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Review Article

Risk factors associated with postpartum anxiety in Australia, Europe, and North America: A systematic review and narrative synthesis

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ABSTRACT

Background: Reducing the prevalence and consequences of anxiety following childbirth (postpartum anxiety) is a strategic priority in the UK and many similar nations; a comprehensive review of risk factors can support the development of interventions and guide further research.
Methods: This registered systematic review was guided by 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA) and analysed using 'Synthesis Without Meta-analysis' (SWiM) to answer the question; '*What factors have been reported to increase the risk of maternal postpartum anxiety (PPA) in Australia, Europe, and North America?*'. MEDLINE and PsycINFO were searched for relevant research from Australia, Europe, and North America, published up to July 2021.
Results: Screening yielded 39 reports (total $N = 40{,}238$). Seven risk categories were identified (*Psychopathology and personality, Social, Socio-demographic, Health, Cognitive, Pregnancy and birth,* and *Infant characteristics and postpartum experiences*). Historic and concurrent depression, historic anxiety, and low social support were the most frequently evidenced risk factors.
Limitations: The review was limited to three geographical regions with comparable health, political, and cultural contexts, and research pertaining only to special populations was excluded.
Conclusions: Findings synthesise new evidence of the risk factors associated with PPA, whilst the discussion highlights potentially modifiable factors as targets for intervention. Monitoring for risk factors during routine pregnancy and postpartum care would allow for additional surveillance and earlier intervention with those most at risk. Peer support should be offered to people with heightened vulnerability to PPA. Developing support strategies that address cognitive vulnerabilities (e.g., parenting-related confidence) could prove particularly beneficial.

Abbreviations: APA, Antepartum anxiety; BAI, Beck Anxiety Inventory; CCEI, Crown-Crisp Experiential Index; CIDI-V, Composite International Diagnostic Interview for Women; DASS, Depression Anxiety Stress Scale; EPDS, Edinburgh Postnatal Depression Scale; EPDS-A, Edinburgh Postnatal Depression Scale – Anxiety subscale; GAD, Generalised anxiety disorder; GAD-2/GAD-7, Generalised Anxiety Disorder Assessment (2- or 7-item version); HADS, Hospital Anxiety Depression Scale; HCP, Healthcare professional; MINI, Mini-International Neuropsychiatric Interview; MSPSS, Multidimensional Scale of Perceived Social Support; NICE, National Institute for Health and Care Excellence; PASS, Perinatal Anxiety Screening Scale; pIPV, Psychological Intimate Partner Violence; PMH, Perinatal mental health; NIHR, National Institute for Health and Care Research; PPA, Postpartum anxiety; PPD, Postpartum depression; PSAS, Postpartum Specific Anxiety Scale; PSAS-RSF-C, Postpartum Specific Anxiety Scale – Research Short Form - Crisis; PSWQI, Penn State Worry Questionnaire; PRISMA:, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; RNT, Repetitive negative thinking; SCID, Structured Clinical Interview for DSM Disorders; SCL-ANX, Symptom Checklist-Anxiety; STADI, State-Trait Anxiety Depression Inventory; STAI, State-Trait Anxiety Inventory; SWiM, Synthesis Without M``````eta-analysis.

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1. Introduction

Pregnancy and childbirth are major transitions in a person's life, increasing vulnerability to perinatal[2] mental health (PMH) difficulties (Moustafa et al., 2020). Postpartum anxiety (PPA), that is, anxiety occurring in the year following childbirth, is the most prevalent PMH condition (Fairbrother et al., 2016) and frequently presents with co-morbid depression (Falah-Hassani et al., 2017). Before the COVID-19 pandemic in 2020, approximately 10–20 % of postpartum women and birthing people[3] experienced PPA, rising to over 30 % during the pandemic, with reported rates varying according to definition and measurement (Dennis et al., 2017b; Fawcett et al., 2019). There are significant individual and societal costs associated with PPA (Bauer et al., 2016) due to the negative effects on a range of mother-child interactions (e.g., infant feeding and bonding; Davies et al., 2021; Fallon et al., 2018; Lefkovics et al., 2018), and enduring implications for the child, including emotional and behavioural difficulties and somatic complaints (Glasheen et al., 2010; Rees et al., 2019). This underpins the critical need to identify opportunities to reduce the prevalence and severity of PPA.

A cumulative effect of multiple risk factors is theorised to increase susceptibility to PPA (Biaggi and Pariante, 2020). Several reviews published in the last decade have summarised a range of demographic, social, obstetric, psychological, health, and early parenting-related risk factors associated with PPA (Field, 2018; Furtado et al., 2018; Goodman et al., 2016; Leach et al., 2017); however, many of these vulnerabilities are difficult to change without significant, long-term investment that is simply unavailable in most public health services. Understanding these risk factors is of great importance so that monitoring may be put in place to identify and provide timely support for vulnerable individuals. Furthermore, there is a need to identify and understand modifiable factors (i.e. those typically responsive to treatment/support) so they may be targeted by interventions to actively reduce PPA risk. Indeed, the UK National Institute for Health and Care Research (NIHR) has highlighted this as a gap in current PMH-related knowledge and practice (PRP [38–01-02] https://www.nihr.ac.uk/documents/prp-38-01-02-perinatal-mental-health-care-what-works-for-who-and-in-what-circumstances/35118). In their systematic review of risk factors associated with antepartum anxiety (APA), Bayrampour et al. (2018) recommend pre-conception screening to identify and act on modifiable factors that may limit the development of APA and there are similar opportunities during routine perinatal care to identify the presence of modifiable factors associated with PPA. However, further enquiry is needed to synthesise recently published literature and identify optimal targets for screening and intervention, as well as to guide research and public policy in the development of long-term system-wide strategies that might reduce the prevalence and implications of PPA.

Since the last systematic review of PPA risk factors, which included records published before September 2017 (Furtado et al., 2018), there has been an increase in publications concerning cognitive and social modifiable factors during the perinatal period. For example, Moulds et al. (2018) highlight the potential benefit of addressing underlying transdiagnostic cognitive mechanisms when seeking to reduce the risk of PPA (and other PMH difficulties). Repetitive negative thinking (RNT) is one such mechanism, reported to predict PPA and interact with other factors to influence the development and maintenance of symptoms (Moulds et al., 2022). A growing body of literature also points to the role of potentially modifiable social factors in the development and maintenance of PPA. For example, there is substantial evidence of perceived social support moderating the risk of PMH difficulties (e.g., Harrison et al., 2021a, 2021b; Hughes et al., 2020; Milgrom et al., 2019).

The most recent systematic review of PPA risk factors (Furtado et al., 2018) included research published up to 2017; however, it excluded studies that did not distinguish between new onset and exacerbated PPA, therefore only eleven records were captured. An earlier review by Leach et al. (2017) identified 98 reports presenting the prevalence and correlates of perinatal anxiety (including both APA and PPA); however, only 19 of the included reports provided evidence related to PPA risk factors, and they provided limited evidence of potentially modifiable targets.

Investment in services to support PMH has also increased in recent years. For example, in the UK, the government set a target to double women's access to specialist PMH services between 2020/21 and 2023/24 (*The NHS Long Term Plan*, 2019). However, awareness and understanding of PPA remain behind that of postpartum depression (PPD) (Coates et al., 2015; Harrison et al., 2020), necessitating a further review of the literature to update knowledge of both modifiable and chronic risk factors (i.e. those susceptible to timely change versus those historic, persistent, or unresponsive factors) direct future research, and effectively guide the development of preventative and supportive interventions.

2. Context

When synthesising evidence, particularly concerning risk factors, it is important to acknowledge ways in which context may influence findings. For example, during the COVID-19 pandemic, differences in PPA prevalence were observed by country, governmental response, and COVID-related death rate (Mesquita et al., 2023), as well as COVID-related stress, and pregnancy-specific stress (Lobel et al., 2022), and when the data were collected (with higher PPA rates observed later in the pandemic; Tomfohr-Madsen et al., 2021). Furthermore, when seeking to inform practice and improve outcomes for families, it is essential to consider political and cultural factors (Dennis et al., 2007; Faircloth et al., 2013; Lee et al., 2023), as well as the availability and quality of perinatal health services and social care which can vary greatly within and between countries (Guo et al., 2019; MacGregor et al., 2020; WHO et al., 2023). As such, focusing on literature from comparable regions may improve the translation of research to practice for these populations.

3. Objectives

This review synthesises evidence of risk factors associated with PPA to guide future research supporting the development of interventions that may reduce the prevalence and severity of PPA in the context of UK primary care and similar health services. It aims to answer the overarching research question; '*What factors have been reported to increase the risk of maternal*[4] *postpartum anxiety in Australia, Europe, and North America?'*, and draw out evidence of risk factors that may be particularly amenable to treatment during the perinatal period (i.e., 'modifiable' risk factors).

4. Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidance was utilised for this review (Page et al., 2021; Shamseer et al., 2015) and a systematic review protocol was registered with PROSPERO on 25.06.2021 (registration number CRD42021231595; https://www.crd.york.ac.uk/prospero/display_reco

[2] For this review, 'perinatal' refers to the period from conception to twelve months following childbirth.

[3] Most literature relevant to this review failed to collect data on gender and assumed their sample consisted only of women, overlooking potential differences in the experiences of birthing people who do not identify as women.

[4] *'Maternal' is used to denote women and birthing people (as opposed to fathers and non-birthing or co-parents) and is chosen to align with the language used in the reviewed literature, however the problems pertaining to this term are acknowledged.*

rd.php?ID=CRD42021231595). The review team included six researchers, with affiliations in Europe and Australia.

4.1. Eligibility criteria

Reports were selected in accordance with predefined criteria (Table 1). Only research conducted in Europe (defined by the Schengen Zone and including the UK), North America, and Australia was considered, where perinatal care and parenting practices are similar (Lee et al., 2023). This ensures findings can be applied to the development of interventions within these cultural and political contexts and perinatal healthcare systems.

4.2. Information sources and search strategy

MEDLINE and PsychINFO databases were searched in July 2021 using the search string ((“risk factor*” OR contribut* OR predispos* OR predict* OR associat* OR correlat* OR factor* OR trigger*) AND (“perinatal anxiet*” OR “postnatal anxiet*” OR “postpartum anxiet*” OR “post-natal anxiet*” OR “post-partum anxiet*”)). Limiters were applied to access only peer-reviewed English-language academic journals. Where reports were unavailable in full-text format, alternative university library systems were used, and/or the author was contacted. Some hand-searching was necessary to access full-text reports. Grey literature was not included.

4.3. Selection process

All titles and abstracts generated by the initial search were screened against inclusion and exclusion criteria (Table 1) by one researcher (KJ), and a random subset of 10 % of the records ($n = 36$) was screened by two other members of the review team (KF and LG, $n = 18$ reports each), blind to the original reviewer’s decision. No conflicts arose. Reports were rejected if they did not meet all inclusion criteria or if any exclusion criteria were identified. Where uncertainty existed, the full text was reviewed, and if a report’s suitability remained unclear, it was discussed and resolved with the wider review team. One full-text report (DOI:https://doi.org/10.1080/00049539108259093) was inaccessible despite efforts via multiple university library systems and an attempt at direct contact with the author. Although the research team was not blind to author, journal, or institutional affiliations, reasons for exclusion were recorded and discussed with the review team to protect against potential bias. The search and selection process is depicted in Fig. 1.

