The Prevalence and Correlates of Self-Harm in the Perinatal Period: A Systematic Review

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ABSTRACT

Objective: To perform a systematic review and meta-analysis on research on prevalence and correlates of self-harm in pregnancy and the postpartum year ("perinatal self-harm").

Data Sources: Six databases (EMBASE, MEDLINE, PsycINFO, Maternity and Infant Care Database, CINAHL, Cochrane Controlled Register of Trials) were searched from inception through October 31, 2018.

Study Selection: Inclusion criteria were (1) peer-reviewed articles with (2) data available for estimating prevalence and correlates. Exclusion criteria were (1) studies of women seeking abortion and (2) letters, editorials, or case reports/series.

Data Extraction: Two reviewers independently screened all articles, extracted data, and appraised quality.

Results: Of 3,913 articles screened, 39 (reporting 19,191,431 pregnancies) were included. Prevalence ranges were as follows: self-harm during pregnancy (14 studies): 0%–2.39% (median = 0.0004%; interquartile range [IQR], 0.0002%–0.18%); self-harm during postpartum year (10 studies): 0%–2.41% (median = 0.17%; IQR, 0.04%–1.05%); self-harm during pregnancy in women with serious mental illness (SMI) (6 studies): 0%–23.78% (median = 2.16%; IQR, 0.26%–7.9%); self-harm during postpartum year in women with SMI (7 studies): 0%–21.9% (median = 7.97%; IQR, 0%–18%). Key correlates of self-harm during pregnancy and the postpartum year include mental disorder, substance misuse, younger age, being unmarried, and obstetric and neonatal complications. Additionally, a history of self-harm and fetal/infant loss were associated with postpartum self-harm. There were limited data on correlates of perinatal self-harm in women with SMI.

Conclusions: Perinatal self-harm appears to be rare but is associated with adverse obstetric and neonatal outcomes. However, it is common in women with SMI, though there is limited evidence regarding correlates and outcomes in this population. More research into the prevalence, correlates, and outcomes of perinatal self-harm, particularly in women with SMI, is needed.

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There is growing concern in several high-income countries that self-harm is increasing, particularly in women under 25 years old.[1,2] Self-harm can take many forms, from life-threatening overdose to superficial cutting, and may or may not be associated with suicidal intent.[3] An extensive body of research literature indicates that it is relatively common[4] to experience suicidal ideation during pregnancy and the 1-year postpartum period (collectively known as the perinatal period). It is well recognized that suicide remains a leading cause of maternal deaths in the United Kingdom[5] and other high-income countries.[6] Perinatal suicide has been investigated systematically in Confidential Enquiries into Maternal Deaths[5] and using data from the UK Confidential Enquiry into Suicides and Homicides by People with Mental Illness.[7] However, less is known about the prevalence of nonfatal self-harm during the perinatal period.

In pregnancy, self-harm has the potential to cause direct fetal and maternal harm and, postnatally, may interfere with a mother's ability to care for her dependent infant. Outside the perinatal period, self-harm is strongly associated with mental disorder (particularly depression and personality disorder[8,9]), so self-harm during the perinatal period is likely to be similarly associated with mental disorders. Self-harm could therefore be a marker of treatment need to improve maternal and infant outcomes.[10] Knowing more about the prevalence and correlates of perinatal self-harm may also be relevant to the prevention of suicide, as it is well established that maternal deaths are frequently preceded by perinatal self-harm.[7,11]

We therefore aimed to investigate the prevalence and correlates of perinatal self-harm in a systematic review.

METHODS

The protocol for this study is published on PROSPERO[12] (CRD: 42015028052). This study was written in accordance with PRISMA[13] guidelines.

Data Sources

EMBASE, MEDLINE, PsycINFO, Maternity and Infant Care Database, CINAHL, and Cochrane Central Register of Controlled Trials were searched systematically from database inception through October 31, 2018, using a priori defined keywords and relevant Medical Subject Headings (see Supplementary Appendix 1). This approach

Clinical Points

- It is hard to estimate how common perinatal self-harm is, because most data are based on hospital attendances and most people who self-harm probably do not attend hospital.
- From the existing data, self-harm during the perinatal period appears to be rare, unless a woman has serious mental illness, in which case it is more common, particularly in the postnatal period.

was supplemented by forward and backward citation tracking. Seven international experts in the field of perinatal mental health were also contacted for recommendations.

Study Selection

Our inclusion criteria were (1) studies published in peer-reviewed journals and (2) data available on prevalence and/or correlates of acts of self-harm occurring during pregnancy and/or 1 year after birth (the postpartum period). Studies reporting primarily on injuries were included in full-text screening, as it was possible intentional self-injuries would be reported. Reviews were included for citation tracking but not included as articles in this review.

Our exclusion criteria were (1) studies investigating women seeking abortion, as the psychosocial factors relating to abortion and pregnancy/birth are likely to be different; and (2) letters, editorials, case reports, and case series.

Two reviewers (K.A. and H.G.G.) independently screened all studies. Discrepancies were resolved by discussion, and a third reviewer (L.M.H.) was available to resolve disagreements. When data were unclear, authors were contacted. Articles not in English were translated.

Data Extraction

A data extraction sheet was created and piloted. Two authors (K.A. and H.G.G.) independently extracted data. Regarding quality appraisal, our aim for each study was to assess the representativeness of the sample and the risk of misclassification bias in the outcome measure. Two reviewers (K.A. and H.G.G.) independently assessed these attributes according to predefined rules. All discrepancies in data and quality appraisal were resolved by discussion or consultation with the third reviewer (L.M.H.). Representativeness and risk of outcome measure bias are reported as high, medium, or low (see Tables 1 and 2).

Data Analysis

We reported evidence relating to the prevalence of self-harm during pregnancy and the postpartum year separately. A small number of studies did not make a distinction between these periods and were discussed separately. The correlates of self-harm during pregnancy and the postpartum were also discussed separately.

We standardized prevalence estimates when possible as number of self-harm events per 100,000 births. Our rationale for the standardization calculation was one woman could have self-harmed more than once and one woman could have had more than 1 pregnancy. Therefore, when studies reported both the number of self-harm events and the number of women accounting for such events (numbers that were often different), we used the number of events as the numerator. We took the denominator as number of births (both live and still, when available), as each birth invariably indicated that a pregnancy occurred. Values were rounded up when not whole numbers. When studies reported prevalence over a range of years and did not provide a summary value for the duration of the study, we reported the data from the most recent year.

We reported prevalence estimates from the relatively smaller studies (ie, those with $N < 10,000$) as percentages, rounded up to 2 decimal points. When possible, a summary statistic and heterogeneity (I^2 statistic) were estimated, using a binomial model within *R*.[14] Correlates were reported as odds ratios (ORs) with their 95% CIs. When odds ratios were adjusted, this was indicated in the text and by use of the abbreviation *aOR*.

RESULTS

Our search strategy identified 3,913 studies (see PRISMA Flowchart, Figure 1).

All reasons for exclusion of articles at the full-text screening stage are listed in Figure 1. People who have thoughts of self-harm are known to be at higher risk of subsequent acts of self-harm.[15] However, not all acts are preconceived; many are impulsive.[16] For these reasons, we felt that measuring the prevalence of acts of perinatal self-harm in studies of women known[17] or likely to have[18,19] baseline thoughts of self-harm or of women known to have denied thoughts of self-harm[20–22] were likely to be biased. We therefore excluded those studies.

