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The Association of Intimate Partner Violence with Breastfeeding Outcomes: A Systematic Review

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Abstract:

Objective*:* The association between intimate partner violence (IPV) and breastfeeding is unclear. We conducted a systematic review to summarise the evidence on breastfeeding outcomes following exposure of IPV prior to, during and after pregnancy.

Design: Systematic review.

Data sources: PubMed, Embase, SCOPUS and Global Health Library.

Eligibility criteria for selecting studies: We searched for published studies without study design and language restrictions (up to July 2019). Studies comparing various breastfeeding outcomes (initiation, duration and exclusive breastfeeding) in women with and without IPV exposure in any form (physical, psychological or sexual) and at any stage (one year pre, during or post pregnancy) were included. Study quality assessments (using the Newcastle-Ottawa scale) and data extraction were performed in duplicate. As meta-analysis proved unfeasible, results were summarised taking precision and quality into account.

Results: A total of 16 studies (participants n= 414,393) were included. Their analyses adjusted the IPV-outcome association for 48 different confounders. Ten studies found that exposure to IPV in any form and at any stage had a significant negative effect on a range of breastfeeding practices (study quality high=4, fair/low=6; participants=264,482). IPV exposure significantly shortened breastfeeding duration in 4/7 studies reporting this outcome (study quality high=1, fair/low=3; participants=250,017). It significantly led to early termination of exclusive breastfeeding in 5/10 studies reporting this outcome (study quality high=3, fair/low=2; participants=13,737). It significantly reduced breastfeeding initiation in 2/6 studies reporting this outcome (study quality high=1, fair=1; participants=11,187).

Conclusion*:* This evidence synthesis suggests, based on precise, well-controlled results from quality studies, that IPV exposure appears to affect some breastfeeding outcomes negatively. Individual patient data meta-analysis will be required to quantify the magnitude of the association for specific IPV-outcome combinations.

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PROSPERO registration number: CRD42019129353.

Strengths and limitations of this study:

- We included a proper quality assessment of included studies by a validated tool and a thorough evaluation of different outcome measures.
- We minimized the risk of error and subjectivity by duplicate assessment.
- The limitation of this systematic review reflects a weakness in the underlying evidence not in the robustness of reviewing.

- We reported the review complying with as many of the PRISMA and MOOSE guideline statements as possible. Our approach to making transparent these variations in evidence merits consideration as a strength of the review and we objectively exposed the complexity of the topic.

Introduction

Intimate partner violence (IPV), defined as any behavior that causes physical, psychological or sexual harm to those within an intimate relationship [1, 2], and it is mostly perpetrated by men against women [1-3]. Evidence points out that IPV have both immediate and long-life mental and physical health consequences, including depression and physical impairment in the victims [3-5]. World Health Organization (WHO) estimates that one in three women, are exposed to either physical and/or sexual violence from a current or former partner [2].

It has been found that IPV is linked to negative reproductive health outcomes, such as preterm birth, low birth weight, insufficient weight gain, miscarriage, induced abortion, difficulties or lack of attachment to the baby [3-6] and that it may influence the establishment of breastfeeding practices [7]. However, the association between breastfeeding and IPV is complex as it involves various forms of violence and types of breastfeeding practices. Further, there is no transparency in the acknowledgment of factors that may confound the association and hence here is variation in the statistical models used for analyses. This can be the reason why studies on the relationship of IPV with breastfeeding practices have been inconsistent. Interestingly, one study has even found that IPV exposure might improve breastfeeding initiation [8]. A recent systematic review has concluded that the majority amongst its 12 included papers (participants= 133,861) showed a negative association, reducing breastfeeding initiation and exclusive breastfeeding for the first six months [9]. The variety of the results it collated can be reflective of heterogeneity in the population enrolled, diversity in the measurements of both IPV exposure and breastfeeding outcomes, inconsistency in the modelling used for statistical analyses, and differences in the study designs and methods. Yet the review did not involve proper quality assessment and no detailed description of confounders was made.

As the extent of any association between IPV and breastfeeding is not firm and new literature has been published recently, we conducted a robust systematic review thoroughly investigating the association of exposure to IPV pre, during and post pregnancy with breastfeeding outcomes synthesizing evidence with due regard to precision and quality.

Keywords: Intimate partner violence, domestic violence, breastfeeding, breastfeeding practices, exclusive breastfeeding, breastfeeding initiation.

Methods

The systematic review was protocol-driven with prospective registration (PROSPERO, ID: CRD42019129353) and reported according to PRISMA [10] and MOOSE [11] guidelines

Eligibility criteria

We searched PubMed, Embase, SCOPUS and Global Health Library from the 8th of March to 12th of March 2019. An updated search was conducted the 18th of July 2019. Search terms included "intimate partner violence" OR "spouse abuse" OR "domestic violence" OR "physical abuse" OR "sex offenses" OR "battered women" AND "breast feeding" OR "breastmilk expression" OR "feeding behavior" OR "milk, human" OR lactation OR "milk ejection" (full search in Appendix, S1). The literature search had no date or language restrictions. Eligible studies were original publications, that reported exposure to intimate partner violence (IPV) and breastfeeding practices.

WHO recommends initiating of breastfeeding within one hour of birth, exclusive breastfeeding for six months and that mothers should continue breastfeeding for up to two years or beyond together with complementary feeding [12], and therefore we looked for outcomes according to these recommendations. We included studies with women exposed to violence one year prior to pregnancy, during pregnancy and in the postpartum period. Therefore, we excluded studies of women with experiences of childhood abuse and later breastfeeding practices.

After removing duplicates, two authors independently screened titles, abstract and full-text (AKN and AB) using Covidence (www.covidence.org) [13]. Disagreements were solved through discussion. One author (AKN) extracted data from included studies into a standardized Excel template. Extracted data included: Title, first author, publication year, country, study characteristics, study objective, participant characteristics, sample size, inclusion/exclusion criteria, type of exposure, measurement tool of exposure, primary outcomes and confounders adjusted for. Outcome data were verified by a second author (FKM).

Study quality assessment

The Newcastle Ottawa scale was used to assess the quality of cohort studies [14-18] and a modified version of the scale was used for cross-sectional studies [19-29] The scale addresses the following domains: selection process, comparability and the ascertainment of either exposure or outcome of interest. A maximum of nine stars can be given if all domains are well described in a given study. For the cross-sectional version of the scale, the domain that assessed confounders was modified and no stars were given if papers did not justify their choice of confounders in their statistical analysis. A total of 10 stars could be given in the cross-sectional scale. As a modification of both scales, points were given according to the number of confounding domains adjusted for (Appendix table S2.2).

AKN and DSL conducted the quality assessment of Madsen et al., as FKM was co-author of this study and therefore considered ineligible.

Cohort studies were regarded as 'good quality' if rewarded 3 or 4 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain, 'fair quality' if rewarded 2 stars in selection domain AND 1 or 2 stars in comparability domain AND 2 or 3 stars in outcome/exposure domain and 'poor quality' if rewarded 0 or 1 star in selection domain OR 0 stars in comparability domain OR 0 or 1 stars in outcome/exposure domain. Cross-sectional studies were regarded as 'very good' if rewarded 9-10 points, 'good' if rewarded 7-8 points, 'satisfactory' if rewarded 5-6 points and 'unsatisfactory' if rewarded 0-4 points.

Data synthesis

Results for the various IPV-outcome combinations were individually tabulated and summarised in forest plots. Inferences were generated taking study precision and quality into account as quantitative synthesis (meta-analysis) proved unfeasible. The substantial heterogeneity of exposure, outcome, study quality and statistical models in the adjusted odds ratios (aOR) reported in individual studies was the reason we settled for a qualitative synthesis in the form of vote-counting, which we conducted within broad exposure-outcome subgroups stratified by study quality and precision to minimise bias. To determine whether a study showed a negative association or no difference we relied on numerical data in vote-counting to avoid subjectivity. This approach is in line with what is considered suitable given study variability in previous review publications [30, 31]

Results

The database searches resulted in 2062 records, with 1634 records eligible for title and abstract screening after removal of duplicates (Fig. 1). After full text screening 16 studies met the inclusion criteria of which 11 were cross-sectional [15, 19-29] and five were cohort studies [17, 18, 32, 33]. The studies were published between 2006 and 2019. Four studies was conducted in The United States [15, 20, 23, 29], four in India [19, 21, 24, 27], two in Brazil [17, 26], one in Tanzania [32], one in Spain [33], one in Sweden [22], , one in Norway [18], one in Australia [25] and one in Hong Kong [28]. Population age varied from 14 years to 49 years, and it was reported as means (n= 3) or in intervals (n= 13). The sample sizes varied from 69 to 195,264 with a mean sample of 25,899 (Table 1). Exposure (IPV) was measured through questionnaires [20, 21, 23, 24, 27, 29, 32] or through various validated tools: Conflict-Tactic Scale (CTS) [15, 17, 19, 26, 28], Abuse Assessment Screen (AAS) [28], Index of Spouse Abuse (ISA) [33], Composite Abuse Scale (CAS) [25] and Norvold Abuse Questionnaire [22] (Table 1)

Two of the studies only focused on physical violence [20, 26] whereas one study focused only on psychological violence [19]. The majority of studies measured IPV as 'any IPV' and did not separate types of violence into groups [15, 17, 20, 22, 25, 27-29]. Five studies measured both physical, or/and psychological or/and sexual violence respectively and combined to compare the differences in exposure of a certain type of IPV [18, 21, 24, 32, 33]. The outcome, breastfeeding was measured as early cessation/shortened duration of breastfeeding; initiation of breastfeeding, or exclusive breastfeeding. Some studies investigated more than one outcome and therefore, one study could be presented in more than one outcome table.

Overall, the included studies adjusted for 48 different confounders within the following domains: maternal sociodemographic, relationship characteristics, maternal lifestyle and health, economy, pregnancy and postpartum related problems, child characteristics, support during pregnancy and postpartum, violence or stressful life events, pregnancy intention, caste and religion. Most studies did not justify the choice of confounders [17, 19-23, 25, 27-29]. Sorbo et al. and Madsen et. al. used acrylic graph analysis (DAG) to justify the confounders adjusted for in their analysis and afterwards made a sensitivity analysis to determine whether the association between abuse and breastfeeding practices was mediated primarily through postpartum depression.

Study quality assessment

Of the five cohort studies, one study was judged as 'good quality' [32], three studies was judged as 'fair quality' [15, 18, 33] and one study was judged as 'poor quality' [17]. Of the 11 cross-sectional studies, six were judged as having 'good' quality [19-21, 24, 26, 28], one was judged as 'satisfactory' [29] and three studies was judged as 'unsatisfactory' [23, 25, 27]. One cross-sectional study was not assessed using NOS for cross-sectional, since the study was embedded from a cohort [22], and therefore NOS for cohort studies was used to assess the quality and was judged as 'poor quality' [22]. In the figure illustration of the NOS scale, the studies, which reached a maximum of stars in each category of the NOS-scale was rewarded a 'yes' and further if the studies adjusted for more than four confounding domains, they were rewarded a 'yes' (Fig. 2).

The association between IPV and breastfeeding outcomes

Seven studies reported outcomes based on early cessation or shortened duration of breastfeeding when exposed to violence [15, 18-20, 23, 25, 29] Three studies found a significant association between exposure to IPV and early cessation/shortened duration of breastfeeding [15, 18, 20].

One study found a statistically significant association between reduction in duration/cessation and IPV (OR=1,41 95% CI 1.15-1.74) However, the association became insignificant when adjusted for confounders (aOR=0.94; 95% CI 0.76-1.7) [29]. Miller-graff et. al found that IPV was associated with decreased odds ratio of for continuing breastfeeding (OR=0.22; 95 % CI 0.5-0.85) or in other words, IPV was associated with an increased risk of shortened duration of breastfeeding. Three of the studies found no association between violence and breastfeeding duration or early cessation [19, 23, 25].Three studies did not distinguish between period of exposure [17, 25, 27], whereas the remaining papers categorized time of exposure. One study [25] found no association between IPV and breastfeeding practices and concluded that IPV itself did not influence breastfeeding outcomes as much as maternal age, education and birth method (Fig. 3)

Six studies investigated the association between exposure to IPV and initiation of breastfeeding [15, 20, 21, 23, 29, 33]. Two studies found a statistically significant association between initiation of breastfeeding and exposure to either physical or sexual violence [21] (aOR physical=0.81; 95% CI 0.71-0.93. aOR sexual=0.52; 95% CI 0.36-0.76) or psychological violence [33] (aOR 2; 95% CI 1.2-3.3). Four studies found no association when exposed to multiple types of violence combined [15, 21, 23, 29]. Ten studies assessed exposure to violence in relation to risk of early termination of exclusive breastfeeding and five studies found a statistically association [17, 21, 24, 28, 32], and five studies found no statistically association [15, 22, 23, 26, 27] (Fig. 3).

Discussion

Main findings

This systematic review summarized the evidence, including substantial amount of new, previously synthesized evidence, between exposure to IPV and breastfeeding practices. Forty-eight different confounders were controlled for in the studies. Our meticulous quality assessment judged the majority of studies included as being good quality, and a quarter as being of fair quality. The majority of studies found that exposure to IPV in any form and at any stage had a significant negative effect on a range of breastfeeding practices. IPV exposure shortened breastfeeding duration, and

it led to early termination of exclusive breastfeeding, but it did not reduce initiation. These inferences have for the following provisos in interpretation.

Strengths and limitations:

Overall, the data we included tripled the evidence size compared to the previous review (280·532 more participants contributed date to our analysis than the 133·861 participants previously) [9].

The evaluation of the association was complex as both IPV exposure and breastfeeding outcomes were measured in different ways and statistical analytic models had variation in confounder adjustment between studies. We included a proper quality assessment of included studies by a validated tool and a thorough evaluation of different outcome measures. We minimized the risk of error and subjectivity by duplicate assessment. Our conclusion is subject to the proviso that the majority of studies were cross-sectional in design, so a causal association cannot be inferred [34]. The limitation of this systematic review reflects a weakness in the underlying evidence not in the robustness of reviewing. We reported the review complying with as many of the PRISMA [10] and MOOSE [11] guideline statements as possible. Our approach to making transparent these variations in evidence merits consideration as a strength of the review and we objectively exposed the complexity of the topic.

Interpretation of findings

Comparing our results with a previous review [9], we found that our synthesis was more comprehensive considering the adjustment of a full range of confounders for analysis of the IPV-breastfeeding relationship. Some covariates may be part of the causal pathway of the association between violence and breastfeeding, hence they are not true confounders and therefore make considerations regarding confounding factors important. A key finding of this review is that most studies did not state their reasons for choice of confounders and there seems to be lack of consensus in the identification of potential confounders. For instance, depression is one variable that can both be identified as a confounder, or an intermediate variable in the causal pathway. Another important confounder is childhood abuse, yet only two studies have adjusted for childhood abuse in their statistical calculations with contradictory results [15, 18]. Thus the association of only experiencing violence in pregnancy may be overestimated as there is evidence that victimization as a young child increases the risk of further victimization later in life [35] and also increases risk of breastfeeding difficulties when becoming a mother [36, 37]. It is likely that there is no specific type of violence that causes revictimization of women and different types of violence often coexist [1-3].

Our review excluded studies with women exposed to lifetime history of violence in general and childhood abuse, whereas previous review included this population of women. However, most studies included only women who were interviewed about violence in relation to pregnancy, while childhood experiences of violence were not addressed. This can potentially change the target population, from women having no experiences of violence in childhood to a population of women with experiences of childhood abuse, mixed with women experiencing IPV in relation to pregnancy or women experiencing both types of violence and consequently change the association between IPV and breastfeeding practices. Another factor that can potentially affect the estimate is recall bias. Women are primarily interviewed about exposure of IPV in relation to pregnancy in the postpartum period, which can potentially introduce

recall bias. Reasons for that can be, if women do not remember or want to remember when they were exposed to violence.

Further, exclusive breastfeeding is often referred to as the most favourable feeding of infants, because of recommendations and studies of benefits from breast milk. These recommendations may influence the reporting because of this ideal and hence have an impact of mothers' retrospective recall, when breastfeeding is strongly correlated to the feeling of being a mother. As a result, both outcomes, but also exposure are difficult to measure when biased by strong feelings of parenthood, which can cause reporting biases. Moreover, women exposed to violence are often under reported [38]. This might as well be the same case for pregnant women and reasons for underreporting could be caused by protection of themselves and the perpetrator or completely refusing to participate in the study compared to women without violence experiences and consequently affecting the association.

Conclusion

This review established that the association between IPV and breastfeeding was complex and that the effect of exposure to IPV on breastfeeding practices was difficult to properly explore in a study-level data synthesis. The majority of studies in this review indicated that IPV exposure in pregnancy was associated with impaired breastfeeding, but still some studies found no association. Future research should focus on longitudinal studies in with robust designs, where women feel safe to offer information about violence and breastfeeding. As an interim step individual patient data meta-analysis [39], by sharing raw data from existing studies and powerful reanalysis can make evidence synthesis more robust in this area.

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Declaration of interests

DSL, AKN, AB, and KK had no conflict of interest. VR and FMK are co-authors of 1 study included in this review.

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Author statement:

AKN and AB made the protocol and screened for eligible articles. AKN planned the data extraction, which was cross-checked and verified by FKM, as well as the quality assessment. Disagreement was solved through discussion. AKN designed to tables and wrote the first draft of the manuscript, which was reviewed by DSL, VR, KS and AB. All authors approved the final manuscript.

Supporting information

Following supplementary materials are available for this article (includes; tables, figures and appendix)

Table 1: Characteristics of studies included in the review of the intimate partner violence and breastfeeding outcomes

Reference	Study design	Country	Setting	Sample size	Age	Tool to measure IPV
Madsen, 2019 [32]	Cohort	Tanzania	Hospital	1128	20-30	Interview (from WHO multi-country study)
Martin-de-las-Heras, 2018 [33]	Cohort	Spain	Antenatal care clinic	718	>20-40+	ISA[A]
Miller-Graff, 2018 [15]	Cohort	The United States	WIC clinic (Women, infant and children clinic)	69	26.5 (mean)	CTS[B]
Tiwari, 2018 [19]	Cross-sectional	India	Household	26,587	15-49	CTS-2[B]
Wallenborn, 2018 [20]	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	195,264	<20-35+	Questionnaire
Boyce, 2017 [21]	Cross-sectional	India	Household	10,469	20-29	Questionnaire
Finnbogadottir, 2017 [22]	Cross-sectional	Sweden	Project: "Pregnant women and new mother's life experience"	713	30 (mean)	Norvold Abuse Questionnaire
Holland, 2017 [23]	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	760	20-29	Questionnaire (based on CDC's monitoring system)
Hasselmann, 2016 [17]	Cohort	Brazil	Primary health clinic	564	<20-20+	CTS-1[B]
Islam, 2016 [24]	Cross-sectional	India	Community based survey	426	14-25+	Questionnaire (based on WHO demographic health survey)
Sørbø, 2015 [18]	Cohort	Norway	MoBa (The Norwegian Mother and Child Cohort Study)	53,934	14-35+	Norvold Abuse Questionnaire
James, 2014 [25]	Cross-sectional (embedded from an RCT)	Australia	MOVE (Improving maternal and child health nurse care for vulnerable mothers)	2621	15-35+	CAS[C]
Moraes, 2011 [26]	Cross-sectional	Brazil	Public Health Center	811	<20-20+	CTS-2[B]
Shroff, 2011 [27]	Cross-sectional (embedded from an RCT)	India	Household	600 (mother-infant pairs)	22.14 (mean)	Questionnaire

Lau, 2007 [28]	Cross-sectional	Hong Kong	-	1150	<25-20+	AAS[D], CTS[B]
Silverman, 2006 [29]	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	118,579	<20-30+	Questionnaire

A: Index of Spouse Abuse, B: Conflict-Tactic Scale, C: Composite Abuse Scale, D: Abuse Assessment Screen

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Appendix, S1: Search strategy

Embase search: Searched on the 11th of March with a total result of 1382 articles

#ID	Search
1	Exp partner violence/
2	Exp domestic violence/
3	Exp physical abuse/
4	Exp battered woman/
5	Exp breast feeding/
6	Exp breast milk expression/
7	Exp feeding behavior
8	Exp lactation
9	Exp milk ejection
10	”intimate partner violence”
11	”dating violence”
12	”partner violence”
13	”partner homicide”
14	”psychological violence”
15	”psychological abuse”
16	”spouse abuse”
17	”spousal abuse”
18	”wife abuse”
19	”partner abuse”
20	”domestic violence”
21	”family violence”
22	”physical abuse”
23	”physical violence”
24	”physical maltreatment”
25	”sex offenses”
26	”sexual violence”
27	”sexual harm”
28	”sexual coercion”
29	”battered woman”
30	”battered women”
31	”abused women”
32	”abused woman”
33	”relationship violence”
34	”relationship aggression”
35	”couple violence”
36	”spousal violence”
37	”domestic abuse”
38	”wife beating”
39	”physical harm”
40	”physical aggression”
41	”emotional violence”
42	”emotional abuse”
43	”emotional harm”
44	”violence against women”
45	1 or 2 o 3 or 4 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44
46	Exp sexual abuse
47	Controlling behavior
48	45 or 46 or 47
49	”sexual abuse”
50	48 or 49
51	”exclusive breastfeeding”
52	”breastfeeding duration”
53	”breastfeeding intention”
54	”pumping breast”
55	”human milk”
56	”breast milk”
57	”milk secretion”
58	”milk let-down”
59	5 or 6 or 7 or 8 or 51 or 52 or 53 or 54 or 55 or 57 or 58
60	Feeding behavior
61	Feeding pattern
62	”feeding patterns”

