

# The Prevalence of Postpartum Depression among Women with Substance Use, an Abuse History, or Chronic Illness: A Systematic Review

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## Abstract

**Background:** Although much is known about risk factors for postpartum depression (PPD), many potentially important clinical variables have still not been investigated. In this systematic literature review, we examine the published evidence for the prevalence of PPD among three populations of women commonly seen by providers of perinatal care: women who use substances, women with current or past experiences of abuse, and women with chronic illness.

**Methods:** We searched Medline, CINAHL, EMBASE, PsycINFO, and the Cochrane Library from their start dates through to August 1, 2008, using keywords relevant to depression and each of the three target clinical populations. All published, peer-reviewed papers in English or French were included in the review if a standardized assessment of depression between 3 and 52 weeks postpartum was used and if either the prevalence of PPD in the target population or a comparison of depression scores between the target population and a control group were reported.

**Results:** Seventeen papers were included in the review. There were high rates of PPD among substance-using women and those with current or past experiences of abuse. However, little evidence was found to suggest an increased risk for depression among women with chronic illness.

**Conclusions:** Few eligible studies were identified for each clinical population of interest. Despite limitations of the studies reviewed, the results indicate that both substance use and current or past experiences of abuse are associated with increased risk for PPD. Targeted clinical interventions for these women may be beneficial.

## Introduction

POSTPARTUM DEPRESSION (PPD), affecting approximately 13% of women,<sup>1</sup> is one of the most common complications of childbearing.<sup>2</sup> Consequences of PPD for both mother and infant have been well established; women who have suffered from PPD are twice as likely to experience future episodes of depression over a 5-year period.<sup>3</sup> PPD can also impair maternal-infant interactions, leading to attachment insecurity, developmental delay, and social interaction difficulties in affected children.<sup>4-6</sup>

Risk factors for PPD have been examined in three meta-analyses,<sup>1,7,8</sup> which indicated that the strongest risk factors include depression or anxiety during pregnancy, personal and family history of depression, lack of social support, and stressful life events. However, other potentially important risk factors have not been widely reported on in the PPD

literature and so may not have been identified in these meta-analyses. In particular, these meta-analyses do not permit examination of potential risk for PPD associated with other clinical issues commonly present among perinatal populations. Examples of comorbidities for which there is theoretical support for a relationship with PPD include substance use, history of abuse/trauma, and chronic illness. The purpose of this systematic review is, therefore, to determine rates of PPD among women who report substance use, history of abuse/trauma, or chronic illness, in order to assist healthcare providers in considering risk for PPD when working with these common patient groups.

### *Substance use and PPD*

In recent years, researchers have become increasingly aware that individuals who experience problems with alcohol

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and drugs are also more likely to have comorbid symptoms of mental disorders. In a report from the National Institute for Mental Health Epidemiological Catchment Area study, the lifetime incidence of drug abuse or dependence on substances other than alcohol was 6.1% in the general U.S. population.<sup>9</sup> More than half (53%) of these people were found to have a comorbid mental disorder. In particular, individuals with drug-use disorders (abuse or dependence) were 4.5 times more likely to have a mental disorder than those without a drug-use disorder. Affective disorders affected approximately one third of those whose dependence or abuse involved drugs other than marijuana. The National Comorbidity Survey also examined the co-occurrence of substance abuse and mental disorders in the general U.S. population.<sup>10</sup> In this population-based study, the lifetime prevalence of substance abuse other than alcohol was 12%. Again, more than half (51%) of individuals with a lifetime diagnosis of any alcohol or drug disorder had a lifetime co-occurrence of a mental disorder, and almost one third (30%) had a lifetime diagnosis of an affective disorder. Despite the clearly evidenced relationship between substance abuse and affective disorders in general, few studies have examined the prevalence of *PPD* among substance-abusing mothers.

#### *Abuse and PPD*

Violence against women, including physical, sexual, and psychological trauma during childhood or adulthood, is exceedingly common and has been associated with significant health and mental health consequences.<sup>11,12</sup> For example, numerous studies have identified an association between childhood maltreatment and depression,<sup>13,14</sup> possibly mediated through effects on the hypothalamic-pituitary-adrenal (HPA) axis.<sup>15</sup> History of childhood trauma has been associated with psychopathology, particularly symptoms of post-traumatic stress disorder (PTSD), during the postpartum period.<sup>16</sup> In one cohort study of 56 women with hospital admission for *PPD*, 28 (50%) reported childhood sexual abuse.<sup>17</sup> Further, women with childhood sexual abuse histories showed more impairments in the mother-infant relationship, more severe depression,<sup>17</sup> and poorer outcomes at 3 years of follow-up<sup>18</sup> than nonabused women.

Similarly, intimate partner violence (IPV) (abuse of a woman by her spouse or intimate partner) has been associated with increased rates of depression among primary care samples.<sup>19,20</sup> There is evidence that the prevalence and severity of IPV may increase during the perinatal period,<sup>21</sup> and it has been associated with adverse pregnancy outcomes, including increased rates of low birth weight and maternal mortality.<sup>22–24</sup> Postpartum mental health outcomes among women who have experienced IPV have received little study.