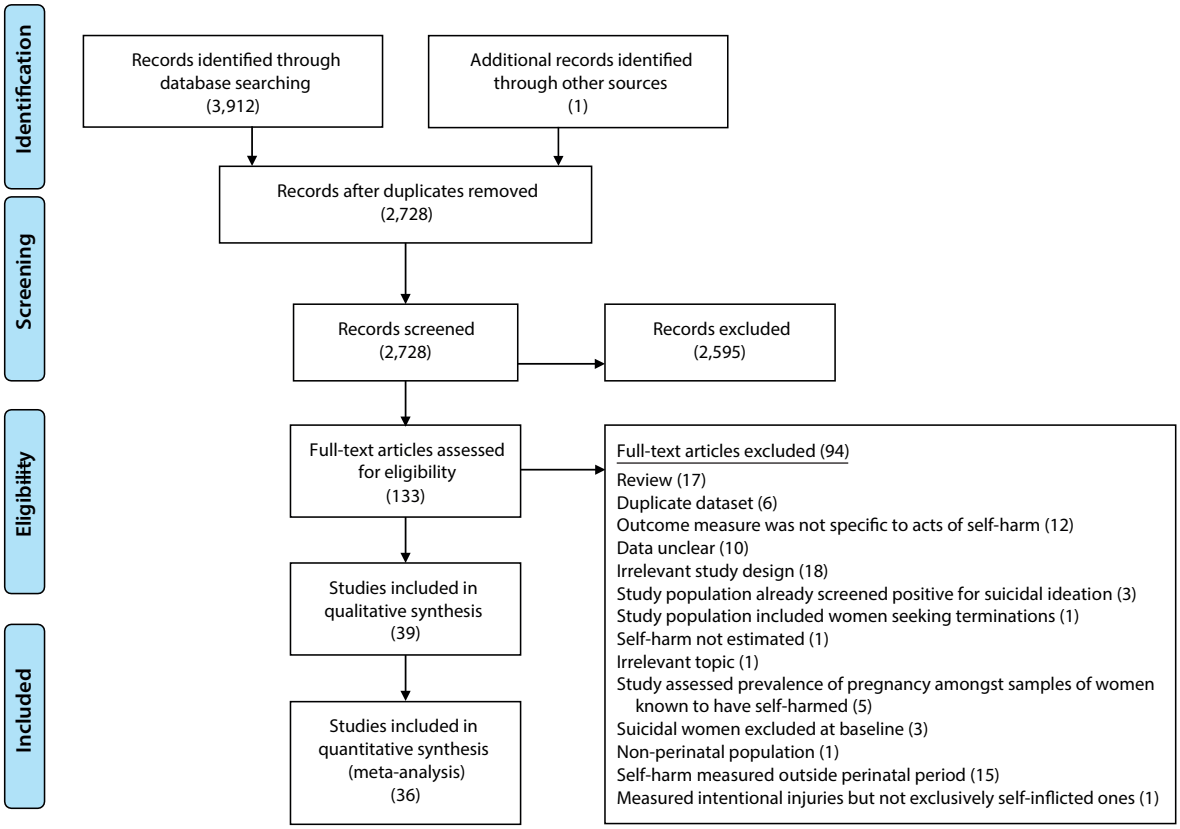
Our screening process identified 39[23–61] studies that met our inclusion criteria (comprising 19,191,431 pregnancies). Of the 39 studies included, 13[24,29,30,32,40–42,47–50,55,56] were from low or middle-income countries and the remaining 26 from high-income countries. Pooling of prevalence estimates was possible only for retrospective administrative data-linkage cohort studies, as the remaining studies were too methodologically heterogeneous.

We found studies relating to 3 main populations: (1) perinatal women in the general population, (2) perinatal women with serious mental illness (SMI, defined as contact with specialist psychiatric health care services, also known as secondary mental health care services), and (3) teenage perinatal women.

Prevalence

Studies reporting the prevalence of self-harm in pregnancy. Of the 22 studies listed in Table 1, 14 studies[31,33,34,36,38,40,41,43,44,47,55,58,60,61] reported the prevalence of acts of self-harm in pregnancy (see Table 1 for details). The overall range of prevalence was 0%–2.39% (median = 0.0004%; interquartile range [IQR], 0.0002%–0.18%).

Figure 1. PRISMA Flow Diagram of Study Identification, Study Selection, and Reasons for Exclusion From Qualitative Synthesis and Meta-Analysis



Among these, 8 studies[31,33,36,43,44,58,60,61] used linked databases of routinely collected administrative records of hospital admissions for pregnancy/delivery and/or administrative records of infant birth/death to generate retrospective cohorts of pregnant women (see Table 1). Self-harm was measured using administrative records of hospital attendances coded for self-harm. The pooled prevalence was 32 per 100,000 births (95% CI, 25–43; see Figure 2).

Despite the similar study design in all 8 studies, the statistical heterogeneity of this meta-analysis was very high ($I^2 = 98.7\%$). Differences in outcome ascertainment may contribute to this: 3 of the studies[31,43,44] estimated the prevalence of overdose, as opposed to all methods of self-harm. One of these[31] did not distinguish between intentional and accidental overdose. Furthermore, not all hospital discharge databases measure the same thing: some record emergency department (ED) discharges only[35,58]; some, inpatient discharges only[61]; and some, a combination of ED, inpatient, and observational unit discharges.[45,60] There were also differences in methods of cohort generation: some studies used data only on women with live births,[31,35,36,58–60] while others also included women suffering fetal death/infant death.[33,43,44,54]

The remaining 6 studies[34,38,40,41,47,55] were of recruited women, as opposed to administrative data (see Table 1). The prevalence of suicide attempts in 1 large prospective cohort study[38] done in the Bristol area of the United Kingdom was 0.18% (N = 9,460, n = 17; G Hammerton, PhD,[38] written communication about previously unpublished data via e-mail, 2018). Five smaller cross-sectional studies[34,40,41,47,55] of women accessing maternity care, usually in 1 catchment area, reported self-harm measured using questionnaires or diagnostic interviews with prevalence between 0% and 2.39%. A pooled estimate for these studies was not possible because the questionnaire asked only about self-harm occurring within the last month or because women were asked about self-harm "during the pregnancy" when they were at various non-term stages of gestation.[40,41] The overall range of prevalence of self-harm in pregnancy from these 6 non-administrative studies was 0%–2.39% (median = 0.52%; IQR, 0%–1.7%).

Our search also identified 6 studies[25,37,46,51,52,57] reporting the prevalence of self-harm during pregnancy in women with SMI (see Table 1). Prevalence range was 0%–23.78% (median = 2.16%; IQR, 0.26%–7.9%). These were studies of diverse study populations, including a population retrospective data-linkage cohort study of women with schizophrenia accessing emergency care in Canada[52]; an electronic health record derived cohort of women with psychotic or bipolar illnesses accessing secondary mental

Table 1. Studies Reporting Prevalence of Self-Harm in Pregnancy

Study	Design	Population	Outcome	Outcome Measure	Prevalence	Representativeness	Risk of Misclassification Bias
Flint et al 2002[31]	Administrative data–linkage cohort	Women giving birth to live-born babies in hospital in Jutland, Finland, 1977–1999 N = 132,934	Births to women hospitalized for poisoning in pregnancy (intent not specified) n = 30	Hospital administrative database *ICD-8* codes 960.09–993.39 *ICD-10* codes T360–T709	23/100,000 livebirths	High	High
Gandhi et al 2006[33]	Administrative data–linkage cohort	Women delivering live-born or stillborn infants beyond 20 weeks' gestation in California, 1991–1999 N = 4,833,286	Deliveries to women hospitalized for suicide attempt after 19 weeks' gestation n = 2,132	Hospital administrative database *ICD-9* codes E950–E959	40/100,000 pregnancies	High	High
Greenblatt et al 1997[36]	Administrative data–linkage cohort	Mothers aged 15–44 y of live-born babies whose birth was registered with Maryland State Vital Statistics in Maryland, 1979–1990 N = 814,420	Hospitalizations for suicide attempt n = 219	Hospital administrative database *ICD-9* codes E950–E959	27/100,000 livebirths	High	High
McClure et al 2011[43]	Administrative data–linkage cohort	Women aged 15–44 y delivering live-born or stillborn infants at 20–42 weeks' gestation in California, 2000–2004 N = 2,285,540	Hospitalizations for intentional self-poisoning n = 513	Hospital administrative database *ICD-9* codes E950–E952	22/100,000 pregnancies	High	High
McClure et al 2011[44]	Administrative data–linkage cohort	Women aged 15–44 y delivering live or stillborn infants at 20–42 weeks' gestation in California, 2000–2004 N = 2,215,920	Women with hospitalizations for intentional acute poisoning in pregnancy n = 430	Hospital administrative database *ICD-9* codes E950–E952	20/100,000 pregnancies	High	High
Weiss 1999[58]	Administrative data–linkage cohort	Mothers aged 15–44 y of live-born babies whose births were registered in Pennsylvania, 1995 N = 150,000 births (calculated from raw data)	Hospitalizations for self-inflicted injury during pregnancy n = 84	Hospital administrative database of emergency department discharges *ICD-9* codes (E-code not specified)	56/100,000 live births (self-injury)	High	High
Wiencrot et al 2012[60]	Administrative data–linkage cohort	Mothers of live-born babies born at more than 20 weeks' gestation or 350 g in weight in Massachusetts, 2001–2004 N = 176,845	Hospitalizations for self-inflicted injury n = 102	Hospital administrative database of inpatient, emergency and observation unit discharges *ICD-9* codes (E-code not specified)	58/100,000 livebirths	High	High
Zhong et al 2016[61]	Administrative data–linkage cohort	Women admitted to hospital during pregnancy or delivery in the United States, 2012[a] N = 4,176,646	Suicide attempt n = 1,365	Hospital administrative database of inpatient discharges *ICD-9* codes E950–E959	33/100,000 pregnancy or delivery-associated hospitalizations	High	High
Hammerton et al 2015[38]	Prospective cohort	Women living in Avon, UK, enrolled while pregnant and with expected delivery between April 1, 1991, and December 31, 1992, who gave birth to singletons surviving until at least 1 year of age and who completed all 3 questionnaires in the perinatal period N = 9,460[a]	Suicide attempt n = 17[a] (all of pregnancy)	Combined result from 2 ALSPAC questionnaires administered at 2 time points: 18 weeks' gestation—suicide attempt since pregnant 8 weeks' postnatal—suicide attempt since mid-pregnancy	0.18%[a]	High	Low
Girardi et al 2011[34]	Cross-sectional	Women admitted for childbirth to San Pietro Hospital, Rome, March–December 2009 N = 92	Suicide attempt in the last 12 mo n = 0	Suicidal History Self-Rating Screening Scale, ie, suicide attempt in the last 12 mo	0%	Low	Low