63	59 or 60 or 61 or 62
64	Feeding behaviors
65	63 or 64
66	”exclusive breast feeding”
67	”exclusive bresat feedings”
68	”breast feedings”
69	”breast feeding”
70	”breastmilk expression”
71	”breastmilk expressions”
72	”milk collection”
73	”milk collections”
74	”breast pumping”
75	”milk secretion”
76	”milk secretions”
77	65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76
78	Lactations
79	Lactation
80	77 or 78 or 79
81	50 and 80

Global Health Library search: Searched on the 12th of March with a total result of 91 articles

#ID	Search
S1	”intimate partner violence” OR ”dating violence” OR ”partner violence” OR ”partner homicide” OR ”psychological abuse” OR ”psychological violence”
S2	”spouse abuse” OR ”spousal abuse” OR ”wife abuse” OR ”partner abuse”
S3	S3 OR S2
S4	”domestic violence” OR ”family violence”
S5	S4 OR S3
S6	”physical abuse” OR ”physical violence” OR ”physical maltreatment”
S7	S6 OR S5
S8	”sexual assault” OR ”sex offenses” OR ”sexual violence” OR ”sexual abuse” OR ”sexual harm” OR ”sexual coercion”
S9	S8 OR S7
S10	”battered woman ”OR ”battered women” OR “abused woman” OR “abused women”
S11	S10 OR S9
S12	“relationship violence” OR “relationship aggression” OR “couple violence” OR “spousal violence” OR “domestic abuse” OR “wife beating” OR “physical harm” OR “physical aggression”
S13	S12 OR S11
S14	“emotional violence” OR “emotional abuse” OR “emotional harm” OR “controlling behaviour” OR “violence against women”
S15	S14 OR S13
S16	“breast feeding” OR “breastfeeding” OR “exclusive breast feeding” OR “exclusive breastfeeding” OR “breastfeeding duration” OR “breastfeeding intention”
S17	“breast milk expression” OR “breast milk expressions” OR “milk collection” OR “milk collections” OR “breast pumping” OR “pumping breast”
S18	S17 OR S16
S19	“feeding behaviour” OR “feeding behaviors” OR “feeding pattern” OR “feeding patterns” OR “human milk” OR “milk, human”
S20	S19 OR S18
S21	Lactation OR lactations OR “milk secretion” OR “milk secretions” OR “milk ejection” OR “milk let-down”
S22	S21 OR S20
S23	S22 AND S15

PubMed search: Searched on the 8th of March with a total result of 253 articles

((((((((((((("Breast Feeding"[Mesh]) OR breastfeeding) OR exclusive breast fe*) OR "exclusive breastfeeding") OR "breastfeeding duration") OR breast fe*) OR "breastfeeding intention")) OR ((((((("Breast Milk Expression"[Mesh]) OR breast milk expression*) OR breastmilk expression*) OR milk collection*) OR breast pumping*) OR "pumping breast")) OR ((("Feeding Behavior"[Mesh]) OR feeding behavior*) OR feeding pattern*)) OR (("Milk, Human"[Mesh]) OR "human milk")) OR ((("Lactation"[Mesh]) OR milk secretion*) OR lactation*)) OR (("Milk Ejection"[Mesh]) OR "milk let-down"))) AND ((((((((((((((((((("relationship violence") OR "relationship aggression") OR "couple violence")

OR "spousal violence") OR "domestic abuse") OR "wife beating") OR "physical harm") OR "physical aggression") OR "emotional violence") OR "emotional abuse") OR "emotional harm") OR controlling behavior*) OR "violence against women")) OR ((((("Battered Women"[Mesh]) OR "Battered Woman") OR "abused women") OR "abused woman")) OR ((((((("Sex Offenses"[Mesh]) OR "sex offenses") OR "sexual violence") OR sexual abuse*) OR "sexual harm") OR "sexual coercion")) OR ((((("Physical Abuse"[Mesh]) OR "physical abuse") OR "physical violence") OR "physical maltreatment")) OR ((("Domestic Violence"[Mesh]) OR "domestic violence") OR "family violence")) OR (((((("Spouse Abuse"[Mesh]) OR "spouse abuse") OR "spousal abuse") OR "wife abuse") OR "partner abuse")) OR (((((((("Intimate Partner Violence"[Mesh]) OR "intimate partner violence") OR "dating violence") OR "partner violence") OR "partner homicide") OR "psychological violence") OR "psychological abuse"))

SCOPUS: Searched on the 11th of March with a total result of 257 articles

((((TITLE-ABS-KEY("breast feeding")) OR (TITLE-ABS-KEY("breastfeeding intention"))) OR ((TITLE-ABS-KEY(breastfeeding)) OR (TITLE-ABS-KEY("breastfeeding duration"))) OR ((TITLE-ABS-KEY("exclusive breast feeding")) OR (TITLE-ABS-KEY("exclusive breastfeeding")))) OR ((TITLE-ABS-KEY("breast milk expression")) OR (TITLE-ABS-KEY("breast milk expressions")) OR (TITLE-ABS-KEY("breastmilk expression")) OR (TITLE-ABS-KEY("breastmilk expressions")) OR (TITLE-ABS-KEY("milk collections")) OR (TITLE-ABS-KEY("milk collection")) OR (TITLE-ABS-KEY("breast pumping")) OR (TITLE-ABS-KEY("pumping breast"))) OR ((TITLE-ABS-KEY("feeding behavior")) OR (TITLE-ABS-KEY("feeding pattern")) OR (TITLE-ABS-KEY("human milk")) OR (TITLE-ABS-KEY("milk, human")) OR (TITLE-ABS-KEY("breast milk"))) OR ((TITLE-ABS-KEY(lactation)) OR (TITLE-ABS-KEY("milk secretion")) OR (TITLE-ABS-KEY("milk ejection")) OR (TITLE-ABS-KEY("milk let-down")))) AND (((TITLE-ABS-KEY("intimate partner violence")) OR (TITLE-ABS-KEY("dating violence")) OR (TITLE-ABS-KEY("partner violence")) OR (TITLE-ABS-KEY("partner homicide")) OR (TITLE-ABS-KEY("psychological violence")) OR (TITLE-ABS-KEY("psychological abuse"))) OR (((TITLE-ABS-KEY("spouse abuse")) OR (TITLE-ABS-KEY("spousal abuse"))) OR (TITLE-ABS-KEY("wife abuse")) OR (TITLE-ABS-KEY("partner abuse"))) OR ((TITLE-ABS-KEY("domestic violence")) OR (TITLE-ABS-KEY("family violence")) OR (TITLE-ABS-KEY("physical abuse")) OR (TITLE-ABS-KEY("physical violence")) OR (TITLE-ABS-KEY("physical maltreatment"))) OR ((TITLE-ABS-KEY("sex offenses")) OR (TITLE-ABS-KEY("sexual violence")) OR (TITLE-ABS-KEY("sexual abuse")) (TITLE-ABS-KEY("sexual harm")) OR (TITLE-ABS-KEY("sexual coercion"))) OR (((TITLE-ABS-KEY("battered women")) OR (TITLE-ABS-KEY("battered woman"))) OR ((TITLE-ABS-KEY("abused woman")) OR (TITLE-ABS-KEY("abused women")))) OR ((((TITLE-ABS-KEY("relationship aggression")) OR (TITLE-ABS-KEY("couple violence"))) OR (TITLE-ABS-KEY("relationship violence"))) OR (TITLE-ABS-KEY("spousal violence"))) OR ((TITLE-ABS-KEY("domestic violence")) OR (TITLE-ABS-KEY("wife beating")) OR (TITLE-ABS-KEY("physical harm")) OR (TITLE-ABS-KEY("physical aggression"))) OR ((TITLE-ABS-KEY("emotional violence")) OR (TITLE-ABS-KEY("emotional abuse")) OR (TITLE-ABS-KEY("emotional harm")) OR (TITLE-ABS-KEY("controlling behavior"))) OR (TITLE-ABS-KEY("violence against women")))

Appendix, S2: Data synthesis tables

Table S2.1: Confounders adjusted for in studies

Reference	Domain									
	Economy	Maternal life style and health lifestyle	Pregnancy/post patum related problems	Maternal socio-demographic	Child characteristics	Relationship characteristics	Support during pregnancy/ postpartum	Violence or stressfull life events	Pregnancy intention	Caste and religion
Madsen, 2019 [32]		x		x						
Martin-de-las-Heras, 2018 [33]		x	x	x		x	x		x	
Miller-Graff, 2018 [15]	x		x				x	x		

Tiwari, 2018 [19]	x			x		x		x		x
Wallenborn, 2018 [20]	x			x		x		x	x	
Boyce, 2017* [21]										
Finnbogadottir, 2017 [22]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Holland, 2017 [23]		x	x	x				x		
Hasselmann, 2016 [17]				x	x	x				
Islam, 2016 [24]	x	x	x	x	x	x	x	x	x	
Sørbø, 2015 [18]				x		x		x		
James, 2014 [25]	x		x	x						
Moraes, 2011 [26]		x		x	x		x			
Shroff, 2011 [27]		x		x	x	x				x
Lau, 2007 [28]		x	x	x		x			x	
Silverman, 2006 [29]		x		x		x				

*Article states that the association between IPV and BF was adjusting for any covariate that were significant at p < 0,20 levels in bivariate analysis, but results not shown

NA (not applicable)

Explanation of following groups of confounders:

Economy: Insurance and receipt of government assistance

Maternal life style and health: Smoking, substance use prior to pregnancy, substance use all time, maternal health status, mothers BMI, HIV status

Pregnancy and postpartum related problems: Pregnancy health problems, preterm labor, mode of birth, complications during birth, mother/infant separation after birth, antenatal complications, postnatal complications, reasons for stopping BF and resuscitation

Maternal sociodemographic: Maternal age, maternal education, maternal race/ethnicity, first baby/number of the child, employment status, place of residence, parity, occupation, number of years lived in the U.S and language

Child characteristics: Gender of child, age of child, low birthweight/birth weight, child health

Relationship characteristics: Marital status, relationship characteristics, partner's education level, family structure, cohabitation

Support during pregnancy and postpartum: Prenatal BF education, number of antenatal care visits/health care services, kin support, social support, type of maternity clinic

Violence or stressful life events: Stressful live events 12 months before pregnancy, depression childhood abuse, other forms of IPV

Pregnancy intention

Caste and religion

Table S2.2: Results of NOS quality assessment

Cohort studies					
	Selection (maximum 4 stars)	**Comparability (maximum 2 stars)**	**Outcome (maximum 3 stars)**	No. of stars	No. of stars with domains

											adjusted for
Study	Representativeness of the exposed cohort	Selection of the non-exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of study	Comparability of cohorts on the basis of the design or analysis	Confounding domains ajusted for (table 5)	Assessment of outcome	Was follow-up long enough for outcomes to occur	Adequacy of follow up of cohorts		
Madsen, 2019	*	*	*	*	**	**	-	*	*	8	10
Martin-de-las-heras, 2018	*	*	*	*	**	******	-	-	-	6	12
Miller-Graff, 2018	-	*	*	*	**	****	-	*	*	7	11
Finnbogadottir, 2017[A]	*	*	-	*	-	-	-	*	-	4	4
Hasselmann, 2016	*	*	*	-	-	***	-	*	-	4	7
Sørbø, 2015	*	*	-	*	**	***	-	*	-	6	9
	Cross-sectional studies										
	Selection (maximum 5 stars)				**Comparability (maximum 2 stars)**		**Outcome (maximum 3 stars)**			No. of stars	
Study	Representativeness of the sample	Sample size	Non-respondents	Ascertainment of the exposure (risk factor)	The subjects in different outcome groups are comparable, based on the study design or analysis. Confouding factors are controlled	Confounding domains ajusted for (table 5)	Assessment of outcome	Statistical test			
Tiwari, 2018	*	*	*	**	*	****	*	*		8	12
Wallenborn, 2018	*	*	-	**	*	*****	*	*		7	12
Boyce, 2017	*	*	*	**	-	-	*	*		7	7
Holland, 2017	-	-	-	*	_-	****	*	*		3	7
Islam, 2016	*	-	*	*	**	********	*	*		7	16
James, 2014	-	-	-	**	-	***	*	*		4	7
Moraes, 2011	*	-	*	**	**	****	*	*		8	12
Shroff, 2011	-	-	-	*	-	*****	*	*		3	8
Lau, 2007	*	*	*	**	-	*****	*	*		7	12
Silverman, 2006	*	*	*	*	-	***	*	*		6	9

[A] Cross-sectional study embedded from a cohort. Analyzed with NOS for cohort.

Table S2.3: Early cessation/shortened duration of breastfeeding (aOR; 95% CI) vs. no cessation of breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 [32]	NA	NA	NA	NA
Martin-de-las-Heras, 2018 [33]	NA	NA	NA	NA
Miller-Graff, 2018 [15]	P + E + S: 0.22 (0.05-0.85)[A]			
Tiwari, 2018 [19]	E: 1.07 (0.81-1.41)[B]			
Wallenborn, 2018 [20]	P: 1.18 (1.01-1.37)	P: 1.15 (0.94-1.4)	NA	NA
	P: 1.03 (0.89-1.19)		NA	NA
Boyce, 2017 [21]	NA		NA	
Finnbogadottir, 2017 [22]	NA	NA	NA	NA
Holland, 2017 [23]	NA	NA	P + E + S: 5.92 (1.72-27.98)[C,D,F] P + E + S: 3·33 (1.46-8)[C,E;F] P + E + S: 0·66 (0.25-1.59)[C,D,G] P + E + S: 0·93 (0.54-1.58) [C,E,G] P + E + S 0·68 (0.25-1.72)[C,D;H] P + E + S: 0·87 (0.44-1.68)[C,E,H]	
Hasselmann, 2016 [17]	NA			
Islam, 2016 [24]	NA	NA	NA	NA
Sørbø, 2015 [18]	P: 0.96 (0.73-1.25) E: 1·28 (1.18-1.39) S: 0·94 (0.76-1.16)		P + E + S: 1.47 (1.23-1.76) P + E: 1.39 (1.18-1.39) P + S: 0.95 (0.61-1.47) S + E: 1.27 (1.02-1.58)	
James, 2014 [25]	P + E + S: 1.25 (0.85-1.84)[I,J] P + E + S: 1·01 (0.8-1.29)[I,K]			
Moraes, 2011 [26]	NA	NA	NA	NA
Shroff, 2011 [27]	NA	NA	NA	NA
Lau, 2007 [28]	NA	NA	NA	NA
Silverman, 2006 [29]	NA	NA	P + E: 0.94 (0.76-1.7)	P + E: 0.97 (0.72-1.3)
	NA	NA	P + E: 1.05 (0.86-1.3)	

NA (not applicable)

* IPV measured as physical (P), or emotional (E) or sexual (S)

** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined

[A] Crude OR (measured as effect of IPV exposure the past year and interpreted as lower likelihood of continuing BF)

[B] At least one month of BF

[C] HR interpreted as the probability of stopping BF
[D] Duration at 4 weeks
[E] Duration at 13 weeks
[F] White women
[G] Black women
[H] Hispanic women
[I] Interpreted as likelihood of BF at the time measured
[J] BF at 3 months
[K] BF at 6 months

Table S2.4: Initiation of breastfeeding (aOR; 95% CI) vs. no initiation of breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 [32]	NA	NA	NA	NA
Martin-de-las-Heras, 2018 [33]	NA	E: 2 (1.2-3.3)[B] P: 0.9 (0.3-2.6)[B]	NA	NA
Miller-Graff, 2018 [15]	P + E + S: 0.62 (0.06-6.7)			
Tiwari, 2018 [19]	NA			
Wallenborn, 2018 [20]	P: 1.05 (0.9-1.23)	P: 0.9 (07.3-1.11)	NA	NA
	P: 0.98 (0.84-1.13)		NA	NA
Boyce, 2017 [21]	P: 0.81 (0.71-0.93)[C] S: 0.52 (0.36-0.76)[C]		P + S: 0.83 (0.67-1.01)[C]	
Finnbogadottir, 2017 [22]	NA	NA	NA	NA
Holland, 2017 [23]			P + E + S: 2.3 (0.7-7.2)[D,E] P + E + S: 1.8 (0.9-3.9)[D,F] P + E + S: 0.9 (0.2-3.8)[D,G]	
Hasselmann, 2016 [17]	NA			
Islam, 2016 [24]	NA	NA	NA	NA
Sørbø, 2015 [18]	NA		NA	
James, 2014 [25]	NA			
Moraes, 2011 [26]	NA	NA	NA	NA
Shroff, 2011 [27]	NA	NA	NA	NA
Lau, 2007 [28]	NA	NA	NA	NA
Silverman, 2006 [29]	NA	NA	P + E: 0.95 (0.81-1.1)	P + E: 0.86 (0.69-1.06)
	NA	NA	P + E: 0.87 (0.76-1.01)	

NA (not applicable)
* IPV measured as physical (P), or emotional (E) or sexual (S)
** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined
[B] Measured as BF avoidance
[C] Lifetime IPV intepreted as lower odds of early initation of BF
[D] Measured as OR
[E] White women
[F] Black women
[G] Hispanic women

Table S2.5: Early termination of exclusive breastfeeding (aOR; 95% CI) vs. no termination of exclusive breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 [32]	P: 1.53 (1.01-23.1) E: 1.61 (1.26-2.07) S: 1.5 (1.07-2.09)	P: 1.68 (1-2.82) E: 1.23 (0.91-1.65) S: 1.35 (0.96-1.91)	P + E + S: 1.93 (1.11-3.34)	P + E + S: 2.87 (1.27-6.46)
Martin-de-las-Heras, 2018 [33]	NA	NA	NA	NA
Miller-Graff, 2018 [15]	NA	NA	0.41[A] (0.11-1.45)	NA
Tiwari, 2018 [19]	NA	NA	NA	NA
Wallenborn, 2018 [20]	NA	NA	NA	NA
Boyce, 2017 [21]	P: 0.83 (0.71-0.96)[B] S: 0.74 (0.49-1.12)[B]		P + S: 0.92 (0.75-1.15)[B]	
Finnbogadottir, 2017 [22]			P + E + S: 5.7515 (0.229-144.4791)[N,T] P + E + S: 1.7305 (0.4944-6.0564)[O,T] P + E + S: 0.7756 (0.2616-2.9999)[P,T] P + E + S: 0.5204 (0.2158-1.2548)[Q,T] P + E + S: 0.5442 (0.2224-1.3319)[R,T] P + E + S: 0.5792 (0.1655-2.0271)[S,T]	
Holland, 2017 [23]			P + E + S: 1.73 (0.97-3.11)[I,K] P + E + S: 1.65 (0.95-2.86)[J,K] P + E + S: 0.95 (0.63-1.43)[I,L] P + E + S: 0.97 (0.67-1.39)[J,L] P + E + S: 0.71 (0.41-1.19)[I,M] P + E + S: 0.83 (0.50-1.35)[J,M]	
Hasselmann, 2016 [17]	NA	NA	NA	P + E + S: 1.35 (1.07-1.71)[G] P + E + S: 1.56 (1.16-1.95)[H]
Islam, 2016 [24]	NA	P: 0.17 (0.07-0.4)[C] E: 0.51 (0.26-1)[D] S: 0.43 (0.18-1.06)	NA	NA
Sørbø, 2015 [18]	NA	NA	NA	NA
James, 2014 [25]	NA	NA	NA	NA
Moraes, 2011 [26]	NA	P: 1.17 (0.89-1.53)[E]	NA	NA
Shroff, 2011 [27]	P: 0.69 (0.42-1.11)		NA	NA

Lau, 2007 [28]	NA	NA	NA	P + E + S: 1.839 (1.61-2.911)[F]
Silverman, 2006 [29]	NA	NA	NA	NA

NA (not applicable)
* IPV measured as physical (P), or emotional (E) or sexual (S)
** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined
[A] Measured as crude OR and interpreted as lower likelihood of EBF
[B] Lifetime IPV and interpreted as lower odds of EBF
[C] Interpreted as 83 % greater risk of discontinuing EBF
[D] Interpreted as 49 % less likely to exclusively breastfeed
[E] Measured as HR and interpreted as probability of early cessation of EBF
[F] Measured as experience of 'no IPV' and interpreted as more likely to breastfeed
[G] IPV until 3rd month postpartum measured as RR
[H] IPV in the 3rd month postpartum measured as RR
[I] EBF at 4 weeks postpartum
[J] EBF at 14 weeks postpartum
[K] White women
[L] Black women
[M] Hispanic women
[N] EBF at 1 month
[O] EBF at 2 months
[P] EBF at 4 months
[Q] EBF at 6 months
[R] EBF at 9 months
[S] EBF at 12 months
[T] OR measured at: https://www.medcalc.org/calc/odds_ratio.php

Figure 1: Flow chart of study selection in the review of intimate partner violence and breastfeeding outcomes

