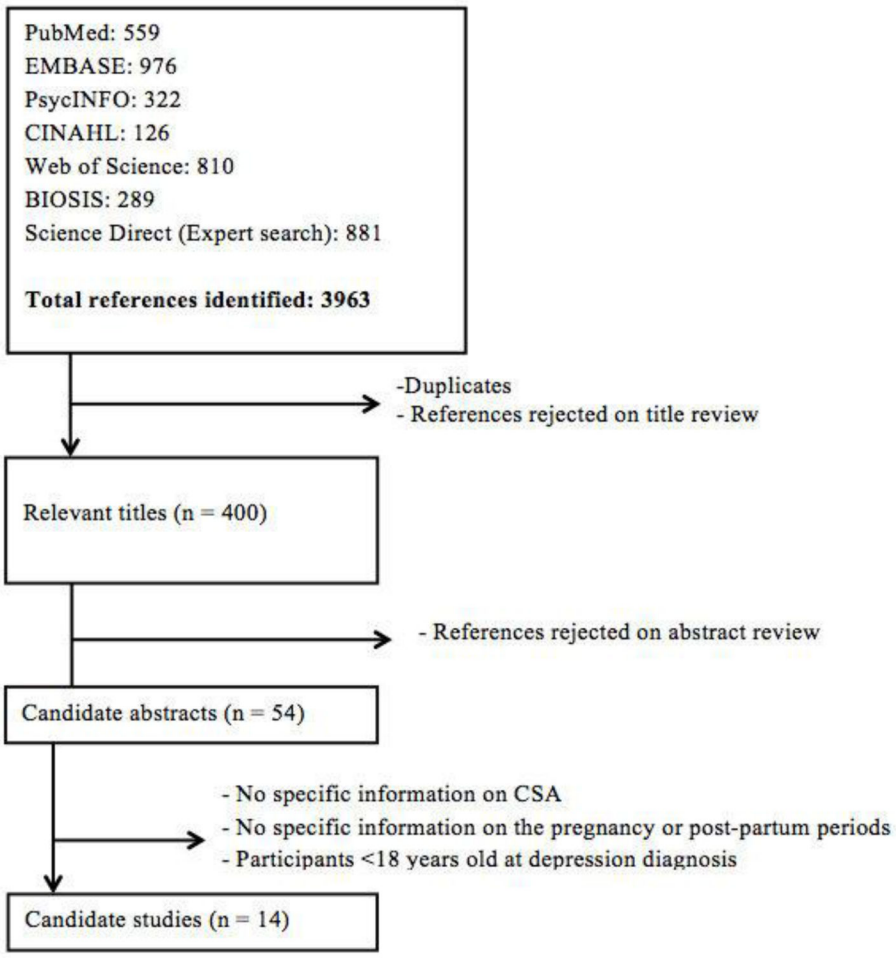

Fig. 1.

Selection of articles reporting on the relationship between CSA and depression in pregnant or postpartum women