Table 1
Inclusion and exclusion criteria.

	Inclusion criteria	Exclusion criteria
a. Publication status	• Research published in a peer-reviewed academic journal.	• Grey literature
b. Language	• English language	• Research not published in English
c. Setting	• Research conducted in Europe (Schengen and UK), North America, or Australia	• Research including participants residing outside of Europe, North America, or Australia
d. Design	• Cross-sectional or longitudinal quantitative study reporting risk factors associated with postpartum anxiety in a sample ≥ 50.	• Review paper • Intervention study • Case study • Small sample ($N < 50$) • Duplicate study • Companion study using overlapping data
e. Participants	• Human adults aged 18 years or older who gave birth no more than twelve months before participation	• Research focusing entirely on special populations unlikely to represent the general population (e.g., clinical inpatients or primiparous mothers only)
f. Outcomes	• Postpartum anxiety symptoms measured as the research outcome between one week and twelve months following childbirth using a standardised tool, validated for the population under investigation and distinguished from other psychological symptoms	• Research reporting on postpartum anxiety measured retrospectively more than twelve months postpartum. • Studies failing to distinguish between comorbid disorders • Anxiety only measured immediately after birth (i.e., < 1 week postpartum)

4.4. Data collection process

One reviewer (KJ) collected data from all the included reports. To ensure reliability, two further reviewers (KF and HP) each independently collected data from a subsample of 10 % of the included reports (total $n = 8$) using the same methods. Extracted data were compared between reviewers and discussed with the review team. No conflicts occurred.

4.5. Data items

To ensure consistency, relevant data were extracted from the included studies using a specially developed data extraction form. This was created using items identified in previously published reviews (e.g., Furtado et al., 2018; Goodman et al., 2016) and piloted with a selection of reports before use. Extracted data were collated and tabulated (see Tables 2 and 3).

Papers using any validated self-report measures of PPA and/or structured clinical interview were eligible for inclusion, where outcome data were collected between one week and 12 months postpartum. Studies that did not distinguish between outcome data collected before and/or after and during this period were excluded. Twenty-five different PPA outcome measures were reported, although many were adaptations of a common tool. For example, nine studies used the original State-Trait Anxiety Inventory (STAI), three used a validated adaptation, three used the trait subscale, and three used the state subscale. Five versions of the diagnostic Structured Clinical Interview for DSM Disorders (SCID) were used, including one adapted into a self-report tool. Three perinatal-specific outcome measures (Edinburgh Postnatal Depression Scale – Anxiety subscale [EPDS-A]; Perinatal Anxiety Screening Scale [PASS]; Postpartum Specific Anxiety Scale – Research Short Form - Crisis [PSAS-RSF-C]) were used in four studies. This heterogeneity contributed to the decision not to conduct a meta-analysis.

Further data collected included geographical region; setting and sampling method (e.g., hospital cohort or convenience sample); research design (including the number of data collection points); outcome measures (including method of administration); time of outcome measures; statistical analysis; sample characteristics (including age, ethnicity, education level, and parity); response and participation rates (including management of missing data); final sample size; risk factors and correlates measured (including methods); and findings and implications.

4.6. Study risk of bias assessment

A risk-of-bias appraisal tool was created using a combination of questions from two Joanna Briggs Institute Critical Appraisal Tools (https://jbi.global/critical-appraisal-tools), adapted to capture the risk of bias in both cross-sectional and longitudinal PPA research. Clear criteria were described to ensure reliable and consistent appraisal between reviewers. Reports were not scored numerically; instead, each criterion was answered as *‘all criteria met; some criteria met; incomplete or unclear information; criteria not met; or not applicable’*. One reviewer (KJ) completed this appraisal on all included reports, and where uncertainty existed, reports were discussed with the wider review team. For reliability, a random 10 % of the included reports were appraised again by a second reviewer (KF $n = 4$). No conflicts arose. Findings were recorded

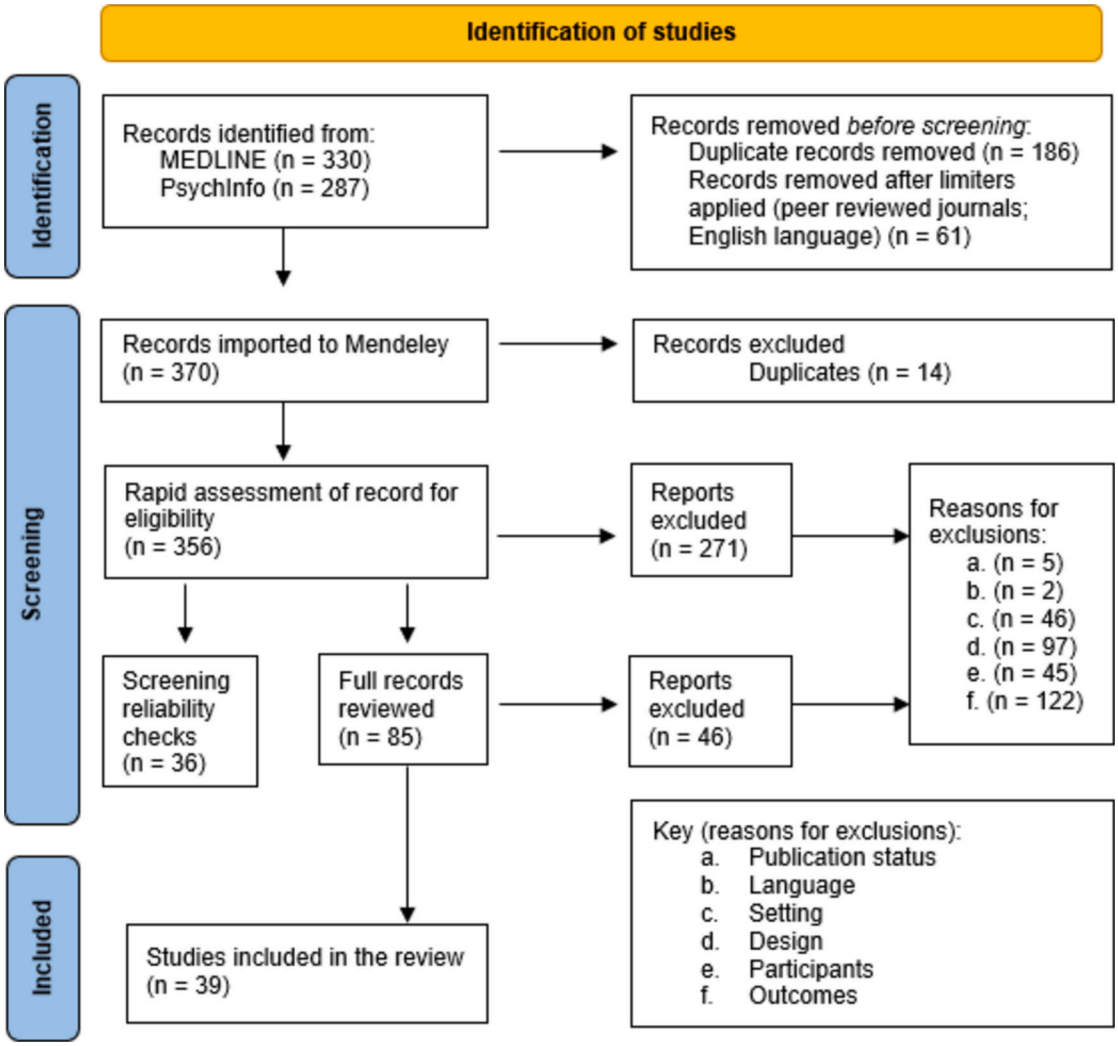


Fig. 1. Flow chart of the report selection process.

in a heat table for ease of interpretation (Table 4). No studies were excluded from the narrative synthesis based on this appraisal; however, findings were prioritised according to the quality of evidence.

4.7. Effect measures

Evidence of effect was reported by counting the number of reports (and total number of participants studied) presenting statistically significant effects. This was presented in Table 4 and discussed alongside methodological characteristics and risk of bias appraisals.

4.8. Synthesis methods

Informed by Muka et al.'s (2020) guide on how to design, conduct, and publish systematic reviews and meta-analyses, heterogeneity in the data extracted from included articles was considered at multiple levels including study design, population characteristics, measures, and methods before a final decision was made on methods of synthesis. Puhan et al. (2006) demonstrated that, when conducting a meta-analysis, it is essential not only to observe a strong enough correlation between instruments to ensure that the same constructs are in focus but also to identify similar levels of responsiveness (that is, the extent to which the instrument detects change). Overlooking responsiveness may introduce significant bias in results and risk variability being wrongly attributed. In the present review, 25 different instruments were used to measure PPA, conceptualising PPA in various ways and differing in the extent to which they detect change; therefore, a meta-analysis was not considered appropriate. Campbell et al. (2020) report that approximately 32 % of systematic reviews pertaining to health interventions do not include a meta-analysis, and in response, they set out a structure to ensure appropriate reporting of such research: 'Synthesis Without Meta-analysis' (SWiM) guidelines (Campbell et al., 2020). This was followed throughout the present review.

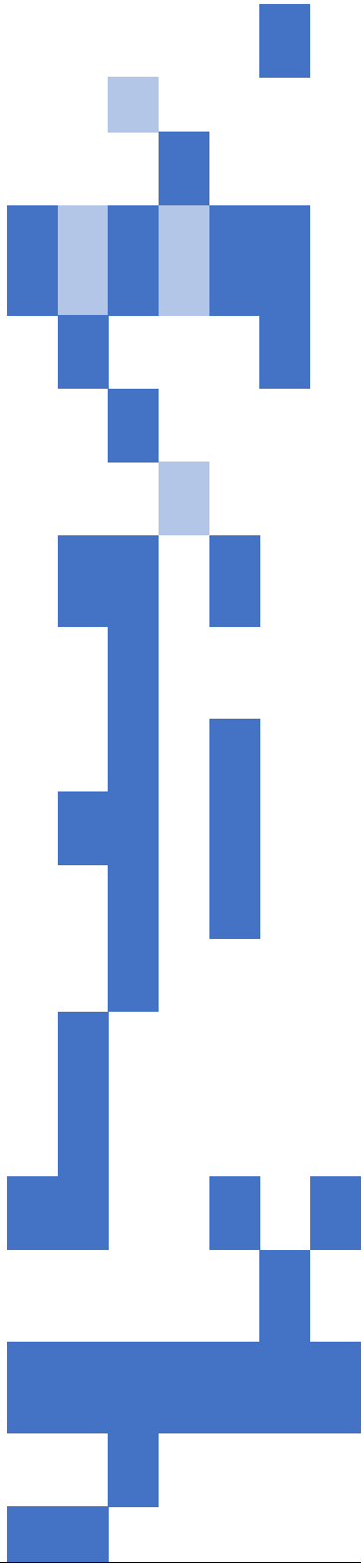
PPA risk factors and correlates identified in the data were organised into categories and considered alongside those published in previous reviews (e.g., Biaggi and Pariante, 2020; Furtado et al., 2018; Leach et al., 2017). Each broad category was broken down into more specific factors associated with PPA. During this qualitative synthesis, categories were discussed and refined with the research team. These were described in order of frequency of occurrence, with the number of reports presenting a significant association and the total number of participants studied providing a proxy for evidence of effect. Due to the limited body of evidence to draw upon and the conceptual diversity across the literature, many findings could not be clustered, and evidence from single studies is also reported.