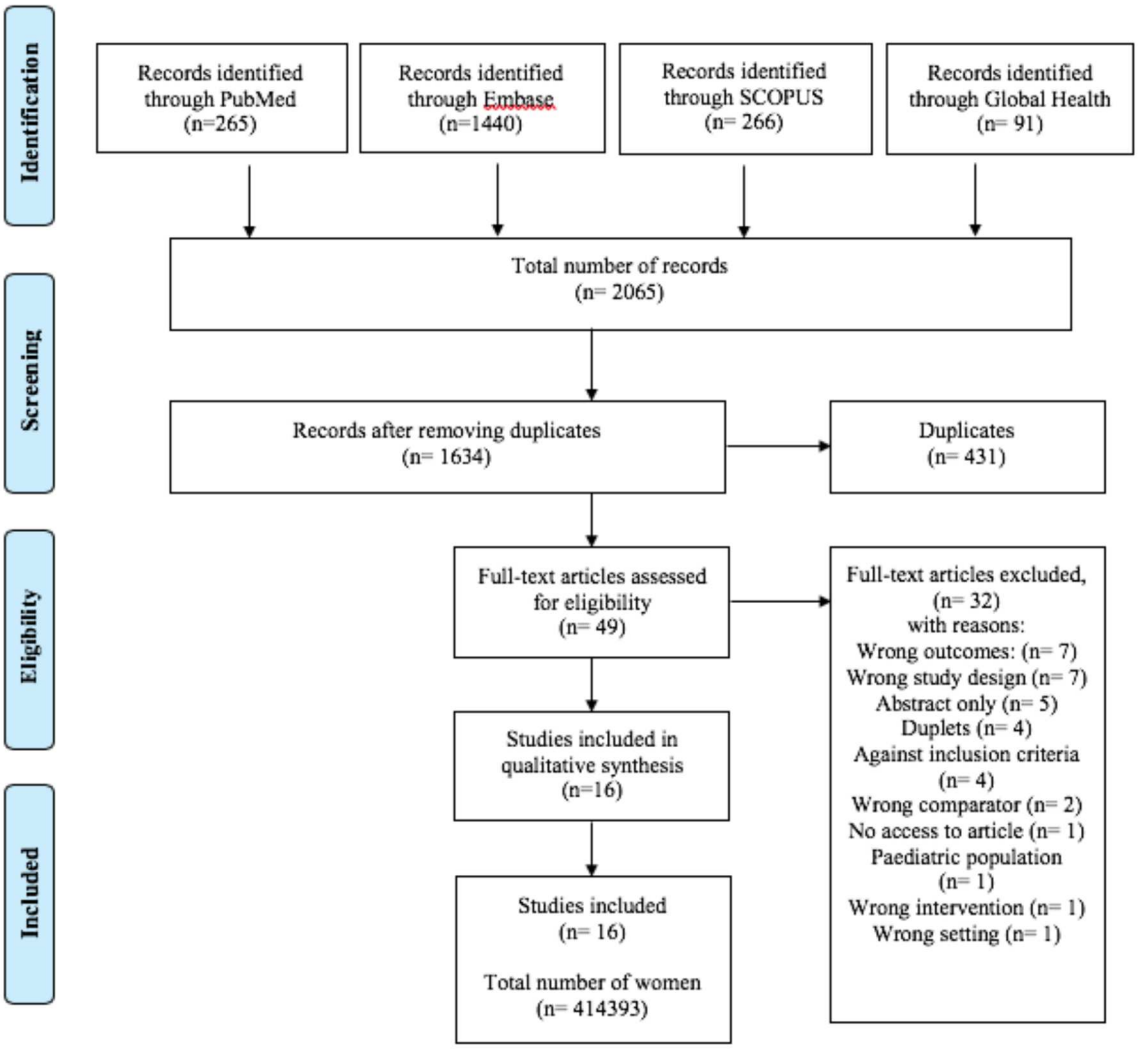
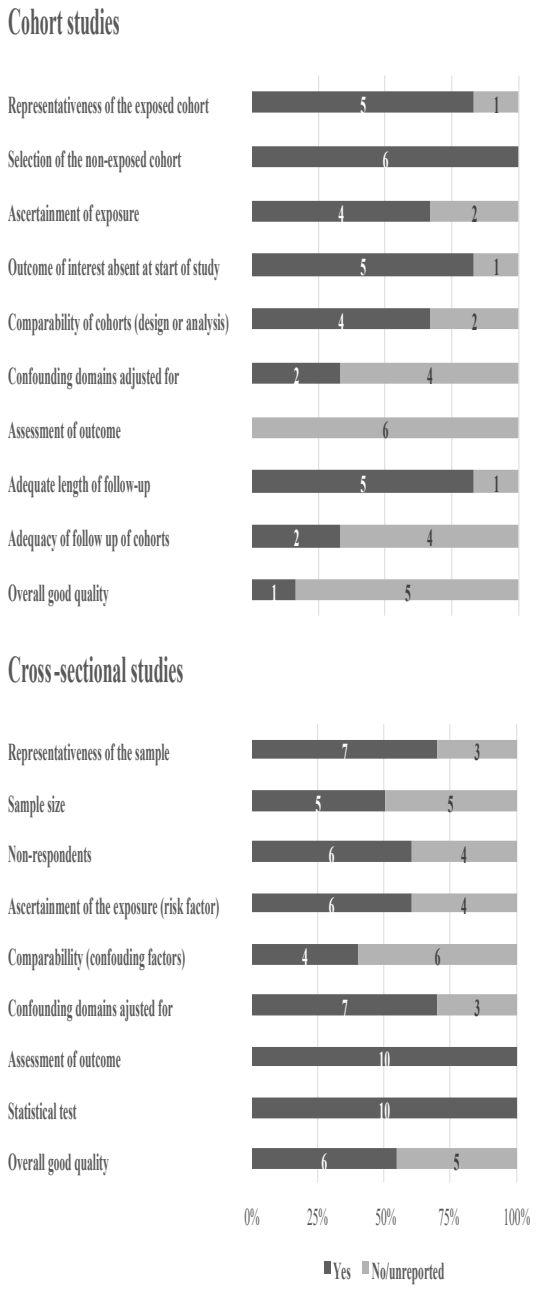
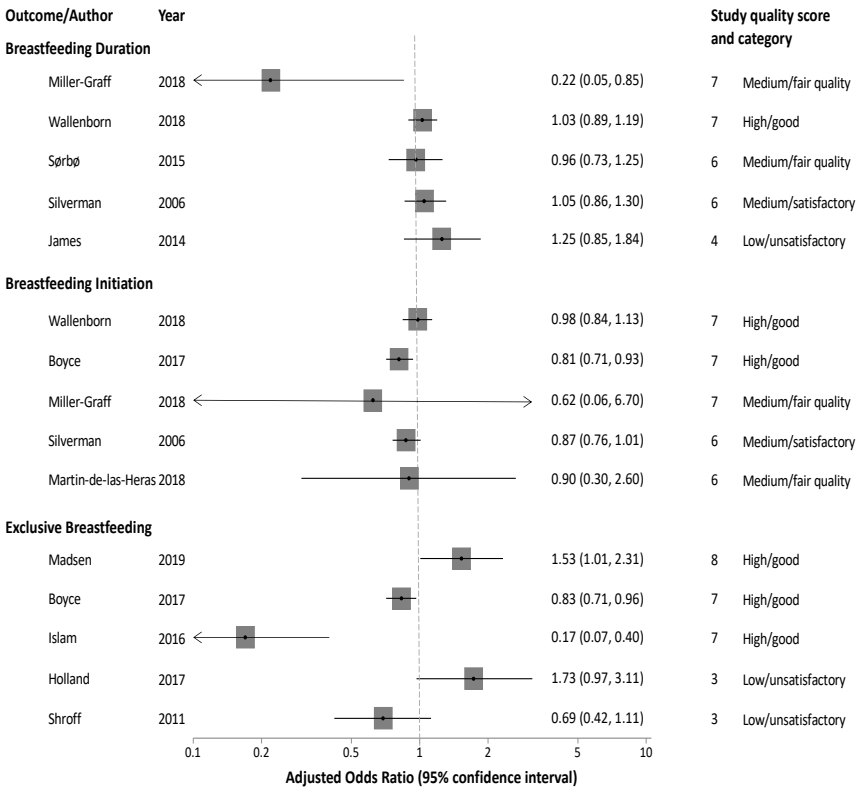


Figure 2: Study quality for cohort and cross-sectional studies in the review of intimate partner violence and breastfeeding outcomes



In the figure illustration of the NOS scale, the studies, which reached a maximum of stars in each category of the NOS-scale was rewarded a 'yes' and further if the studies adjusted for more than four confounding domains, they were rewarded a 'yes' (see appendix S2.2)

Figure 3: Results of physical violence and association with breastfeeding duration, breastfeeding initiation and exclusive breastfeeding presented in a Forest plot



PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2-3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2-3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3 + appendix
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3-4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	4
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	4
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	5
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	5
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	6
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	6
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	6-7
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	8
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	8

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Intimate Partner Violence and Breastfeeding: A Systematic Review

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Abstract

Objective*:* The association between intimate partner violence (IPV) and breastfeeding is unclear. We conducted a systematic review to summarise the evidence of breastfeeding outcomes following exposure to IPV.

Design: Systematic review.

Methods: We searched for published studies without study design or language restrictions (up to July 2019) in the following databases: PubMed, Embase, SCOPUS and The Global Health Library. Studies assessing various breastfeeding outcomes (initiation, duration and exclusive breastfeeding) in women exposed to IPV in any form (physical, psychological or sexual) and at any stage (one-year pre-, during, or post pregnancy) were included. Two authors independently selected the studies and conducted the quality appraisal by use of the Newcastle-Ottawa Scale. Results were summarised taking precision and quality into account.

Results: A total of 16 studies (participants n= 414,393) were included and they adjusted for a total of 48 different confounders. The majority of studies were cross-sectional (n= 11) and most studies were judged to be fair/low quality. Four out of seven studies found that IPV exposure shortened breastfeeding duration (aORs= 0,22 (95 % CI: 0,05-0,85), 1,18 (95 % CI: 1,01-1,37), 5,92 (95 % CI: 1,72-27,98), 1,28 (95 % CI: 1,18-1,39)) Further, 5/10 studies found that IPV led to early termination of exclusive breastfeeding (aORs= 1,53 (95 % CI: 1,01-23,1), 0,83 (95 % CI: 0,71-0,96), 1,35 (95 % CI:1,07-1,71), 0,17 (95 % CI: 0,07-0,4), 1,839 (95 % CI: 1,61-2,911)) and 2/6 studies found that IPV significantly reduced breastfeeding initiation (aOR= 2,00 (95% CI: 1,2-3,3), 0,81 (95% CI: 0,7-0,93)).

Conclusion*:* IPV exposure appears to associate negatively with some breastfeeding outcomes. Individual patient data meta-analysis is required to quantify the magnitude of the association for specific IPV-outcome combinations. More high-quality studies and definition of core confounders is warranted.

PROSPERO registration number: CRD42019129353 (prospectively registered)

Keywords: Intimate partner violence, domestic violence, breastfeeding, breastfeeding practices, exclusive breastfeeding, breastfeeding initiation.

Strengths and limitations of this study:

- This systematic review provides the latest evidence of the association between IPV and breastfeeding and summarises studies that have not previously been included in other reviews.
- We conducted a proper quality assessment of included studies by use of the Newcastle-Ottawa Scale
- We provided an overview of the heterogenous field of confounders and suggest defining core confounders related to IPV.
- The majority of studies included in this review were cross-sectional, hence, it was not possible to make a causal association nor conduct a meta-analysis.

Introduction

Intimate partner violence (IPV) is defined as any behavior by a current or former intimate partner that causes physical, psychological or sexual harm to those within an intimate relationship (1, 2). Most often, IPV is perpetrated by men against women (1-3), and the World Health Organization (WHO) estimates that one in three women will be exposed to either physical/or sexual violence during their lifetime (2). IPV can have both immediate and long-term mental and physical health consequences for the victims, including depression and physical impairment (3-5). Further, it has been found that IPV is related to a number of reproductive health outcomes, including preterm birth, low birth weight, insufficient weight gain, miscarriage, induced abortion and difficulties or lack of attachment to the baby (3-6). It has been speculated that IPV may also influence the establishment of breastfeeding practices, however this association is complex. WHO recommends initiating breastfeeding within one hour of birth, exclusive breastfeeding for six months and that mothers should continue breastfeeding for up to two years or beyond together with complementary feeding (7). IPV may affect breastfeeding directly, e.g. through sore nipples and difficulty in relaxing enough for adequate let down, but also indirectly, e.g. through lack of support or depression, self-doubt, body negativity, and anxiety (8, 9) Furthermore, qualitative studies have found that women who have experienced violence in their childhood may have trouble continuing exclusive breast feeding due to difficulties in separating the sexual role from the maternal role of breasts or due to lack of situational control (10, 11). The existing literature is characterised by various outcome measures for both IPV and breastfeeding, and further there are no agreement of core factors that may confound the association between IPV and breastfeeding, hence, there is variation in the statistical models used for analysing the relationship. This may be the reasons why studies on the relationship of IPV and breastfeeding practise have had inconsistent results. A study of IPV and breastfeeding practices across Africa found that IPV was associated with lower adjusted odds for breastfeeding initiation and exclusive breastfeeding in some African countries and higher adjusted odds in other countries (12), whilst a recent systematic review concluded that the majority of studies (n= 12, participant= 133,861) found a negative association between breastfeeding initiation and exclusive breastfeeding for the first six months (13). Yet, the review did not involve proper quality assessment and had no detailed discussion of confounders. Further, new literature has been published. Therefore, we conducted a robust systematic review thoroughly investigating the association of exposure to IPV pre, during and post pregnancy with breastfeeding outcomes sand synthesised the evidence taking confounders, precision and quality into considerations.

Methods

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (14) and Meta-analyses Of Observational Studies in Epidemiology (MOOSE) (15) guidelines. The protocol was prospectively registered in The International Prospective Register of Systematic Reviews (PROSPERO, ID: CRD42019129353)

Eligibility criteria and search methods identification of studies

We searched PubMed, Embase, SCOPUS and the Global Health Library from the (8-12 March 2019) with no time or language restrictions. An updated search was conducted the 18th of July 2019. Search terms included “intimate partner violence” OR “spouse abuse” OR “domestic violence” OR “physical abuse” OR “sex offenses” OR “battered women” AND “breast feeding” OR “breastmilk expression” OR “feeding behavior” OR “milk, human” OR lactation OR “milk

ejection" (full search in Appendix, S1). Eligible studies were original publications that reported exposure to IPV and breastfeeding practices in according with WHO's recommendations and exposure to IPV. We included studies with women exposed to violence one year prior to pregnancy, during pregnancy, and in the postpartum period and excluded studies of women who had experienced childhood abuse. Further, we excluded studies of violence perpetrated by women against men.

After removing duplicates, two authors independently screened titles, abstract and full-text (AKN and AB) using Covidence (www.covidence.org) (16). Disagreements were solved through discussion. One author (AKN) extracted data from included studies into a standardised Excel template. Extracted data included: Title, first author, publication year, country, study characteristics, study objective, participant characteristics, sample size, inclusion/exclusion criteria, type of exposure, measurement tool of exposure, primary outcomes and confounders that were adjusted for in the statistical analysis. Outcome data were verified by a second author (FKM).

Study quality assessment and data synthesis

The Newcastle Ottawa Scale (NOS) was used to assess the quality of cohort studies and a modified version of the scale was used for cross-sectional studies. The scale addresses the following domains: Selection process, comparability, exposure and outcome of interest. A maximum of nine stars can be given if all domains are well described in a given study. Cohort studies are regarded to be of 'good quality' if rewarded 3 or 4 stars in the selection domain, 1 or 2 stars in the comparability domain, and 2 or 3 stars in the outcome/exposure domain. Studies are regarded as being of 'fair quality' if rewarded 2 stars in the selection domain, 1 or 2 stars in the comparability domain, and 2 or 3 stars in the outcome/exposure domain. Finally, studies are judged as being of 'poor quality' if rewarded 0 or 1 star in the selection domain or 0 stars in the comparability domain or 0 or 1 stars in the outcome/exposure domain. For the cross-sectional version of the scale, the domain that assessed confounders was modified and no stars were given if studies did not justify their choice of confounders in their statistical analysis. A total of 10 stars can be given to the cross-sectional studies, and they are regarded as 'very good' if rewarded 9-10 points, 'good' if rewarded 7-8 points, 'satisfactory' if rewarded 5-6 points and 'unsatisfactory' if rewarded 0-4 points. Further, we modified both scales and added a point system for confounders, so that each study was given one point or star for each confounder they adjusted for (Table S2.1) Two authors (AKN and FMK) conducted the quality assessment independently and compared results. Disagreement were solved through discussion. AKN and DSL conducted the quality assessment of Madsen et al., as FKM was co-author of this study and therefore considered ineligible.

Two authors (AKN and DSL) made key domains for confounding factors and grouped them (Table S2.2). Results for the various IPV outcomes combinations were summarised and physical violence was presented in a forest plot. Inferences were generated taking study precision and quality into account as meta-analysis was not possible. The substantial heterogeneity of exposure, outcome, study quality and statistical models in the adjusted odds ratios (aOR) reported in individual studies was the reason we settled for a qualitative synthesis in the form of vote-counting, which we conducted within broad exposure-outcome subgroups stratified by study quality and precision to minimise bias. To determine whether a study showed a negative association or no difference we relied on numerical data in vote-

counting to avoid subjectivity. This approach is in line with what is considered suitable given study variability in previous review publications (17, 18).

Patient and Public Involvement:

No patients involved.

Results

The database searches resulted in 2062 records and 1634 records were eligible for title and abstract screening after removal of duplicates (Fig. 1). A total of 16 studies met the inclusion criteria of which 11 were cross-sectional (19-30) and five were cohort studies (31-34). The studies were published between 2006 and 2019. Four studies was conducted in The United States (19, 21, 24, 30), four in India (20, 22, 25, 28), two in Brazil (27, 33), one in Tanzania (31), one in Spain (32), one in Sweden (23), , one in Norway (34), one in Australia (26) and one in Hong Kong (29). Population age ranged from 14 years to 49 year and was reported as means (n= 3) or in intervals (n= 13). The size of the study population varied from 69 to 195,264 participants with a mean sample size of 25,899 (Table 1). Exposure (IPV) was measured through questionnaires (21, 22, 24, 25, 28, 30, 31) or through various validated tools: The Conflict-Tactic Scale (CTS) (19, 20, 27, 29, 33), The Abuse Assessment Screen (AAS) (29), the Index of Spouse Abuse (ISA) (32), the Composite Abuse Scale (CAS) (26), and the Norvold Abuse Questionnaire (23) (Table 1)

In regards to exposure, two of the studies only focused on physical violence (21, 27) and one study only focused on psychological violence (20). However, the majority of studies measured IPV as 'any IPV' and did not separate violence into groups (19, 21, 23, 26, 28-30, 33), and five studies measured both physical, or/and psychological or/and sexual violence respectively and combined to compare the differences in exposure of a certain type of IPV (22, 25, 31, 32, 34). The outcome, breastfeeding was measured as early cessation/shortened duration of breastfeeding, initiation of breastfeeding, or exclusive breastfeeding. The definition of ¨shortened duration of breastfeeding¨ differed as each study sat their own time limit (Table S2.3). Some studies investigated more than one outcome and therefore, one study could be presented in more than one outcome table.

Overall, the included studies adjusted for 48 different confounders within the following domains: maternal sociodemographic, relationship characteristics, maternal lifestyle and health, economy, pregnancy and postpartum related problems, child characteristics, support during pregnancy and postpartum, violence or stressful life events, pregnancy intention, caste and religion. The most common confounding factors were maternal lifestyle and health, maternal sociodemographics, and relationship characteristics. The majority of studies did not justify their choice of confounders (20-24, 26, 28-30, 33). Sorbo et al. and Madsen et. al. used the directed acyclic graph (DAG) to justify the confounders adjusted for in their analysis, and Sorbo et. al. also made a sensitivity analysis to determine whether or not the association between IPV and breastfeeding practices was mediated primarily through postpartum depression. They found that depression could not explain early cessation of breastfeeding (34).

Study quality assessment

Of the five cohort studies, one study was judged as 'good quality' (31), three studies was judged as 'fair quality' (19, 32, 34) and one study was judged as 'poor quality' (33). Of the 11 cross-sectional studies, six were judged as having 'good' quality (20-22, 25, 27, 29), one was judged as 'satisfactory' (30) and three studies were judged as 'unsatisfactory' (24, 26, 28). One cross-sectional study was not assessed using NOS for cross-sectional studies, since the study was embedded from a cohort (23), hence, NOS for cohort studies was used to assess the quality and it was judged as of 'poor quality' (23) (Fig. 2).