(continued)

Table 1 (continued).

Study	Design	Population	Outcome	Outcome Measure	Prevalence	Representativeness	Risk of Misclassification Bias
Lara and Letechipia 2009[40]	Cross-sectional	Pregnant women seeking antenatal care at various stages of gestation in waiting rooms of 4 health centers in Mexico City, Mexico N = 117	Suicide attempts in the current pregnancy n = 1	Questionnaire adapted from CES-D	0.85%	Medium	Medium
Lara et al 2006[41]	Cross-sectional	Pregnant women seeking antenatal care at various stages of gestation in waiting rooms of a tertiary referral hospital for high-risk pregnancies, a gynecologic clinic, and a health center in Mexico City, Mexico N = 300	Suicide attempts in the last mo n = 0[b]	Questionnaire adapted from CES-D	0%[b]	Medium	Medium
Onah et al 2017[47]	Cross-sectional	Pregnant women attending the Midwife Obstetric Unit for their first antenatal visit (regardless of gestation) in Hanover Park, South Africa N = 376	Suicide attempts in the last mo n = 9	MINI	2.39%	Medium	Medium
Supraja et al 2016[55]	Cohort study baseline data	Pregnant women at 5–20 weeks' gestation attending a hospital antenatal clinic in South Bangalore, India, and agreeing to take part in a cohort study on maternal mental health N = 462	Suicide attempts in the current pregnancy n = 8	Questionnaire adapted from Suicidal Behaviors Questionnaire–Revised	1.7%	Medium	Medium
Rochon-Terry et al 2016[52]	Administrative data–linkage cohort	All women in Ontario, Canada, with schizophrenia who had a live birth 2003–2011. N = 1,433	Self-harm emergency department visits n = 9 women	*ICD-10* codes for intentional self-harm (X60–X84) and for sequelae of events of undetermined event that included a cut/piercing (Y10–Y19, Y28).	Calculation: 0.6%	High	High
Brameld et al 2017[25]	Historical cohort using administrative data linkage and case note review	All women with schizophrenia, bipolar disorder, or major depression treated by inpatient or outpatient services during pregnancy at the State Psychiatric Hospital in Western Australia 1966–1996 and gave birth 1980–1992 164 births, N = 138 women	Suicide attempt (n = 22 women, 24 attempts) and non-suicidal self-injury (occurred in 15 pregnancies)	Case note review using structured checklist developed for the study	Reported: 14.6% suicide attempt, 9% non-suicidal self-injury Calculation: 23.78%	Medium	Medium
Newport et al 2007[46]	Secondary analysis of women in a prospective cohort	Pregnant women at various stages of gestation presenting to tertiary referral centers specializing in perinatal mental illness and perinatal epilepsy in Atlanta, Georgia, enrolled in a study on neuropsychiatric illness and medication in pregnancy N = 380[c]	Suicide attempts or gestures n = 1[c]	HDRS and AEM[c]	0% From HDRS but 0.26% from AEM[c]	Medium	Medium
Pope et al 2013[51]	Secondary analysis of women in a prospective cohort study	Pregnant women at >24 weeks' gestation with an existing diagnosis of depression or bipolar disorder attending a perinatal clinic in London, Ontario, Canada, 2005–2010, recruited for a study of the course of mood disorders during pregnancy and followed up throughout the postnatal year N = 147	Attempts at suicide n = 0	HDRS	0%	Low	Medium

(continued)

Table 1 (continued).

Study	Design	Population	Outcome	Outcome Measure	Prevalence	Representativeness	Risk of Misclassification Bias
Taylor et al 2016[57]	Historical cohort using clinical informatics	All pregnant women with serious mental illness in contact with 1 secondary mental health care service in South London, UK, 2007–2011 N = 420	Self-harm events n = 33 women, 52 events	Natural language processing of clinical notes	7.9%	High	Low
Freitas et al 2008[32]	Case-control	Random sampling of teenagers aged 14–18 y accessing outpatient public antenatal care in Piracicaba, Brazil, attending for 20-wk ultrasound scan N = 110	Attempted suicide during the current pregnancy n = 0	Structured interview derived from Multisite Intervention Study on Suicidal Behaviors (SUPRE-MISS)	0%	Medium	Medium
Gressier et al 2017[37]	Cross-sectional audit	Women admitted to Mother and Baby Units in France for at least 5 consecutive d, 2001–2010 N = 1,439	Suicide attempt n = 49 women	Marcé Clinical Checklist applied to clinical notes	3.71%	Medium	Medium
Pinheiro et al 2012[49]	Cross-sectional	Consecutive sampling of teenagers aged 13–18 y accessing outpatient public antenatal care in Pelotas, Brazil N = 828	Attempted suicide in the last mo n = 11	MINI	1.3%	Medium	Medium

[a]G. Hammerton, PhD; e-mail communication, 2018.
[b]M. A. Lara, PhD; e-mail communication, 2018.
[c]D. J. Newport, MD; e-mail communication, 2018.
Abbreviations: AEM = adverse event monitoring, ALSPAC = Avon Longitudinal Study of Parents and Children, CES-D = Center for Epidemiologic Studies–Depression scale, HDRS = Hamilton Depression Rating Scale, MINI = Mini-International Neuropsychiatric Interview.

health care in England[57]; women admitted to multiple Mother and Baby Units across France[37]; and cohorts of women with neuropsychiatric[46] and mood disorders.[51]

Our search also identified 2 cross-sectional studies[32,49] reporting the prevalence of self-harm in pregnancy in teenaged women (see Table 1). Both study populations were of women of generally lower socioeconomic status accessing routine antenatal services in the Brazilian public health care system.[32] Prevalence was 0% (N = 110)[32] and 1.3% (N = 828, n = 11),[49] respectively.

Studies reporting the prevalence of postpartum self-harm. Of the 17 studies listed in Table 2, 10 studies[23,30,35,38,48,50,53,54,56,59] reported the prevalence of self-harm during the postpartum period (see Table 2). The overall range of prevalence was 0%–2.41% (median = 0.17%; IQR, 0.04%–1.05%).