Greater emphasis was placed on reports presenting the most robust evidence according to the risk of bias appraisal. Furthermore, longitudinal cohort studies were favoured over cross-sectional designs and multivariate analyses over univariate or bivariate analyses. Concerns regarding the quality of evidence are reported where necessary.

Table 2
Overview of the extracted data.

First author (year)	Country	Design (no. data collection points)	Anxiety measure(s)	Time of anxiety measure(s)	Final sample size	Factors associated with PPA symptoms
						Sociodemographic / Social / Psychopathology & personality / Cognitive / Health / Pregnancy & birth / Infant & postpartum
Aaron (2015)	USA	Longitudinal (2)	STAI-T	>24 weeks gestation; <6 months postpartum	162	
Ahmed (2018)	Canada	Longitudinal (3)	EPDS-A	Early pregnancy (17.4 +/- 4.9 weeks gestation); late pregnancy (30.6 +/- 2.7 weeks gestation); early postpartum (4.2 +/- 2.1 weeks postpartum)	615	
Akinbode (2021)	USA	Longitudinal (3)	STAI-T	Late pregnancy; 6-weeks postpartum; 12-weeks postpartum	176	
Aris-Meijer (2019)	Netherlands	Longitudinal (4)	STAI	Mean 12-weeks' gestation (range 5-19 weeks); 5-months postpartum (range 4-7 months)	2003	
Arnold (2020)	USA	Cross-sectional (1)	GAD-7	Mean age of infant 169.44 days	596	
Bell (2016)	UK	Longitudinal (2)	CCEI	2-months postpartum; 8-months postpartum	4672	
Britton (2008)	USA	Longitudinal (2)	STAI-S	Before discharge from peripartum hospital admission; 1-month postpartum	296	
Britton (2011)	USA	Longitudinal (2)	STAI-S	Before discharge from peripartum hospital admission; 1-month postpartum	296	
Clout (2015)	Australia	Longitudinal (2)	DASS-21	3rd pregnancy trimester (32-36 weeks gestation); 4-6 months postpartum (mean time to follow up 21.5-weeks postpartum [5-months])	105	
Dawson (2021)	USA	Longitudinal (4)	NetSCID (baseline); BAI (other time points)	3; 6; 12; 18-months postpartum	76	
Dennis (2017)	Canada	Longitudinal (3)	STAI	1; 4; 8-weeks postpartum	498	
Fallon (2021)	UK (COVID-19)	Cross-sectional (1)	STAI-S; PSAS-RSF-C	0-12 weeks postpartum	614	
Farr (2014)	USA	Cross-sectional (1)	Study-specific questions, validated in another report.	< 9-months postpartum (average 4-months postpartum)	4250	
Fonseca (2018)	Portugal	Cross-sectional (1)	HADS-A	0-12 months postpartum (Mean 4.37 months postpartum)	262	
George (2013)	France	Longitudinal (2)	HADS-A	26-35 weeks gestation; 6-8 weeks postpartum	173	
Grant (2008)	Australia	Longitudinal (2)	MINI; STAI	15.46 weeks gestation; 32 weeks postpartum	100	
Grant (2012)	Australia	Longitudinal (2)	MINI; STAI	3rd pregnancy trimester pregnancy (mean 36.93-weeks' gestation); 7-months postpartum (mean 31.66-weeks postpartum)	88	
Harrison (2021)	UK (COVID-19)	Cross-sectional (1)	PASS	0-12 months postpartum (mean 6.29-months)	251	
Hetherington (2018)	Canada	Longitudinal (4)	STAI	< 25-weeks' gestation; 34-36 weeks gestation; 4-months postpartum; 1-year postpartum	1573 (4-month outcomes n = 3057)	

Janevic (2021)	USA (COVID-19)	Cross-sectional (1)	GAD-7	Unknown postpartum	237	
Karukivi (2015)	Finland	Longitudinal (3)	STAI	18-20 weeks gestation; 3-month postpartum; 12-months postpartum	100	
Marques (2018)	Portugal	Cross-sectional (1)	HADS-A	1-12 months postpartum (mean 4.83-months postpartum)	450	
Martini (2015)	Germany	Longitudinal (7)	CID-V	10-12 weeks gestation; 22-24 weeks gestation; 35-37 weeks gestation; 10-days postpartum; 2-months postpartum; 4-months postpartum; 16-months postpartum	283	
Matthies (2020)	Germany	Longitudinal (3)	STAI	Third pregnancy trimester; first week postpartum; 4-months postpartum	166	
Micali (2011)	UK	Longitudinal (5)	CCEI	18-weeks gestation; 32-weeks gestation; 8-weeks postpartum; 8-months postpartum	10887	
Molnar (2018)	Hungary	Cross-sectional (1)	STAI	0-12 months postpartum	125	
Moss (2009)	Australia	Longitudinal (4)	STAI-T	T1 mean = 34.45-weeks' gestation; T2 mean = 7-weeks postpartum; T3 mean = 26.55-weeks postpartum; T4 mean = 53.43-weeks postpartum	159	
Oddo-Sommerfeld (2016)	Germany	Longitudinal (2)	STADI	Third pregnancy trimester (mean gestation 30.15-weeks); 12-weeks postpartum	266	
Osborne (2019)	USA	Longitudinal (2)	SCID-IV; PASS; STAI	Pregnancy (multiple time points depending on time of recruitment); 6-9 weeks postpartum.	92	
Osnes (2019)	Norway	Longitudinal (3)	SCL-A; MINI-anxiety	17-weeks' gestation; 32-weeks' gestation; 8-weeks postpartum	1563	
Osnes (2020)	Norway	Longitudinal (2)	SCL-A	17-weeks' gestation; 9-weeks postpartum	530	
Reck (2009)	Germany	Longitudinal (6)	SCID; ASQ-15	2, 4, 6, 8, 10, 12-weeks postpartum	853	
Schwab-Reese (2017)	USA	Longitudinal (3)	DASS-21	postpartum hospital stay; 3-months postpartum; 6-months postpartum	97	
Schwab-Reese (2017)	USA	Longitudinal (3)	DASS-21	postpartum hospital stay; 3-months postpartum; 6-months postpartum	99	
Seymour (2014)	Australia	Cross-sectional (1)	DASS-21	0-12 months postpartum	223	
Tendais (2016)	Portugal	Longitudinal (5)	STAI-Y (state)	8-15 weeks gestation; 20-24 weeks gestation' 28-43 weeks gestation; postpartum hospital stay; 4 months postpartum	189 (couples)	
van der Zee-van den Berg (2021)	Netherlands	Longitudinal (3; anxiety data from one time point only)	STAI-6	3-weeks postpartum	1406	
Wenzel (2005)	USA	Cross-sectional (1)	SCID-NP; BAI; PSWQ	8 weeks postpartum (mean age of infant 60.8 days)	147	
Yelland (2010)	Australia	Cross-sectional (1)	DASS-21	6-months postpartum	4076	



Legend:

Multivariate association

Uni/bivariate association

Key: APA: Antepartum anxiety; BAI: Beck Anxiety Inventory; CCEI: Crown-Crisp Experiential Index; CIDI-V: Composite International Diagnostic Interview for Women; DASS: Depression Anxiety Stress Scale; EPDS: Edinburgh Postnatal Depression Scale; EPDS-A: Edinburgh Postnatal Depression Scale – Anxiety subscale; GAD-2/GAD-7: Generalised Anxiety Disorder Assessment (2- or 7-item version); HADS: Hospital Anxiety Depression Scale; MINI: Mini-International

Neuropsychiatric Interview; PASS: Perinatal Anxiety Screening Scale; PSAS: Postpartum Specific Anxiety Scale; SAS-RSF-C: Postpartum Specific Anxiety Scale – Research Short Form - Crisis; PSWQ: Penn State Worry Questionnaire; SCID: Structured Clinical Interview for DSM Disorders; SCL-ANX: Symptom Checklist-Anxiety; STADI: State-Trait Anxiety Depression Inventory; STAI: State-Trait Anxiety Inventory.

Effect modifiers (i.e., moderating and mediating factors identified in statistical modelling) are highlighted, and in the discussion, potentially 'modifiable' risk factors (i.e., factors susceptible to change during the perinatal period) are drawn out and considered as potential targets for intervention.

4.9. Reporting bias assessment

This review only reports on risk factors significantly associated with PPA using appropriate statistical methods. This approach deliberately overlooks non-significant findings, not only to maintain focus on the research aims but also due to a lack of clarity in the majority of papers around whether additional risk factors and correlates had been assessed but omitted from reports due to a lack of statistical significance (as is often the case with sociodemographic factors).

4.10. Certainty assessment

Certainty of evidence was based on risk of bias appraisals and consistency of findings. This information was collated as part of the core data extraction by one reviewer (KJ) and repeated on a subsample of 10 % of the included reports by a second reviewer (KF).

5. Results

5.1. Study selection

356 records were screened for prominent conflicts with inclusion criteria, resulting in 271 exclusions. 85 full-text reports were reviewed in greater depth for additional information, resulting in 39 reports for inclusion (Fig. 1).

5.2. Study characteristics

Table 2 provides a comprehensive overview of the data extracted from the studies. Of the 39 included reports, 11 used cross-sectional designs. The 28 longitudinal studies collected data between two and seven time points, with 19 beginning during pregnancy. Recruitment methods were not always reported, but where described, frequently occurred in clinical settings during routine perinatal appointments. Countries most frequently contributing evidence to the review were the USA ($n = 12$), Australia ($n = 6$), Germany ($n = 4$), and the UK (n = 4). Sample sizes ranged from 76 to 10,887 participants (mean = 1031; median = 262). The included literature was published between 2005 (the earliest identified reports) and 2021. Six studies used structured clinical interviews (including online administered tools) to report on clinical anxiety disorders, whilst the remaining studies used self-report tools to identify clinical anxiety symptom profiles as outcome measures. Two studies used only perinatal-specific measures (Ahmed et al., 2018; Harrison et al., 2021b), and a further two studies used both perinatal-specific and generalised anxiety outcome measures (Fallon et al., 2021; Osborne et al., 2019).