Initiation of breastfeeding

Six studies investigated the association between exposure to IPV and initiation of breastfeeding (19, 21, 22, 24, 30, 32). Two studies found a statistically significant association between initiation of breastfeeding and exposure to either physical or sexual violence (22) ($aOR_{physical}$=0.81; 95% CI 0.71-0.93. aOR_{sexual}=0.52; 95% CI 0.36-0.76) or psychological violence (32) (aOR 2,00; 95% CI 1.2-3.3). Four studies found no association when exposed to multiple types of violence (19, 22, 24, 30) (Table S2.4)

Shortened duration of breastfeeding

Seven studies reported outcomes based on early cessation or shortened duration of breastfeeding when exposed to violence (19-21, 24, 26, 30, 34), and four studies found a significant association (aORs= 0,22 (95 % CI: 0,05-0,85), 1,18 (95 % CI: 1,01-1,37), 5,92 (95 % CI: 1,72-27,98), 1,28 (95 % CI: 1,18-1,39)) between exposure to IPV and early cessation/shortened duration of breastfeeding (19, 21, 34) (Table S2.3) Miller-graff et. al (19) found that IPV was associated with decreased odds ratio of for continuation of breastfeeding (OR=0.22; 95 % CI 0.5-0.85), hence, IPV was associated with an increased risk of shortened duration of breastfeeding. Further, one study found a statistically significant association between reduced duration/early cessation and IPV (OR=1,41 95% CI 1.15-1.74). However, the association became insignificant when adjusting for confounders (aOR=0.94; 95% CI 0.76-1.7) (30). Three of the studies found no association between violence and breastfeeding duration or early cessation (20, 24, 26).Three studies did not distinguish between period of exposure (26, 28, 33), whereas the remaining papers categorised time of exposure. One study (26) found no association between IPV and breastfeeding practices and concluded that IPV itself did not influence breastfeeding outcomes as much as maternal age, education and birth method (Fig. 3)

Exclusive breastfeeding

Ten studies assessed exposure to violence in relation to risk of early termination of exclusive breastfeeding and five studies found a statistically association (aORs= 1,53 (95 % CI: 1,01-23,1), 0,83 (95 % CI: 0,71-0,96), 1,35 (95 % CI:1,07-1,71), 0,17 (95 % CI: 0,07-0,4), 1,839 (95 % CI: 1,61-2,911) (22, 25, 29, 31, 33) and five studies found no statistically association (19, 23, 24, 27, 28) (Fig. 3) (Table S2.5)

Discussion

Main findings

This systematic review summarised the most recent evidence, between exposure to IPV and breastfeeding practices. A total of 16 studies were included of which 11 were cross-sectional and five were cohort studies. Forty-eight different confounders were controlled for in the studies. Only one cohort was judged as being of good quality, hence, the overall

quality of the studies was fair to low. The majority of studies found that exposure to IPV in any form and at any stage had a significant negative association with breastfeeding duration, early termination of exclusive breastfeeding, but it did not reduce initiation.

Strengths and limitations:

The review synthesises the latest evidence of pregnancy-related IPV and WHO recommended breastfeeding practices and elucidates the complex association between IPV exposure, breastfeeding, and confounding factors. A limitation of this review is that the majority of included studies were cross-sectional, hence, a causal association cannot be estimated (35), and we were not able to conduct a meta-analysis. Therefore, there is a need for well-designed longitidunal studies to better estimate the association. Another limitation of this review is that a similar systematic review was recently conducted (13). However, only seven studies were included in both reviews and the data included in this review tripled the evidence size compared to the previous (280,532 more participants contributed date to our analysis than the 133,861 participants previously) (13). Yet one should bear in mind that the participants in this review primarily come from two large scale studies that both used data from Pregnancy Risk Assessment Monitoring System (PRAMS) (21) (30) whilst only one of these studies (30) was included in the previous review. However, as there is no overlap in data - Silverman et. al. (30) used data from women participating in the PRAMS study between 2000-2003, whereas Wallenborn et. al. (21) used data from women participating from 2004-2014, we considered them as separate studies – we believe it to be a strength of this review that both studies are included. In comparison to the other recent review, another strength of this review is that we conducted a proper quality assessment of all included studies and made use of a validated tool in the form of NOS, whilst Mezzavilla et al. (13) used STROBE to asses quality through bias susceptibility of included studies. However, STROBE is not a proper quality assessment tool as this is a reporting guideline for observational studies (36, 37), hence, the quality assessment conducted in this review is more meticulous. Yet, a limitation of NOS is that the quality assessors need to adapt the scale to specific research designs, which can lead to the possibility of low agreement between quality assessors (38, 39). Nevertheless, as our quality assessment was conducted by two independent reviewers, we judged this issue to be minor. Further, the two versions of the NOS scale do not consider that cohort studies are superior to cross-sectional studies in the evidence hierarchy, hence, this is a separate parameter to take into consideration when judging the overall quality of evidence according to NOS. Additionaly, our review excluded studies with women who had a lifetime history of violence and childhood abuse, whereas the previous review included these populations of women. Hence, our exposure differs to some extent and a more heterogenous exposure that consist of both childhood abuse and pregnancy-related IPV adds a further complicating element to the association.

Interpretation of findings

Overall, our study results support the findings of the recent review by Mezzavilla et. al (13) despite our review is mainly being based on different studies and have different exposures. In line with Mezzavilla et. al we found that the most investigated outcome was exclusive breastfeeding, and that studies varied in quality. In contrast to Mezzavilla et. al, they also reported significant results from studies investigating women exposed to lifetime history of IPV. This may indicate that exposure to any time of violence may affect breastfeeding patterns. However, the reason why we choose to exclude life time IPV is that evidence points out that the association of only experiencing violence in

pregnancy may be overestimated as there is evidence that victimisation as a young child increases the risk of further victimisation later in life (40), hence, it also increases risk of breastfeeding difficulties when becoming a mother (41, 42). Mediational models exploring childhood abuse and the negative association with breastfeeding have found it to stem from shame and the reaction to touch, in the postnatal period, which can lead to possible re-traumatization (10). With this in mind, it is interesting that only two studies in our review adjusted for childhood abuse in their statistical calculations with contradictory results (19, 34). Hence, as the majority of studies did not control for this factor, we cannot rule out that the exposure of IPV found in this study may be overestimated. Further, it is plausible that our exposure can be affected by recall bias. Women are primarily interviewed about exposure of IPV in relation to pregnancy in the postpartum period, which can potentially introduce recall bias as some women may not remember the extent of the violence or when they were exposed to violence. Moreover, women exposed to violence often under-report or refuse to participate in IPV studies in order to protect themselves or the perpetrator (43). If our effect estimates are affected by recall bias or underreporting, it plausible that true association is underestimated. Further, exclusive breastfeeding is often referred to as the most favourable type of feeding of infants. These recommendations may influence the women's reports on exclusive breastfeeding as is it can be strongly correlated to the feeling of being a "good" mother. If women systematically erroneously report to exclusively breastfeed their babies to a higher extent than what to be the case, it is a type of reporting bias, which may also underestimate the true association between IPV and breastfeeding.

In relation to confounders it is worth noticing that our synthesis elucidated the comprehensive number of confounders that are adjusted for in the IPV-breastfeeding relationship. A key finding of this review is that most studies did not state their reasons for choice of confounders and there seems to be lack of consensus in the identification of potential confounders. Some covariates may be part of the causal pathway of the association between violence and breastfeeding, hence they are not true confounders. For instance, depression is one variable that can both be identified as a confounder, or an intermediate variable in the causal pathway. Sorbo et. al (34) concluded, that depression could not explain early cessation of breastfeeding, whilst other studies (44, 45), found that depression had a negative impact on breastfeeding duration in women suffering from depression. The mechanism between breastfeeding and depression is poorly understood, but research of failed lactation and perinatal depression theorise that it may be the manifestation of neuroendocrine perturbations in gonadal and lactogenic hormones (46). Overall, the inconsistency of potential confounders propose a need for defining core outcome measures related to IPV and breastfeeding practices (47). We suggest an individual patient data meta-analysis (48), by sharing raw data from existing studies and a powerful reanalysis adjusting for predefined confounders, can make evidence synthesis more robust in this area.

Conclusion

This review shows that the association between IPV and breastfeeding is complex and that the effect of exposure to IPV on breastfeeding practices was difficult to properly asses based on data synthesis without the possibility of meta-analysis. The majority of studies in this review indicated that IPV exposure in pregnancy was associated with impaired breastfeeding, yet still some studies also found no association. There is no consensus of which confounders influence the relationship, hence, future research should aim to define core outcome measures and include longitudinal studies of high quality with pre-defined confounders.

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Competing interests

DSL, AKN, AB, and KSK had no conflict of interest. VR and FMK are co-authors of one study included in this review.

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Author statement

AKN and AB made the protocol and screened for eligible articles. AKN planned the data extraction, which was cross-checked and verified by FKM. AKN, FKM and DSL did quality assessment. Disagreement was solved through discussion.

AKN designed to tables and wrote the first draft of the manuscript, which was reviewed by DSL, VR, KSK and AB. All authors approved the final manuscript.

Data sharing statement

No additional data available.

Table 1: Characteristics of studies included in the review of the intimate partner violence and breastfeeding outcomes

Reference	Study design	Country	Setting	Sample size	Age	Tool to measure IPV	Outcome measures	Quality
Madsen, 2019 (33)	Cohort	Tanzania	Hospital	1128	20-30	Interview (from WHO multi-country study)	Premature termination of exclusive BF	Good
Martin-de-las-Heras, 2018 (34)	Cohort	Spain	Antenatal care clinic	718	>20-40+	ISA[A]	BF avoidance (initiation)	Fair
Miller-Graff, 2018 (18)	Cohort	The United States	WIC clinic (Women, infant and children clinic)	69	26.5 (mean)	CTS[B]	BF exclusivity, initiation and cessation	Fair
Tiwari, 2018 (22)	Cross-sectional	India	Household	26,587	15-49	CTS-2[B]	BF duration	Good

Wallenborn, 2018 (23)	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	195,264	<20-35+	Questionnaire	BF initiation and duration	Good
Boyce, 2017 (24)	Cross-sectional	India	Household	10,469	20-29	Questionnaire	Early BF initiation and exclusivity	Good
Finnbogadottir, 2017 (25)	Cross-sectional	Sweden	Project: "Pregnant women and new mother's life experience"	713	30 (mean)	Norvold Abuse Questionnaire	Exclusive BF	Poor
Holland, 2017 (26)	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	760	20-29	Questionnaire (based on CDC's monitoring system)	BF initiation, duration and exclusivity	Unsatisfactory
Hasselmann, 2016 (20)	Cohort	Brazil	Primary health clinic	564	<20-20+	CTS-1[B]	Interruption of exclusive BF	Poor
Islam, 2016 (27)	Cross-sectional	India	Community based survey	426	14-25+	Questionnaire (based on WHO demographic health survey)	Exclusive BF	Good
Sørbø, 2015 (21)	Cohort	Norway	MoBa (The Norwegian Mother and Child Cohort Study)	53,934	14-35+	Norvold Abuse Questionnaire	Early cessation of any BF	Fair
James, 2014 (28)	Cross-sectional (embedded from an RCT)	Australia	MOVE (Improving maternal and child health nurse care for vulnerable mothers)	2621	15-35+	CAS[C]	BF duration	Unsatisfactory
Moraes, 2011 (29)	Cross-sectional	Brazil	Public Health Center	811	<20-20+	CTS-2[B]	Early cessation of exclusive BF	Good
Shroff, 2011 (30)	Cross-sectional (embedded from an RCT)	India	Household	600 (mother-infant pairs)	22.14 (mean)	Questionnaire	Exclusive BF	Unsatisfactory
Lau, 2007 (31)	Cross-sectional	Hong Kong	-	1150	<25-20+	AAS[D], CTS[B]	Breastfeeding and mixed feeding	Good
Silverman, 2006 (32)	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	118,579	<20-30+	Questionnaire	BF initiation and early cessation	Satisfactory

A: Index of Spouse Abuse, B: Conflict-Tactic Scale, C: Composite Abuse Scale, D: Abuse Assessment Scree

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Figure legends

Figure 1 **Flow chart of study selection in the review of intimate partner violence and breastfeeding outcomes**
Figure 2 **Study quality of cohort and cross-sectional studies in the review of intimate partner violence and breastfeeding outcomes**
Figure 3 **Results of physical violence and the association with breastfeeding duration, breastfeeding initiation and exclusive breastfeeding presented in a Forest plot ordered according to descending quality**

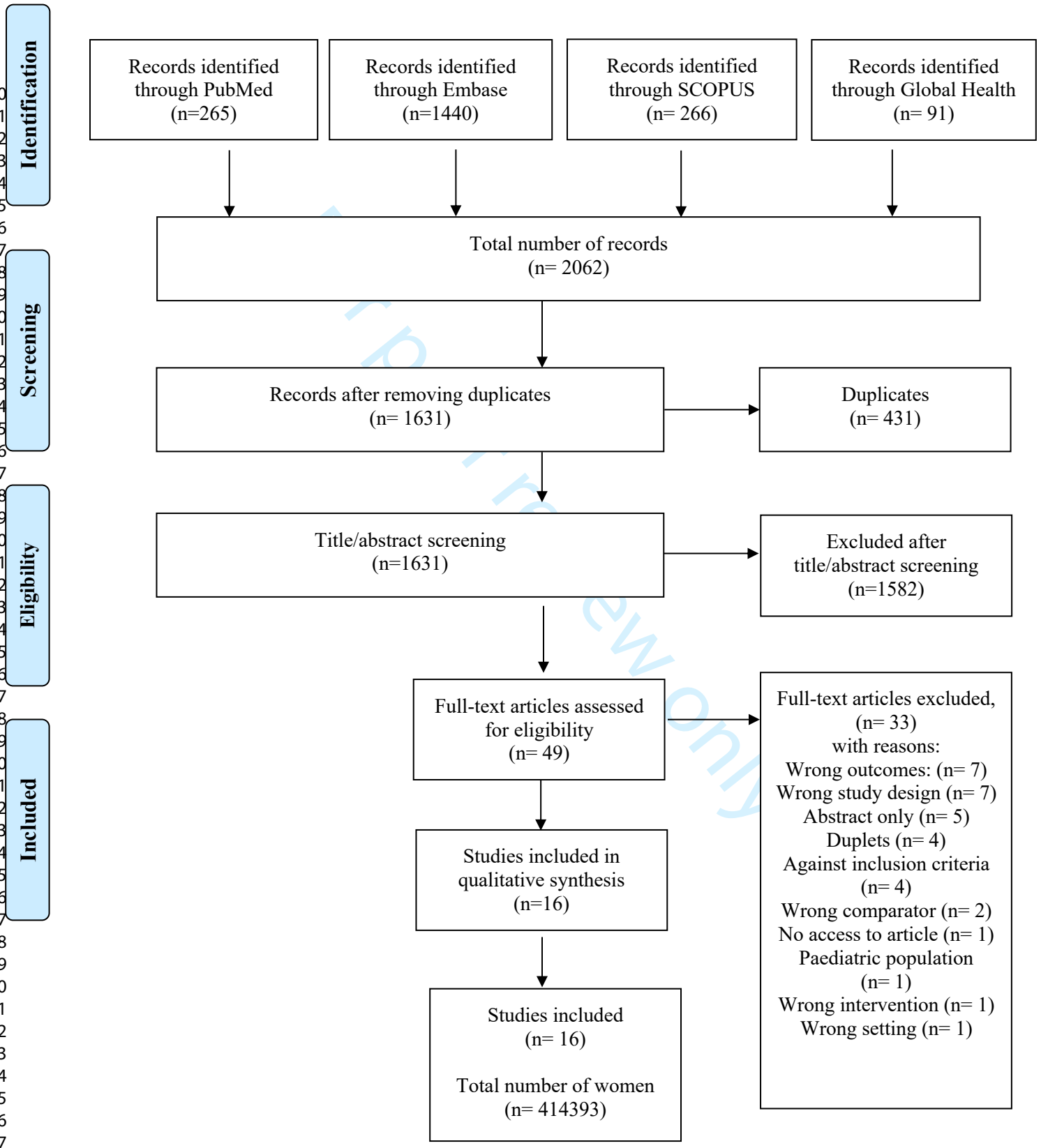
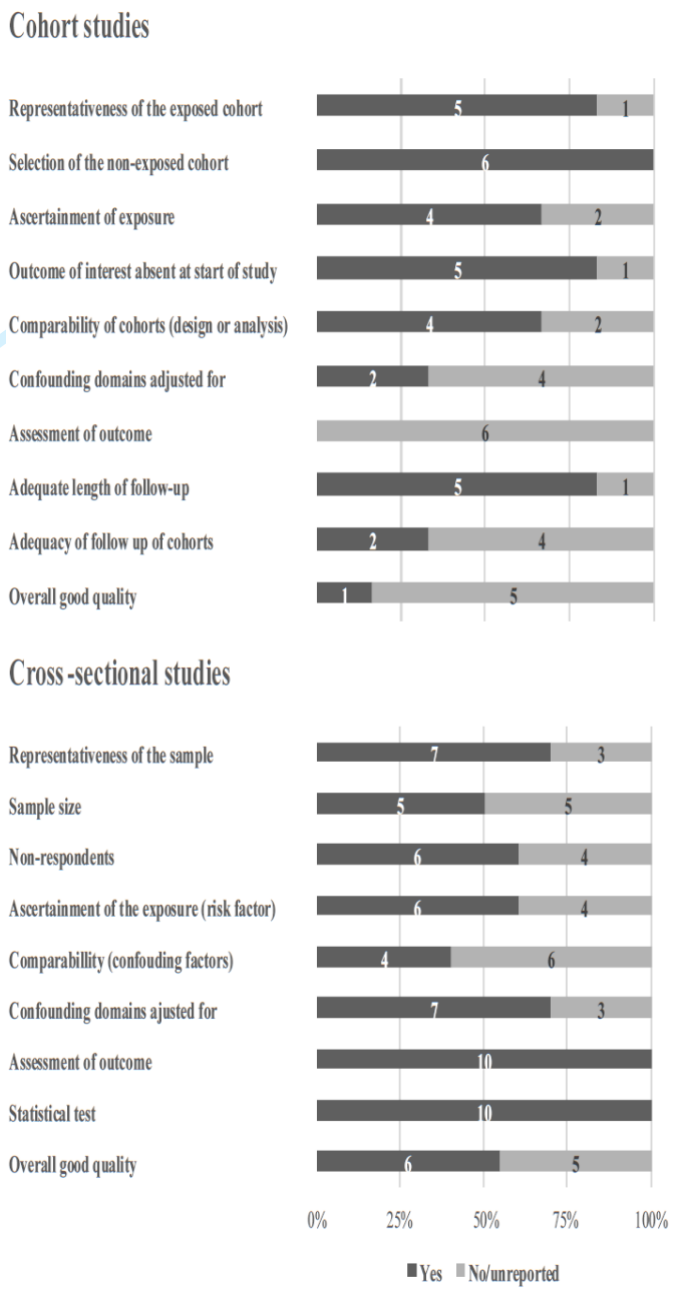
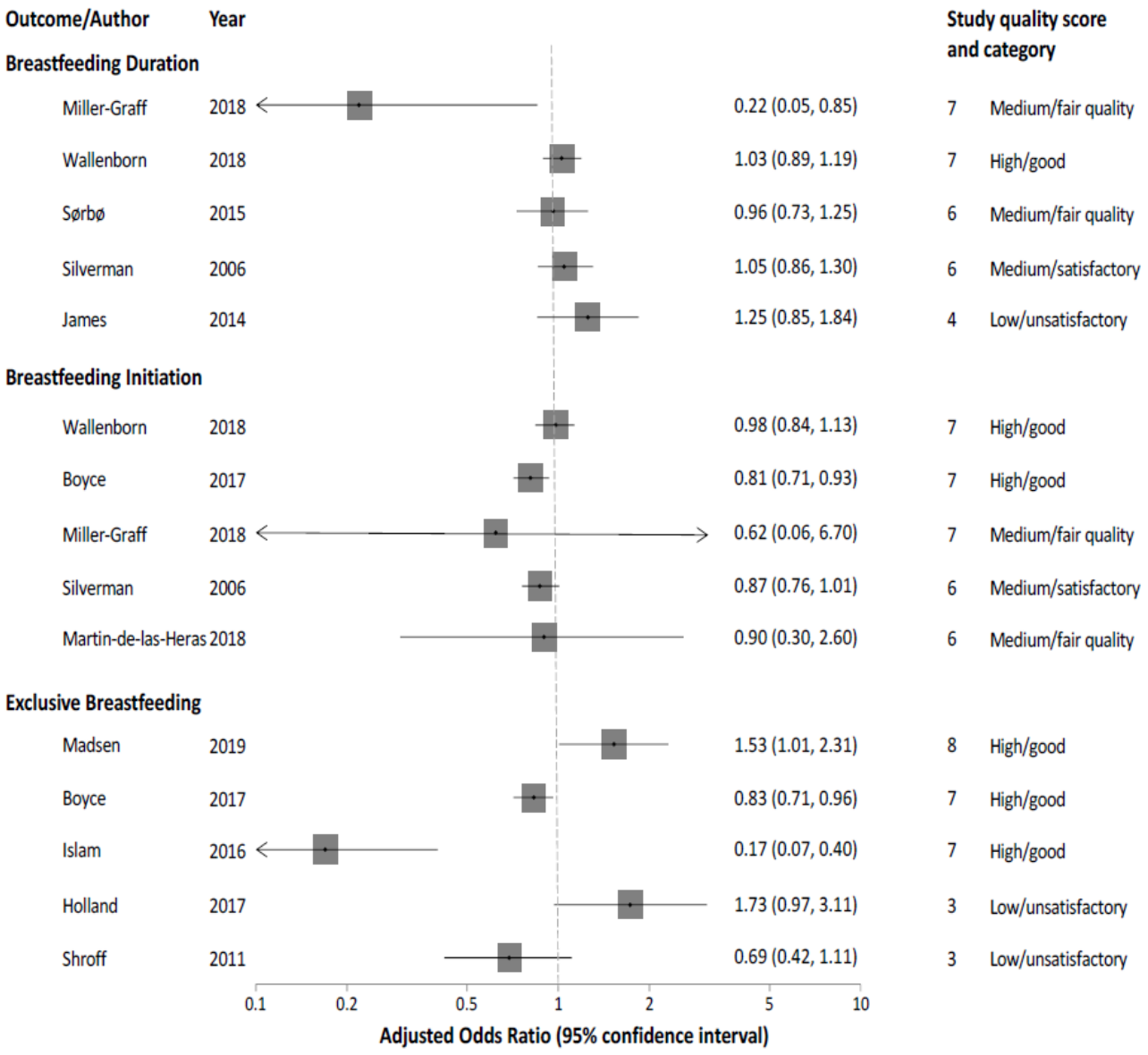