#### *Chronic illness and PPD*

Chronic medical illness and depression often co-occur.<sup>25</sup> In many cases, depressive disorders may develop secondarily to the stress associated with the symptoms of chronic illnesses, including asthma, cardiovascular disease (CVD), cancer, and diabetes.<sup>25</sup> Some chronic conditions, such as fibromyalgia<sup>26</sup> and irritable bowel syndrome (IBS),<sup>27</sup> are thought to result at least in part from neuroendocrine dysfunctions. Perhaps consequently, these conditions often have depressive symptoms. Finally, in other cases, such as HIV infection, the chronic

condition may not be directly associated with depression, but rather correlates, such as social stigma and other environmental factors, may mediate the relationship.<sup>28</sup>

Where depression occurs in the context of a chronic medical illness, the comorbidity has important implications for management of both conditions.<sup>25</sup> Some chronic conditions are known to either improve or worsen during the perinatal period, likely as a result of the associated hormonal changes. For example, symptoms of rheumatoid arthritis tend to improve during pregnancy and flare within 6 months of delivery.<sup>29</sup> Similarly, the risk of exacerbation of multiple sclerosis (MS) symptoms is increased 2–3-fold during the first 12–24 weeks postpartum.<sup>30</sup> The potential implications of these changes in disease course on maternal mental health have not been well explored.

## **Materials and Methods**

### *Data sources*

Papers included in this review were identified through electronic searching of the following databases: Medline, CINAHL, EMBASE, PsycINFO, and the Cochrane Library. Each database was searched from its start date through to August 1, 2008, using the following keywords: postpartum, postnatal, pregnan\*, perinatal, childbirth, obstetr\*, labor, puerperal, parturition, parity, or maternal in combination with depress\*, mental health, mental illness, mood disorder, affective disorder, emotion, or baby blues. Additional keywords used for the substance use search included substance/drug/alcohol abuse, substance/drug/alcohol dependence, substance-related disorder or addiction. Additional keywords used for the current/past abuse search included abuse, spouse\* abuse, battered women, domestic violence, sexual assault, family abuse, or physical/sexual/emotional abuse. Additional keywords used for the chronic illness search included chronic disease/ illness, disabled, rheumatoid arthritis, lupus, multiple sclerosis, fibromyalgia, chronic fatigue, polycystic ovarian syndrome, cancer, endometriosis, autoimmune disease/disorder, Graves disease, Crohn's disease, colitis, scleroderma, cerebral palsy, heart disease, asthma, scoliosis, HIV, AIDS, or acquired immunodeficiency syndrome. Additional papers were identified from the reference lists of included studies and relevant reviews.

### *Study selection*

Published, peer-reviewed papers available in English or French were considered for this review. Only research studies that focused on *PPD* were included; studies of other childbirth-related conditions (including perinatal anxiety, blues, or psychosis that did not specifically measure depression) were excluded. To be included in this review, studies were required to include a standardized assessment of depression (either self-report or observer-rated), performed between approximately 3 and 52 weeks postpartum, and to report either the prevalence of *PPD* (as variously defined by the authors) in the population of interest or a statistical comparison of depression scores between the target population and a control group. Peer-reviewed publications were identified in the initial stage of the search process, and potentially relevant abstracts meeting the predetermined eligibility criteria were subsequently obtained for further examination. Research papers

were then retrieved and assessed more rigorously to determine inclusion suitability.

## Results

In total, we examined approximately 7500 abstracts and retrieved 120 papers for further review. Of these, 17 papers (5 for substance use, 8 for abuse, and 4 for chronic illness) were ultimately determined to meet the inclusion and exclusion criteria and were included in the review. The most common reasons for exclusion were use of a nonstandardized assessment of depression or assessment of depression <3 weeks or >52 weeks postpartum.

### *Substance use and PPD*

One Finnish study and four U.S. studies examined the relationship between substance use and PPD (Table 1). The Finnish study examined the prevalence of PPD among mothers receiving treatment for substance abuse. In this study, 12 mothers with an alcohol or drug abuse problem from three treatment units and 12 low-risk control mothers, matched on maternal age and sex of the baby, were assessed at 12 and 24 weeks postpartum using the Edinburgh Postnatal Depression Scale (EPDS).<sup>31</sup> At 12 weeks, 3 mothers (25%) in the substance abuse treatment group scored positive on the EPDS compared with 1 mother (8%) in the control group. At 24 weeks, 5 mothers (42%) in the substance abuse treatment group scored positive compared with 1 mother (8%) in the control group. At 12 weeks postpartum, the substance abuse treatment group had a mean EPDS score of 9.8 (SD 3.2) in comparison to a mean score of 5.1 (SD 4.8) in control group mothers ( $p < 0.003$ ). Similar results were found at 24 weeks. It is notable that there were significant sociodemographic differences between the substance-using and control groups in this study; substance-using women were more often single, less well educated, unemployed, and multiparous. These differences were not controlled for in the statistical analyses, as the authors note, "In reality, the situation of substance-addicted mothers is usually characterized by multiple psychosocial problems."<sup>31</sup>

One U.S. study examined the course of depressive symptoms from pregnancy to 24 weeks postpartum among cocaine-abusing women.<sup>32</sup> Seventy-eight chronic cocaine users recruited from referrals from the Department of Child and Family services and local public health and drug treatment centers who retained custody of their children after birth were assessed using the Beck Depression Inventory (BDI). Thirty-one percent of the sample reported severe depressive symptoms antenatally. At 24 weeks postpartum, mothers had a mean BDI score of 11.6 (SD 7.5), and 29% exceeded the cutoff for clinical depression. Of those mothers who experienced severe PPD, only 5 had not previously reported antenatal depression.