5.3. Risk of bias in studies

The risk of bias is illustrated in Table 4. Where studies were highlighted as not utilising a representative sample, they frequently did not capture the experiences of young, less-educated, low-income, single-parent families, and people who do not engage with health services. A lack of ethnic diversity was also repeatedly identified. No reports presented data on gender identity or sexual orientation. Similarly, data regarding health and/or disability status were rarely reported. Primiparous women were unintentionally over-represented (in comparison to the general population) in seven studies (Clout and Brown, 2015; George et al., 2013; Grant et al., 2012, Grant et al., 2008; Martini et al., 2015; Oddo-Sommerfeld et al., 2016; Osnes et al., 2019), and multiparous women in three (Aris-Meijer et al., 2019; Osnes et al., 2020; Wenzel et al., 2005). A small number of studies deliberately over-represented specific sub-populations, including people living with HIV (Aaron et al., 2015), people who experienced childhood sexual abuse (Akinbode et al., 2021), women at high risk for developing postpartum mood disorders (Grant et al., 2008), and low-income families with a high prevalence of psychological intimate partner violence (pIPV; Dawson et al., 2021). One study (Marques et al., 2018) only included participants with comorbid anxiety and depression. Longitudinal evidence was frequently influenced by attrition, and in some reports, missing data was excluded without reporting or accounting for potential differences in characteristics.

5.4. Results of individual studies

An overview of data from each included report, including the broad category of risk factors evidenced, is presented in Table 2 and discussed as part of the synthesised findings below.

5.5. Results of synthesis

We identified seven broad categories of risk factors significantly associated with PPA: *Psychopathology and personality; Social; Sociodemographic; Health; Cognitive; Pregnancy and birth;* and *Infant characteristics and postpartum experiences*, each including multiple descriptive sub-categories as presented in Table 4. These are described in turn, followed by a summary of the effect modifiers identified across the thematic categories.

5.5.1. Psychopathology and personality

Anxiety symptoms before, during, and in the early postpartum predicted later PPA in 16 studies (total $n = 13{,}358$; Aaron et al., 2015; Akinbode et al., 2021; Aris-Meijer et al., 2019; Bell et al., 2016; Britton, 2008; Clout and Brown, 2015; Dennis et al., 2017a; Fallon et al., 2021; Grant et al., 2008; Martini et al., 2015; Moss et al., 2009; Oddo-Sommerfeld et al., 2016; Osborne et al., 2019; Osnes et al., 2020, Osnes et al., 2019), and depression (before, during, and after pregnancy) was reported to predict PPA in 15 studies (total $n = 24{,}737$; (Ahmed et al., 2018; Aris-Meijer et al., 2019; Bell et al., 2016; Britton, 2008; Dennis et al., 2017a; Fallon et al., 2021; Martini et al., 2015; Micali et al., 2011; Moss et al., 2009; Oddo-Sommerfeld et al., 2016; Osborne et al., 2019; Osnes et al., 2020, Osnes et al., 2019; Reck et al., 2009; van der Zee-van den Berg et al., 2021). Most studies reporting psychopathology and personality factors presented medium- or high-quality evidence according to the risk of bias appraisals; however, results were not always consistent. One strong study collected data via clinical interview at seven time points from early pregnancy to sixteen months postpartum and found anxiety before pregnancy (measured retrospectively in early pregnancy), and anxiety and depression during pregnancy (measured using the CIDI-V at 22–24 weeks and 35–37 weeks pregnancy gestation) predicted PPA in their final sample of $n = 283$, while depression before pregnancy did not (Martini et al., 2015). Another longitudinal study of 530 people did find depression before pregnancy (measured retrospectively using the Lifetime Major Depression self-report scale based on DSM-IV criteria) predicted PPA (Osnes et al., 2020) and similar associations were found in other studies (Dennis et al., 2017a; Moss et al., 2009; Osnes et al., 2019).

Five studies (total $n = 8636$; Bell et al., 2016; Dennis et al., 2017a;

Table 3
Risk of bias appraisal.

First author (year)	Clearly defined inclusion criteria	Clearly described participants and setting	Representative sample	Valid and reliable measure of risk factor(s)	Objective, standardised criteria to measure PPA	PPA measured in a reliable and valid way	Confounding factors identified and appropriately managed	Prenatal baseline anxiety measured, or psychiatric history reported.	Appropriate statistical analysis	Longitudinal studies only: <20% attrition, or dropouts described and explained	Longitudinal studies only: Appropriate strategies to address missing data
Aaron (2015)											
Ahmed (2018)											
Akinbode (2021)											
Aris-Meijer (2019)											
Arnold (2020)											
Bell (2016)											
Britton (2008)											
Britton (2011)											
Clout (2015)											
Dawson (2021)											
Dennis (2017)											
Fallon (2021)											
Farr (2014)											
Fonseca (2018)											
George (2013)											
Grant (2008)											
Grant (2012)											
Harrison (2021)											
Hetherington (2018)											
Janevic (2021)											
Karukivi (2015)											
Marques (2018)											
Martini (2015)											
Matthies (2020)											
Micali (2011)											
Molnar (2018)											
Moss (2009)											
Oddo-Sommerfeld (2016)											
Osborne (2019)											
Osnes (2019)											
Osnes (2020)											
Reck (2009)											
Schwab-Reese (2017)											
Schwab-Reese (2017)											
Seymour (2014)											
Tendais(2016)											
van der Zee-van den Berg (2021)											
Wenzel (2005)											
Yelland (2010)											

Legend:

All criteria met, *some criteria met*, incomplete/unclear information, criteria not met, *N/A* = not applicable

Fonseca et al., 2018; Hetherington et al., 2018; Wenzel et al., 2005) reported other psychiatric diagnoses being associated with PPA; however, they were typically reported under the broad banner of 'psychiatric history'. Eating disorders (both before pregnancy and as measured at 18 weeks pregnancy gestation) were the only other diagnosis that received specific attention – reported to be associated with PPA in a longitudinal cohort study of 10,887 participants, considered at low risk of bias and confirmed to be representative of the local population at the time (Micali et al., 2011).

Personality characteristics were associated with PPA in four studies (total $n = 1460$; Arnold and Kalibatseva, 2020; Dennis et al., 2017a; Karukivi et al., 2015; Oddo-Sommerfeld et al., 2016). In a cross-sectional study of 596 participants in the USA, Arnold and Kalibatseva (2020) found the relationship between perfectionism and PPA was moderated by Perceived Social Support, although they acknowledged that their measure of perfectionism was not validated for use with perinatal populations and that it did not differentiate between adaptive and maladaptive perfectionism. In an earlier longitudinal study of 266 participants in Germany, Oddo-Sommerfeld et al. (2016) reported indirect effects of dysfunctional perfectionism and avoidant personality style (both measured in the third pregnancy trimester) on PPA via antepartum anxiety (APA) and antepartum depression (APD). They found dysfunctional perfectionism (disaggregating adaptive perfectionism by using a sum of two subscales) had a greater influence on PPA than avoidant personality style, although the two personality styles were highly correlated. Dennis et al. (2017a) also considered personality characteristics, reporting vulnerable personality measured at one week postpartum to be associated with sustained PPA (identified at one- and/or four-weeks and eight weeks postpartum) in their initial univariate analysis; however, it was not statistically significant in later multivariate modelling. Alexithymia present at 18–20 weeks pregnancy gestation was also found to highly correlate with PPA in a small study of 100 people (Karukivi et al., 2015); however, no significant relationship was found in regression analysis.

5.5.2. Social

Social factors were also frequently reported to predict PPA. Social support (including perceived social support, perceived need for social support, social provision, and social network size) was the most common (Table 3) investigated in 11 studies (total $n = 11,541$). Of these, nine reported significant associations in multivariate analyses (total $n = 10,962$; Arnold and Kalibatseva, 2020; Bell et al., 2016; Dennis et al., 2017a; Harrison et al., 2021b; Hetherington et al., 2018; Moss et al., 2009; Schwab-Reese et al., 2017b; Seymour et al., 2015; van der Zee-van den Berg et al., 2021). As well as cross-sectional studies reporting the relationship between concurrent social support and PPA (e.g., Arnold and Kalibatseva, 2020; Harrison et al., 2021b; Seymour et al., 2015), a predictive relationship was observed in longitudinal research. For example, Hetherington et al. (2018) found low social support at four months postpartum predicted PPA at twelve months, although attrition by twelve months may have influenced results. Dennis et al. (2017a) reported social support at one week postpartum (including support from a partner, mother-in-law, and other women with children) predicted sustained PPA (enduring from one week and/or four weeks to eight weeks postpartum), however, only partner support at one week postpartum was significant in multivariate modelling. Social support (measured concurrently with anxiety symptoms in cross-sectional research) was also reported to moderate the relationship between PPA and other risk factors. Harrison et al. (Harrison et al., 2021b) found that perceived social support from friends (not family or significant others) moderated the relationship between RNT and PPA, and Arnold and Kalibatseva (2020) reported the same measure moderated the relationship between perfectionism and PPA. Again, Arnold and Kalibatseva found that perceived social support from friends had the largest effect. Other studies (using different measures of social support) found partner support to be particularly important (Dennis et al., 2017a; van der Zee-van den Berg et al., 2021). Of these, one found a predictive relationship between partner social support at one week postpartum and sustained PPA measured at one- and four and/or eight weeks postpartum (Dennis et al., 2017a).

Relationship satisfaction (including perceived relationship quality) was associated with PPA in five studies (total $n = 1584$; Ahmed et al., 2018; Britton, 2008; Martini et al., 2015; Matthies et al., 2020; Seymour et al., 2015), with most evidence reported from correlational analyses. For example, Britton (2008) and Martini et al. (2015) both reported simple statistical relationships that were not significant in regression analysis. Therefore, further research is required to explore the nature of this relationship. Matthies et al. (2020) reported partnership satisfaction (and postpartum bonding, both measured during the third pregnancy trimester) mediated the relationship between maternal-foetal attachment and PPA in a complex path model, explaining 18.25 % of the variance in state anxiety and 30.5 % of the variance in trait anxiety in their sample. Although significant attrition may have influenced their results and the analysis did not account for psychiatric history or comorbid depression, making it difficult to fully discern drivers of risk.

An array of stressful life events was reported to be associated with PPA across nine studies (total $n = 18,072$; Ahmed et al., 2018; Aris-Meijer et al., 2019; Bell et al., 2016; Britton, 2008; Dennis et al., 2017a; Farr et al., 2014; Osnes et al., 2019; Schwab-Reese et al., 2017a; Yelland et al., 2010). These included specific stressors such as partner and financial-related stress (Farr et al., 2014) and family conflict (Aris-Meijer et al., 2019; Dennis et al., 2017a), as well as general measures of stressful life events before, during, and after pregnancy. Due to how stress was measured and reported, it was not possible to distinguish between psychological feelings of 'stress' and perceived or actual social and environmental stressors. However, it was notable that five studies found the risk of PPA increased in line with the number of stressful events and experiences reported (e.g., Ahmed et al., 2018; Bell et al., 2016; Dennis et al., 2017a; Farr et al., 2014; Yelland et al., 2010). In a study considered to be high quality, Britton (2008) explored stressful peripartum events by accessing medical records, along with data on stressful social life events measured prior to hospital discharge using the Inventory of Recent Life Events, as well as self-reported perceptions of the magnitude of perceived stress. Whilst all three stress factors correlated with PPA, only perceived stress significantly predicted PPA in linear and logistic regression analyses.