Identification
Records identified through PubMed (n=265)
Records identified through Embase (n=1440)
Records identified through SCOPUS (n= 266)
Records identified through Global Health (n= 91)
Screening
Total number of records (n= 2062)
Records after removing duplicates (n= 1631)
Duplicates (n= 431)
Eligibility
Title/abstract screening (n=1631)
Excluded after title/abstract screening (n=1582)
Full-text articles assessed for eligibility (n= 49)
Full-text articles excluded, (n= 33) with reasons: Wrong outcomes: (n= 7) Wrong study design (n= 7) Abstract only (n= 5) Duplets (n= 4) Against inclusion criteria (n= 4) Wrong comparator (n= 2) No access to article (n= 1) Paediatric population (n= 1) Wrong intervention (n= 1) Wrong setting (n= 1)
Included
Studies included in qualitative synthesis (n=16)
Studies included (n= 16)
Total number of women (n= 414393)

Figure 2: Study quality of cohort and cross-sectional studies in the review of intimate partner violence and breastfeeding outcomes



In the figure illustration of the NOS scale, the studies, which reached a maximum of stars in each category of the NOS-scale was rewarded a 'yes' and further if the studies adjusted for more than four confounding domains, they were rewarded a 'yes' (see appendix S2.2)

Figure 3: Results of physical violence and association with breastfeeding duration, breastfeeding initiation and exclusive breastfeeding presented in a Forest plot ordered according to descending quality



Appendix, S1: Search strategy

Embase search: Searched on the 11th of March with a total result of 1382 articles

#ID	Search
1	Exp partner violence/
2	Exp domestic violence/
3	Exp physical abuse/
4	Exp battered woman/
5	Exp breast feeding/
6	Exp breast milk expression/
7	Exp feeding behavior
8	Exp lactation
9	Exp milk ejection
10	”intimate partner violence”
11	”dating violence”
12	”partner violence”
13	”partner homicide”
14	”psychological violence”
15	”psychological abuse”
16	”spouse abuse”
17	”spousal abuse”
18	”wife abuse”
19	”partner abuse”
20	”domestic violence”
21	”family violence”
22	”physical abuse”
23	”physical violence”
24	”physical maltreatment”
25	”sex offenses”
26	”sexual violence”
27	”sexual harm”
28	”sexual coercion”
29	”battered woman”
30	”battered women”
31	”abused women”
32	”abused woman”
33	”relationship violence”
34	”relationship aggression”
35	”couple violence”
36	”spousal violence”
37	”domestic abuse”
38	”wife beating”
39	”physical harm”
40	”physical aggression”
41	”emotional violence”
42	”emotional abuse”
43	”emotional harm”
44	”violence against women”
45	1 or 2 o 3 or 4 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44
46	Exp sexual abuse
47	Controlling behavior
48	45 or 46 or 47
49	”sexual abuse”
50	48 or 49
51	”exclusive breastfeeding”
52	”breastfeeding duration”
53	”breastfeeding intention”
54	”pumping breast”
55	”human milk”
56	”breast milk”
57	”milk secretion”
58	”milk let-down”
59	5 or 6 or 7 or 8 or 51 or 52 or 53 or 54 or 55 or 57 or 58
60	Feeding behavior
61	Feeding pattern
62	”feeding patterns”

63	59 or 60 or 61 or 62
64	Feeding behaviors
65	63 or 64
66	”exclusive breast feeding”
67	”exclusive bresat feedings”
68	”breast feedings”
69	”breast feeding”
70	”breastmilk expression”
71	”breastmilk expressions”
72	”milk collection”
73	”milk collections”
74	”breast pumping”
75	”milk secretion”
76	”milk secretions”
77	65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76
78	Lactations
79	Lactation
80	77 or 78 or 79
81	50 and 80

Global Health Library search: Searched on the 12th of March with a total result of 91 articles

#ID	Search
S1	”intimate partner violence” OR ”dating violence” OR ”partner violence” OR ”partner homicide” OR ”psychological abuse” OR ”psychological violence”
S2	”spouse abuse” OR ”spousal abuse” OR ”wife abuse” OR ”partner abuse”
S3	S3 OR S2
S4	”domestic violence” OR ”family violence”
S5	S4 OR S3
S6	”physical abuse” OR ”physical violence” OR ”physical maltreatment”
S7	S6 OR S5
S8	”sexual assault” OR ”sex offenses” OR ”sexual violence” OR ”sexual abuse” OR ”sexual harm” OR ”sexual coercion”
S9	S8 OR S7
S10	”battered woman ”OR ”battered women” OR “abused woman” OR “abused women”
S11	S10 OR S9
S12	“relationship violence” OR “relationship aggression” OR “couple violence” OR “spousal violence” OR “domestic abuse” OR “wife beating” OR “physical harm” OR “physical aggression”
S13	S12 OR S11
S14	“emotional violence” OR “emotional abuse” OR “emotional harm” OR “controlling behaviour” OR “violence against women”
S15	S14 OR S13
S16	“breast feeding” OR “breastfeeding” OR “exclusive breast feeding” OR “exclusive breastfeeding” OR “breastfeeding duration” OR “breastfeeding intention”
S17	“breast milk expression” OR “breast milk expressions” OR “milk collection” OR “milk collections” OR “breast pumping” OR “pumping breast”
S18	S17 OR S16
S19	“feeding behaviour” OR “feeding behaviors” OR “feeding pattern” OR “feeding patterns” OR “human milk” OR “milk, human”
S20	S19 OR S18
S21	Lactation OR lactations OR “milk secretion” OR “milk secretions” OR “milk ejection” OR “milk let-down”
S22	S21 OR S20
S23	S22 AND S15

PubMed search: Searched on the 8th of March with a total result of 253 articles

((((((((((((("Breast Feeding"[Mesh]) OR breastfeeding) OR exclusive breast fe*) OR "exclusive breastfeeding") OR "breastfeeding duration") OR breast fe*) OR "breastfeeding intention")) OR ((((((("Breast Milk Expression"[Mesh]) OR breast milk expression*) OR breastmilk expression*) OR milk collection*) OR breast pumping*) OR "pumping breast")) OR ((("Feeding Behavior"[Mesh]) OR feeding behavior*) OR feeding pattern*)) OR (("Milk, Human"[Mesh]) OR "human milk")) OR ((("Lactation"[Mesh]) OR milk secretion*) OR lactation*)) OR (("Milk Ejection"[Mesh]) OR "milk let-down"))) AND ((((((((((((((((((("relationship violence") OR "relationship aggression") OR "couple violence") OR "spousal violence") OR "domestic abuse") OR "wife beating") OR "physical harm") OR "physical aggression") OR "emotional violence") OR "emotional abuse") OR "emotional harm") OR controlling behavior*) OR "violence against women")) OR ((((("Battered Women"[Mesh]) OR "Battered Woman") OR "abused women") OR "abused woman")) OR ((((((("Sex Offenses"[Mesh]) OR "sex offenses") OR "sexual violence") OR sexual abuse*) OR "sexual harm") OR "sexual coercion")) OR ((((("Physical Abuse"[Mesh]) OR "physical abuse") OR "physical violence") OR "physical maltreatment")) OR ((("Domestic Violence"[Mesh]) OR "domestic violence") OR "family violence")) OR (((((("Spouse

Abuse"[Mesh]) OR "spouse abuse") OR "spousal abuse") OR "wife abuse") OR "partner abuse")) OR (((((("Intimate Partner Violence"[Mesh]) OR "intimate partner violence") OR "dating violence") OR "partner violence") OR "partner homicide") OR "psychological violence") OR "psychological abuse"))

SCOPUS: Searched on the 11th of March with a total result of 257 articles

((((TITLE-ABS-KEY("breast feeding")) OR (TITLE-ABS-KEY("breastfeeding intention"))) OR ((TITLE-ABS-KEY(breastfeeding)) OR (TITLE-ABS-KEY("breastfeeding duration"))) OR ((TITLE-ABS-KEY("exclusive breast feeding")) OR (TITLE-ABS-KEY("exclusive breastfeeding")))) OR ((TITLE-ABS-KEY("breast milk expression")) OR (TITLE-ABS-KEY("breast milk expressions")) OR (TITLE-ABS-KEY("breastmilk expression")) OR (TITLE-ABS-KEY("breastmilk expressions")) OR (TITLE-ABS-KEY("milk collections")) OR (TITLE-ABS-KEY("milk collection")) OR (TITLE-ABS-KEY("breast pumping")) OR (TITLE-ABS-KEY("pumping breast"))) OR ((TITLE-ABS-KEY("feeding behavior")) OR (TITLE-ABS-KEY("feeding pattern")) OR (TITLE-ABS-KEY("human milk")) OR (TITLE-ABS-KEY("milk, human")) OR (TITLE-ABS-KEY("breast milk"))) OR ((TITLE-ABS-KEY(lactation)) OR (TITLE-ABS-KEY("milk secretion")) OR (TITLE-ABS-KEY("milk ejection")) OR (TITLE-ABS-KEY("milk let-down")))) AND (((TITLE-ABS-KEY("intimate partner violence")) OR (TITLE-ABS-KEY("dating violence")) OR (TITLE-ABS-KEY("partner violence")) OR (TITLE-ABS-KEY("partner homicide")) OR (TITLE-ABS-KEY("psychological violence")) OR (TITLE-ABS-KEY("psychological abuse"))) OR (((TITLE-ABS-KEY("spouse abuse")) OR (TITLE-ABS-KEY("spousal abuse"))) OR (TITLE-ABS-KEY("wife abuse")) OR (TITLE-ABS-KEY("partner abuse"))) OR ((TITLE-ABS-KEY("domestic violence")) OR (TITLE-ABS-KEY("family violence")) OR (TITLE-ABS-KEY("physical abuse")) OR (TITLE-ABS-KEY("physical violence")) OR (TITLE-ABS-KEY("physical maltreatment"))) OR ((TITLE-ABS-KEY("sex offenses")) OR (TITLE-ABS-KEY("sexual violence")) OR (TITLE-ABS-KEY("sexual abuse")) (TITLE-ABS-KEY("sexual harm")) OR (TITLE-ABS-KEY("sexual coercion"))) OR (((TITLE-ABS-KEY("battered women")) OR (TITLE-ABS-KEY("battered woman"))) OR ((TITLE-ABS-KEY("abused woman")) OR (TITLE-ABS-KEY("abused women")))) OR ((((TITLE-ABS-KEY("relationship aggression")) OR (TITLE-ABS-KEY("couple violence"))) OR (TITLE-ABS-KEY("relationship violence"))) OR (TITLE-ABS-KEY("spousal violence"))) OR ((TITLE-ABS-KEY("domestic violence")) OR (TITLE-ABS-KEY("wife beating")) OR (TITLE-ABS-KEY("physical harm")) OR (TITLE-ABS-KEY("physical aggression"))) OR ((TITLE-ABS-KEY("emotional violence")) OR (TITLE-ABS-KEY("emotional abuse")) OR (TITLE-ABS-KEY("emotional harm")) OR (TITLE-ABS-KEY("controlling behavior"))) OR (TITLE-ABS-KEY("violence against women")))

Appendix, S2: Data synthesis tables

Table S2.1: Results of NOS quality assessment

Cohort studies											
	Selection (maximum 4 stars)				Comparability (maximum 2 stars)		Outcome (maximum 3 stars)			No. of stars	No. of stars with domains adjusted for
Study	Representativeness of the exposed cohort	Selection of the non-exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of study	Comparability of cohorts on the basis of the design or analysis	Confounding domains ajusted for (table S2.1)	Assessment of outcome	Was follow-up long enough for outcomes to occur	Adequacy of follow up of cohorts		
Madsen, 2019	*	*	*	*	**	**	-	*	*	8	10
Martin-de-las-heras, 2018	*	*	*	*	**	******	-	-	-	6	12
Miller-Graff, 2018	-	*	*	*	**	****	-	*	*	7	11
Finnbogadottir, 2017[A]	*	*	-	*	-	-	-	*	-	4	4
Hasselmann, 2016	*	*	*	-	-	***	-	*	-	4	7
Sørbø, 2015	*	*	-	*	**	***	-	*	-	6	9
	Cross-sectional studies										
	Selection (maximum 5 stars)				Comparability (maximum 2 stars)		Outcome (maximum 3 stars)			No. of stars	
Study	Representativeness of the sample	Sample size	Non-respondents	Ascertainment of the exposure (risk factor)	The subjects in different outcome groups are comparable, based on the study design or analysis. Confouding factors are controlled	Confounding domains ajusted for (table S2.1)	Assessment of outcome	Statistical test			
Tiwari, 2018	*	*	*	**	*	****	*	*		8	12
Wallenborn, 2018	*	*	-	**	*	*****	*	*		7	12
Boyce, 2017	*	*	*	**	-	-	*	*		7	7
Holland, 2017	-	-	-	*	_-	****	*	*		3	7
Islam, 2016	*	-	*	*	**	********	*	*		7	16
James, 2014	-	-	-	**	-	***	*	*		4	7

Moraes, 2011	*	-	*	**	**	****	*	*	8	12
Shroff, 2011	-	-	-	*	-	*****	*	*	3	8
Lau, 2007	*	*	*	**	-	*****	*	*	7	12
Silverman, 2006	*	*	*	*	-	***	*	*	6	9

A Cross-sectional study embedded from a cohort. Analyzed with NOS for cohort.

Table S2.2: Confounders adjusted for in studies

Reference	Domain										Outcome
	Economy	Maternal lifestyle and health	Pregnancy/post patum related problems	Maternal socio-demographic	Child characteristics	Relationship characteristics	Support during pregnancy/ postpartum	Violence or stressfull life events	Pregnancy intention	Caste and religion	Outcome meaures
Madsen, 2019 (35)		x		x							Premature termination of exclusive BF
Martin-de-las-Heras, 2018 (36)		x	x	x		x	x		x		BF avoidance (initiation)
Miller-Graff, 2018 (18)	x		x				x	x			BF exclusivity, initiation and cessation
Tiwari, 2018 (22)	x			x		x		x		x	BF duration
Wallenborn, 2018 (23)	x			x		x		x	x		BF initiation and duration
Boyce, 2017* (24)											Early BF initiation and exclusivity
Finnbogadottir, 2017 (25)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Exclusive BF
Holland, 2017 (26)		x	x	x				x			BF initiation, duration and exclusivity
Hasselmann, 2016 (20)				x	x	x					Interruption of exclusive BF
Islam, 2016 (27)	x	x	x	x	x	x	x	x	x		Exclusive BF
Sørbø, 2015 (21)				x		x		x			Early cessation of any BF
James, 2014 (28)	x		x	x							BF duration
Moraes, 2011 (29)		x		x	x		x				Early cessation of exclusive BF
Shroff, 2011 (30)		x		x	x	x				x	Exclusive BF
Lau, 2007 (31)		x	x	x		x			x		Breastfeeding and mixed feeding
Silverman, 2006 (32)		x		x		x					BF initiation and early cessation

*Article states that the association between IPV and BF was adjusting for any covariate that were significant at p < 0,20 levels in bivariate analysis, but results not shown

NA (not applicable)

Explanation of following groups of confounders:

Economy: Insurance and receipt of government assistance

Maternal lifestyle and health: Smoking, substance use prior to pregnancy, substance use all time, maternal health status, mothers BMI, HIV status

Pregnancy and postpartum related problems: Pregnancy health problems, preterm labor, mode of birth, complications during birth, mother/infant separation after birth, antenatal complications, postnatal complications, reasons for stopping BF and resuscitation

Maternal sociodemographic: Maternal age, maternal education, maternal race/ethnicity, first baby/number of the child, employment status, place of residence, parity, occupation, number of years lived in the U.S and language
Child characteristics: Gender of child, age of child, low birthweight/birth weight, child health
Relationship characteristics: Marital status, relationship characteristics, partner's education level, family structure, cohabitation
Support during pregnancy and postpartum: Prenatal BF education, number of antenatal care visits/health care services, kin support, social support, type of maternity clinic
Violence or stressful life events: Stressful live events 12 months before pregnancy, depression, childhood abuse, other forms of IPV
Pregnancy intention
Caste and religion

Table S2.3: Early cessation/shortened duration of breastfeeding (aOR; 95% CI) vs. no cessation of breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 (35)				
Martin-de-las-Heras, 2018 (36)				
Miller-Graff, 2018 (18)	P + E + S: 0.22 (0.05-0.85)[A]			
Tiwari, 2018 (22)	E: 1.07 (0.81-1.41)[B]			
Wallenborn, 2018 (23)	P: 1.18 (1.01-1.37)[L]	P: 1.15 (0.94-1.4)[L]		
	P: 1.03 (0.89-1.19)[L]			
Boyce, 2017 (24)				
Finnbogadottir, 2017 (25)				
Holland, 2017 (26)			P + E + S: 5.92 (1.72-27.98)[C,D,F,O] P + E + S: 3.33 (1.46-8)[C,E;F,O] P + E + S: 0.66 (0.25-1.59)[C,D,G,O] P + E + S: 0.93 (0.54-1.58) [C,E,G,O] P + E + S 0.68 (0.25-1.72)[C,D;H,O] P + E + S: 0.87 (0.44-1.68)[C,E,H,O]	
Hasselmann, 2016 (20)				
Islam, 2016 (27)				
Sørbø, 2015 (21)	P: 0.96 (0.73-1.25)[M] E: 1.28 (1.18-1.39)[M] S: 0.94 (0.76-1.16)[M]		P + E + S: 1.47 (1.23-1.76)[M] P + E: 1.39 (1.18-1.39)[M] P + S: 0.95 (0.61-1.47)[M] S + E: 1.27 (1.02-1.58)[M]	
James, 2014 (28)	P + E + S: 1.25 (0.85-1.84)[I,J] P + E + S: 1·01 (0.8-1.29)[I,K]			
Moraes, 2011 (29)				
Shroff, 2011 (30)				
Lau, 2007 (31)				
Silverman, 2006 (32)			P + E: 0.94 (0.76-1.7)[D]	P + E: 0.97 (0.72-1.3)[D]
			P + E: 1.05 (0.86-1.3)[D]	

* IPV measured as physical (P), or emotional (E) or sexual (S)

** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined

[A] Crude OR (measured as effect of IPV exposure the past year and interpreted as lower likelihood of continuing BF at 6 weeks)

[B] At least one month of BF

[C] HR interpreted as the probability of stopping BF

[D] Duration at 4 weeks

[E] Duration at 13 weeks

[F] White women

[G] Black women

[H] Hispanic women

[I] Interpreted as likelihood of BF at the time measured

[J] BF at 3 months

[K] BF at 6 months

L BF at 1-8 weeks
M BF < 4 weeks
O Interview of participants included items about the prepgrancy, prenatal and postpartum period

Table S2.4: Initiation of breastfeeding (aOR; 95% CI) vs. no initiation of breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 (35)				
Martin-de-las-Heras, 2018 (36)		E: 2 (1.2-3.3)[B] P: 0.9 (0.3-2.6)[B]		
Miller-Graff, 2018 (18)	P + E + S: 0.62 (0.06-6.7)[A]			
Tiwari, 2018 (22)				
Wallenborn, 2018 (23)	P: 1.05 (0.9-1.23)	P: 0.9 (07.3-1.11)		
	P: 0.98 (0.84-1.13)			
Boyce, 2017 (24)	P: 0.81 (0.71-0.93)[C] S: 0.52 (0.36-0.76)[C]		P + S: 0.83 (0.67-1.01)[C]	
Finnbogadottir, 2017 (25)				
Holland, 2017 (26)			P + E + S: 2.3 (0.7-7.2)[D,E] P + E + S: 1.8 (0.9-3.9)[D,F] P + E + S: 0.9 (0.2-3.8)[D,G]	
Hasselmann, 2016 (20)				
Islam, 2016 (27)				
Sørbø, 2015 (21)				
James, 2014 (28)				
Moraes, 2011 (29)				
Shroff, 2011 (30)				
Lau, 2007 (31)				
Silverman, 2006 (32)			P + E: 0.95 (0.81-1.1)	P + E: 0.86 (0.69-1.06)
			P + E: 0.87 (0.76-1.01)	

* IPV measured as physical (P), or emotional (E) or sexual (S)

** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined

[A] Participants were interview during pregnancy and again approximately 6 weeks postpartum. Results don't distinguish between violence before and after pregnancy

[B] Measured as BF avoidance

[C] Lifetime IPV intepreted as lower odds of early initation of BF

[D] Measured as OR

[E] White women

[F] Black women

[G] Hispanic women

Table S2.5: Early termination of exclusive breastfeeding (aOR; 95% CI) vs. no termination of exclusive breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 (35)	P: 1.53 (1.01-23.1) E: 1.61 (1.26-2.07) S: 1.5 (1.07-2.09)	P: 1.68 (1-2.82) E: 1.23 (0.91-1.65) S: 1.35 (0.96-1.91)	P + E + S: 1.93 (1.11-3.34)	P + E + S: 2.87 (1.27-6.46)
Martin-de-las-Heras, 2018 (36)				
Miller-Graff, 2018 (18)			P + E + S: 0.41[A] (0.11-1.45)	
Tiwari, 2018 (22)				
Wallenborn, 2018 (23)				
Boyce, 2017 (24)	P: 0.83 (0.71-0.96)[B] S: 0.74 (0.49-1.12)[B]		P + S: 0.92 (0.75-1.15)[B]	
Finnbogadottir, 2017 (25)			P + E + S: 5.7515 (0.229-144.4791)[N,T] P + E + S: 1.7305 (0.4944-6.0564)[O,T] P + E + S: 0.7756 (0.2616-2.9999)[P,T] P + E + S: 0.5204 (0.2158-1.2548)[Q,T] P + E + S: 0.5442 (0.2224-1.3319)[R,T] P + E + S: 0.5792 (0.1655-2.0271)[S,T]	
Holland, 2017 (26)			P + E + S: 1.73 (0.97-3.11)[I,K] P + E + S: 1.65 (0.95-2.86)[J,K] P + E + S: 0.95 (0.63-1.43)[I,L] P + E + S: 0.97 (0.67-1.39)[J,L] P + E + S: 0.71 (0.41-1.19)[I,M] P + E + S: 0.83 (0.50-1.35)[J,M]	
Hasselmann, 2016 (20)				P + E + S: 1.35 (1.07-1.71)[G] P + E + S: 1.56 (1.16-1.95)[H]
Islam, 2016 (27)		P: 0.17 (0.07-0.4)[C] E: 0.51 (0.26-1)[D] S: 0.43 (0.18-1.06)		
Sørbø, 2015 (21)				
James, 2014 (28)				
Moraes, 2011 (29)		P: 1.17 (0.89-1.53)[E]		
Shroff, 2011 (30)	P: 0.69 (0.42-1.11)			
Lau, 2007 (31)				P + E + S: 1.839 (1.61-2.911)[F]
Silverman, 2006 (32)				

* IPV measured as physical (P), or emotional (E) or sexual (S)
** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined
[A] Measured as crude OR and interpreted as lower likelihood of EBF
[B] Lifetime IPV and interpreted as lower odds of EBF
[C] Interpreted as 83 % greater risk of discontinuing EBF
[D] Interpreted as 49 % less likely to exclusively breastfeed
[E] Measured as HR and interpreted as probability of early cessation of EBF
[F] Measured as experience of 'no IPV' and interpreted as more likely to breastfeed
[G] IPV until 3rd month postpartum measured as RR
[H] IPV in the 3rd month postpartum measured as RR
[I] EBF at 4 weeks postpartum
[J] EBF at 14 weeks postpartum
[K] White women
[L] Black women
[M] Hispanic women

N EBF at 1 month
O EBF at 2 months
P EBF at 4 months
Q EBF at 6 months
R EBF at 9 months
S EBF at 12 months
T OR measured at: https://www.medcalc.org/calc/odds_ratio.php

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2-3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2-3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3 + appendix
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3-4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	NA
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	NA
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	4
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	NA
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	NA

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	4
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	NA
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	5
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	5
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	6
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	NA
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	NA
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	NA
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	6
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	6-7
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	8
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	8

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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Intimate Partner Violence and Breastfeeding: A Systematic Review

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Abstract

Objective*:* The association between intimate partner violence (IPV) and breastfeeding is unclear. We conducted a systematic review to summarise the evidence of breastfeeding outcomes following exposure to IPV.