A second U.S. study identified prenatal factors that predicted postpartum comorbid depressive symptoms and alcohol use in 595 women using data from an ongoing longitudinal study of pregnancy outcomes.<sup>33</sup> Prenatal variables in five domains (psychological, substance use, social, obstetrical, and demographic) were considered as potential predictors. At each trimester, higher rates of depressive symptoms, binge drinking (four or more drinks per occasion), and tobacco use were independently associated with co-

morbid postpartum depressive symptoms and alcohol use at 32 weeks postpartum (first trimester: OR = 4.9; second trimester: OR = 10.1; third trimester: OR = 3.5).

In a population-based U.S. study designed to provide data on the recognition of PPD, the medical charts of a random sample of 403 women were retrospectively reviewed from pregnancy to 1 year postpartum.<sup>34</sup> Using a broad definition of PPD, 15 (3.7%) women's physicians recognized symptoms of PPD during the year following delivery. Twenty percent of the women with PPD had a history of substance abuse compared with 4.6% of the women without PPD ( $p = 0.009$ ). Illegal drug use during pregnancy was also much higher in the PPD group (46.7%) compared with the group without PPD (16.5%) ( $p = 0.003$ ).<sup>34</sup>

In the largest study identified for this review, mothers of 1053 infants were interviewed using the Addiction Severity Index to examine potential relationships among prenatal cocaine exposure, current postpartum depression, and infant neurobehavior.<sup>35</sup> Mother-infant dyads were recruited immediately after delivery, and 385 cocaine-exposed dyads and 668 comparison dyads matched for race, gender, and gestational age participated in a semistructured interview at approximately 1 month postpartum. Women whose infants were no longer residing with them, as well as those with prenatal opiate exposure, were excluded from the study. In this sample, there was no significant difference in the number of women meeting criteria for depression in the past 30 days between women with and without prenatal cocaine use (19.3% vs. 15.5%,  $p = 0.09$ ). Of the prenatal cocaine users, however, those who met criteria for depression in the past 30 days were more likely than nondepressed women to also report use of cocaine in the first 30 days postpartum (26.3% vs. 14.3%,  $p < 0.02$ ). Of note, more women in the prenatal cocaine group reported accessing outpatient mental health treatment in the first 30 days postpartum compared with the group without prenatal cocaine use (26.5% vs. 2.3%,  $p < 0.0001$ ).<sup>35</sup>

### *Abuse and PPD*

Eight studies have reported on the prevalence of PPD among women with either current or past abuse or trauma (Table 2). In a Canadian study, 30 women with a history of physical abuse during pregnancy were assessed at approximately 12 weeks postpartum with the General Health Questionnaire and a structured diagnostic interview.<sup>36</sup> Of these, 16 (53.3%) women met DSM-III-R diagnostic criteria for a major depressive episode, and 9 (30.0%) women met criteria for another psychiatric disorder (including dysthymia, PTSD, and adjustment disorder with depressed mood), and only 5 (16.7%) had no disorder. Scores on the General Health Questionnaire were also elevated, with a mean score of 7.7 (SD 1.7). It is noteworthy that a score >2 has been validated as an indicator of psychiatric morbidity.<sup>36</sup>

In a second Canadian study, 200 women recruited from the postpartum wards of six Toronto-area hospitals were assessed by telephone at 8–10 weeks postpartum.<sup>37</sup> History of abuse was determined using the Conflict Tactics Scale or the Abuse Assessment Screen, and PPD was assessed using the EPDS. Only history of emotional abuse, and not physical or sexual abuse, was associated with elevated risk for EPDS score  $\geq 12$  (adult emotional abuse OR = 3.39, 95% CI 1.37–8.38; any emotional abuse OR = 3.02, 95% CI 1.23–7.44).