Abuse and victimisation predicted PPA in four studies (total $n = 4869$ Akinbode et al., 2021; Dawson et al., 2021; Hetherington et al., 2018; Osnes et al., 2019). Osnes (2019) found previous forced sexual activity predicted PPA at eight weeks postpartum in a longitudinal study of 1563 participants, whilst Akinbode et al. (2021) reported childhood sexual abuse predicted PPA in late pregnancy, and six- and 12-weeks postpartum; however, Akinbode et al. measured trait rather than state anxiety and their reporting made it difficult to assess study reliability and validity. Dawson et al. (2021) considered the impact of psychological intimate partner violence (pIPV) on PPA throughout the postpartum, albeit with a small sample of 76 participants, reporting mean levels of psychological pIPV (measured at each postpartum timepoint) predicted PPA at 3-, 6-, 12-, and 18-months postpartum amongst people exposed to moderate-to-high levels of gender discrimination. Finally, Hetherington et al. (2018) included adverse childhood experiences (ACEs), such as abuse and neglect, alongside other variables, such as a history of psychopathology, in their measure of prenatal cumulative mental health risk. Results from this large cohort study demonstrated that the risk of PPA at four- and twelve-months increased with the number of prenatal cumulative mental health risk factors, and this risk was significantly higher for people with low levels of social support. A further study found that retrospectively reported sub-optimal parenting (including items relating to neglectful parenting) in the first 16 years of life was associated with PPA (Grant et al., 2012). This study focused on parenting typology rather than asking specifically about abuse and, therefore, was not categorised within abuse and victimisation. However,

Table 4
Factors associated with Postpartum Anxiety in Europe, North America, and Australia (ordered by frequency of occurrence).

Risk or protective factor	Total studies (Total no. participants)	Bivariate associations (Total no. participants)	Multivariate association (Total no. participants)	Comments	References
Psychopathology and personality					
Anxious symptoms	16 (13,358)	1 (498)	15 (12,860)	Before and/or during pregnancy, or at an earlier postpartum time point	(Aaron et al., 2015; Akinbode et al., 2021; Aris-Meijer et al., 2019; Bell et al., 2016; Britton, 2008; Clout and Brown, 2015; Dennis et al., 2017a; Fallon et al., 2021; Grant et al., 2008; Martini et al., 2015; Moss et al., 2009; Oddo-Sommerfeld et al., 2016; Osborne et al., 2019; Osnes et al., 2020, Osnes et al., 2019)
Depressive symptoms	15 (24,737)		15 (24,737)	Before, during, and/or following pregnancy, including 'maternity blues'.	(Ahmed et al., 2018; Aris-Meijer et al., 2019; Bell et al., 2016; Britton, 2008; Dennis et al., 2017a; Fallon et al., 2021; Martini et al., 2015; Micali et al., 2011; Moss et al., 2009; Oddo-Sommerfeld et al., 2016; Osborne et al., 2019; Osnes et al., 2020, Osnes et al., 2019; Reck et al., 2009; van der Zee-van den Berg et al., 2021)
Other unspecified historic psychiatric difficulties	5 (8636)	2 (760)	4 (7876)	Historic and/or present	(Bell et al., 2016; Dennis et al., 2017a; Fonseca et al., 2018; Hetherington et al., 2018; Wenzel et al., 2005)
Personality characteristics	4 (1460)	2 (598)	2 (862)	Perfectionism, vulnerable personality, avoidant personality, and alexithymia	(Arnold and Kalibatseva, 2020; Dennis et al., 2017a; Karukivi et al., 2015; Oddo-Sommerfeld et al., 2016)
Eating disorder prior to childbirth	1 (10,887)		1 (10,887)		(Micali et al., 2011)
Family psychiatric history	1 (147)		1 (147)		(Wenzel et al., 2005)
Social					
Social network & support	11 (11,541)	2 (579)	9 (10,962)	Perceived social support, perceived need for social support, social provision, and social network size.	(Arnold and Kalibatseva, 2020; Bell et al., 2016; Britton, 2008; Dennis et al., 2017a; Harrison et al., 2021b; Hetherington et al., 2018; Martini et al., 2015; Moss et al., 2009; Schwab-Reese et al., 2017b; Seymour et al., 2015; van der Zee-van den Berg et al., 2021)
Stressful life events	9 (18,072)	2 (4865)	6 (13,207)	Perceived stress observed stressful life events, and social conflict.	(Ahmed et al., 2018; Aris-Meijer et al., 2019; Bell et al., 2016; Britton, 2008; Dennis et al., 2017a; Farr et al., 2014; Osnes et al., 2019; Schwab-Reese et al., 2017b; Yelland et al., 2010)
Relationship satisfaction	5 (1584)	3 (1194)	2 (390)	Relationship quality and satisfaction	(Ahmed et al., 2018; Aris-Meijer et al., 2019; Dennis et al., 2017a; Matthies et al., 2020; Seymour et al., 2015)
Abuse & victimisation	4 (4869)		4 (4869)	Past or present discrimination forced sexual activity, psychological Intimate Partner Violence, and childhood abuse or neglect.	(Akinbode et al., 2021; Dawson et al., 2021; Hetherington et al., 2018; Osnes et al., 2019)
Work environment	2 (595)	1 (498)	1 (97)		(Dennis et al., 2017a; Schwab-Reese et al., 2017a)
Sub-optimal parenting in childhood	1 (88)		1 (88)	Over-protection and low care.	(Grant et al., 2012)
Socio-demographic					
Income	6 (9877)	2 (560)	4 (9117)	Including difficulty managing current income	(Ahmed et al., 2018; Akinbode et al., 2021; Dennis et al., 2017a; Farr et al., 2014; Fonseca et al., 2018; Yelland et al., 2010)
Education	5 (2385)		5 (2385)		(Akinbode et al., 2021; Britton, 2008; Martini et al., 2015; Seymour et al., 2015; van der Zee-van den Berg et al., 2021)
Age	3 (1074)	1 (615)	2 (459)		(Ahmed et al., 2018; Akinbode et al., 2021; Martini et al., 2015)
Immigration status	2 (4574)	1 (498)	1 (4076)		(Dennis et al., 2017a; Yelland et al., 2010)
Employment status	2 (877)	2 (877)			(Ahmed et al., 2018; Fonseca et al., 2018)
Relationship status	2 (791)	1 (615)	1 (176)		(Ahmed et al., 2018; Akinbode et al., 2021)
Unsuitable housing	1 (498)	1 (498)			(Dennis et al., 2017a)
Race	1 (176)		1 (176)		(Akinbode et al., 2021)
Health					
Physical health problems	5 (8440)	2 (781)	3 (7659)	Specific problems and general health-related stress	(Aris-Meijer et al., 2019; Dennis et al., 2017a; Farr et al., 2014; Martini et al., 2015; van der Zee-van den Berg et al., 2021)

(*continued on next page*)

Table 4 (*continued*)

Risk or protective factor	Total studies (Total no. participants)	Bivariate associations (Total no. participants)	Multivariate association (Total no. participants)	Comments	References
Sleep Quality	5 (2568)	1 (159)	4 (2409)	Including insomnia	(Moss et al., 2009; Osborne et al., 2019; Osnes et al., 2020, Osnes et al., 2019; Seymour et al., 2015)
Smoking	2 (4865)	1 (615)	1 (4250)		(Ahmed et al., 2018)
Allopregnanolone	1 (92)		1 (92)		(Osborne et al., 2019)
Cognitive					
Self-appraisals	5 (3097)	3 (1077)	3 (2518)	Parenting and general self-esteem, self-efficacy, and mastery	(Britton, 2008; Dennis et al., 2017a; Fallon et al., 2021; Martini et al., 2015; van der Zee-van den Berg et al., 2021)
Cognitive regulation strategies	3 (963)		3 (963)	Repetitive Negative Thinking experiential avoidance, and emotional regulation	(Fonseca et al., 2018; Harrison et al., 2021b; Marques et al., 2018)
Early cognitive development	2 (575)		2 (575)	Attachment-related avoidance, attachment-related anxiety, and early maladaptive schemas	(Marques et al., 2018; Molnar et al., 2018)
Dysfunctional beliefs towards motherhood	1 (262)		1 (262)		(Fonseca et al., 2018)
Coping strategies	1 (173)	1 (173)			(George et al., 2013)
Pregnancy and Birth					
Mode of delivery	3 (4638)		3 (4638)		(Clout and Brown, 2015; Farr et al., 2014; Martini et al., 2015)
Perception of birth	2 (4919)		2 (4919)	Satisfaction and perception of the birth	(Bell et al., 2016; Janevic et al., 2021)
Parity	2 (4782)	1 (100)	1 (4682)		(Bell et al., 2016)
Premature delivery	1 (4250)		1 (4250)		(Farr et al., 2014)
Planned pregnancy	1 (615)	1 (615)			(Ahmed et al., 2018)
Coping with pregnancy	1 (498)	1 (498)		Mother and partner's coping	(Dennis et al., 2017a)
Infertility treatment	1 (189)		1 (189)		(Tendais and Figueiredo, 2016)
Maternal-foetal attachment	1 (166)		1 (166)		(Matthies et al., 2020)
Infant characteristics and postpartum experiences					
Infant behaviour	3 (1926)		3 (1926)	Including infant temperament and excessive infant crying	(Britton, 2011; Seymour et al., 2015; van der Zee-van den Berg et al., 2021)
Infant health	2 (4355)	1 (4250)	1 (105)	Including infant hospital admissions	(Clout and Brown, 2015; Farr et al., 2014)
Infant age	2 (876)	1 (262)	1 (614)		(Fallon et al., 2021; Fonseca et al., 2018)
Perception of first postpartum week	1 (1406)		1 (1406)		(van der Zee-van den Berg et al., 2021)
Postpartum bonding	1 (166)		1 (166)		(Matthies et al., 2020)

this presents a further example of the enduring risk posed by adverse early social experiences. Grant et al. (2012) found suboptimal parenting in childhood (measured retrospectively) predicted PPA, with women who had experienced over-protection and low care (affectionless control) from their parents during childhood reporting higher levels of PPA on self-report measures. However, the relationship between parenting and DSM-IV anxiety was not significant, illustrating the influence different anxiety measures can have.

Two longitudinal studies report a relationship between work social environment and PPA (total $n = 595$; Dennis et al., 2017a; Schwab-Reese et al., 2017a). In a logistic regression model adjusted for prior mental health and the number of children, Schwab-Reese et al. (2017a) found both co-worker social environment and supervisor social environment were associated with PPA measured concurrently at 6 months postpartum in a small, predominantly multiparous sample. Similarly, Dennis et al. (2017a) reported the extent to which the boss/work environment was supportive of pregnancy (measured retrospectively at one week postpartum was associated with later PPA in univariate analysis; however, this was not significant in multivariate modelling.