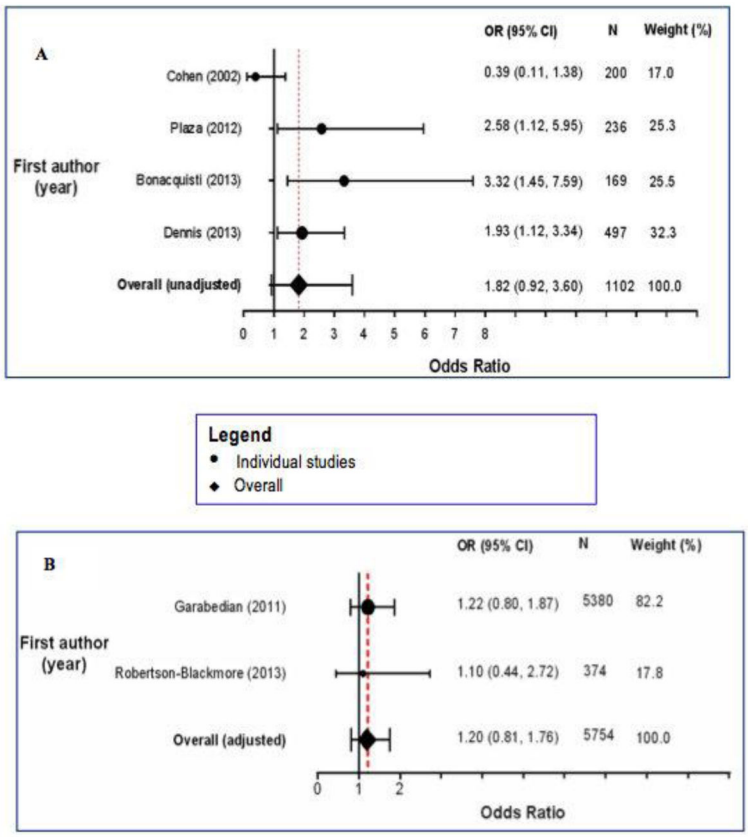

Fig. 2.

Fig. 2a Forest plot showing studies on the relationship between CSA and postpartum depression (unadjusted estimates)

Fig. 2b Forest plot showing studies on the relationship between CSA and postpartum depression (adjusted estimates)

Table 1

Study inclusion and exclusion criteria

Characteristics	Inclusion	Exclusion
Publication type	Full length articles published in peer-reviewed journals	Conference abstracts/presentations, dissertations, gray literature
Study design	Prospective cohort, retrospective cohort, case-control, cross-sectional	Reviews, case reports, case series
Language	English language articles, without restriction to country	Non-English language articles
Sample	Pregnant women and women within a few months or years postpartum; women reporting information relevant to the pregnancy or postpartum periods	Men, non-pregnant or non-postpartum women, participants < 18 years at time of depression data collection
Exposure and outcome evaluation	Sexual abuse occurring at < 18 years of age or before adulthood; outcome assessment at ≥ 18 years; Use of medical records, questionnaire or interviews for collecting information on CSA exposure and depression or depressive symptoms	No comparison group (i.e., non-CSA exposed or non-depressed group)
Measure of association	Studies reporting quantitative information on CSA and depression (including counts, prevalence, odds ratios, r coefficients, etc)	Qualitative studies; no quantitative information on CSA-depression association

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Table 2

Summary of findings on the relationship between CSA and prenatal depression

Author (year)	Country	Study design	Recruitment	Sample size	CSA assessment (data collection)	Depression or depressive symptom assessment (data collection)	Main findings
(Benedict et al. 1999)	USA	CS	Prenatal clinics in large university-based hospital (at 28–32 weeks gestation)	357 pregnant women	≥1 non-consensual and non-experimental contact or noncontact sexual episode (< 18 years) by a perpetrator who was ≥5 years older than victim (interviews & self-administered questionnaires)	> 30 on the CES-D scale (via interviews and self-administered questionnaires)	CSA associated with severe depressive symptomatology (aOR 2.44; 95% CI = 1.12, 5.31). Confounders adjusted for: payment source; past and current physical abuse/violence; past and current verbal abuse; negative life events; and alcohol and illegal drug use