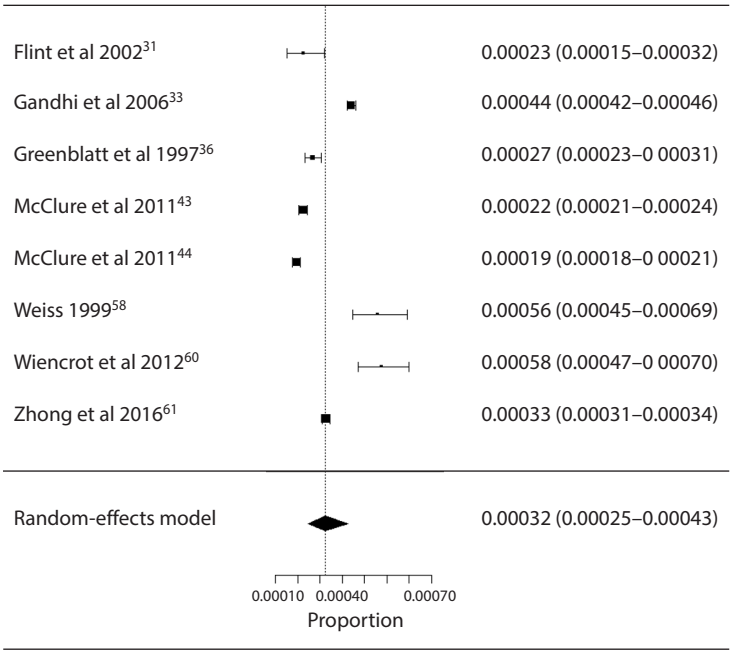
Four of these studies[23,35,54,59] used hospital attendances and administrative data to measure postpartum self-harm (see Table 2). The pooled prevalence was 33 per 100,000 births (95% CI, 14–78; see Figure 3). As with our meta-analysis of self-harm during pregnancy, the statistical heterogeneity was very high (I^2 = 99.4%).

The 6 remaining non-administrative studies[30,38,48,50,53,56] used samples of recruited women and asked about self-harm using interviews or questionnaires (see Table 2). The prevalence of postpartum self-harm up to 8 months postpartum within the Avon Longitudinal Study of Parents and Children (ALSPAC), a UK birth cohort (supplied by G Hammerton, PhD,[38] written communication about unpublished data via e-mail, 2018), was 0.21% (N = 9,460, n = 20). The other 5 studies estimated self-harm in women either recruited from antenatal care and followed up into the postpartum period[30,50] or recruited after birth.[48,53,56] The prevalence of postpartum self-harm from these 6 non-administrative studies was 0%–2.41% (median = 1.03%; IQR, 0.21%–1.6%).

Regarding postpartum self-harm in women with SMI (see Table 2), prevalence from 7 studies[24,27,37,39,42,51,52] was 0%–21.9% (median = 7.97%; IQR, 0%–18%). This wide range again reflects the heterogeneity of both source population and outcome measures.

Studies reporting prevalence of self-harm across the perinatal period. Two studies[26,45] did not disaggregate pregnancy from the postpartum year and investigated self-harm occurring throughout the whole perinatal period (see Supplementary Table 1). Nannini et al[45] used a statewide administrative database recording health care data on all women residing in Massachusetts delivering babies between 2001 and 2004 (N = 100,051). They found 168 self-harm events requiring inpatient, observation unit, or emergency department care from all licensed acute care hospitals in Massachusetts per 100,000 women. One case-note review[26] of 406 women referred to an oversubscribed outpatient perinatal service in Gosford Australia with a selective admissions

Figure 2. Prevalence of Self-Harm in Pregnancy



process (therefore women likely to be higher risk and non-representative of the population) reported that 16.3% of women (N = 406, n = 66) had engaged in self-harm during their assessment and treatment period.

Correlates

Correlates of self-harm in pregnancy. The most detailed evidence on correlates of self-harm in pregnancy was the retrospective data-linkage cohort study by Gandhi et al[33] examining around 5 million Californian women. Correlates of self-harm in pregnancy included being younger (aged ≤ 20 years: OR = 2.88; 95% CI, 2.48–3.36); multiparous (parity 2: OR = 1.22; 95% CI, 1.06–1.41); unmarried (married status OR = 0.68; 95% CI, 0.61–0.76); and having less than a high-school education and a diagnosis of substance misuse (OR = 14.2; 95% CI, 12.62–15.98). A diagnosis of psychiatric illness ($P < .001$; OR and 95% CI not provided) was also associated, although the authors report these data were unreliable. Some of these correlates have also been found in other studies: Zhong et al[61] found evidence linking self-harm with depression and younger age in their administrative data–linkage study (see Table 1 for study details). A much smaller case-control study[29] of pregnant women admitted to a Hungarian toxicology unit after overdosing (study population n = 559) linked overdose in pregnancy with reduced maternal education (9 years; calculated 95% CI, 8.8–9.19 years vs 13.3 years; calculated 95% CI, 13.1–13.5 years) and lower neonatal gestational age ($t = -2.34$; $P = .02$, model adjusted for birth order, smoking, and alcohol), although interpretation is limited as the control group was women recruited from periconception care, in which, in contrast with the exposure group, all pregnancies were planned.

Gandhi et al[33] also investigated obstetric and neonatal outcomes for women who self-harm in pregnancy. After adjustment for the correlates described earlier, women who self-harmed in pregnancy were more likely to have premature labor (aOR = 1.28; 95% CI, 1.1–1.49), deliver by caesarean section (adjusted OR = 1.2; 95% CI, 1.08–1.33), and require blood transfusion (aOR = 2.01; 95% CI, 1.22–3.29). Their infants were more likely to suffer respiratory distress syndrome (aOR = 1.41; 95% CI, 1.07–1.86) and be of low birth weight (aOR = 1.25; 95% CI, 1.08–1.44), a difference that remained significant when controlled for gestational age (aOR = 1.67; 95% CI, 1.41–1.98). A subanalysis of women who delivered at the time of the self-harm (n = 30) and women who delivered later (n = 2,157), compared with pregnant women who had not self-harmed, found that in the late delivery group (n = 2,157), maternal and fetal outcomes were similar to those in the main analysis discussed previously. However, women who delivered immediately (n = 30) were more likely to experience premature delivery (aOR = 3.56; 95% CI, 1.58–8.02) as well as premature labor (aOR = 4.61; 95% CI, 1.96–10.86), neonatal (aOR = 4.92; 95% CI, 1.05–22.99), and infant death (aOR = 4.93; 95% CI, 1.05–23.02) as well as infant respiratory distress syndrome (aOR = 5.8; 95% CI, 1.7–19.82). Interestingly, the association with low birth weight in this group became nonsignificant after control for gestational age.

We found 2 studies that investigated correlates of self-harm during pregnancy in women with SMI. Taylor et al[57] generated a South London cohort of pregnant women with psychotic or bipolar illnesses using deidentified comprehensive electronic health records and found that women who self-harmed in pregnancy, compared with

Table 2. Studies Reporting Prevalence of Postpartum Self-Harm

Study	Study Design	Population	Outcome	Outcome Measure	Prevalence	Representativeness	Risk of Misclassification Bias
Appleby and Turnbull 1995[23]	Case-control	Births in South London, UK, from census data N = 3,991	Parasuicide n = 5	Consecutive presentations to 1 South London emergency department over 6 mo, assessed through patient contact and their medical records, then extracting which ones had delivered a baby in the last year	125/100,000 births	Medium	Medium
Glasser et al 2018[35]	Administrative data–linkage cohort	Women aged 18–44 y who registered births in Israel 2006–2015 N = 1,569,445 (not stated, calculated based on data in article)	Suicide attempt resulting in emergency department visit n = 565	Hospital administrative database of emergency department discharges *ICD-9* codes E950–E959	36/100,000 population	High	High
Schiff and Grossman 2006[54]	Administrative data–linkage cohort	Mothers who registered births or fetal death in Washington state 1987–2001 N = 1,194,319	Suicide attempt n = 520	Hospital administrative database *ICD-9* codes E959–E959	44/100,000 pregnancies	High	High
Weng et al 2016[59]	Administrative data–linkage cohort	Women who registered livebirths in Taiwan 2000–2012 N = 1,521,107	Suicide attempt n = 139	Hospital administrative database *ICD-9* codes E950–E959	10/100,000 live births	High	High
Hammerton et al 2015[38]	Prospective cohort	Women living in Avon, UK, enrolled while pregnant and with expected delivery between March 1, 1991, and December 31, 1992, who gave birth to singletons surviving until at least 1 y of age and who completed all 3 questionnaires in the perinatal period N = 9,460[a]	Suicide attempt n = 20[a]	ALSPAC questionnaire, administered at 8 mo postnatal, asking about suicide attempt since child's birth	0.21%[a]	High	Medium
Dewing et al 2013[30]	Nested prospective cohort	Pregnant women recruited by outreach workers to take part in a study on perinatal depression as part of a wider cohort study on maternal and child health and nutrition in Khayelitsha, South Africa, interviewed 3 mo after birth N = 249	Suicidal and non-suicidal self-injurious behavior in the last month n = 3 and n = 3, respectively (no overlap)[b]	MINI	Calculation: 2.41%[b]	Low	Medium
Pinheiro et al 2008[48]	Cross-sectional	Women between 30 and 120 d postpartum screened for a trial of psychotherapy for postpartum depression, including women in the community from the catchment area of 1 hospital in Pelotas, Brazil, and women referred by health practitioners N = 317	Suicide attempt n = 5	MINI	1.6%	Low	Medium
Pinheiro et al 2012[50]	Cross-sectional	Women recruited from routine antenatal care within the national public health system in Pelotas, Brazil, interviewed 45–90 d after birth N = 190	Suicide attempt in the last mo n = 2[c]	MINI	1.05%[c]	Medium	Medium
Saurel-Cubizolles et al 2007[53]	Cross-sectional	Women aged 25–39 y at home in France who had a baby in the last 12 mo and agreed to participate in the National Survey of Violence against Women in France survey N = 307	Suicide attempt in the last 12 mo n = 0	Unvalidated telephone interview question	0	Medium	High