Design: Systematic review.

Methods: We searched for published studies without study design or language restrictions (up to July 2019) in the following databases: PubMed, Embase, SCOPUS and The Global Health Library. Studies assessing various breastfeeding outcomes (initiation, duration and exclusive breastfeeding) in women exposed to IPV in any form (physical, psychological or sexual) and at any stage (one-year pre-, during, or post pregnancy) were included. Two authors independently selected the studies and conducted the quality appraisal by use of the Newcastle-Ottawa Scale. Results were summarised taking precision and quality into account.

Results: A total of 16 studies (participants n= 414,393) were included and they adjusted for a total of 48 different confounders. The majority of studies were cross-sectional (n= 11) and most studies were judged to be fair/low quality. Four out of seven studies found that IPV exposure shortened breastfeeding duration (aORs= 0,22 (95 % CI: 0,05-0,85), 1,18 (95 % CI: 1,01-1,37), 5,92 (95 % CI: 1,72-27,98), 1,28 (95 % CI: 1,18-1,39)) Further, 5/10 studies found that IPV led to early termination of exclusive breastfeeding (aORs= 1,53 (95 % CI: 1,01-23,1), 0,83 (95 % CI: 0,71-0,96), 1,35 (95 % CI:1,07-1,71), 0,17 (95 % CI: 0,07-0,4), 1,839 (95 % CI: 1,61-2,911)) and 2/6 studies found that IPV significantly reduced breastfeeding initiation (aOR= 2,00 (95% CI: 1,2-3,3), 0,81 (95% CI: 0,7-0,93)).

Conclusion*:* IPV exposure appears to associate negatively with some breastfeeding outcomes. Individual patient data meta-analysis is required to quantify the magnitude of the association for specific IPV-outcome combinations. More high-quality studies and definition of core confounders are warranted.

PROSPERO registration number: CRD42019129353 (prospectively registered)

Keywords: Intimate partner violence, domestic violence, breastfeeding, breastfeeding practices, exclusive breastfeeding, breastfeeding initiation.

Strengths and limitations of this study:

- This systematic review provides the latest evidence of the association between IPV and breastfeeding.
- Our review excluded studies with women who had a lifetime history of violence and childhood abuse.
- We conducted an appropriate quality assessment of studies by use of the Newcastle-Ottawa Scale.
- The heterogenous field of confounders in the included studies was grouped by making key domains.
- It was not possible to make a causal association nor conduct a meta-analysis.

Introduction

Intimate partner violence (IPV) is defined as any behavior by a current or former intimate partner that causes physical, psychological or sexual harm to those within an intimate relationship (1, 2). Most often, IPV is perpetrated by men against women (1-3), and the World Health Organization (WHO) estimates that one in three women will be exposed to either physical/or sexual violence during their lifetime (2). IPV can have both immediate and long-term mental and physical health consequences for the victims, including depression and physical impairment (3-5). Further, it has been found that IPV is related to a number of reproductive health outcomes, including preterm birth, low birth weight, insufficient weight gain, miscarriage, induced abortion and difficulties or lack of attachment to the baby (3-6). It has been speculated that IPV may also influence the establishment of breastfeeding practices, however this association is complex. WHO recommends initiating breastfeeding within one hour of birth, exclusive breastfeeding for six months and that mothers should continue breastfeeding for up to two years or beyond together with complementary feeding (7). IPV may affect breastfeeding directly, e.g. through sore nipples and difficulty in relaxing enough for adequate let down, but also indirectly, e.g. through lack of support or depression, self-doubt, body negativity, and anxiety (8, 9) Furthermore, qualitative studies have found that women who have experienced violence in their childhood may have trouble continuing exclusive breast feeding due to difficulties in separating the sexual role from the maternal role of breasts or due to lack of situational control (10, 11). The existing literature is characterised by various outcome measures for both IPV and breastfeeding, and further there are no agreement of core factors that may confound the association between IPV and breastfeeding, hence, there is variation in the statistical models used for analysing the relationship. This may be the reasons why studies on the relationship of IPV and breastfeeding practise have had inconsistent results. A study of IPV and breastfeeding practices across Africa found that IPV was associated with lower adjusted odds for breastfeeding initiation and exclusive breastfeeding in some African countries and higher adjusted odds in other countries (12), whilst a recent systematic review concluded that the majority of studies (n= 12, participant= 133,861) found a negative association between breastfeeding initiation and exclusive breastfeeding for the first six months (13). Yet, the review did not involve an appropriate quality assessment and had no detailed discussion of confounders. Further, new literature has been published. Therefore, we conducted a robust systematic review thoroughly investigating the association of exposure to IPV pre, during and post pregnancy with breastfeeding outcomes sand synthesised the evidence taking confounders, precision and quality into considerations.

Methods

This systematic review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (14) and Meta-analyses Of Observational Studies in Epidemiology (MOOSE) (15) guidelines. The protocol was prospectively registered in The International Prospective Register of Systematic Reviews (PROSPERO, ID: CRD42019129353)

Eligibility criteria and search methods identification of studies

We searched PubMed, Embase, SCOPUS and the Global Health Library from the (8-12 March 2019) with no time or language restrictions. An updated search was conducted the 18th of July 2019. Search terms included "intimate partner violence" OR "spouse abuse" OR "domestic violence" OR "physical abuse" OR "sex offenses" OR "battered women" AND "breast feeding" OR "breastmilk expression" OR "feeding behavior" OR "milk, human" OR lactation OR "milk ejection" (full search in Appendix, S1).

A PICO-model was made to develop the search strategy and selection of the literature (16). We included studies with women exposed to violence one year prior to pregnancy, during pregnancy, and in the postpartum period which met the following criteria; (a) men as perpetrators of violence against women, (b) women in an intimate relationship over one month during previous pregnancies, current pregnancy and postpartum, (c) women who breast fed from the first hour and until 6 months after giving birth, (d) women exposed to IPV but also perpetrators of violence against men, (e) women exposed to other forms of violence (e.g. gang violence bulliyng). We excluded (a) women in intimate relationships of less than one month of duration (during previous pregnancies, current pregnancy or postpartum), (b) women who gave birth to twins or triplets, (c) women with absolute counter indication for breast feeding, (d) women who were not able to breastfeed (e.g. due to mastectomy), (e) women with eating disorders or chronical illness (e.g. HIV), (f) women with substance abuse (e.g. alcohol, drugs), (g) studies with only sexual minorities (e.g. bisexual, homosexuals).

IPV was defined as the following: Physical violence (i.e slapping, hitting, kicking, beating), sexual violence (including forced sexual intercourse or other forms of sexual coercion), psychological violence (humiliation, insults, intimidation, threats of harm), economic violence (i.e restricting access to financial resources, education, employment and medical care) and controlling behaviours (i.e isolating a person from friends and family, controlling their movements, restricting access to education and employment).

Outcome was breastfeeding practices in according with WHO's recommendations defined as; (a) intention to breastfeed (when the woman showed interest in offering breast milk), (b) start of breastfeeding/duration (when the woman offered the child breast milk in the postpartum period), (c) exclusive breastfeeding of children from first day of life and up to 6 months (exclusive breastfeeding defined as the infant only receiving breast milk without any additional food or drink, not even water), (d) duration of exclusive breastfeeding. Eligible studies for inclusion were original publications of observational studies.

After removing duplicates, two authors independently screened titles, abstract and full-text (AKN and AB) using Covidence (www.covidence.org) (17). Disagreements were solved through discussion. One author (AKN) extracted data from included studies into a standardised Excel template. Extracted data included: Title, first author, publication year, country, study characteristics, study objective, participant characteristics, sample size, inclusion/exclusion criteria, type of exposure, measurement tool of exposure, primary outcomes and confounders that were adjusted for in the statistical analysis. Outcome data were verified by a second author (FKM).

Study quality assessment and data synthesis

The Newcastle Ottawa Scale (NOS) was used to assess the quality of cohort studies and a modified version of the scale was used for cross-sectional studies. The scale addresses the following domains: Selection process, comparability, exposure and outcome of interest. A maximum of nine stars can be given if all domains are well described in a given study. Cohort studies are regarded to be of 'good quality' if rewarded 3 or 4 stars in the selection domain, 1 or 2 stars in the comparability domain, and 2 or 3 stars in the outcome/exposure domain. Studies are regarded as being of 'fair quality' if rewarded 2 stars in the selection domain, 1 or 2 stars in the comparability domain, and 2 or 3 stars in the outcome/exposure domain. Finally, studies are judged as being of 'poor quality' if rewarded 0 or 1 star in the selection domain or 0 stars in the comparability domain or 0 or 1 stars in the outcome/exposure domain.

For the cross-sectional version of the scale, the domain that assessed confounders was modified and no stars were given if studies did not justify their choice of confounders in their statistical analysis. A total of 10 stars can be given to the cross-sectional studies, and they are regarded as 'very good' if rewarded 9-10 points, 'good' if rewarded 7-8 points, 'satisfactory' if rewarded 5-6 points and 'unsatisfactory' if rewarded 0-4 points. Further, we modified both scales and added a point system for confounders, so that each study was given one point or star for each confounder they adjusted for (Table S2.1) Two authors (AKN and FMK) conducted the quality assessment independently and compared results. Disagreement were solved through discussion. AKN and DSL conducted the quality assessment of Madsen et al., as FKM was co-author of this study and therefore considered ineligible.

Two authors (AKN and DSL) made key domains for confounding factors and grouped them (Table S2.2). Results for the various IPV outcomes combinations were summarised and physical violence was presented in a forest plot. Studies that investigated physical violence were presented to emphasize the most reported form of IPV (3). Inferences were generated taking study precision and quality into account as meta-analysis was not possible. The substantial heterogeneity of exposure, outcome, study quality and statistical models in the adjusted odds ratios (aOR) reported in individual studies was the reason we settled for a qualitative synthesis in the form of vote-counting, which we conducted within broad exposure-outcome subgroups stratified by study quality and precision to minimise bias. To determine whether a study showed a negative association or no difference we relied on numerical data in vote-counting to avoid subjectivity. This approach is in line with what is considered suitable given study variability in previous review publications (18, 19).

Patient and Public Involvement:

No patients involved.

Results

The database searches resulted in 2062 records and 1634 records were eligible for title and abstract screening after removal of duplicates (Fig. 1). A total of 16 studies met the inclusion criteria of which 11 were cross-sectional (20-31) and five were cohort studies (32-35). The studies were published between 2006 and 2019. Four studies was conducted in The United States (20, 22, 25, 31), four in India (21, 23, 26, 29), two in Brazil (28, 34), one in Tanzania (32), one in Spain (33), one in Sweden (24), , one in Norway (35), one in Australia (27) and one in Hong Kong (30). Population age ranged from 14 years to 49 year and was reported as means (n= 3) or in intervals (n= 13). The size of the study population varied from 69 to 195,264 participants with a mean sample size of 25,899 (Table 1). Exposure (IPV) was measured through questionnaires (22, 23, 25, 26, 29, 31, 32) or through various validated tools: The Conflict-Tactic Scale (CTS) (20, 21, 28, 30, 34), The Abuse Assessment Screen (AAS) (30), the Index of Spouse Abuse (ISA) (33), the Composite Abuse Scale (CAS) (27), and the Norvold Abuse Questionnaire (24) (Table 1)

In regards to exposure, two of the studies only focused on physical violence (22, 28) and one study only focused on psychological violence (21). However, the majority of studies measured IPV as 'any IPV' and did not separate violence into groups (20, 22, 24, 27, 29-31, 34), and five studies measured both physical, or/and psychological or/and sexual violence respectively and combined to compare the differences in exposure of a certain type of IPV (23, 26,

32, 33, 35). The outcome, breastfeeding was measured as early cessation/shortened duration of breastfeeding, initiation of breastfeeding, or exclusive breastfeeding. The definition of ¨shortened duration of breastfeeding¨ differed as each study sat their own time limit (Table S2.3). Some studies investigated more than one outcome and therefore, one study could be presented in more than one outcome table.

Overall, the included studies adjusted for 48 different confounders within the following domains: maternal sociodemographic, relationship characteristics, maternal lifestyle and health, economy, pregnancy and postpartum related problems, child characteristics, support during pregnancy and postpartum, violence or stressful life events, pregnancy intention, caste and religion. The most common confounding factors were maternal lifestyle and health, maternal sociodemographics, and relationship characteristics. The majority of studies did not justify their choice of confounders (21-25, 27, 29-31, 34). Sorbo et al. and Madsen et. al. used the directed acyclic graph (DAG) to justify the confounders adjusted for in their analysis, and Sorbo et. al. also made a sensitivity analysis to determine whether or not the association between IPV and breastfeeding practices was mediated primarily through postpartum depression. They found that depression could not explain early cessation of breastfeeding (35).

Study quality assessment

Of the five cohort studies, one study was judged as 'good quality' (32), three studies was judged as 'fair quality' (20, 33, 35) and one study was judged as 'poor quality' (34). Of the 11 cross-sectional studies, six were judged as having 'good' quality (21-23, 26, 28, 30), one was judged as 'satisfactory' (31) and three studies were judged as 'unsatisfactory' (25, 27, 29). One cross-sectional study was not assessed using NOS for cross-sectional studies, since the study was embedded from a cohort (24), hence, NOS for cohort studies was used to assess the quality and it was judged as of 'poor quality' (24) (Fig. 2).

Initiation of breastfeeding

Six studies investigated the association between exposure to IPV and initiation of breastfeeding (20, 22, 23, 25, 31, 33). Two studies found a statistical significant association between initiation of breastfeeding and exposure to either physical or sexual violence (23) ($aOR_{physical}$=0.81; 95% CI 0.71-0.93. aOR_{sexual}=0.52; 95% CI 0.36-0.76) or psychological violence (33) (aOR 2,00; 95% CI 1.2-3.3). Four studies found no association when exposed to multiple types of violence (20, 23, 25, 31) (Table S2.4)

Shortened duration of breastfeeding

Seven studies reported outcomes based on early cessation or shortened duration of breastfeeding when exposed to violence (20-22, 25, 27, 31, 35), and four studies found a significant association (aORs= 0,22 (95 % CI: 0,05-0,85), 1,18 (95 % CI: 1,01-1,37), 5,92 (95 % CI: 1,72-27,98), 1,28 (95 % CI: 1,18-1,39)) between exposure to IPV and early cessation/shortened duration of breastfeeding (20, 22, 35) (Table S2.3) Miller-graff et. al (20) found that IPV was associated with decreased odds ratio of for continuation of breastfeeding (OR=0.22; 95 % CI 0.5-0.85), hence, IPV was associated with an increased risk of shortened duration of breastfeeding. Further, one study found a statistical significant association between reduced duration/early cessation and IPV (OR=1,41 95% CI 1.15-1.74). However, the association became insignificant when adjusting for confounders (aOR=0.94; 95% CI 0.76-1.7) (31). Three of the

studies found no association between violence and breastfeeding duration or early cessation (21, 25, 27).Three studies did not distinguish between period of exposure (27, 29, 34), whereas the remaining papers categorised time of exposure. One study (27) found no association between IPV and breastfeeding practices and concluded that IPV itself did not influence breastfeeding outcomes as much as maternal age, education and birth method (Table S2.3)

Exclusive breastfeeding

Ten studies assessed exposure to violence in relation to risk of early termination of exclusive breastfeeding and five studies found a statistical association (aORs= 1,53 (95 % CI: 1,01-23,1), 0,83 (95 % CI: 0,71-0,96), 1,35 (95 % CI:1,07-1,71), 0,17 (95 % CI: 0,07-0,4), 1,839 (95 % CI: 1,61-2,911) (23, 26, 30, 32, 34) and five studies found no statistical association (20, 24, 25, 28, 29) (Fig. 3) (Table S2.5)

Discussion

Main findings

This systematic review summarised the most recent evidence, between exposure to IPV and breastfeeding practices. A total of 16 studies were included of which 11 were cross-sectional and five were cohort studies. Forty-eight different confounders were controlled for in the studies. Only one cohort was judged as being of good quality, hence, the overall quality of the studies was fair to low. The majority of studies found that exposure to IPV in any form and at any stage had a significant negative association with breastfeeding duration, early termination of exclusive breastfeeding, but it did not reduce initiation.

Strengths and limitations:

The review synthesises the latest evidence of pregnancy-related IPV and WHO recommended breastfeeding practices and elucidates the complex association between IPV exposure, breastfeeding, and confounding factors. A limitation of this review is that the majority of included studies were cross-sectional, hence, a causal association cannot be estimated (36), and we were not able to conduct a meta-analysis. Therefore, there is a need for well-designed longitidunal studies to better estimate the association. The individual results were presented in a forest plot, without meta-analysis to illustrate the heterogeneity across studies. The forest plot was ordered in the vertical axis by the risk of bias in a manner that places higher-quality study findings above those with lower quality. This approach is in line with the recommendation to exploit the plot's vertical dimension should be used to illustrate differences in important study characteristics such as risk of bias (37). Another limitation of this review is that a similar systematic review was recently conducted (13). However, only seven studies were included in both reviews and the data included in this review tripled the evidence size compared to the previous (280,532 more participants contributed date to our analysis than the 133,861 participants previously) (13). Yet one should bear in mind that the participants in this review primarily come from two large scale studies that both used data from Pregnancy Risk Assessment Monitoring System (PRAMS) (21) (31) whilst only one of these studies (31) was included in the previous review. However, as there is no overlap in data - Silverman et. al. (31) used data from women participating in the PRAMS study between 2000-2003, whereas Wallenborn et. al. (22) used data from women participating from 2004-2014, we considered them as separate studies – we believe it to be a strength of this review that both studies are included. In comparison to the other recent review, another strength of this review is that we conducted an appropriate quality assessment of all

included studies and made use of a validated tool in the form of NOS, whilst Mezzavilla et al. (13) used STROBE to asses quality through bias susceptibility of included studies. However, STROBE is not an accepted quality assessment tool as this is a reporting guideline for observational studies (38, 39), hence, the quality assessment conducted in this review is more meticulous. Yet, a limitation of NOS is that the quality assessors need to adapt the scale to specific research designs, which can lead to the possibility of low agreement between quality assessors (40, 41). Nevertheless, as our quality assessment was conducted by two independent reviewers, we judged this issue to be minor. Further, the two versions of the NOS scale do not consider that cohort studies are superior to cross-sectional studies in the evidence hierarchy, hence, this is a separate parameter to take into consideration when judging the overall quality of evidence according to NOS. Additionaly, our review excluded studies with women who had a lifetime history of violence and childhood abuse, whereas the previous review included these populations of women. Hence, our exposure differs to some extent and a more heterogenous exposure that consist of both childhood abuse and pregnancy-related IPV adds a further complicating element to the association.