(Bonacquisti et al. 2014)	USA	CS	Ob/gyn clinic affiliated with an urban university hospital (at ≥ 24 weeks gestation)	50 HIV positive, 113 HIV-negative pregnant women	A positive answer to the question: “have you ever experienced childhood sexual abuse?” (via interviews)	≥16 on the CES-D and high SCID scores indicated MDD (via interviews)	CSA associated with depressive symptoms; β = 0.17, p = 0.03. Confounders controlled for: HIV status, history of depression, and social support
(Bublitz and Stroud 2012)	USA	CS	Women were recruited throughout pregnancy	135 pregnant women	Sexual abuse prior to age 18 (4 sexual abuse specific questions on the Adverse Childhood Experiences Scale)	Inventory for Depressive Symptomatology (IDS)	Mean IDS scores were not significantly different among women exposed to CSA (mean ± SD: 14±12) compared to women exposed to other forms of child abuse (mean ± SD: 14±8) and women with no child abuse (mean ± SD: 12 ± 10, p = 0.80)
(Lang et al. 2006)	USA	CS	University-affiliated obstetric clinic (average of 17.5±7.3 gestational weeks)	44 pregnant women	Total score on sexual abuse sub-scale of CTQ (via mailed self-administered questionnaires)	Total score on the 21-item BDI-II (via mailed self-administered questionnaires)	CSA associated with depressive symptoms during pregnancy (β = 0.35, p = 0.03). No information given about control of confounding
(Leeners et al. 2014)	Germany	CS	Centers offering support to women who have experienced sexual abuse; and local kindergartens	85 women with history of CSA, 170 women without CSA	Contact and non-contact sexual abuse occurring at < 18 years old (8 specific questions via interviews)	Self-reported depression during index-pregnancy (via interviews)	Depression during index-pregnancy endorsed by 24.7% of CSA exposed women compared to 1.8% among unexposed women (P < 0.001)
(Lev-Wiesel and Daphna-Tekoah 2010)	Israel	CS	Prenatal care visit referrals	1003 women	Penetrative and non-penetrative sexual abuse at < 14 years old (via self-administered questionnaires)	Center for Epidemiologic Studies - Depression scale (CES-D) indicates major depression (via self-administered questionnaires)	Mean and (SD) depression score in the second trimester was 1.60 (0.38) for women with no trauma, 1.77 (0.47) for CSA-exposed women and 1.59 (0.41) for women with other trauma (p < 0.001)
(Robertson-Blackmore et al. 2013)	USA	CS	Hospital-based obstetrics practice (< 18 weeks gestation)	374 women	SCID for DSM-IV-TR (via interviews)	Self -reported diagnosis of MDD, minor depression, or depressive	CSA was associated with depression at 18 or 32 weeks (aOR = 2.47; 95% CI, 1.27 - 4.78). Confounders