(continued)

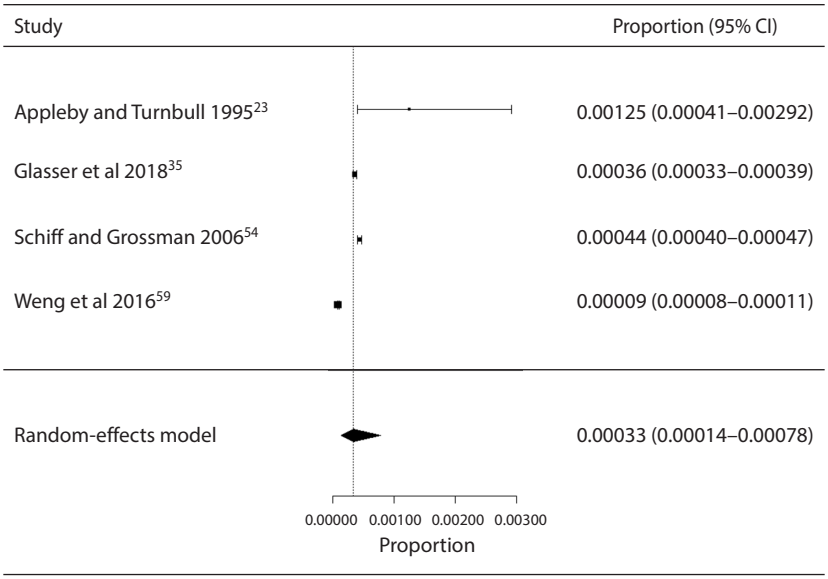
Table 2 (continued).

Study	Study Design	Population	Outcome	Outcome Measure	Prevalence	Representativeness	Risk of Misclassification Bias
Tavares et al 2012[56]	Cross-sectional	Mothers who had given birth while at maternity wards in Pelotas, Brazil, interviewed at home 30–90 d after birth N = 919	Suicide attempt in the last mo n = 9[d]	MINI	1%[d]	Medium	Medium
Coker et al 2017[27]	Secondary analysis of women in a prospective cohort study	Pregnant women at < 20 weeks' gestation presenting to a perinatal mental illness and perinatal epilepsy tertiary referral service at Emory University in Atlanta, Georgia, followed at 4- to 8-wk intervals during pregnancy and the postnatal year N = 625[e]	Attempts at suicide n = 0[e]	HDRS	0% in first 13 wk postpartum[e]	Medium	Medium
Babu et al 2008[24]	Cross-sectional	Consecutive admissions to the National Institute of Mental Health and Neurosciences in Bangalore, India, with severe mental illness of onset within 6 mo of delivery, March 2006–September 2007 N = 84	Attempts at suicide n = 15	Unstructured patient interview ± collateral history	18%	Low	Medium
Luis and de Oliveira 1998[42]	Cross-sectional	Women with a diagnosis of *ICD-9* 684.4 mental disorders in pregnancy, childbirth, and puerperium presenting to the Psychiatric Emergency or Midwifery Clinics of 1 University hospital in Ribeirão Preto, São Paulo, Brazil, 1988–1998 N = 135	Attempts at suicide n = 16	Search for diagnostic codes among medical records	11.86%	Medium	High
Healey et al 2013[39]	Audit	Pregnant women referred to 1 perinatal mental health service in Liverpool, UK, due to a previous history of postpartum depression N = 73	Self-harm n = 16	Medical record review	21.9% of referrals had self-harmed during previous episode of postpartum depression	Low	Medium
Rochon-Terry et al 2016[52]	Administrative data–linkage cohort	All women in Ontario, Canada, with schizophrenia who had a live birth 2003–2011. N = 1,433	Self-harm emergency department visits n = 13	*ICD-10* codes for intentional self-harm (X60–X84) and for sequelae of events of undetermined event that included a cut/piercing (Y10–Y19, Y28).	Calculation: 0.9%	High	High
Gressier et al 2017[37]	Cross-sectional audit	Women admitted to Mother and Baby Units in France for at least 5 consecutive d, 2001–2010 N = 1,439	Suicide attempt n = 105	Marcé Clinical Checklist applied to clinical notes	7.97%	Medium	Medium
Pope et al 2013[51]	Secondary analysis of women in a prospective cohort study	Pregnant women at > 24 weeks' gestation with an existing diagnosis of depression or bipolar disorder attending a perinatal clinic in London, Ontario, Canada, 2005–2010, recruited for a study on the course of mood disorders during pregnancy and followed up throughout the postnatal year N = 147	Attempts at suicide n = 0	HDRS	0%	Low	Medium

[a]G. Hammerton, PhD, e-mail communication, 2018. [b]A. Tsai, PhD, e-mail communication, 2018. [c]R. Pinheiro, PhD, e-mail communication, 2018. [d]L. Quevedo, PhD, e-mail communication, 2018. [e]J. Coker, MD, e-mail communication, 2018.

Abbreviations: ALSPAC = Avon Longitudinal Study of Parents and Children, HDRS = Hamilton Depression Rating Scale, MINI = Mini-International Neuropsychiatric Interview.

Figure 3. Prevalence of Postpartum Self-Harm



women who did not self-harm, were, after adjustment, younger (aOR = 0.91; 95% CI, 0.85–0.98), more likely to have smoked prior to pregnancy (aOR = 3.64; 95% CI, 1.3–10.19), and more likely to have self-harmed within 2 years prior to conception (aOR = 2.55; 95% CI, 1.05–6.5). An association between perinatal self-harm and smoking during pregnancy was found in a French study[37] of clinical data from women admitted to MBUs across France (aOR = 1.87; 95% CI, 1.01–3.49), as well as associations with alcohol use (aOR = 2.37; 95% CI, 1.02–5.53) and a history of miscarriage (aOR = 2.29; 95% CI, 1.18–4.41).

Correlates of postpartum self-harm. We found 3 administrative data–linkage studies, all of which were using hospital attendances for self-harm as the outcome measure. Comtois et al[28] compared postpartum women hospitalized for attempted suicide (n = 355) in Washington State between 1992 and 2001 with controls (n = 1,420) selected at random and frequency-matched to cases on year of birth/death. After adjustment for gravidity and fetal/infant death, self-harm was associated with younger age (< 20 years: aOR = 3.8; 95% CI, 1.8–7.8), less than high school education (aOR = 3.9; 95% CI, 2.1–7.2), use of public health insurance (aOR = 1.5; 95% CI, 1.1–2.1), substance misuse (aOR = 6.2; 95% CI, 2.8–13.9), and, in a dose-dependent fashion, psychiatric history (1 hospitalization: aOR = 10.7; 95% CI, 6.5–17.5; ≥ 2 hospitalizations: aOR = 25.5; 95% CI, 11.8–55.2).

Using the same methodology and population, but over a longer time period (1987–2001), Schiff and Grossman[54] found, adjusting for maternal age and marital status, prenatal smoking (aOR = 2.7; 95% CI, 2.2–3.4), parity (2: aOR = 1.8; 95% CI, 1.4–2.4; ≤ 3: aOR = 3.1; 95% CI, 2.4–4.2), and fetal/infant death (aOR = 3.1; 95% CI, 1.4–7.3) were associated with postpartum suicide attempts.