5.5.3. Sociodemographic

Income was associated with PPA in six studies (total $n = 9877$; Ahmed et al., 2018; Akinbode et al., 2021; Dennis et al., 2017a; Farr et al., 2014; Fonseca et al., 2018; Yelland et al., 2010), and education in five (total $n = 2385$; Akinbode et al., 2021; Britton, 2008; Martini et al., 2015; Seymour et al., 2015; van der Zee-van den Berg et al., 2021). Less frequently reported sociodemographic factors included age (total $n = 1074$; Ahmed et al., 2018; Akinbode et al., 2021; Martini et al., 2015), immigration status (total $n = 4574$; Dennis et al., 2017a; Yelland et al., 2010), employment status (total $n = 877$; Ahmed et al., 2018; Fonseca et al., 2018), relationship status (total $n = 791$; Ahmed et al., 2018; Akinbode et al., 2021), and race ($n = 176$; Akinbode et al., 2021). Many of these studies suffered from a lack of participant diversity, limiting the application of findings, although there was good statistical evidence regarding low education level as a predictor of PPA in a model also including history of depressed mood, trait anxiety, and perceived perinatal stress as risk factors (Britton, 2008).

5.5.4. Health

Physical health problems were associated with PPA in five studies (total $n = 8440$; Aris-Meijer et al., 2019; Dennis et al., 2017a; Farr et al., 2014; Martini et al., 2015; van der Zee-van den Berg et al., 2021). These included broad measures of health and sickness (e.g., Aris-Meijer et al., 2019; Dennis et al., 2017a; van der Zee-van den Berg et al., 2021) and specific health challenges. Farr et al. (2014) reported women experiencing PPA were more likely to have pre-existing diabetes, whilst Martini et al. (2015) found premenstrual syndrome before pregnancy (reported during pregnancy) predicted PPA.

Sleep quality (including insomnia) was also associated with PPA in five studies (total $n = 2568$; Moss et al., 2009; Osborne et al., 2019; Osnes et al., 2020, Osnes et al., 2019; Seymour et al., 2015). Two studies measured insomnia during pregnancy (Osnes et al., 2020, Osnes et al.,

2019) and three studies used the Pittsburgh Sleep Quality Index (PSQI) to measure sleep quality (one as a predictive measure collected in pregnancy (Moss et al., 2009), all finding significant relationships with PPA. There were some concerns with attrition and the final samples not being representative of the wider population; nonetheless, this research from Australia, Europe, and North America combines to provide strong evidence of a relationship between sleep and PPA.

Smoking was associated with PPA in two studies (total $n = 4865$; Ahmed et al., 2018; Farr et al., 2014). For example, Farr et al. (2014) found women reporting PPA symptoms were more likely to be current smokers in their population-based single-point-in-time self-report survey of 4250 people.

5.5.5. Cognitive

Self-appraisals, including parenting and general self-esteem, self-efficacy, and mastery, were associated with PPA in five studies (total $n = 3097$; Britton, 2008; Dennis et al., 2017a; Fallon et al., 2021; Martini et al., 2015; van der Zee-van den Berg et al., 2021). Self-efficacy was investigated in all five studies Britton, 2008; Dennis et al., 2017a; Fallon et al., 2021; Martini et al., 2015; van der Zee-van den Berg et al., 2021), each using different measures to consider slightly different aspects of self-efficacy. Breastfeeding self-efficacy measured at one week postpartum (Dennis et al., 2017a), general self-efficacy measured at 35–37 weeks pregnancy gestation (Martini et al., 2015), and mastery reported prior to hospital discharge (Britton, 2008) were all significantly associated with later PPA in simple bivariate analyses; however, they failed to reach significance in multivariate models. van der Zee-van den Berg et al. (2021) explored maternal self-efficacy alongside a battery of other measures and found low levels of maternal self-efficacy (measured concurrently with anxiety) to be the greatest predictor of PPA in a multivariate logistic regression analysis (OR 10.0 [6.21–16.2], $n = 1406$), whilst Fallon et al. (2021) found a change in parenting competence during the COVID-19 pandemic predicted PPA in their multivariate analysis.

The only self-appraisal factor measured using the same tool in more than one study was self-esteem. Martini et al. (2015) found a correlation between self-esteem in late pregnancy and PPA, whilst Dennis et al., 2017a reported low self-esteem at four weeks postpartum predicted sustained PPA (above-threshold anxiety scores at one week, and/or four weeks, and eight weeks postpartum). This was significant after controlling for sociodemographic variables, parity, and specific stressors, but not when depressive symptoms were added to the model.

Cognitive regulation strategies were reported in three cross-sectional studies, all of which conducted comprehensive multi-level analyses (Fonseca et al., 2018; Harrison et al., 2021b; Marques et al., 2018). Each report focused on a different cognitive strategy or response. For example, Harrison et al. (Harrison et al., 2021b) found a significant relationship between RNT (which includes rumination) and PPA that was moderated by perceived social support from friends, whilst Fonseca et al. (2018) reported experiential avoidance to predict PPA and discussed rumination as one such mechanism of experiential avoidance. Fonseca, et al. also explored dysfunctional beliefs towards motherhood, reporting a significant relationship between dysfunctional beliefs and PPA occurring via experiential avoidance. Specifically, dysfunctional beliefs regarding maternal responsibility and other people's judgements were associated with experiential avoidance, which in turn increased PPA.

There was some overlap between cognitive regulation strategies and responses associated with early cognitive development (i.e., attachment representations and maladaptive schemas). Marques et al. (2018) found emotional regulation difficulties mediated the relationship between both attachment-related anxiety and attachment-related avoidance and PPA in their cross-sectional study, although their sample only included people with comorbid anxiety and depression. Their findings also resonated with the research around self-appraisals, as insecure attachment representations are known to affect self-representations and present as low self-worth (Marques et al., 2018; Mikulincer and Shaver, 2012).

Further parallels can be seen in George et al.'s (2013) study that reported dysfunctional coping strategies measured in pregnancy and postpartum were associated with PPA. Their study suffered from significant attrition, over-represented primiparous women, and would have benefitted from more complex statistical modelling; nonetheless, taken together with other literature in this category, it adds weight to the role of cognitive factors in predicting and/or maintaining PPA.

5.5.6. Pregnancy and birth

Though several pregnancy and birth experiences were associated with PPA, only two (mode of delivery and perception of birth) were reported in multiple studies.

Mode of delivery was associated with PPA in three studies (total $n = 4638$; Clout and Brown, 2015; Farr et al., 2014; Martini et al., 2015). Clout and Brown (2015) found caesarean birth was significantly associated with PPA in their longitudinal study; however, this did not reach significance when controlling for antenatal distress in multivariable regression analysis. Farr et al.'s (2014) findings from their large cross-sectional study reinforced the association between caesarean birth and PPA. Martini et al. (2015) also reported mode of delivery (caesarean section vs. vaginal delivery) predicted PPA; however, this was based on a very small subsample that reported relevant data., Farr et al. (2014) also found premature delivery predicted PPA in their study which benefitted from a large sample ($n = 4250$) and consideration of a vast array of variables. Perception of birth also predicted PPA in two studies (total $n = 4919$; Bell et al., 2016; Janevic et al., 2021). This included both birth satisfaction (measured concurrently with anxiety in a cross-sectional study (Janevic et al., 2021) and perception of the birth measured at 8-weeks postpartum (Bell et al., 2016), the latter being associated with increased PPA at two- and eight-months postpartum in a large cohort study(Bell et al., 2016).

Pregnancy-related factors associated with PPA included parity (Bell et al., 2016; Grant et al., 2008), whether pregnancy was planned (Ahmed et al., 2018), mothers and/or fathers coping with pregnancy (measured at one week postpartum; (Dennis et al., 2017a), and infertility treatment resulting in twins (Tendais and Figueiredo, 2016).

5.5.7. Infant characteristics and postpartum experiences

Infant behaviour was associated with PPA in three studies ($n = 1926$; Britton, 2011; Seymour et al., 2015; van der Zee-van den Berg et al., 2021). This included difficult child behaviour (Seymour et al., 2015), infant crying perceived to be excessive ((van der Zee-van den Berg et al., 2021), and infant temperament (Britton, 2011), all measured concurrently with anxiety symptoms. The latter predicted PPA (state anxiety measured using the STAI-S) after controlling for trait anxiety (STAI-T) measured before hospital discharge, education, depressive history, and perceived perinatal stress (Britton, 2011). Two studies reported infant health to be associated with PPA (total $n = 4355$; Clout and Brown, 2015; Farr et al., 2014); for example, in their cross-sectional study, Farr et al. (2014) found higher rates of PPA amongst women whose infants stayed in the hospital for >14 days. However, this finding was not significant in a multivariate model. Similarly, Clout and Brown (2015) found that the child's health at the time of data collection (4–6 months postpartum) predicted PPA in a regression model, but the findings were not significant after adding antenatal distress (measured during pregnancy) to the model. Two cross-sectional studies (Fallon et al., 2021; Fonseca et al., 2018) also found older infant age (at the time of data collection) was associated with an increased risk of PPA.

The perception of the first week following childbirth was associated with PPA in a study simultaneously exploring an array of risk factors (van der Zee-van den Berg et al., 2021); however, this factor was the result of a single question capturing the perception of negative experiences (yes/no). Finally, Matthies et al. (2020) found the relationship between maternal-foetal attachment assessed during pregnancy, and

PPA was mediated by postpartum bonding measured both at one week and four months postpartum (as well as partnership satisfaction reported during pregnancy), whilst direct effects of maternal-foetal attachment were not significant.

5.5.8. Effect modifiers

Several studies included in this review broke down the relationships between risk factors to consider both mediating and moderating factors. Although there is not enough evidence to confirm the effects, these factors are highlighted as possible targets for further research aimed at developing future interventions to mitigate the risk of PPA.

The most promising effect modifier identified in the present review was social support, reported by both Harrison et al. (2021b) and Arnold and Kalibatseva (2020). These findings were based on cross-sectional data, so are limited in their ability to establish cause and effect; however, the importance of social support is reinforced by a further nine other studies (Bell et al., 2016; Britton, 2008; Dennis et al., 2017a; Hetherington et al., 2018; Martini et al., 2015; Moss et al., 2009; Schwab-Reese et al., 2017b; Seymour et al., 2015; van der Zee-van den Berg et al., 2021) that reported a direct association between low levels of social support (including social network size) and PPA, albeit measuring slightly different constructs of social support. Hetherington et al. (2018) produced log-binomial models of the longitudinal relationship between social support, cumulative mental health risk, and PPA, which were strengthened by their separation of risk factors and outcome measurements over time. Their results demonstrated the protective influence of social support, which provided the greatest benefit to those with the highest mental health risk. Emotional and informational support had the greatest effect, although they found all types of social support to be important, whilst the two earlier mentioned cross-sectional studies (which used the MSPSS to breakdown support by source rather than type) identified social support from friends as superior to social support from family or significant others in moderating risk of PPA (Arnold and Kalibatseva, 2020; Harrison et al., 2021b).