Author (year)	Country	Study design	Recruitment	Sample size	CSA assessment (data collection)	Depression or depressive symptom assessment (data collection)	Main findings
						disorder not otherwise specified disorder not otherwise specified	controlled for: age, education, ethnicity and marital status

ALPHA = Antenatal Psychosocial Health Assessment; aOR = adjusted odds ratio; aRR = adjusted risk ratio; BDI-II = Beck Depression Inventory II; CES-D = Center for Epidemiologic Studies - Depression; CI = Confidence Interval; CIDI = Composite International Diagnostic Interview; CTQ = Childhood Trauma Questionnaire; EPDS = Edinburgh Postnatal Depression Scale; ETI-SR = Early Trauma Inventory Self-Report; MDD = Major Depressive Disorder; Ob/gyn = Obstetrics and gynecology; PPD = Postpartum Depression; SCID = Structured Clinical Interview for DSM-IV; uOR = unadjusted odds ratio; uRR = unadjusted risk ratio; Study designs; CS = Cross Sectional; P = Prospective; R = Retrospective

Table 3

Summary of findings on the relationship between CSA and postpartum depression

Author (year)	Country	Study design	Recruitment	Sample size description	CSA assessment (data collection)	Depression or depressive symptom assessment (data collection)	Main findings
(Bonacquisti et al. 2014) (personal communication)	USA	P	Ob/gyn clinic affiliated with an urban university hospital (at ≥24 weeks gestation)	50 HIV positive, 113 HIV-negative pregnant women	A positive answer to the question: "have you ever experienced childhood sexual abuse?" (via interviews)	≥16 on the CES-D (via interviews)	46.7% of postpartum women with CSA history had high CES-D scores compared with 20.9% of women without CSA history (uOR = 3.32, 95% CI: 1.45, 7.59) in the period between 6 weeks to 6 months postpartum
(Cohen et al. 2002)	Canada	P	Hospital labor and delivery ward	200 postpartum women	Unwanted sexual experiences at < 14 years old assessed using questions modified from (Briere and Runtz 1988) (via telephone interviews)	Score of ≥ 12 on the 10-item EPDS indicative of probable PPD at 8–10 weeks postpartum (via telephone interviews)	Prevalence of CSA in women with EPDS score of 0–8 was 16% and 15% in women with EPDS score of 9–11; prevalence of CSA was 0% in women with EPDS score ≥12. No significant association between CSA and EPDS score ≥9 (uOR = 0.39, 95 CI 0.11, 1.38)
(Dennis and Vigod 2013)	Canada	P	Healthcare provider offices	497 women	ALPHA questionnaire was used to assess experience of sexual abuse as a child (via standardized questionnaires)	> 9 on the 10-item EPDS indicates depressive symptomatology (via standardized questionnaires)	CSA significantly associated with 8-week postpartum depression scores (uOR = 1.93, 95% CI 1.12, 3.35)
(Garabedian et al. 2011)	USA	CS	Kentucky Women's Health Registry (KWHR)	5380 women	Yes to single question: "when you were a child, did any parent, step-parent, or guardian or any other person make you have sex (any sex act, not just intercourse) by using force or threatening to harm you or someone close to you?" (via questionnaires)	Yes to single yes/no item related to "significant symptoms of depression which women experience within a few days of giving birth and may continue to experience for weeks or months following delivery" Symptoms were not linked to a specific pregnancy (via questionnaires)	Relationship between CSA and PPD symptoms was: (uRR 1.48, 95% CI 1.26–1.74); (aRR 1.16, 95% CI 0.75–1.78). Confounders adjusted for: age, current marital status, smoking status, history of alcohol abuse, history of drug abuse, history of complicated pregnancy, and history of breastfeeding, and any adult violence exposure
(Plaza et al. 2012)	Spain	CS	Obstetrics units (24–48 hours postpartum)	236 women	Sexual abuse subscale of the ETI-SR (via semi-structured interviews) Score of ≥2 of 15 on sexual abuse questions	≥10 on the EPDS indicated depressive symptomatology (via semi-structured interviews)	CSA associated with depressive symptomatology within 2 days of childbirth (uOR = 2.58, 95% CI 1.12–5.96)

Author (year)	Country	Study design	Recruitment	Sample size description	CSA assessment (data collection)	Depression or depressive symptom assessment (data collection)	Main findings
					was used as the criteria for CSA exposure (via semi-structured interviews) was used as the criteria for CSA exposure (via semi-structured interviews) was used as the criteria for CSA exposure (via semi-structured interviews) was used as the criteria for CSA exposure (via semi-structured interviews)		
(Roberts et al. 2004)	UK	P	Residents of Avon, England recruited through midwives, local publicity, and direct contact	8292 women	Self-report questions about if the respondent had ever been sexually abused, and at what age (CSA defined as sexual assault before the teenage years)	Total continuous EPDS score (via questionnaire)	CSA associated with higher levels of depressive symptoms within 3 years after childbirth (7.89 vs. 6.11, $p = 0.0001$; $\beta = 0.04$)
(Robertson-Blackmore et al. 2013)	USA	P	Hospital-based obstetrics practice (< 18 weeks gestation)	374 women	SCID for DSM-IV-TR (via interviews)	Diagnosis of MDD, minor depression, or depressive disorder not otherwise specified within 6 weeks to 6 months postpartum (according to SCID for DSM-IV-TR)	CSA was not significantly associated with 6 – 8 week or 6-month postpartum depression (aOR = 1.10, 95% CI 0.44 – 2.7). Confounders controlled for: age, education, ethnicity, marital status, and antepartum depression

ALPHA = Antenatal Psychosocial Health Assessment; aOR = adjusted odds ratio; aRR = adjusted risk ratio; BDI-II = Beck Depression Inventory II; CES-D = Center for Epidemiologic Studies - Depression; CI = Confidence Interval; CIDI = Composite International Diagnostic Interview; CTQ = Childhood Trauma Questionnaire; EPDS = Edinburgh Postnatal Depression Scale; ETI-SR = Early Trauma Inventory Self-Report; MDD = Major Depressive Disorder; Ob/gyn = Obstetrics and gynecology; PPD = Postpartum Depression; SCID = Structured Clinical Interview for DSM-IV; uOR = unadjusted odds ratio; uRR = unadjusted risk ratio; Study designs; CS = Cross Sectional; P = Prospective; R = Retrospective