In Taiwan, Weng et al[59] compared 139 women who had attempted suicide within 1 year of birth and 1,390 women matched for age and year of delivery. Women who had attempted suicide were more likely to have never been married (aOR = 2.06; 95% CI, 1.09–3.88), been widowed or divorced (aOR = 5.06; 95% CI, 2.15–11.93), had a caesarean section (aOR = 2.38; 95% CI, 1.56–3.62), had a history of suicide attempts prior to delivery (aOR = 32.34; 95% CI, 3.52–297.11), and had a diagnosis of postpartum depressive disorder (aOR = 20.27; 95% CI, 8.99–45.73).

Only 1 study of postpartum self-harm in women with SMI was found. The study by Gressier et al[37] of women admitted to MBUs in France found that postpartum suicide attempts were associated with younger maternal age (aOR = 0.96; 95% CI, 0.93–0.99). Among the mental disorders considered as covariates, they found that suicide attempts were associated with mood disorders—major depressive episode (aOR = 2.72; 95% CI, 1.40–5.26) and recurrent depression (aOR = 4.12; 95% CI, 2.25–7.51).

DISCUSSION

We found that perinatal self-harm was rare when measured using hospital discharge data, less so when measured using interviews or questionnaires (overall range in pregnancy, 0%–2.39%; median = 0.0004%; IQR, 0.0002%–0.18%; overall range postpartum, 0%–2.41%; median = 0.17%; IQR, 0.04%–1.05%), and more common in women with SMI (range, 0%–23.78%; median = 2.16%; IQR, 0.26%–7.9% in pregnancy; range, 0%–21.9%; median = 7.97%; IQR, 0%–18% postpartum). Women who self-harm perinatally, compared with perinatal women who do not, appear to be younger,[28,33,61] unmarried,[29,33,59] and multiparous[33,62] and have mental health[28,33,59] and substance misuse[28,33] disorders and less education.[28,29] Importantly, there is some evidence that women who self-harm perinatally may be at increased risk of adverse obstetric/neonatal outcomes.[29,33,54] There are

limited data on correlates and obstetric/neonatal outcomes in women with SMI who self-harm perinatally.

We found self-harm was more common in the postpartum year than in pregnancy, particularly in women with SMI, with a median prevalence postpartum of 7.97% compared to median 2.16% in pregnancy. This finding is important clinically, as the postpartum period is a time when maternity service input is usually scaled down and caring for an infant may mean women are more socially isolated or have more difficulty accessing care.

Correlates of self-harm occurring in pregnancy and the postpartum were similar, with younger age one of the most consistently reported findings. Most of the studies in our review (including 2 of teenage women, which reported surprisingly low prevalence estimates: 0%[32] and 1.3%[49]) were conducted before the recent rise in rate of self-harm in young women,[1,2] so future research needs to investigate perinatal self-harm in young women who may be at higher risk. Indeed, a recent article[63] found very high rates of mental disorder in pregnant women under 25 years of age compared with those 25 and over.

It is interesting to note that a prior history of self-harm was reported as a correlate of perinatal self-harm.[59] Given the strong association self-harm has with mental disorder outside the perinatal period,[8] this finding could suggest that women who self-harm perinatally may be more likely to do so in the context of preexisting mental health issues, rather than new-onset disorders, although this difference requires further investigation.

Overall, the profile of correlates suggests that women who self-harm in the perinatal period are likely to be vulnerable. The highest prevalence estimates[30,47] we found were from studies of women from regions with high baseline levels of poverty, substance misuse and violence.

Despite the fact that we found perinatal self-harm to be much more common in women with SMI, we identified limited data (only 2 studies[37,57]) on correlates in this population, with smoking the only consistent finding. This evidence gap is important. Nevertheless, there remain significant evidence gaps around whether common risk factors for self-harm such as physical or sexual abuse (past or present), adverse childhood experiences, trauma, and partner violence are associated with perinatal self-harm, in part because these exposures are not included in routinely collected administrative datasets. While some of the studies in our review did collect information on these exposures, we were unable to establish these as correlates of acts of perinatal self-harm, as within those studies they were analyzed on the basis of composite measures of both suicidal ideation and self-harm (suicidal behavior[47] or suicidality[30,55]).

We also found evidence that perinatal self-harm was associated with adverse obstetric and neonatal outcomes.[29,33,54] One hypothesis could be that perinatal self-harm is a proxy marker for other factors that contribute to these adverse outcomes. In the subanalysis by Gandhi et al,[33] neonates born to mothers who delivered at the time of the self-harm event were more likely to die. However, there were also adverse outcomes seen in mothers who were able to continue with the pregnancy and deliver later, such as low birth weight. The authors hypothesize that acts of self-harm, while not requiring or precipitating immediate delivery, could initiate a pathway to placental insufficiency, manifesting as low birth weight. This hypothesis is supported by other work on more general maternal injuries by Schiff et al[62] that suggests any injury, even when nonsevere, is associated with an increased risk of adverse obstetric and neonatal outcomes. Seen together, these findings indicate that self-harm in pregnancy is important, regardless of severity or whether it is associated with immediate delivery. The higher prevalence of negative obstetric outcomes might also be a result of fetal programming in vulnerable women. Perinatal self-harm could be marker for vulnerability (eg, poor nutrition, substance misuse), and it is already known that some maternal vulnerabilities are associated with adverse obstetric outcomes.[10] Our search identified no evidence regarding the obstetric and neonatal outcomes in women with SMI who self-harm perinatally, which is a further evidence gap considering the higher baseline rates of obstetric and neonatal complications in this population.[64,65]

Strengths

We used a broad search strategy with no language restrictions. We considered all self-harm and made no distinctions based on intentionality. We were able to include previously unpublished data from a UK pregnancy cohort (G Hammerton PhD,[38] written communication via e-mail, 2018) and provide, to our knowledge, the first-ever meta-analysis of perinatal self-harm. While the statistical heterogeneity is high, we describe the methodological heterogeneity most likely underlying it, hence providing direction for future research.

Limitations

The main limitation of our study was that, for the purposes of our research question, many studies in our review were of low or medium representativeness, with a medium or high risk of misclassification bias. Measuring stigmatized events like self-harm using hospital discharges, particularly when they occur in pregnancy (when women may have additional concerns about being perceived as unfit to be a parent[66]), is likely to incur misclassification bias. In general, most injured women attending an emergency department are not admitted, meaning studies of only inpatient discharges are further limited.[58] Most women who self-harm do not seek medical care,[1] so the utility of measuring self-harm in this way is inherently limited. Studies in which women were asked about self-harm subverted this limitation, but women were often asked only about self-harm in the last month[30,41,47,50,56] or the current pregnancy, so those estimates will not reflect the true period prevalence. Similarly, cross-sectional studies of postpartum women recruited at various stages before the end of postpartum year[24,53] and cohort studies in which women were followed only for a portion of the postpartum year[27,38] are also limited. In summary, limitations in the

current literature mean that current prevalence of perinatal self-harm is likely to be underestimated.

CONCLUSIONS

Perinatal self-harm appears to be rare, though current evidence is likely to underestimate the prevalence due to methodological limitations. Young, unmarried, socioeconomically disadvantaged women with mental disorder or substance misuse problems appear to be most at risk, particularly in the postpartum period. Concerningly, women who self-harm perinatally appear to be at greater risk of adverse neonatal and obstetric outcomes. In contrast to in the general population, perinatal self-harm appears to be relatively common in women with SMI, yet there is comparatively little research on correlates or outcomes in this population. It is not yet known whether routine inquiry into self-harm would lead to higher numbers of disclosures and, as a result, postnatally mitigate risk to the mother and her infant.