Another social/environmental modifier of effect was gender discrimination measured at 6, 12, and 18 months postpartum, and found to moderate the relationship between pIPV and PPA (Dawson et al., 2021), again revealing the potential to mitigate the effects of some of the more challenging risk factors by modifying the social environment.

This review also identified several mediating factors underlying the relationship between risk factors. These included antepartum anxiety and depression (mediating the relationships between both dysfunctional perfectionism and avoidant personality styles and PPA; Oddo-Sommerfeld et al., 2016), emotional regulation difficulties (mediating the relationship between attachment representations and PPA measured concurrently; Marques et al., 2018), experiential avoidance (mediating the relationship between dysfunctional beliefs towards motherhood and PPA; Fonseca et al., 2018), postpartum bonding and partnership satisfaction (both mediating the role between maternal-foetal attachment and PPA; Matthies et al., 2020).

6. Discussion

This review systematically reports on the range of factors associated with increased risk of PPA in Australia, Europe, and North America, with a narrative synthesis revealing seven broad categories of risk: *psychopathology and personality, social, sociodemographic, health, cognitive, pregnancy and birth;* and *infant characteristics and postpartum experiences.* It extends previous reviews by capturing the surge of literature recently published on PPA. Of the 39 included reports, 20 (51 %) were published since the last review was conducted in 2017. Furthermore, the majority of reports presenting potentially modifiable cognitive and social factors (i.e., factors that may be responsive to intervention during the perinatal period) were published since the last review. This is important, given the opportunity to reduce the cumulative risk of PPA by addressing modifiable factors during perinatal primary care.

Reiterating findings from previous reviews (e.g., Field, 2018; Goodman et al., 2016), anxiety before and during pregnancy was strongly associated with PPA, and APA was also reported to moderate the relationship between other variables and PPA. Strong evidence of the relationship between depression before, during, and after pregnancy and PPA was again identified, which is unsurprising given the well-documented comorbidity of perinatal anxiety and depression (Falah-Hassani et al., 2017). Health care professionals (HCPs) should be mindful of this relationship when a history of depressive symptoms is identified. This strong body of evidence, alongside several reports demonstrating the relationship between other psychopathological factors and PPA (recorded in Table 3), continues to suggest that screening for historical and concurrent mental health difficulties is essential when seeking to identify the people most vulnerable to PPA.

6.1. Modifiable risk factors

To efficiently guide the development of targeted interventions that may reduce the prevalence and severity of PPA, attention is drawn to modifiable risk factors during the perinatal period.

This review synthesises a wealth of literature reaffirming social support's influence on postpartum psychological wellbeing – a valuable finding given the relative ease and low cost of establishing community-based social support initiatives. The reviewed quantitative findings sit alongside qualitative evidence that adds depth to our understanding of the importance of social support in various forms, most notably peer support (Coates et al., 2015; Harrison et al., 2020). For example, Harrison et al. (2020) found mothers experienced significant relief through exchanging motherhood stories with peers, as this allowed unrealistic ideals to be challenged, leading to the realisation that they were not abnormal, inadequate, or alone in their experience. This may explain why, in the present review, social support from friends was of greater value than support from family or a significant other (Harrison et al., 2021b).

Hetherington et al. (2018) reported that enhancing social support may be particularly effective in modifying the cumulative risk of PPA posed by a history of psychopathology and/or adverse childhood experiences and prove a cost-effective strategy for preventative intervention. Whilst they found all forms of support were important, emotional and informational support were found most effective in reducing the risk of PPA at both four months and one year postpartum. The authors concluded that incorporating emotional and informational support into interventions that also encourage strong social networks and more tangible support (such as practical assistance with the infant) could prove particularly effective for people with a high risk of developing PPA. This finding is reinforced by qualitative literature that describes a need to encourage families to develop realistic expectations of the perinatal period via social support and credible parenting education, including accurate, evidence-based information (Harrison et al., 2020; Jones et al., 2022; Law et al., 2018). (2020) Universally accessible, comprehensive, and credible antenatal and early postpartum parenting psychoeducation may help to reduce the cumulative risk of PPA in the general perinatal population whilst including social and emotional support may be particularly beneficial to people who have more enduring or difficult-to-modify risk profiles. Further research around such preventative and supportive interventions is warranted.

It is not uncommon for women to hold unrealistic expectations about motherhood, a concern that has been frequently associated with psychological distress in the qualitative literature (Coates et al., 2014; Djafarova and Trofimenko, 2017; Harrison et al., 2020; Law et al., 2018; Wardrop and Popadiuk, 2013). Indeed, dysfunctional beliefs about motherhood were found in the present review to predict PPA (Fonseca et al., 2018), and negative self-appraisals (including general and parenting-specific self-efficacy and self-esteem) was the most frequently reported modifiable cognitive risk factor in our analysis. Most self-efficacy measures related directly to mothering, such as low maternal

self-efficacy (van der Zee-van den Berg et al., 2021), breastfeeding self-efficacy (Dennis et al., 2017a), and parenting self-confidence (Fallon et al., 2021). van der Zee-van den Berg et al. (2021) found low maternal self-efficacy was a strong predictor of PPA, with a high odds ratio compared to other risk factors. Their comprehensive model, including self-efficacy, low support from the partner, negative experience of the first week postpartum, poor health of the mother, and infant crying perceived to be excessive, was powerful in predicting PPA (van der Zee-van den Berg et al., 2021). Similarly, Dennis et al. (2017a) found self-esteem, partner social support, perceived stress at one week postpartum, and childcare stress at four weeks postpartum combined to explain 42 % of the variance in sustained PPA. While self-esteem became non-significant when depressive symptoms were added to the model, this may simply be due to the overlap of shared features between low self-esteem and depressive symptoms. These findings demonstrate the combined influence of cognitive, social, and psychological risk factors, reinforcing the need to establish a comprehensive model of PPA risk rather than viewing individual risk factors in isolation, particularly when exploring potential intervention strategies.

Another modifiable cognitive risk factor identified was repetitive negative thinking (RNT). RNT is a transdiagnostic process, including perseverative, abstract thought in various forms, such as rumination about the past and worry about the future. It is evident across psychological disorders, including perinatal anxiety and depression (Moulds et al., 2022), and worthy of particular attention, as rumination may be a mechanism in the transmission of psychopathology from mother to child (Stein et al., 2012, Stein et al., 2009). However, not all worry is problematic in the perinatal period – indeed, some may be considered adaptive and beneficial to early parenthood. To avoid over-pathologizing appropriate perinatal responses, further longitudinal research is required to understand how people adjust during the postpartum period, reveal the relationship between RNT and PPA over time, and understand when, why, and for whom perinatal worry becomes a matter of concern requiring intervention.

During the COVID-19 pandemic, Harrison et al. (2021b) found the relationship between RNT and PPA was moderated by perceived social support from friends (not family or significant others). They proposed that a reduction in perceived social support during the pandemic (because of lockdown restrictions) may have given rise to persistent RNT, which may have contributed to the increase in PPA at this time. Rumination often occurs and is maintained when there is a discrepancy between an idealised or desired state and one's actual experience (Martin and Tesser, 1996) which returns to the problem of unrealistic mothering ideals and a need for greater parenting- and psychoeducation during the perinatal period. Fonseca et al. (2018) reported a significant relationship between dysfunctional beliefs towards motherhood and PPA occurring via increased rates of experiential avoidance. They suggested rumination may be one experiential avoidance strategy that controls repetitive negative thoughts and feelings. Harrison et al. (2021b) proposed that peer support may prove to be a cost-effective method of reducing perinatal RNT and, ultimately, PPA. Further research is needed to explore the content and context of RNT, experiential avoidance, and other dysfunctional cognitive strategies, and investigate the potential for social/peer support to reduce these cognitive vulnerabilities in practice.

Whilst many health-related risk factors for PPA may be considered beyond control or difficult to change within the perinatal period, there may be some opportunities to address these factors. For example, the NHS strategic plan 'Saving Babies Lives' includes actions to reduce smoking during pregnancy (*Saving Babies' Lives Version Two A Care Bundle for Reducing Perinatal Mortality*, 2019). Furthermore, psychoeducation and/or psychological interventions may reduce the effect of sleep difficulties often viewed as inevitable with a young infant (Ladyman et al., 2022).

Although further research is required to identify the optimum time points for assessing and addressing modifiable vulnerabilities, longitudinal research has already demonstrated associations between some modifiable risk factors observed in late pregnancy or early postpartum and later PPA, suggesting the potential to reduce the long-term severity of PPA via early interventions. For example, addressing sleep difficulties during pregnancy may reduce the risk of anxiety following childbirth (Moss et al., 2009; Osnes et al., 2020, Osnes et al., 2019) whilst support to overcome negative self-appraisals during pregnancy and early postpartum may reduce the risk of later PPA (Dennis et al., 2017a; Martini et al., 2015; van der Zee-van den Berg et al., 2021). New longitudinal research to explore the relationship between RNT, dysfunctional beliefs, and PPA is warranted given the relationships identified in cross-sectional studies (Fonseca et al., 2018; Harrison et al., 2021b), as is further exploration of the role social support plays over time.

6.2. Chronic vulnerabilities

This review highlighted a range of psychological, social, and sociodemographic risk factors that may be considered persistent, unpredictable, or particularly slow to change during the perinatal period. These chronic risk factors include comorbid or historic mental illness, stressful life events, past abuse and victimisation, immigration status, and low income or education levels. Such factors are often difficult to change without significant investment which is not available in most public health and social care systems. Indeed, some of these factors require system-level change that would take many years to have an impact. Nonetheless, identifying such vulnerabilities early in the perinatal journey (possible as many are already routinely disclosed to HCPs when registering a pregnancy) provides the opportunity to review individuals' risk profiles, closely monitor their emotional wellbeing, and provide timely intervention if required.

Many chronic vulnerabilities associated with PPA, such as low maternal age, income, and education, immigration status, poor physical health, and unplanned pregnancy, commonly cluster around social disadvantage and, therefore, should also be considered by policymakers and commissioners reviewing long-term local and national public health strategies. This review revealed a lack of demographic diversity in the available literature, in particular relating to low-income and less-educated people, single-parent households, Black, Asian, and Minoritised Ethnic groups, LGBTQ+ families, and those living with a long-term chronic health difficulty or disability. To fully understand and protect against multiple social disadvantages as a risk factor for PPA, future research should pay particular attention to diversity and inclusion, ensuring research methods are appropriate, applicable, and accessible to these seldom-included communities.

In the UK and nations with comparable public health systems, pregnancy and birth-related risk factors might be monitored during routine antenatal and postpartum midwifery and obstetric appointments. For example, additional information and support could be offered to people who have had difficult fertility, pregnancy, or birth experiences, and maternal-foetal attachment could be monitored during routine perinatal care. Risk factors relating to infant characteristics and postpartum experiences could be addressed at a community level via additional information, support, and wellbeing checks to families experiencing significant ill health in their infant, and challenges around infant behaviour, temperament, and bonding could be supported.