TABLE 1. STUDIES EXAMINING RISK FOR POSTPARTUM DEPRESSION (PPD) AMONG WOMEN WITH SUBSTANCE USE CONCERNS

Study	Participants	Assessment time(s)	Depression assessment	Substance use assessment	Results
Pajulo et al., 2001 <sup>31</sup>	12 Finnish substance-abusing mothers living in residential treatment facilities (SA group) and 12 low-risk control women; mean age: 25 years SA group, 27 years control group; only 42% of SA women were living with a partner, compared with 100% of control women; SA women were also predominantly unemployed (92%, 25% in control group)	12 and 24 weeks postpartum	EPDS <sup>a</sup>	"Self-report questionnaire"; no details provided	Substance users had higher rates of depression at 12 and 24 weeks Substance users: EPDS >12: 25% Mean 9.8, SD 3.2 Control: EPDS >12: 8% Mean 5.1, SD 4.8 24 weeks Substance users: EPDS >12: 42% Mean 9.2, SD 4.6 Control: EPDS >12: 8% Mean 5.0, SD 3.0 BDI >15: 29% Mean 11.6, SD 7.5
Beckwith et al., 1999 <sup>32</sup>	78 U.S. cocaine users; mean age: 29 years; predominantly ethnic minority (83%) and single (85%)	24 weeks postpartum	BDI	No details provided	
Homish et al., 2004 <sup>33</sup>	595 women who reported ≥3 drinks per week in the first trimester or smoked marijuana and a random sample of women who did not use substances; mean age: 23 years; predominantly single (66%), multiparous (71%), and of lower socioeconomic status (40% with household incomes <\$400/month)	32 weeks postpartum	CES-D	Developed for the Maternal Health Practices and Child Development Project; queried quantity and frequency of consumption during each trimester and prior to pregnancy; also aided with use of calendar marking approximate dates of conception, recognition of pregnancy, and confirmation of pregnancy	Antenatal binge drinking (four or more drinks per occasion) was significantly associated with comorbid PPD (CES-D >16) and alcohol use (OR 4.9 in 1st trimester, 10.1 in 2nd trimester, and 3.5 in 3rd trimester)
Bryan et al., 1999 <sup>34</sup>	Retrospective chart review for 403 U.S. women; predominantly aged 19–32 years (66%), married (84%), and multiparous (70%)	0–52 weeks postpartum	Depressive symptoms 2 weeks apart based on DSM-IV criteria	Collected from medical records	Women with PPD 20.0% substance abuse history; 46.7% illegal drug use during pregnancy Women without PPD 4.6% substance abuse history ( $p=0.009$ ); 16.5% illegal drug use during pregnancy ( $p=0.003$ ) No significant difference in number of women meeting criteria for depression in the past 30 days: 19.3% in COC group, 15.5% in non-COC group, $p=0.09$ ; no significant difference in ASI psychological symptom severity score: mean 0.834 (COC) and 0.692 (non-COC), NS
Salisbury et al., 2007 <sup>35</sup>	385 U.S. women with prenatal cocaine use (COC group) and 668 women without cocaine use (non-COC); COC women were predominantly aged 26–49 (81%), and non-COC women were predominantly aged 18–25 (55%); both groups were predominantly single (89% in COC group, 74% in non-COC group) and receiving Medicaid (89% in COC group, 78% in non-COC group)	4 weeks postpartum	Addiction Severity Index: those classified as depressed reported serious depression in the past 30 days, lasting at least 2 weeks, plus had a Psychological Problems subscale score ≥3	Maternal Interview of Substance Use structured interview developed for study; collects frequency and quantity of use of cocaine, alcohol, marijuana, and nicotine for each trimester	

<sup>a</sup>EPDS, Edinburgh Postnatal Depression Scale; BDI, Beck Depression Inventory; CES-D, Center for Epidemiologic Studies–Depression Scale.

TABLE 2. STUDIES EXAMINING RISK FOR POSTPARTUM DEPRESSION (PPD) AMONG WOMEN WITH CURRENT OR PAST ABUSE

Study	Participants	Assessment time(s)	Depression assessment	Abuse assessment	Results
Stewart, 1994 <sup>36</sup>	30 Canadian women identified in a study of physical abuse during pregnancy; no sociodemographic data provided	12 weeks postpartum	GHQ <sup>a</sup> structured diagnostic interview (DSM-III-R)	Questionnaire designed for study, which asked about the occurrence of physical abuse (whether they had been hit, choked, slapped, punched, kicked, injured with a weapon or other object, or otherwise injured)	53.3% (16 women) met criteria for major depressive episode
Cohen et al., 2002 <sup>37</sup>	200 Canadian women recruited from postpartum hospital wards; predominantly aged 30–34 years (41%), Canadian-born (58%), and with high household incomes (29% >\$100,000/year)	8–10 weeks postpartum	EPDS	At half of sites: modified Conflict Tactics scale for physical and sexual abuse, selected questions for emotional abuse At other sites: Abuse Assessment Screen for physical and sexual abuse, questions from Violence Against Women survey for adult emotional abuse	Increased risk of EPDS >12 among women reporting adult emotional abuse (OR = 3.39, 95% CI 1.37–8.38) and any emotional abuse (OR = 3.02, 95% CI 1.23–7.44)
Leung et al., 2002 <sup>38</sup>	838 Hong Kong women recruited from postpartum hospital wards; mean age: 29 years in abused group, 30 years in nonabused group; predominantly Chinese (99%), married (97%), and employed (50%) with high family incomes (29% >30,000 HK\$/month)	Depression: 6 weeks postpartum Abuse: 2–3 days postpartum	EPDS	Chinese modification of Abuse Assessment Screen	Increased risk of EPDS >9 among mothers reporting abuse in last year: 15% for mothers reporting abuse in last year; 6% for nonabused mothers ( $p = 0.001$ )
Tiwari et al., 2005 <sup>39</sup>	110 Chinese women with a history of intimate partner violence; mean age: 30 years in intervention group, 31 years in the control group; predominantly married (91%), not in paid workforce (62%), with high monthly family incomes (24% >30,000 HK\$/month)	Depression: 6 weeks postpartum Abuse: 18–30 weeks gestation	EPDS	Chinese modification of Abuse Assessment Screen (Conflict Tactics Scale also administered to assess effectiveness of intervention)	Decreased risk of EPDS >9 among mothers given empowerment intervention; control group: 45.5%; intervention group: 16.4%; RR 0.36, 95% CI: 0.15–0.88

(continued)