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REFERENCES

1. McManus SBP, Jenkins R, Brugha T. *Mental Health and Wellbeing in England: Adult Psychiatric Morbidity Survey 2014*. Leeds, UK: NHS Digital; 2016.
2. Australian Institute of Health and Welfare. *Suicide and Hospitalised Self-Harm in Australia: Trends and Analysis*. Injury Research and Statistics Series no. 93. Cat. no. INJCAT 169. Canberra, Australia: Australian Institute of Health and Welfare; 2014.
3. Klonsky ED. The functions of deliberate self-injury: a review of the evidence. *Clin Psychol Rev*. 2007;27(2):226–239.
4. Lindahl V, Pearson JL, Colpe L. Prevalence of suicidality during pregnancy and the postpartum. *Arch Women Ment Health*. 2005;8(2):77–87.
5. Knight M, Tuffnell D, Kenyon S, et al; MBRRACE-UK. Saving Lives, Improving Mothers' Care—Surveillance of maternal deaths in the UK 2011–13 and lessons learned to inform maternity care from the UK and Ireland Confidential Enquiries into Maternal Deaths and Morbidity 2009–13. National Perinatal Epidemiology Unit (NPEU) website. https://www.npeu.ox.ac.uk/downloads/files/mbrrace-uk/reports/MBRRACE-UK%20Maternal%20Report%202015.pdf. 2015.
6. Thornton C, Schmied V, Dennis CL, et al. Maternal deaths in NSW (2000–2006) from nonmedical causes (suicide and trauma) in the first year following birth. *BioMed Res Int*. 2013;2013:623743.
7. Khalifeh H, Hunt IM, Appleby L, et al. Suicide in perinatal and non-perinatal women in contact with psychiatric services: 15 year findings from a UK national inquiry. *Lancet Psychiatry*. 2016;3(3):233–242.
8. Haw C, Hawton K, Houston K, et al. Psychiatric and personality disorders in deliberate self-harm patients. *Br J Psychiatry*. 2001;178(1):48–54.
9. Suominen K, Isometsä E, Suokas J, et al. Completed suicide after a suicide attempt: a 37-year follow-up study. *Am J Psychiatry*. 2004;161(3):562–563.
10. Stein A, Pearson RM, Goodman SH, et al. Effects of perinatal mental disorders on the fetus and child. *Lancet*. 2014;384(9956):1800–1819.
11. Cantwell R, Clutton-Brock T, Cooper G, et al. Saving Mothers' Lives: reviewing maternal deaths to make motherhood safer: 2006–2008. The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. *BJOG*. 2011;118(suppl 1):1–203.
12. Ayre K, Howard L, Dutta R, et al. Acts of self-harm in the perinatal period: prevalence and risks. PROSPERO 2015 CRD42015028052. Published 2017. PROSPERO website. https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=28052.
13. Moher D, Liberati A, Tetzlaff J, et al; PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Med*. 2009;6(7):e1000097.
14. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing; 2013.
15. Nock MK, Borges G, Bromet EJ, et al. Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. *Br J Psychiatry*. 2008;192(2):98–105.
16. Skegg K. Self-harm. *Lancet*. 2005;366(9495):1471–1483.
17. Sit D, Luther J, Buysse D, et al. Suicidal ideation in depressed postpartum women: associations with childhood trauma, sleep disturbance and anxiety. *J Psychiatr Res*. 2015;66-67:95–104.
18. Cardillo VA, de Oliveria LC, dos Santos Monteiro JC, et al. Identification of depressive symptoms during postpartum in adolescent mothers. *Electronic Journal of Nursing*. 2016;18:e1149.
19. Asad N, Karmaliani R, Sullaiman N, et al. Prevalence of suicidal thoughts and attempts among pregnant Pakistani women. *Acta Obstet Gynecol Scand*. 2010;89(12):1545–1551.
20. Eggleston AM, Calhoun PS, Svikis DS, et al. Suicidality, aggression, and other treatment considerations among pregnant, substance-dependent women with posttraumatic stress disorder. *Compr Psychiatry*. 2009;50(5):415–423.
21. Manber R, Blasey C, Allen JJ. Depression symptoms during pregnancy. *Arch Women Ment Health*. 2008;11(1):43–48.
22. Suri R, Stowe ZN, Cohen LS, et al. Prospective longitudinal study of predictors of postpartum-onset depression in women with a history of major depressive disorder. *J Clin Psychiatry*. 2017;78(8):1110–1116.
23. Appleby L, Turnbull G. Parasuicide in the first postnatal year. *Psychol Med*. 1995;25(5):1087–1090.
24. Babu GN, Subbakrishna DK, Chandra PS. Prevalence and correlates of suicidality among Indian women with post-partum psychosis in an inpatient setting. *Aust N Z J Psychiatry*. 2008;42(11):976–980.
25. Brameld KJ, Jablensky A, Griffith J, et al. Psychotropic medication and substance use during pregnancy by women with severe mental illness. *Front Psychiatry*. 2017;8:28.
26. Coates D, Saleeba C, Howe D. Profile of consumers and their partners of a perinatal and infant mental health (PIMH) service in Australia. *Health Soc Care Community*. 2018;26(1):e154–e163.
27. Coker JL, Tripathi SP, Knight BT, et al. Rating scale item assessment of self-harm in postpartum women: a cross-sectional analysis. *Arch Women Ment Health*. 2017;20(5):687–694.
28. Comtois KA, Schiff MA, Grossman DC. Psychiatric risk factors associated with postpartum suicide attempt in Washington State, 1992–2001. *Am J Obstet Gynecol*. 2008;199(2):120.e1–120.e5.
29. Czeizel AE, Tomcsik M, Tímár L. Teratologic evaluation of 178 infants born to mothers who attempted suicide by drugs during pregnancy. *Obstet Gynecol*. 1997;90(2):195–201.
30. Dewing S, Tomlinson M, le Roux IM, et al. Food insecurity and its association with co-occurring postnatal depression, hazardous drinking, and suicidality among women in peri-urban South Africa. *J Affect Disord*. 2013;150(2):460–465.
31. Flint C, Larsen H, Nielsen GL, et al. Pregnancy outcome after suicide attempt by drug use: a Danish population-based study. *Acta Obstet Gynecol Scand*. 2002;81(6):516–522.
32. Freitas GV, Cais CF, Stefanello S, et al. Psychosocial conditions and suicidal behavior in pregnant teenagers: a case-control study in Brazil. *Eur Child Adolesc Psychiatry*. 2008;17(6):336–342.
33. Gandhi SG, Gilbert WM, McElvy SS, et al. Maternal and neonatal outcomes after attempted suicide. *Obstet Gynecol*. 2006;107(5):984–990.
34. Girardi P, Pompili M, Innamorati M, et al. Temperament, post-partum depression, hopelessness, and suicide risk among women