Interpretation of findings

Overall, our study results support the findings of the recent review by Mezzavilla et. al (13) despite our review is mainly being based on different studies and have different exposures. In line with Mezzavilla et. al we found that the most investigated outcome was exclusive breastfeeding, and that studies varied in quality. In contrast to Mezzavilla et. al, they also reported significant results from studies investigating women exposed to lifetime history of IPV. This may indicate that exposure to any time of violence may affect breastfeeding patterns. However, the reason why we choose to exclude life time IPV is that evidence points out that the association of only experiencing violence in pregnancy may be overestimated as there is evidence that victimisation as a young child increases the risk of further victimisation later in life (42), hence, it also increases risk of breastfeeding difficulties when becoming a mother (43, 44). Mediational models exploring childhood abuse and the negative association with breastfeeding have found it to stem from shame and the reaction to touch, in the postnatal period, which can lead to possible re-traumatization (10). With this in mind, it is interesting that only two studies in our review adjusted for childhood abuse in their statistical calculations with contradictory results (20, 35). Hence, as the majority of studies did not control for this factor, we cannot rule out that the exposure of IPV found in this study may be overestimated. Further, it is plausible that our exposure can be affected by recall bias. Women are primarily interviewed about exposure of IPV in relation to pregnancy in the postpartum period, which can potentially introduce recall bias as some women may not remember the extent of the violence or when they were exposed to violence. Moreover, women exposed to violence often under-report or refuse to participate in IPV studies in order to protect themselves or the perpetrator (45). If our effect estimates are affected by recall bias or underreporting, it plausible that true association is underestimated. Further, exclusive breastfeeding is often referred to as the most favourable type of feeding of infants. These recommendations may influence the women's reports on exclusive breastfeeding as is it can be strongly correlated to the feeling of being a "good" mother. If women systematically erroneously report to exclusively breastfeed their babies to a higher extent than what to be the case, it is a type of reporting bias, which may also underestimate the true association between IPV and breastfeeding.

In relation to confounders it is worth noticing that our synthesis elucidated the comprehensive number of confounders that are adjusted for in the IPV-breastfeeding relationship. A key finding of this review is that most studies did not state their reasons for choice of confounders and there seems to be lack of consensus in the identification of potential confounders. Some covariates may be part of the causal pathway of the association between violence and breastfeeding, hence they are not true confounders. For instance, depression is one variable that can both be identified as a confounder, or an intermediate variable in the causal pathway. Sorbo et. al (35) concluded, that depression could not explain early cessation of breastfeeding, whilst other studies (46, 47), found that depression had a negative impact on breastfeeding duration in women suffering from depression. The mechanism between breastfeeding and depression is poorly understood, but research of failed lactation and perinatal depression theorise that it may be the manifestation of neuroendocrine perturbations in gonadal and lactogenic hormones (48). The lack of consensus in identification of potential confounders and their influence on the association between IPV and breastfeeding is also illustrated in two large scale studies by Wallenborn et. al. (22) and Silverman et. al. (31). Hence, Wallenborn et. al. (22) adjusted for marital status, education and insurance status, whilst Silverman et. al. (31) adjusted for race, age, marital status, education and smoking. Their data were from the same surveillance project (PRAMS), but interestingly, Silvermann et. al. (31) did not find any significant association when controlling for confounders, opposite Wallenborn et. al. (22), who found a significant association, but also found that stress and smoking affected breastfeeding when controlling for IPV, which provides evidence that stress and smoking are mediators and should not be treated as confounders.

Overall, the inconsistency of potential confounders propose a need for defining core outcome measures related to IPV and breastfeeding practices (49). We suggest an individual patient data meta-analysis (50), by sharing raw data from existing studies and a powerful reanalysis adjusting for predefined confounders, can make evidence synthesis more robust in this area.

Conclusion

This review shows that the association between IPV and breastfeeding is complex and that the effect of exposure to IPV on breastfeeding practices was difficult to properly asses based on data synthesis without the possibility of meta-analysis. The majority of studies in this review indicated that IPV exposure in pregnancy was associated with impaired breastfeeding, yet still some studies also found no association. There is no consensus of which confounders influence the relationship, hence, future research should aim to define core outcome measures and include longitudinal studies of high quality with pre-defined confounders.

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Competing interests

DSL, AKN, AB, and KSK had no conflict of interest. VR and FMK are co-authors of one study included in this review.

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Author statement

AKN and AB made the protocol and screened for eligible articles. AKN planned the data extraction, which was cross-checked and verified by FKM. AKN, FKM and DSL did quality assessment. Disagreement was solved through discussion.

AKN designed to tables and wrote the first draft of the manuscript, which was reviewed by DSL, VR, KSK and AB. All authors approved the final manuscript.

Data sharing statement

No additional data available.

Table 1: Characteristics of studies included in the review of the intimate partner violence and breastfeeding outcomes

Reference	Study design	Country	Setting	Sample size	Age	Tool to measure IPV	Outcome measures	Quality
Madsen, 2019 (32)	Cohort	Tanzania	Hospital	1128	20-30	Interview (from WHO multi-country study)	Premature termination of exclusive BF	Good
Martin-de-las-Heras, 2018 (33)	Cohort	Spain	Antenatal care clinic	718	>20-40+	ISA[A]	BF avoidance (initiation)	Fair
Miller-Graff, 2018 (20)	Cohort	The United States	WIC clinic (Women, infant and children clinic)	69	26.5 (mean)	CTS[B]	BF exclusivity, initiation and cessation	Fair
Tiwari, 2018 (21)	Cross-sectional	India	Household	26,587	15-49	CTS-2[B]	BF duration	Good
Wallenborn, 2018 (22)	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	195,264	<20-35+	Questionnaire	BF initiation and duration	Good
Boyce, 2017 (23)	Cross-sectional	India	Household	10,469	20-29	Questionnaire	Early BF initiation and exclusivity	Good

Finnbogadottir, 2017 (24)	Cross-sectional	Sweden	Project: "Pregnant women and new mother's life experience"	713	30 (mean)	Norvold Abuse Questionnaire	Exclusive BF	Poor
Holland, 2017 (25)	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	760	20-29	Questionnaire (based on CDC's monitoring system)	BF initiation, duration and exclusivity	Unsatisfactory
Hasselmann, 2016 (34)	Cohort	Brazil	Primary health clinic	564	<20-20+	CTS-1[B]	Interruption of exclusive BF	Poor
Islam, 2016 (26)	Cross-sectional	India	Community based survey	426	14-25+	Questionnaire (based on WHO demographic health survey)	Exclusive BF	Good
Sørbø, 2015 (35)	Cohort	Norway	MoBa (The Norwegian Mother and Child Cohort Study)	53,934	14-35+	Norvold Abuse Questionnaire	Early cessation of any BF	Fair
James, 2014 (27)	Cross-sectional (embedded from an RCT)	Australia	MOVE (Improving maternal and child health nurse care for vulnerable mothers)	2621	15-35+	CAS[C]	BF duration	Unsatisfactory
Moraes, 2011 (28)	Cross-sectional	Brazil	Public Health Center	811	<20-20+	CTS-2[B]	Early cessation of exclusive BF	Good
Shroff, 2011 (29)	Cross-sectional (embedded from an RCT)	India	Household	600 (mother-infant pairs)	22.14 (mean)	Questionnaire	Exclusive BF	Unsatisfactory
Lau, 2007 (30)	Cross-sectional	Hong Kong	-	1150	<25-20+	AAS[D], CTS[B]	Breastfeeding and mixed feeding	Good
Silverman, 2006 (31)	Cross-sectional	The United States	PRAMS (Pregnancy Risk Assessment Monitoring System)	118,579	<20-30+	Questionnaire	BF initiation and early cessation	Satisfactory

A: Index of Spouse Abuse, B: Conflict-Tactic Scale, C: Composite Abuse Scale, D: Abuse Assessment Scree

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Figure legends

Figure 1 **Flow chart of study selection in the review of intimate partner violence and breastfeeding outcomes**

Figure 2 **Study quality of cohort and cross-sectional studies in the review of intimate partner violence and breastfeeding outcomes**

Figure 3 **Results of physical violence and the association with breastfeeding duration, breastfeeding initiation and exclusive breastfeeding presented in a Forest plot ordered according to descending quality**

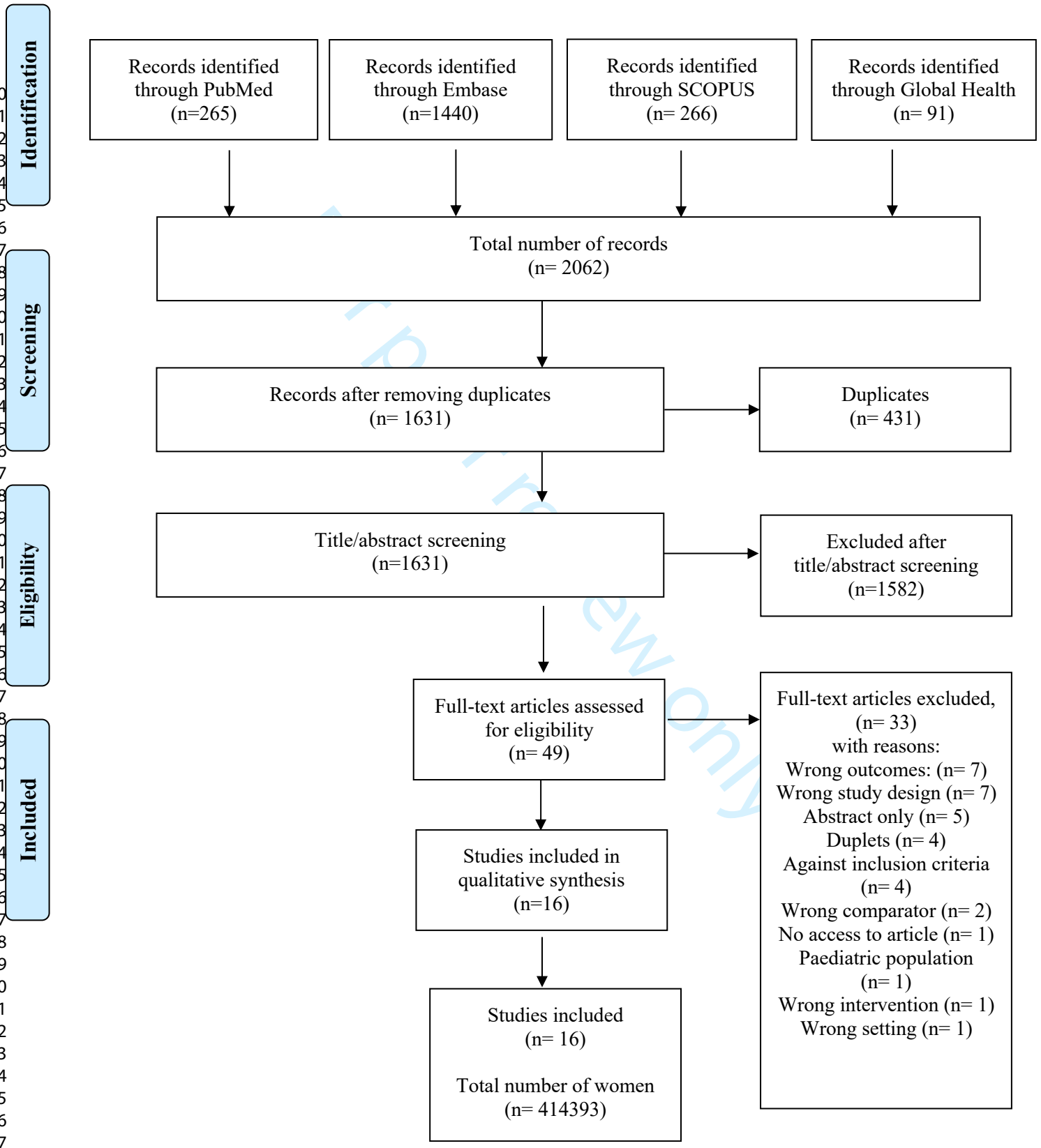
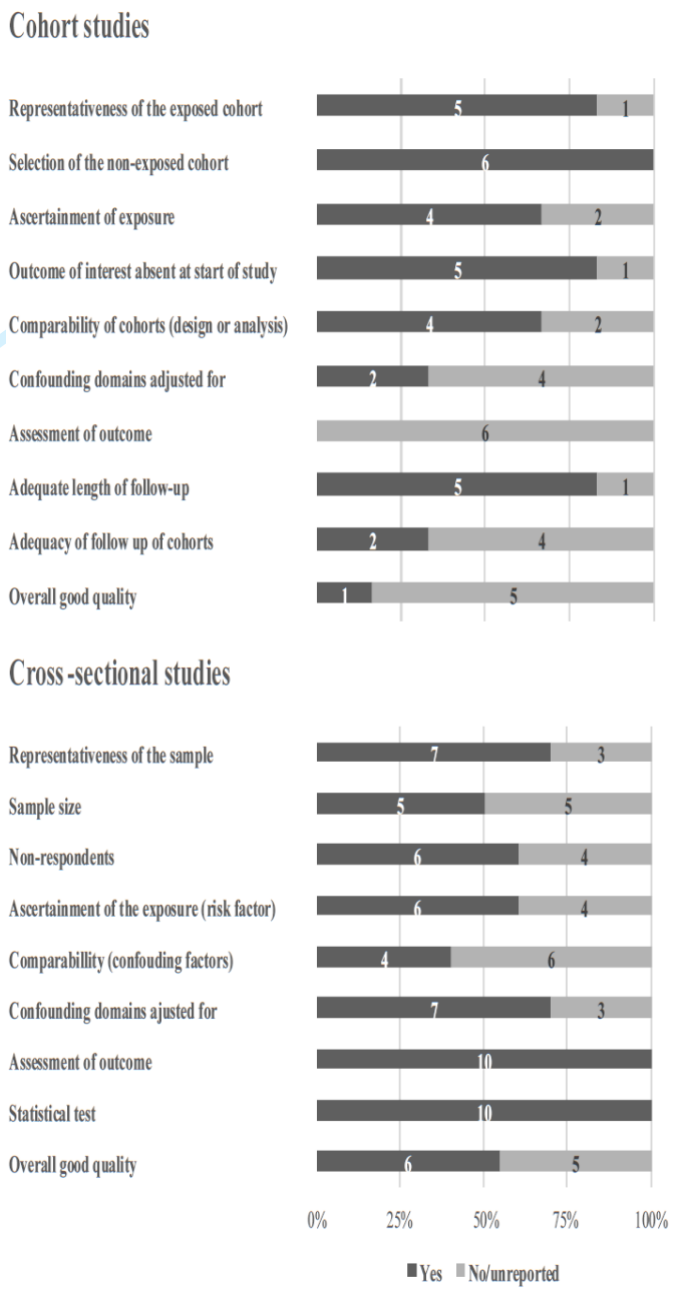
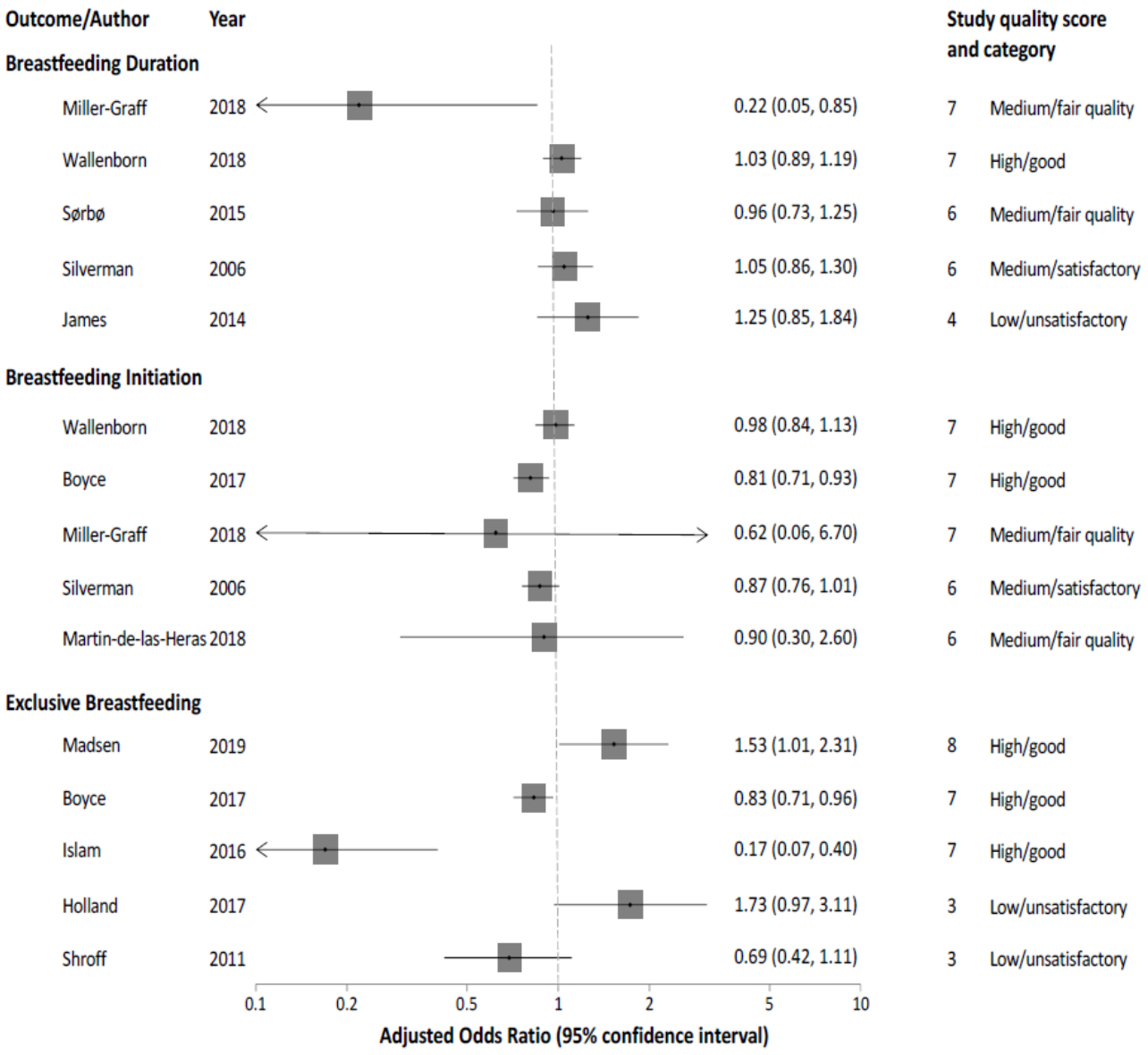

Identification
Screening
Eligibility
Included
Records identified through PubMed (n=265)
Records identified through Embase (n=1440)
Records identified through SCOPUS (n= 266)
Records identified through Global Health (n= 91)
Total number of records (n= 2062)
Records after removing duplicates (n= 1631)
Duplicates (n= 431)
Title/abstract screening (n=1631)
Excluded after title/abstract screening (n=1582)
Full-text articles assessed for eligibility (n= 49)
Full-text articles excluded, (n= 33) with reasons: Wrong outcomes: (n= 7) Wrong study design (n= 7) Abstract only (n= 5) Duplets (n= 4) Against inclusion criteria (n= 4) Wrong comparator (n= 2) No access to article (n= 1) Paediatric population (n= 1) Wrong intervention (n= 1) Wrong setting (n= 1)
Studies included in qualitative synthesis (n=16)
Studies included (n= 16)
Total number of women (n= 414393)

Figure 2: Study quality of cohort and cross-sectional studies in the review of intimate partner violence and breastfeeding outcomes



In the figure illustration of the NOS scale, the studies, which reached a maximum of stars in each category of the NOS-scale was rewarded a 'yes' and further if the studies adjusted for more than four confounding domains, they were rewarded a 'yes' (see appendix S2.2)

Figure 3: Results of physical violence and association with breastfeeding duration, breastfeeding initiation and exclusive breastfeeding presented in a Forest plot ordered according to descending quality



Appendix, S1: Search strategy

Embase search: Searched on the 11th of March with a total result of 1382 articles

#ID	Search
1	Exp partner violence/
2	Exp domestic violence/
3	Exp physical abuse/
4	Exp battered woman/
5	Exp breast feeding/
6	Exp breast milk expression/
7	Exp feeding behavior
8	Exp lactation
9	Exp milk ejection
10	”intimate partner violence”
11	”dating violence”
12	”partner violence”
13	”partner homicide”
14	”psychological violence”
15	”psychological abuse”
16	”spouse abuse”
17	”spousal abuse”
18	”wife abuse”
19	”partner abuse”
20	”domestic violence”
21	”family violence”
22	”physical abuse”
23	”physical violence”
24	”physical maltreatment”
25	”sex offenses”
26	”sexual violence”
27	”sexual harm”
28	”sexual coercion”
29	”battered woman”
30	”battered women”
31	”abused women”
32	”abused woman”
33	”relationship violence”
34	”relationship aggression”
35	”couple violence”
36	”spousal violence”
37	”domestic abuse”
38	”wife beating”
39	”physical harm”
40	”physical aggression”
41	”emotional violence”
42	”emotional abuse”
43	”emotional harm”
44	”violence against women”
45	1 or 2 o 3 or 4 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44
46	Exp sexual abuse
47	Controlling behavior
48	45 or 46 or 47
49	”sexual abuse”
50	48 or 49
51	”exclusive breastfeeding”
52	”breastfeeding duration”
53	”breastfeeding intention”
54	”pumping breast”
55	”human milk”
56	”breast milk”
57	”milk secretion”
58	”milk let-down”
59	5 or 6 or 7 or 8 or 51 or 52 or 53 or 54 or 55 or 57 or 58
60	Feeding behavior
61	Feeding pattern
62	”feeding patterns”