TABLE 2. CONTINUED

<i>Study</i>	<i>Participants</i>	<i>Assessment time(s)</i>	<i>Depression assessment</i>	<i>Abuse assessment</i>	<i>Results</i>
Certain et al., 2008 <sup>40</sup>	1519 U.S. women, 112 of whom reported past year abuse; predominantly white (89%), married (75%), and employed (70%)	Approximately 6 weeks postpartum	EPDS $\geq 13$	Abuse Assessment Screen past 12 months physical and emotional abuse questions	Increased rates of PPD among abused mothers: 10.4 vs. 8.5%, $p < 0.001$ ; in multivariate analyses, increased rates of abuse among women with PPD: OR = 4.21, 95% CI 2.19–8.09
Records and Rice, 2005 <sup>41</sup>	50 U.S. women; 15 of women had chart notation of disclosure of physical or sexual abuse; mean age: 26 years, predominantly married (64%) and having their first or second child (56%)	8 and 12 weeks postpartum	EPDS	Chart notation during prenatal or intrapartum care of disclosure of physical or sexual abuse	Significantly increased mean EPDS scores: 8 weeks: 7.2 vs. 2.8, $p < 0.001$ ; 12 weeks: 8.0 vs. 3.0, $p < 0.05$ ; differences were no longer statistically significant after controlling for CES-D scores at 1 week postpartum
Stevens et al., 2002 <sup>42</sup>	123 U.S. mothers in a home visitation program; 39% of sample was aged $< 18$ years, 90% were single, and 78% were low income	Within first 12 weeks of service	BDI-II	Survey of experience with various traumatic events derived from the Kiddie SADS; mothers indicated if each event never happened, happened once, or happened two or more times	Women with BDI-II $> 13$ significantly more often reported: witnessing violence: 1.03 vs. 0.50, $p < 0.05$ ; being a victim of violence: 0.63 vs. 0.31, $p < 0.05$ ; rape: 0.60 vs. 0.25, $p < 0.05$ ; physical abuse: 0.57 vs. 0.26, $p < 0.05$ ; no statistically significant increase in risk associated with sexual abuse, witnessing crime, or being victim of crime
Lang et al., 2006 <sup>43</sup>	Convenience sample of 32 U.S. mothers; mean age: 29 years, predominantly Caucasian (61%), partnered (81%), and with health insurance (96%)	Depression: Approximately 1 year postpartum Abuse: Third trimester of pregnancy	BDI-II	Childhood Trauma Questionnaire	No significant association between CTQ and BDI-II scores

<sup>a</sup>GHQ, General Health Questionnaire; EPDS, Edinburgh Postnatal Depression Screen; BDI-II, Beck Depression Inventory-II.

Multivariate regression analyses found emotional abuse was not a significant predictor of depression in a model containing a history of PPD. However, when psychiatric history variables were excluded from the model, emotional abuse significantly increased the risk for PPD (OR = 2.8, 95% CI 1.1–7.4).<sup>37</sup>

In a similarly designed Chinese study, elevated rates of PPD among women with a history of violence were found.<sup>38</sup> In this study, 838 Chinese-speaking women were interviewed shortly postdelivery with the Abuse Assessment Screen to detect violence in the past year. The EPDS was then administered at 6 weeks postpartum, and potential differences between the abused and nonabused groups were examined. The abused women ( $n = 113$ ) had significantly higher EPDS scores ( $p = 0.001$ ) and more cases of probable PPD than the nonabused group (EPDS  $\geq 10$ , 15% vs. 6%,  $p = 0.001$ ). It is notable that no physical abuse was reported in this cohort; abuse was predominantly emotional, verbal, or, infrequently, sexual, and the perpetrator was most often reported to be the women's husband/boyfriend (27.9%) or mother-in-law (26.7%).

In another Chinese study, a randomized controlled trial was conducted to evaluate an empowerment intervention for abused pregnant women designed to reduce rates of abuse and symptoms of depression during the postpartum period.<sup>39</sup> In this trial, 110 Chinese pregnant women with a history of IPV were randomized to receive either the empowerment training intervention or standard care. Of the 55 women in the control group, 25 (45.5%) had EPDS scores  $\geq 10$  at 6 weeks postpartum. This rate was significantly greater than the rate in the intervention group (9 women, 16.4%, RR = 0.36, 95% CI 0.15–0.88), indicating that the intervention was effective in reducing the risk of PPD associated with a history of IPV.

Two U.S. studies examined the prevalence of both depression and domestic abuse among women recruited through obstetric clinics. In the largest study, of 1519 women who came for a postpartum visit, 112 (7.4%) reported being either emotionally or physically abused in the past 12 months by someone they knew.<sup>40</sup> In bivariate analyses, these women were significantly more likely than women who reported no domestic abuse to score  $>13$  on the EPDS (10.4% vs. 8.5%,  $p < 0.001$ ). EPDS scores  $>13$  were also predictive of abuse in multivariate logistic regression analysis (OR 4.21, 95% CI 2.19–8.09). Other significant predictors of domestic abuse in the model included being unmarried, being aged  $\geq 36$  years, not being in the labor force, Hispanic ethnicity, and reporting a partner who engaged in binge drinking.<sup>40</sup> The smaller U.S. study yielded similar results, drawing from a convenience sample of 50 postpartum women.<sup>41</sup> Using the EPDS, women who had a medical chart notation of disclosure of physical or sexual abuse history ( $n = 15$ ) had significantly higher mean depression scores than women with no such disclosure at both 8 and 12 weeks postpartum (8 weeks: 7.2 vs. 2.8,  $p = 0.001$ ; 12 weeks: 8.0 vs. 3.0,  $p < 0.05$ ). However, after controlling for depression scores at 1 week postpartum, the differences in depression at 8 and 12 weeks postpartum were no longer statistically significant.<sup>41</sup>