soon after delivering. *Women Health*. 2011;51(5):511–524.
35. Glasser S, Levinson D, Gordon ES, et al. The tip of the iceberg: postpartum suicidality in Israel. *Isr J Health Policy Res*. 2018;7(1):34.
36. Greenblatt JF, Dannenberg AL, Johnson CJ. Incidence of hospitalized injuries among pregnant women in Maryland, 1979–1990. *Am J Prev Med*. 1997;13(5):374–379.
37. Gressier F, Guillard V, Cazas O, et al. Risk factors for suicide attempt in pregnancy and the postpartum period in women with serious mental illnesses. *J Psychiatr Res*. 2017;84:284–291.
38. Hammerton G, Mahedy L, Mars B, et al. Association between maternal depression symptoms across the first eleven years of their child's life and subsequent offspring suicidal ideation. *PLoS One*. 2015;10(7):e0131885.
39. Healey C, Morriss R, Henshaw C, et al. Self-harm in postpartum depression and referrals to a perinatal mental health team: an audit study. *Arch Women Ment Health*. 2013;16(3):237–245.
40. Lara M, Letechipia G. Suicidal ideation and suicidal behavior in pregnancy. *Salud Mental*. 2009;32(5):381–387.
41. Lara Ma A, Navarro C, Navarrete L, et al. Depressive symptoms in pregnancy and associated factors in patients of three health institutions in Mexico City. *Salud Mental*. 2006;29(4):55–62.
42. Luis MA, de Oliveira ER. Mental disorders during pregnancy, childbirth and puerperium in the region of Ribeiro Preto-SP, Brazil [in Portuguese]. *Rev Esc Enferm USP*. 1998;32(4):314–324.
43. McClure CK, Katz KD, Patrick TE, et al. The epidemiology of acute poisonings in women of reproductive age and during pregnancy, California, 2000–2004. *Matern Child Health J*. 2011;15(7):964–973.
44. McClure CK, Patrick TE, Katz KD, et al. Birth outcomes following self-inflicted poisoning during pregnancy, California, 2000 to 2004. *J Obstet Gynecol Neonatal Nurs*. 2011;40(3):292–301.
45. Nannini A, Lazar J, Berg C, et al. Injury: a major cause of pregnancy-associated morbidity in Massachusetts. *J Midwifery Womens Health*. 2008;53(1):3–10.
46. Newport DJ, Levey LC, Pennell PB, et al. Suicidal ideation in pregnancy: assessment and clinical implications. *Arch Women Ment Health*. 2007;10(5):181–187.
47. Onah MN, Field S, Bantjes J, et al. Perinatal suicidal ideation and behaviour: psychiatry and adversity. *Arch Women Ment Health*. 2017;20(2):321–331.
48. Pinheiro RT, da Silva RA, Magalhães PV, et al. Two studies on suicidality in the postpartum. *Acta Psychiatr Scand*. 2008;118(2):160–163.
49. Pinheiro RT, da Cunha Coelho FM, da Silva RA, et al. Suicidal behavior in pregnant teenagers in southern Brazil: social, obstetric and psychiatric correlates. *J Affect Disord*. 2012;136(3):520–525.
50. Pinheiro RT, Pinheiro KA, da Cunha Coelho FM, et al. Brain-derived neurotrophic factor levels in women with postpartum affective disorder and suicidality. *Neurochem Res*. 2012;37(10):2229–2234.
51. Pope CJ, Xie B, Sharma V, et al. A prospective study of thoughts of self-harm and suicidal ideation during the postpartum period in women with mood disorders. *Arch Women Ment Health*. 2013;16(6):483–488.
52. Rochon-Terry G, Gruneir A, Seeman MV, et al. Hospitalizations and emergency department visits for psychiatric illness during and after pregnancy among women with schizophrenia. *J Clin Psychiatry*. 2016;77(4):541–547.
53. Saurel-Cubizolles MJ, Romito P, Lelong N. Women's psychological health according to their maternal status: a study in France. *J Psychosom Obstet Gynaecol*. 2007;28(4):243–249.
54. Schiff MA, Grossman DC. Adverse perinatal outcomes and risk for postpartum suicide attempt in Washington state, 1987–2001. *Pediatrics*. 2006;118(3):e669–e675.
55. Supraja TA, Thennarasu K, Satyanarayana VA, et al. Suicidality in early pregnancy among antepartum mothers in urban India. *Arch Women Ment Health*. 2016;19(6):1101–1108.
56. Tavares D, Quevedo L, Jansen K, et al. Prevalence of suicide risk and comorbidities in postpartum women in Pelotas. *Br J Psychiatry*. 2012;34(3):270–276.
57. Taylor CL, van Ravesteyn LM, van denBerg MP, et al. The prevalence and correlates of self-harm in pregnant women with psychotic disorder and bipolar disorder. *Arch Women Ment Health*. 2016;19(5):909–915.
58. Weiss HB. Pregnancy-associated injury hospitalizations in Pennsylvania, 1995. *Ann Emerg Med*. 1999;34(5):626–636.
59. Weng SC, Chang JC, Yeh MK, et al. Factors influencing attempted and completed suicide in postnatal women: a population-based study in Taiwan. *Sci Rep*. 2016;6(1):25770.
60. Wiencrot A, Nannini A, Manning SE, et al. Neonatal outcomes and mental illness, substance abuse, and intentional injury during pregnancy. *Matern Child Health J*. 2012;16(5):979–988.
61. Zhong QY, Gelaye B, Miller M, et al. Suicidal behavior-related hospitalizations among pregnant women in the USA, 2006–2012. *Arch Women Ment Health*. 2016;19(3):463–472.
62. Schiff MA, Holt VL, Daling JR. Maternal and infant outcomes after injury during pregnancy in Washington State from 1989 to 1997. *J Trauma*. 2002;53(5):939–945.
63. Lockwood Estrin G, Ryan EG, Trevillion K, et al. Young pregnant women and risk for mental disorders: findings from an early pregnancy cohort. *BJPsych Open*. 2019;5(2):e21.
64. Nguyen TN, Faulkner D, Frayne JS, et al. Obstetric and neonatal outcomes of pregnant women with severe mental illness at a specialist antenatal clinic. *Med J Aust*. 2013;199(suppl 3):S26–S29.
65. Thornton D, Guendelman S, Hosang N. Obstetric complications in women with diagnosed mental illness: the relative success of California's county mental health system. *Health Serv Res*. 2010;45(1):246–264.
66. Megnin-Viggars O, Symington I, Howard LM, et al. Experience of care for mental health problems in the antenatal or postnatal period for women in the UK: a systematic review and meta-synthesis of qualitative research. *Arch Women Ment Health*. 2015;18(6):745–759.

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Supplementary Material

Article Title: The Prevalence and Correlates of Self-Harm in the Perinatal Period

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Appendix 1: Electronic Search Strategy

	EMBASE	Medline	MIDIRS	PsycINFO	CINAHL	CENTRAL
	pregnan*	pregnan*	pregnan*	pregnan*	pregnan*	pregnan*
	Antenatal*	antenatal*	antenatal*	antenatal*	antenatal*	antenatal*
	postnatal*	postnatal*	postnatal*	postnatal*	postnatal*	postnatal*
	postpartum	postpartum	postpartum	postpartum	postpartum	postpartum
	prenatal*	prenatal*	prenatal*	prenatal*	prenatal*	prenatal*
	perinatal*	perinatal*	perinatal*	perinatal*	perinatal*	perinatal*
	puerper*	puerper*	puerper*	puerperal	puerperal	puerper*
	-	-	-	puerperium	puerperium	-
	attempt* of suicide	attempt* of suicide	attempt* of suicide	attempt* of suicide	attempt* of suicide	attempt of suicide
	suicidal adj behavio*r*	suicidal adj behavio*r*	suicidal adj behavio*r*	suicidal adj behavio*r*	Suicidal behavio*r*	"suicidal behaviour"
	suicid* adj attempt*	suicid* adj attempt*	suicid* adj attempt*	suicid* adj attempt*	suicid* attempt*	"suicide attempt"
	attempted adj suicide	attempted adj suicide	attempted adj suicide	attempted adj suicide	attempted suicide	"attempted suicide"
	suicidality	suicidality	suicidality	suicidality	suicidality	suicidality
	suicidal adj gesture*	suicidal adj gesture*	suicidal adj gesture*	suicidal adj gesture*	suicidal gesture*	"suicidal gesture"
	self adj injur*	self adj injur*	self adj injur*	self adj injur*	self injur*	"self injury"
	selfharm*	selfharm*	selfharm*	selfharm*	selfharm*	Selfharm*
	self adj harm*	self adj harm*	self adj harm*	self adj harm*	self harm*	"self harm"
	"self inflicted" adj injur*	"self inflicted" adj injur*	"self inflicted" adj injur*	"self inflicted" adj injur*	self inflicted injur*	"self inflicted injury"
	parasuicid*	parasuicid*	parasuicid*	parasuicide	parasuicid*	Parasuicide*
	-	-	-	parasuicidality	-	-
	-	-	-	parasuicidal	-	-
MeSH:	**suicide attempt**	**suicide, attempted**	N/A	**attempted suicide**	**suicide, attempted**	**Suicide, attempted**
MeSH:	**automutilation**	**self-injurious behaviour**	N/A	**self-injurious behaviour**	**Injuries, self-inflicted**	**self-injurious behaviour**

Supplementary Table 1: Studies Reporting Prevalence of Perinatal Self-Harm

Study	Study Design	Population	Outcome	Outcome Measure	Prevalence	Representativeness	Risk of Misclassification Bias
Coates 2018[26]	Audit	Women referred to the Gosford Perinatal and Infant Mental Health service in Australia 2010-2016 N=406	Self-harm n=not stated	Medical record review	16.26% during clinical assessment and treatment	Low	Medium
Nannini 2008[45]	Administrative data-linkage cohort	All women residing in Massachusetts who had a delivery (live birth or fetal death) ≥20 weeks' gestation or ≥350g; 2001-2004. N=100051	Intentional self-inflicted injury requiring inpatient, observation unit or emergency department care from all licensed acute care hospitals in Massachusetts n=168 events	Hospital administrative database of inpatient, observational and emergency department discharges ICD-9-CM E950–E958	Calculated: 0.17%	High	High