63	59 or 60 or 61 or 62
64	Feeding behaviors
65	63 or 64
66	”exclusive breast feeding”
67	”exclusive bresat feedings”
68	”breast feedings”
69	”breast feeding”
70	”breastmilk expression”
71	”breastmilk expressions”
72	”milk collection”
73	”milk collections”
74	”breast pumping”
75	”milk secretion”
76	”milk secretions”
77	65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76
78	Lactations
79	Lactation
80	77 or 78 or 79
81	50 and 80

Global Health Library search: Searched on the 12th of March with a total result of 91 articles

#ID	Search
S1	”intimate partner violence” OR ”dating violence” OR ”partner violence” OR ”partner homicide” OR ”psychological abuse” OR ”psychological violence”
S2	”spouse abuse” OR ”spousal abuse” OR ”wife abuse” OR ”partner abuse”
S3	S3 OR S2
S4	”domestic violence” OR ”family violence”
S5	S4 OR S3
S6	”physical abuse” OR ”physical violence” OR ”physical maltreatment”
S7	S6 OR S5
S8	”sexual assault” OR ”sex offenses” OR ”sexual violence” OR ”sexual abuse” OR ”sexual harm” OR ”sexual coercion”
S9	S8 OR S7
S10	”battered woman ”OR ”battered women” OR “abused woman” OR “abused women”
S11	S10 OR S9
S12	“relationship violence” OR “relationship aggression” OR “couple violence” OR “spousal violence” OR “domestic abuse” OR “wife beating” OR “physical harm” OR “physical aggression”
S13	S12 OR S11
S14	“emotional violence” OR “emotional abuse” OR “emotional harm” OR “controlling behaviour” OR “violence against women”
S15	S14 OR S13
S16	“breast feeding” OR “breastfeeding” OR “exclusive breast feeding” OR “exclusive breastfeeding” OR “breastfeeding duration” OR “breastfeeding intention”
S17	“breast milk expression” OR “breast milk expressions” OR “milk collection” OR “milk collections” OR “breast pumping” OR “pumping breast”
S18	S17 OR S16
S19	“feeding behaviour” OR “feeding behaviors” OR “feeding pattern” OR “feeding patterns” OR “human milk” OR “milk, human”
S20	S19 OR S18
S21	Lactation OR lactations OR “milk secretion” OR “milk secretions” OR “milk ejection” OR “milk let-down”
S22	S21 OR S20
S23	S22 AND S15

PubMed search: Searched on the 8th of March with a total result of 253 articles

((((((((((((("Breast Feeding"[Mesh]) OR breastfeeding) OR exclusive breast fe*) OR "exclusive breastfeeding") OR "breastfeeding duration") OR breast fe*) OR "breastfeeding intention")) OR ((((((("Breast Milk Expression"[Mesh]) OR breast milk expression*) OR breastmilk expression*) OR milk collection*) OR breast pumping*) OR "pumping breast")) OR ((("Feeding Behavior"[Mesh]) OR feeding behavior*) OR feeding pattern*)) OR (("Milk, Human"[Mesh]) OR "human milk")) OR ((("Lactation"[Mesh]) OR milk secretion*) OR lactation*)) OR (("Milk Ejection"[Mesh]) OR "milk let-down"))) AND ((((((((((((((((((("relationship violence") OR "relationship aggression") OR "couple violence") OR "spousal violence") OR "domestic abuse") OR "wife beating") OR "physical harm") OR "physical aggression") OR "emotional violence") OR "emotional abuse") OR "emotional harm") OR controlling behavior*) OR "violence against women")) OR ((((("Battered Women"[Mesh]) OR "Battered Woman") OR "abused women") OR "abused woman")) OR ((((((("Sex Offenses"[Mesh]) OR "sex offenses") OR "sexual violence") OR sexual abuse*) OR "sexual harm") OR "sexual coercion")) OR ((((("Physical Abuse"[Mesh]) OR "physical abuse") OR "physical violence") OR "physical maltreatment")) OR ((("Domestic Violence"[Mesh]) OR "domestic violence") OR "family violence")) OR (((((("Spouse

Abuse"[Mesh]) OR "spouse abuse") OR "spousal abuse") OR "wife abuse") OR "partner abuse")) OR (((((("Intimate Partner Violence"[Mesh]) OR "intimate partner violence") OR "dating violence") OR "partner violence") OR "partner homicide") OR "psychological violence") OR "psychological abuse"))

SCOPUS: Searched on the 11th of March with a total result of 257 articles

((((TITLE-ABS-KEY("breast feeding")) OR (TITLE-ABS-KEY("breastfeeding intention"))) OR ((TITLE-ABS-KEY(breastfeeding)) OR (TITLE-ABS-KEY("breastfeeding duration"))) OR ((TITLE-ABS-KEY("exclusive breast feeding")) OR (TITLE-ABS-KEY("exclusive breastfeeding")))) OR ((TITLE-ABS-KEY("breast milk expression")) OR (TITLE-ABS-KEY("breast milk expressions")) OR (TITLE-ABS-KEY("breastmilk expression")) OR (TITLE-ABS-KEY("breastmilk expressions")) OR (TITLE-ABS-KEY("milk collections")) OR (TITLE-ABS-KEY("milk collection")) OR (TITLE-ABS-KEY("breast pumping")) OR (TITLE-ABS-KEY("pumping breast"))) OR ((TITLE-ABS-KEY("feeding behavior")) OR (TITLE-ABS-KEY("feeding pattern")) OR (TITLE-ABS-KEY("human milk")) OR (TITLE-ABS-KEY("milk, human")) OR (TITLE-ABS-KEY("breast milk"))) OR ((TITLE-ABS-KEY(lactation)) OR (TITLE-ABS-KEY("milk secretion")) OR (TITLE-ABS-KEY("milk ejection")) OR (TITLE-ABS-KEY("milk let-down")))) AND (((TITLE-ABS-KEY("intimate partner violence")) OR (TITLE-ABS-KEY("dating violence")) OR (TITLE-ABS-KEY("partner violence")) OR (TITLE-ABS-KEY("partner homicide")) OR (TITLE-ABS-KEY("psychological violence")) OR (TITLE-ABS-KEY("psychological abuse"))) OR (((TITLE-ABS-KEY("spouse abuse")) OR (TITLE-ABS-KEY("spousal abuse"))) OR (TITLE-ABS-KEY("wife abuse")) OR (TITLE-ABS-KEY("partner abuse"))) OR ((TITLE-ABS-KEY("domestic violence")) OR (TITLE-ABS-KEY("family violence")) OR (TITLE-ABS-KEY("physical abuse")) OR (TITLE-ABS-KEY("physical violence")) OR (TITLE-ABS-KEY("physical maltreatment"))) OR ((TITLE-ABS-KEY("sex offenses")) OR (TITLE-ABS-KEY("sexual violence")) OR (TITLE-ABS-KEY("sexual abuse")) (TITLE-ABS-KEY("sexual harm")) OR (TITLE-ABS-KEY("sexual coercion"))) OR (((TITLE-ABS-KEY("battered women")) OR (TITLE-ABS-KEY("battered woman"))) OR ((TITLE-ABS-KEY("abused woman")) OR (TITLE-ABS-KEY("abused women")))) OR ((((TITLE-ABS-KEY("relationship aggression")) OR (TITLE-ABS-KEY("couple violence"))) OR (TITLE-ABS-KEY("relationship violence"))) OR (TITLE-ABS-KEY("spousal violence"))) OR ((TITLE-ABS-KEY("domestic violence")) OR (TITLE-ABS-KEY("wife beating")) OR (TITLE-ABS-KEY("physical harm")) OR (TITLE-ABS-KEY("physical aggression"))) OR ((TITLE-ABS-KEY("emotional violence")) OR (TITLE-ABS-KEY("emotional abuse")) OR (TITLE-ABS-KEY("emotional harm")) OR (TITLE-ABS-KEY("controlling behavior"))) OR (TITLE-ABS-KEY("violence against women")))

Appendix, S2: Data synthesis tables

Table S2.1: Results of NOS quality assessment

Cohort studies											
	Selection (maximum 4 stars)				Comparability (maximum 2 stars)		Outcome (maximum 3 stars)			No. of stars	No. of stars with domains adjusted for
Study	Representativeness of the exposed cohort	Selection of the non-exposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of study	Comparability of cohorts on the basis of the design or analysis	Confounding domains ajusted for (table S2.1)	Assessment of outcome	Was follow-up long enough for outcomes to occur	Adequacy of follow up of cohorts		
Madsen, 2019	*	*	*	*	**	**	-	*	*	8	10
Martin-de-las-heras, 2018	*	*	*	*	**	******	-	-	-	6	12
Miller-Graff, 2018	-	*	*	*	**	****	-	*	*	7	11
Finnbogadottir, 2017[A]	*	*	-	*	-	-	-	*	-	4	4
Hasselmann, 2016	*	*	*	-	-	***	-	*	-	4	7
Sørbø, 2015	*	*	-	*	**	***	-	*	-	6	9
	Cross-sectional studies										
	Selection (maximum 5 stars)				Comparability (maximum 2 stars)		Outcome (maximum 3 stars)			No. of stars	
Study	Representativeness of the sample	Sample size	Non-respondents	Ascertainment of the exposure (risk factor)	The subjects in different outcome groups are comparable, based on the study design or analysis. Confouding factors are controlled	Confounding domains ajusted for (table S2.1)	Assessment of outcome	Statistical test			
Tiwari, 2018	*	*	*	**	*	****	*	*		8	12
Wallenborn, 2018	*	*	-	**	*	*****	*	*		7	12
Boyce, 2017	*	*	*	**	-	-	*	*		7	7
Holland, 2017	-	-	-	*	_-	****	*	*		3	7
Islam, 2016	*	-	*	*	**	********	*	*		7	16
James, 2014	-	-	-	**	-	***	*	*		4	7

Moraes, 2011	*	-	*	**	**	****	*	*	8	12
Shroff, 2011	-	-	-	*	-	*****	*	*	3	8
Lau, 2007	*	*	*	**	-	*****	*	*	7	12
Silverman, 2006	*	*	*	*	-	***	*	*	6	9

A Cross-sectional study embedded from a cohort. Analyzed with NOS for cohort.

Table S2.2: Confounders adjusted for in studies

Reference	Domain										Outcome
	Economy	Maternal lifestyle and health	Pregnancy/post patum related problems	Maternal socio-demographic	Child characteristics	Relationship characteristics	Support during pregnancy/ postpartum	Violence or stressfull life events	Pregnancy intention	Caste and religion	Outcome meaures
Madsen, 2019 (32)		x		x							Premature termination of exclusive BF
Martin-de-las-Heras, 2018 (33)		x	x	x		x	x		x		BF avoidance (initiation)
Miller-Graff, 2018 (20)	x		x				x	x			BF exclusivity, initiation and cessation
Tiwari, 2018 (21)	x			x		x		x		x	BF duration
Wallenborn, 2018 (22)	x			x		x		x	x		BF initiation and duration
Boyce, 2017* (23)											Early BF initiation and exclusivity
Finnbogadottir, 2017 (24)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Exclusive BF
Holland, 2017 (25)		x	x	x				x			BF initiation, duration and exclusivity
Hasselmann, 2016 (34)				x	x	x					Interruption of exclusive BF
Islam, 2016 (26)	x	x	x	x	x	x	x	x	x		Exclusive BF
Sørbø, 2015 (35)				x		x		x			Early cessation of any BF
James, 2014 (27)	x		x	x							BF duration
Moraes, 2011 (28)		x		x	x		x				Early cessation of exclusive BF
Shroff, 2011 (29)		x		x	x	x				x	Exclusive BF
Lau, 2007 (30)		x	x	x		x			x		Breastfeeding and mixed feeding
Silverman, 2006 (31)		x		x		x					BF initiation and early cessation

*Article states that the association between IPV and BF was adjusting for any covariate that were significant at p < 0,20 levels in bivariate analysis, but results not shown

NA (not applicable)

Explanation of following groups of confounders:

Economy: Insurance and receipt of government assistance

Maternal lifestyle and health: Smoking, substance use prior to pregnancy, substance use all time, maternal health status, mothers BMI, HIV status

Pregnancy and postpartum related problems: Pregnancy health problems, preterm labor, mode of birth, complications during birth, mother/infant separation after birth, antenatal complications, postnatal complications, reasons for stopping BF and resuscitation

Maternal sociodemographic: Maternal age, maternal education, maternal race/ethnicity, first baby/number of the child, employment status, place of residence, parity, occupation, number of years lived in the U.S and language
Child characteristics: Gender of child, age of child, low birthweight/birth weight, child health
Relationship characteristics: Marital status, relationship characteristics, partner's education level, family structure, cohabitation
Support during pregnancy and postpartum: Prenatal BF education, number of antenatal care visits/health care services, kin support, social support, type of maternity clinic
Violence or stressful life events: Stressful live events 12 months before pregnancy, depression, childhood abuse, other forms of IPV
Pregnancy intention
Caste and religion

Table S2.3: Early cessation/shortened duration of breastfeeding (aOR; 95% CI) vs. no cessation of breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 (32)				
Martin-de-las-Heras, 2018 (33)				
Miller-Graff, 2018 (20)	P + E + S: 0.22 (0.05-0.85)[A]			
Tiwari, 2018 (21)	E: 1.07 (0.81-1.41)[B]			
Wallenborn, 2018 (22)	P: 1.18 (1.01-1.37)[L]	P: 1.15 (0.94-1.4)[L]		
	P: 1.03 (0.89-1.19)[L]			
Boyce, 2017 (23)				
Finnbogadottir, 2017 (24)				
Holland, 2017 (26)			P + E + S: 5.92 (1.72-27.98)[C,D,F,O] P + E + S: 3.33 (1.46-8)[C,E;F,O] P + E + S: 0.66 (0.25-1.59)[C,D,G,O] P + E + S: 0.93 (0.54-1.58) [C,E,G,O] P + E + S 0.68 (0.25-1.72)[C,D;H,O] P + E + S: 0.87 (0.44-1.68)[C,E,H,O]	
Hasselmann, 2016 (34)				
Islam, 2016 (26)				
Sørbø, 2015 (35)	P: 0.96 (0.73-1.25)[M] E: 1.28 (1.18-1.39)[M] S: 0.94 (0.76-1.16)[M]		P + E + S: 1.47 (1.23-1.76)[M] P + E: 1.39 (1.18-1.39)[M] P + S: 0.95 (0.61-1.47)[M] S + E: 1.27 (1.02-1.58)[M]	
James, 2014 (27)	P + E + S: 1.25 (0.85-1.84)[I,J] P + E + S: 1·01 (0.8-1.29)[I,K]			
Moraes, 2011 (28)				
Shroff, 2011 (29)				
Lau, 2007 (30)				
Silverman, 2006 (31)			P + E: 0.94 (0.76-1.7)[D]	P + E: 0.97 (0.72-1.3)[D]
			P + E: 1.05 (0.86-1.3)[D]	

* IPV measured as physical (P), or emotional (E) or sexual (S)
** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined
[A] Crude OR (measured as effect of IPV exposure the past year and interpreted as lower likelihood of continuing BF at 6 weeks)
[B] At least one month of BF
[C] HR interpreted as the probability of stopping BF
[D] Duration at 4 weeks
[E] Duration at 13 weeks
[F] White women
[G] Black women
[H] Hispanic women
[I] Interpreted as likelihood of BF at the time measured
[J] BF at 3 months
[K] BF at 6 months

[L] BF at 1-8 weeks
[M] BF < 4 weeks
[O] Interview of participants included items about the pregnancy, prenatal and postpartum period

Table S2.4: Initiation of breastfeeding (aOR; 95% CI) vs. no initiation of breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 (32)				
Martin-de-las-Heras, 2018 (33)		E: 2 (1.2-3.3)[B] P: 0.9 (0.3-2.6)[B]		
Miller-Graff, 2018 (20)	P + E + S: 0.62 (0.06-6.7)[A]			
Tiwari, 2018 (21)				
Wallenborn, 2018 (22)	P: 1.05 (0.9-1.23)	P: 0.9 (07.3-1.11)		
	P: 0.98 (0.84-1.13)			
Boyce, 2017 (23)	P: 0.81 (0.71-0.93)[C] S: 0.52 (0.36-0.76)[C]		P + S: 0.83 (0.67-1.01)[C]	
Finnbogadottir, 2017 (24)				
Holland, 2017 (25)			P + E + S: 2.3 (0.7-7.2)[D,E] P + E + S: 1.8 (0.9-3.9)[D,F] P + E + S: 0.9 (0.2-3.8)[D,G]	
Hasselmann, 2016 (34)				
Islam, 2016 (26)				
Sørbø, 2015 (35)				
James, 2014 (27)				
Moraes, 2011 (28)				
Shroff, 2011 (29)				
Lau, 2007 (30)				
Silverman, 2006 (31)			P + E: 0.95 (0.81-1.1)	P + E: 0.86 (0.69-1.06)
			P + E: 0.87 (0.76-1.01)	

* IPV measured as physical (P), or emotional (E) or sexual (S)
** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined
[A] Participants were interview during pregnancy and again approximately 6 weeks postpartum. Results do not distinguish between violence before and after pregnancy
[B] Measured as BF avoidance
[C] Lifetime IPV intepreted as lower odds of early initation of BF
[D] Measured as OR
[E] White women
[F] Black women
[G] Hispanic women

Table S2.5: Early termination of exclusive breastfeeding (aOR; 95% CI) vs. no termination of exclusive breastfeeding

Reference				
	Exposed to IPV* prior to pregnancy	**Exposed to IPV* during pregnancy/post-partum**	**Exposed to any IPV** prior to pregnancy**	**Exposed to any IPV** during pregnancy/post-partum**
Madsen, 2019 (32)	P: 1.53 (1.01-23.1) E: 1.61 (1.26-2.07) S: 1.5 (1.07-2.09)	P: 1.68 (1-2.82) E: 1.23 (0.91-1.65) S: 1.35 (0.96-1.91)	P + E + S: 1.93 (1.11-3.34)	P + E + S: 2.87 (1.27-6.46)
Martin-de-las-Heras, 2018 (33)				
Miller-Graff, 2018 (20)			P + E + S: 0.41[A] (0.11-1.45)	
Tiwari, 2018 (21)				
Wallenborn, 2018 (22)				
Boyce, 2017 (23)	P: 0.83 (0.71-0.96)[B] S: 0.74 (0.49-1.12)[B]		P + S: 0.92 (0.75-1.15)[B]	
Finnbogadottir, 2017 (24)			P + E + S: 5.7515 (0.229-144.4791)[N,T] P + E + S: 1.7305 (0.4944-6.0564)[O,T] P + E + S: 0.7756 (0.2616-2.9999)[P,T] P + E + S: 0.5204 (0.2158-1.2548)[Q,T] P + E + S: 0.5442 (0.2224-1.3319)[R,T] P + E + S: 0.5792 (0.1655-2.0271)[S,T]	
Holland, 2017 (25)			P + E + S: 1.73 (0.97-3.11)[I,K] P + E + S: 1.65 (0.95-2.86)[J,K] P + E + S: 0.95 (0.63-1.43)[I,L] P + E + S: 0.97 (0.67-1.39)[J,L] P + E + S: 0.71 (0.41-1.19)[I,M] P + E + S: 0.83 (0.50-1.35)[J,M]	
Hasselmann, 2016 (34)				P + E + S: 1.35 (1.07-1.71)[G] P + E + S: 1.56 (1.16-1.95)[H]
Islam, 2016 (26)		P: 0.17 (0.07-0.4)[C] E: 0.51 (0.26-1)[D] S: 0.43 (0.18-1.06)		
Sørbø, 2015 (35)				
James, 2014 (27)				
Moraes, 2011 (28)		P: 1.17 (0.89-1.53)[E]		
Shroff, 2011 (29)	P: 0.69 (0.42-1.11)			
Lau, 2007 (30)				P + E + S: 1.839 (1.61-2.911)[F]
Silverman, 2006 (31)				

* IPV measured as physical (P), or emotional (E) or sexual (S)
** IPV measured as physical (P), emotional/psychological/mental (M) and sexual (S) combined
[A] Measured as crude OR and interpreted as lower likelihood of EBF
[B] Lifetime IPV and interpreted as lower odds of EBF
[C] Interpreted as 83 % greater risk of discontinuing EBF
[D] Interpreted as 49 % less likely to exclusively breastfeed
[E] Measured as HR and interpreted as probability of early cessation of EBF
[F] Measured as experience of 'no IPV' and interpreted as more likely to breastfeed
[G] IPV until 3rd month postpartum measured as RR
[H] IPV in the 3rd month postpartum measured as RR
[I] EBF at 4 weeks postpartum
[J] EBF at 14 weeks postpartum
[K] White women
[L] Black women
[M] Hispanic women

N EBF at 1 month
O EBF at 2 months
P EBF at 4 months
Q EBF at 6 months
R EBF at 9 months
S EBF at 12 months
T OR measured at: https://www.medcalc.org/calc/odds_ratio.php

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	2-3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	2-3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	3 + appendix
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3-4
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	NA
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	NA
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	4
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	NA
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	NA

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	4
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	NA
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	5
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	5
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	5
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	6
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	NA
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	NA
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	NA
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	6
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	6-7
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	8
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	8

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