Another U.S. study investigated the prevalence and correlates of depression and trauma history among 123 first-time mothers in a home visitation program.<sup>42</sup> Mothers were assessed for depression using the BDI within the first 12 weeks of the program. Eligibility for this program included having one or more of the following risk factors: single marital status, low income,  $\leq 18$  years old, and late or no prenatal care.

Thirty-five (28.5%) mothers had depressive symptoms (BDI  $> 13$ ), and these mothers were significantly more likely than nondepressed mothers to report witnessing violence (1.03 vs. 0.50,  $p < 0.05$ ), being a victim of violence (0.63 vs. 0.31,  $p < 0.05$ ), being raped (0.60 vs. 0.25,  $p < 0.05$ ), and having a history of physical abuse (0.57 vs. 0.26,  $p < 0.05$ ).

Only one study identified for inclusion in this review found no significant relationship between abuse and PPD. In this convenience sample of 44 U.S. women, there was no relationship between childhood physical, emotional, or sexual abuse (as measured using the Childhood Trauma Questionnaire) and scores on the BDI among the 32 participants who completed a 1-year postpartum follow-up assessment.<sup>43</sup> In contrast, there was a significant association between sexual abuse history and depression during pregnancy ( $p < 0.05$ ). The authors note their limited power to detect significant effects, as well as the potential that their convenience recruiting method may have attracted particularly resilient women.<sup>43</sup>

### *Chronic illness and PPD*

Four studies were identified that examined levels of psychological distress among women with chronic illness (Table 3). In a study to examine the determinants of PPD among 396 women in Lebanon, Chaaya et al.<sup>44</sup> found higher rates of PPD (EPDS  $> 12$  at 12–20 weeks postpartum) among women who reported more than one chronic health problem (33.3%) than among those with either no (14.9%) or only one chronic problem (15.1%). This finding remained significant after adjustment for other predictors of PPD, including depression during pregnancy, cesarean delivery, and rural vs. urban residence (OR = 2.42, 95% CI 1.13–5.15).<sup>44</sup>

Förger et al.<sup>29</sup> examined health-related quality of life during pregnancy and the first 24 weeks postpartum among 10 women with rheumatoid arthritis, 10 women with ankylosing spondylitis, and 29 control women with no rheumatic disease. Although the mental health subscale scores on the SF-36 were not compared between the groups, the researchers noted that there were no cases of PPD among any of the three study groups during the follow-up period. Although the relatively small sample size may have contributed to this finding, participants in the study were in stable relationships, experienced few psychosocial stressors, and received continuous follow-up in a specialized clinic, which may have reduced their risk for PPD.<sup>29</sup>

Two studies compared mental health outcomes between HIV-positive and HIV-negative women, with neither finding a significant elevation in PPD among HIV-positive women. In the first study, 21 HIV-positive and 21 HIV-negative women matched for age, race, parity, and education completed the SF-36 at 24 weeks postpartum. There were no statistically significant differences in the mental health subscale scores between the groups (median score = 60.0 in both groups).<sup>45</sup> The mental health subscale scores were also consistent over three time points through pregnancy, delivery, and the postpartum period among the HIV-positive women. In the second study, 336 HIV-positive women recruited through infectious disease, high-risk prenatal, or general prenatal clinics were compared with 298 HIV-negative women recruited through prenatal clinics, after matching for HIV risk behavior, race/ethnicity, and late entry into prenatal care. At 24 weeks postpartum, there were no statistically significant differences

TABLE 3. STUDIES EXAMINING RISK FOR POSTPARTUM DEPRESSION AMONG WOMEN WITH CHRONIC ILLNESS

<i>Study</i>	<i>Participants</i>	<i>Assessment time(s)</i>	<i>Depression assessment</i>	<i>Chronic illness assessment</i>	<i>Results</i>
Chaaya et al., 2002 <sup>44</sup>	Consecutively recruited sample of 396 women delivering in hospitals in Beirut (B) or the Beka'a Valley (BV), Lebanon; mean age: 29 years for B group, 27 years for BV group; predominantly married (99%) and having never worked (63% of B group, 90% of BV group)	12–20 weeks postpartum	EPDS <sup>a</sup>	Face-to-face structured interview; “presence of a chronic health condition”	Significantly increased risk for PPD among women with more than one chronic health problem: EPDS >12: 33.3% (>1 problem), 15.1% (1 problem), 14.9% (0 problems); $p < 0.001$ , OR 2.42, 95% CI 1.13–5.15
Förger et al., 2001 <sup>29</sup>	49 Swedish women; 10 with rheumatoid arthritis (RA) of mean duration 6 years; 10 with ankylosing spondylitis (AS) of mean duration 10 years; 29 age-matched healthy control (HC) women; mean age for RA group: 29 years; AS group: 31 years; HC group: 31 years	6, 12, and 24 weeks postpartum	SF-36	According to American College of Rheumatology (RA) or modified New York criteria (AS)	No women (0%) in any group developed PPD
Larabee et al., 1996 <sup>45</sup>	42 U.S. women recruited through prenatal care clinics: –21 HIV-positive women; –21 documented HIV-negative women; no sociodemographic data provided	24 weeks postpartum	SF-36	Not stated	No statistically significant difference in mean SF-36 mental health subscale scores
Ethier et al., 2002 <sup>46</sup>	634 U.S. women: –336 HIV-positive women; –298 HIV-negative women; total sample had mean age 27.8 years, was predominantly black (69.4%) and impoverished (73.0%)	24 weeks postpartum	CES-D modified to exclude 5 somatic items	Not stated for cases; controls were eligible to participate if they had tested negative for HIV during pregnancy	No statistically significant differences in mean modified CES-D scores

<sup>a</sup>EPDS, Edinburgh Postnatal Depression Screen; SF-36, Medical Outcomes Study 36-Item Short Form Health Survey; CES-D, Center for Epidemiologic Studies Depression Subscale.

in mean CES-D scores between the infected and uninfected women (13.5 vs. 13.2) despite mean scores being relatively high in both groups.<sup>46</sup>

## Discussion

The results of this review highlight the paucity of research related to PPD among three clinically important subgroups of childbearing women: those who use substances, those who have experienced abuse, and those with chronic illness. The limited available data reviewed here indicate that additional research on perinatal mental health in these populations is warranted.

In the 5 studies examining PPD among substance-using women, rates of PPD were consistently high, and in all but 1 of the studies that included comparison samples, substance-using mothers had higher rates of depression or mean depression scores than mothers in the control group. These findings were generally consistent across the studies examined despite variable assessment times, instruments, and substances-used. The results are comparable to studies in the general population of substance-using women, which have also demonstrated high rates of comorbid depression.<sup>47,48</sup> However, substance-using participants in these studies typically exhibited numerous sociodemographic risk factors for depression, including single status and low socioeconomic status. Indeed, the only study to find no significant increase in rates of PPD among substance-using women was also the only study in which sociodemographic variables, such as socioeconomic status and marital status, were comparable between the substance-using and comparison groups.<sup>35</sup> Additional research is needed to determine if the increased rates of PPD observed among substance-using women are directly attributable to their substance use or are better explained by a mediating effect of the sociodemographic risk factors.

Regardless of whether this effect is direct or indirect, the association between substance use and PPD could have important implications for health service use. In the general population, women with depression are more likely than non-depressed women to seek treatment for their substance use concerns.<sup>49</sup> Mental health service utilization data are needed to determine if this is also the case for depressed perinatal women who use substances, as the significant social stigma associated with substance use by pregnant and parenting women and fears of child custody loss may deter women from disclosing their use. However, results from the study by Salisbury et al.<sup>35</sup> suggest that perinatal substance use may actually have a positive effect on uptake of perinatal mental health services: women in their sample with prenatal cocaine use were much more likely than nonusers to access outpatient mental health care during the early postpartum period, despite comparable rates of depression. Additional studies documenting uptake of both mental health and substance use services are needed to determine optimal methods of providing care to perinatal women. The rates of PPD identified among substance-using women in this review indicate that specialized services may be warranted in order to reduce the risks of both PPD and maternal substance use for mother and child.

Despite the high rates of abuse histories among women in the general population and the known mental health con-

sequences of this abuse,<sup>11,12</sup> only 8 studies of PPD among women with current or past abuse were identified for inclusion in this review. Although other research has examined the relationship between history of abuse (and child sexual abuse in particular) and perinatal PTSD,<sup>16</sup> fewer studies have examined a potential relationship between abuse and other perinatal psychiatric conditions, including depression. It is notable, however, that half of the abuse studies included in this review were published since 2005, suggesting that this area has recently begun to receive more substantial research attention.

All but 1 of the 8 studies identified for this review found significant associations between abuse and PPD, despite variability in sampling procedures and definitions of abuse. The sole study to find no significant association was limited by its small convenience sample,<sup>43</sup> suggesting that overall there is a strong relationship between the experience of abuse and risk for PPD.

The significance of various forms of abuse in elevating risk for PPD requires further study. Cohen et al.<sup>37</sup> found that only emotional abuse, and not physical or sexual abuse, was associated with PPD in their sample; however, in Stewart's study<sup>36</sup> of women with a history of physical violence, elevated rates of PPD were also reported. More studies of a potential relationship between PPD and history of sexual abuse in particular are needed to guide clinical practice with these patients. Further, additional research is needed to determine if the relationship between abuse and risk for PPD is direct or is mediated by a general increased risk for lifetime depression among women with abuse histories. Both Cohen et al.<sup>37</sup> and Records and Rice<sup>41</sup> found that associations between abuse and PPD identified in bivariate analyses were no longer statistically significant when depression history variables were controlled. Finally, it is not clear from the available data that there are comparable mental health effects when abuse is current vs. historical and when abuse is perpetrated by a caregiver vs. an intimate partner. It is promising that the sole intervention trial identified for this review found that empowerment training was successful in reducing symptoms of depression among Chinese postpartum women who reported emotional abuse during pregnancy.<sup>39</sup> This indicates that the negative impact of abuse on postpartum mental health could be reduced by appropriate clinical intervention. Collaboration between obstetrical and psychiatric health professionals is required to develop and evaluate such interventions.

In contrast to the other two clinical populations examined in this review, only 1 of the 4 studies of women with chronic illness found a significantly increased risk for PPD.<sup>44</sup> The association in this study was between multiple "chronic health problems" and PPD, in contrast to the other three studies, which included women with one specific chronic health problem (rheumatic disease or HIV). Other unique characteristics of this study may explain the inconsistent finding. For example, the Chaaya et al. study<sup>44</sup> was conducted in Lebanon, a developing country, whereas the remaining three studies were all conducted in developed countries (the United States and Switzerland). Chaaya et al.<sup>44</sup> noted that access to high-quality medical and mental health services differs between developed and developing countries and also between rural and urban areas in developing countries. It is possible that a lack of medical attention during pregnancy could cause poor

control of preexisting chronic health conditions, which could lead to psychological distress in the postpartum period. However, Chaaya et al.<sup>44</sup> did not find elevated rates of PPD among women who reported only one chronic health problem relative to women who reported none. It is also possible that the combined effects of multiple chronic illnesses are associated with risk for PPD, whereas one chronic health condition is not associated with elevated risk. Additional research from developed countries that includes women with multiple chronic illnesses is warranted.

The lack of increased risk for PPD among HIV-positive women is surprising, considering the strong relationship between HIV-positive status and depression in the general population.<sup>28</sup> Both studies of HIV-positive women included in this review examined women who were receiving prenatal or specialized healthcare and had well-controlled disease. Rates of depression could be higher among newly diagnosed women and women with less access to appropriate health services. Both the HIV-positive and HIV-negative groups in these two studies had mean rates of PPD that were higher than would be expected in the general population of postpartum women. In both studies, control group participants were matched to HIV-positive participants on such variables as race, age, education, and HIV risk behaviour.<sup>45,46</sup> Consequently, as may be the case for the studies of substance use and PPD, the high rates of PPD in studies of HIV-positive women can probably be attributed to factors other than HIV status, such as socioeconomic status. This is consistent with research on the relationship between HIV and depression in the general population, which has noted a number of potentially mediating variables, including socioeconomic status.<sup>28</sup>

Finally, there is a concerning lack of research on postpartum mental health among women with other chronic illnesses common among women in their childbearing years. Specifically, we could identify no studies reporting on risk for PPD among women with multiple sclerosis, fibromyalgia, chronic fatigue syndrome, heart disease, asthma, or other disabilities. Studies examining the clinical course of these conditions during pregnancy and the postpartum period should include measures of psychological distress to determine if these women are at elevated risk for PPD.

### Limitations

Several limitations of the studies included in this review should be noted. Many had relatively small samples of women reporting the condition of interest, particularly where specific chronic health conditions or domains of abuse (e.g., physical, sexual) were considered. This could have limited the power to detect statistically significant differences in PPD rates among women with these conditions. Further, some of the included studies had no comparison groups, suboptimal comparison groups, or incomplete matching procedures. This limitation is of particular concern in those studies that include target groups who exhibit high rates of other known risk factors for PPD, such as low socioeconomic status or social isolation. In addition, few studies considered psychiatric history as a potential confounding variable despite strong associations between prenatal and postnatal mental health.<sup>8</sup>

Finally, the instruments used to identify the target populations and symptoms of depression varied widely among studies, limiting our capacity to compare results. Because we accepted the study authors' various ways of operationalizing PPD, our definition is very broad. In particular, only 2 of the included studies used a diagnostic assessment of depression, and the rest relied on self-report assessments of depressive symptoms or psychological distress. Similarly, various self-report measures of abuse or trauma history were used in the included studies. Many of these measures were modified from previously published instruments, with no psychometric data provided. Additional research using reliable and valid measures of depression, abuse, and other variables of interest is needed.

Studies of the potential relationships between history of substance use and current/past abuse and PPD are limited by the potential for nondisclosure of these conditions. Because of the social stigma associated with both substance use and abuse, these conditions are known to be underreported in primary care settings. For example, the finding of a strong relationship between emotional abuse and depression may be due to its being less stigmatizing to disclose than physical abuse.<sup>37</sup> It is possible that women who feel unable to disclose substance use or abuse may be at increased risk for depression because of the lack of formal or clinical supports for their conditions. This would bias the studies toward the null hypothesis by reducing the apparent magnitude of the relationship between substance use or abuse and depression observed.

### Conclusions

Despite important limitations of the available evidence, studies consistently demonstrated that both substance use and current or past experiences of abuse are associated with increased risk for PPD. These risk factors may be added to the commonly known risk factors that have been identified in previous meta-analyses. Targeted clinical interventions for substance-using women and for women with histories of abuse may be beneficial for the prevention or amelioration of PPD and its consequences.

### Acknowledgments

L.E.R. is supported as a New Investigator by the Canadian Institutes of Health Research and Ontario Women's Health Council, Award NOW-84656.

We thank Ms. Corrie Goldfinger, Ms. Vashti Campbell, Ms. Melissa Dorsay, and Ms. Laura Villegas for their assistance in the preparation of this paper.

### Disclosure Statement

The authors have no conflicts of interest to report.

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