6.3. Strengths and limitations

This review is strengthened by its use of PRISMA (Page et al., 2021) and SWiM (Campbell et al., 2020) guidelines, reliability checks from multiple reviewers in Europe and Australia, and in-depth risk of bias assessment. Although heterogeneity in the constructs measured, the responsiveness of tools used, and the timing of data collection across the included literature meant that data were not suited to meta-analysis, the inclusion of research investigating both self-reported symptoms of PPA

and clinically diagnosed anxiety disorders was a significant strength of this review, allowing for consideration of both clinically diagnosed PPA and subclinical PPA symptoms. This is important given that identifying and supporting mild-to-moderate PMH difficulties is recommended in the UK and similar nations (*Antenatal and Postnatal Mental Health: Clinical Management and Service Guidance Clinical Guideline,* 2014). Furthermore, the variance inherent in self-report measures may make them more sensitive to identifying relationships between factors than categorical DSM-IV diagnostic data. The inability to pool evidence to conclude effects across multiple studies limits the potential to apply findings in practice, although some recommendations may be considered tentatively. Importantly, findings from this synthesis without meta-analysis provides a firm basis from which to develop further research.

The discussion highlights new information about modifiable social and cognitive factors associated with PPA, outlining evidence which may guide research to support the development of cost-effective targeted interventions. The geographical restrictions on the included reports, while ensuring evidence is contextually appropriate (within Australia, Europe, and North America), limit the application of findings beyond these regions and potentially overlook some internationally relevant evidence. The review also excluded studies focused entirely on special populations (e.g., hospital inpatients) unless results were presented alongside a general postpartum population comparison group. As a result, some risk factors specific to certain populations may have been overlooked.

Poor demographic diversity in the literature may limit generalisability across sub-populations, as low-income and less educated people, single-parent households, Black, Asian, and Minoritised Ethnic groups, LGBTQ+ families, and those living with long-term chronic health difficulties or disabilities were under-represented in this review. Methodological differences across the included reports may also result in differences in how PPA risk evolves. For example, 15 of the 39 studies did not include any data collected beyond four months postpartum, potentially overlooking an array of experiences that only become relevant later in the postpartum year. Most studies also failed to consider potential differences between transient anxiety symptoms, which may be common in the first month following childbirth, and more enduring PPA, lasting throughout the year following birth.

7. Conclusions

This review reinforces the notion that multiple factors combine to increase the risk of PPA (Biaggi and Pariante, 2020). Findings provide a strong body of evidence to confirm the relationship between psychopathologies before and during pregnancy and PPA, as well as the importance of social support as a mitigating factor. This revew also draws together sufficient evidence to suggest the role of stressful life events, relationship difficulties, abuse and victimisation, income, education, physical health, sleep quality, and self-appraisals on the development of PPA, as well as presenting several emerging risk factors, including cognitive regulation strategies and various childbirth-related experiences. Whilst it is important to consider the chronic (i.e., historic, persistent, or difficult-to-modify) factors associated with PPA (e.g., income, immigration status, mental and physical health difficulties), increasing understanding of cognitive and social factors that are amenable to change during the perinatal period may have greater benefits in practice. Improving understanding of transdiagnostic mechanisms thought to underly many experiences of PPA may also help clinicians to identify mild-to-moderate symptoms often missed during routine screening.

Though this review focuses on quantitative evidence, the discussed parallels in qualitative findings reinforce the need to extend understanding of the content of motherhood-related dysfunctional beliefs, expectations, and RNT, and identify experiences that may trigger the progression of symptoms. To better understand the nature and direction of the relationships between modifiable and chronic risk factors, longitudinal research should simultaneously explore multiple factors, ensuring sufficient participant diversity to consider the implications of multiple deprivation and disadvantages. Potential differences between transient early PPA and PPA enduring long into the postpartum period should be investigated, whilst greater consistency in the standardised measures used to investigate PPA and the associated factors would be beneficial and facilitate meta-analysis.

Although gaps in knowledge remain, this systematic review points to the importance of social support during the postpartum period. Therefore, peer support should be made available to people presenting with heightened vulnerability to anxiety during the perinatal period. Developing peer support strategies which specifically address the cognitive vulnerabilities to PPA (e.g., dysfunctional beliefs towards motherhood and parenting-related confidence) and adapting these to support the unique needs of vulnerable populations (e.g., those experiencing socioeconomic disadvantage) could prove particularly beneficial. Recognising the complex cumulative nature of PPA risk, future research, intervention, and policy development should draw upon the evidence presented here and work with under-represented communities to identify multi-pronged, accessible, and targeted support strategies that maximise impact in the most at-risk populations.

CRediT authorship contribution statement

Katie Jones: Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Kelda Folliard:** Writing – review & editing, Validation, Investigation. **Gina Di Malta:** Writing – review & editing, Validation, Supervision, Methodology. **John Oates:** Writing – review & editing, Validation, Supervision, Methodology. **Leah Gilbert:** Writing – review & editing, Validation, Investigation. **Virginia Harrison:** Writing – review & editing, Validation, Supervision, Methodology.

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Declaration of competing interest

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References

Aaron, E., Bonacquisti, A., Geller, P.A., Polansky, M., 2015. Perinatal depression and anxiety in women with and without human immunodeficiency virus infection. Womens Health Issues 25, 579–585. https://doi.org/10.1016/j.whi.2015.04.003.

Ahmed, A., Feng, C., Bowen, A., Muhajarine, N., 2018. Latent trajectory groups of perinatal depressive and anxiety symptoms from pregnancy to early postpartum and their antenatal risk factors. Arch. Womens Ment. Health 21, 689–698. https://doi.org/10.1007/s00737-018-0845-y.

Akinbode, T.D., Pedersen, C., Lara-Cinisomo, S., 2021. The price of pre-adolescent abuse: effects of sexual abuse on perinatal depression and anxiety. Matern. Child Health J. 25, 1083–1093. https://doi.org/10.1007/s10995-020-03088-x.

Antenatal and Postnatal Mental Health: Clinical Management and Service Guidance Clinical Guideline, 2014.

Aris-Meijer, J., Bockting, C., Stolk, R., Verbeek, T., Beijers, C., van Pampus, M., Burger, H., 2019. What if pregnancy is not seventh heaven? The influence of specific life events during pregnancy and delivery on the transition of antenatal into postpartum anxiety and depression. Int. J. Environ. Res. Public Health 16. https://doi.org/10.3390/ijerph16162851.

Arnold, M., Kalibatseva, Z., 2020. Are "superwomen" without social support at risk for postpartum depression and anxiety? Women Health. https://doi.org/10.1080/03630242.2020.1844360.
Bauer, A., Knapp, M., Parsonage, M., 2016. Lifetime costs of perinatal anxiety and depression. J. Affect. Disord. 192, 83–90. https://doi.org/10.1016/j.jad.2015.12.005.
Bayrampour, H., Vinturache, A., Hetherington, E., Lorenzetti, D.L., Tough, S., 2018. Risk factors for antenatal anxiety: a systematic review of the literature. J. Reprod. Infant Psychol. 36, 476–503. https://doi.org/10.1080/02646838.2018.1492097.
Bell, A.F., Carter, C.S., Davis, J.M., Golding, J., Adejumo, O., Pyra, M., Connelly, J.J., Rubin, L.H., 2016. Childbirth and symptoms of postpartum depression and anxiety: a prospective birth cohort study. Arch. Womens Ment. Health 19, 219–227. https://doi.org/10.1007/s00737-015-0555-7.
Biaggi, A., Pariante, C.M., 2020. Risk factors for depression and anxiety during the perinatal period. In: Handbook of Perinatal Clinical Psychology. Routledge, pp. 239–265.
Britton, J.R., 2008. Maternal anxiety: course and antecedents during the early postpartum period. Depress. Anxiety 25, 793–800. https://doi.org/10.1002/da.20325.
Britton, J.R., 2011. Infant temperament and maternal anxiety and depressed mood in the early postpartum period. Women Health 51, 55–71. https://doi.org/10.1080/03630242.2011.540741.
Campbell, M., McKenzie, J.E., Sowden, A., Katikireddi, S.V., Brennan, S.E., Ellis, S., Hartmann-Boyce, J., Ryan, R., Shepperd, S., Thomas, J., Welch, V., Thomson, H., 2020. Synthesis without meta-analysis (SWiM) in systematic reviews: reporting guideline. The BMJ 368, 1–6. https://doi.org/10.1136/bmj.l6890.
Clout, D., Brown, R., 2015. Sociodemographic, pregnancy, obstetric, and postnatal predictors of postpartum stress, anxiety and depression in new mothers. J. Affect. Disord. 188, 60–67. https://doi.org/10.1016/j.jad.2015.08.054.
Coates, R., Ayers, S., de Visser, R., 2014. Women's experiences of postnatal distress: a qualitative study. BMC Pregnancy Childbirth 14, 1–14. https://doi.org/10.1186/1471-2393-14-359.
Coates, R., De Visser, R., Ayers, S., 2015. Not identifying with postnatal depression: a qualitative study of womens postnatal symptoms of distress and need for support. J. Psychosom. Obstet. Gynecol. 36, 114–121. https://doi.org/10.3109/0167482X.2015.1059418.
Davies, S.M., Silverio, S.A., Christiansen, P., Fallon, V., 2021. Maternal-infant bonding and perceptions of infant temperament: the mediating role of maternal mental health. J. Affect. Disord. 282, 1323–1329. https://doi.org/10.1016/j.jad.2021.01.023.
Dawson, D.N., Volpe, V.V., Laurent, H.K., 2021. Synergistic effects of psychological intimate partner violence exposure and gender discrimination on postnatal mental health trajectories. J. Interpers. Violence 36, NP8907–NP8932. https://doi.org/10.1177/0886260519844274.
Dennis, C.L., Fung, K., Grigoriadis, S., Robinson, G.E., Romans, S., Ross, L., 2007. Traditional postpartum practices and rituals: a qualitative systematic review. Women Health. https://doi.org/10.2217/17455057.3.4.487.
Dennis, C.-L., Brown, H.K., Falah-Hassani, K., Marini, F.C., Vigod, S.N., 2017a. Identifying women at risk for sustained postpartum anxiety. J. Affect. Disord. 213, 131–137. https://doi.org/10.1016/j.jad.2017.02.013.
Dennis, C.L., Falah-Hassani, K., Shiri, R., 2017b. Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. Br. J. Psychiatry 210, 315–323. https://doi.org/10.1192/bjp.bp.116.187179.
Djafarova, E., Trofimenko, O., 2017. Exploring the relationships between self-presentation and self-esteem of mothers in social media in Russia. Comput. Hum. Behav. 73, 20–27. https://doi.org/10.1016/j.chb.2017.03.021.
Fairbrother, N., Janssen, P., Antony, M.M., Tucker, E., Young, A.H., 2016. Perinatal anxiety disorder prevalence and incidence. J. Affect. Disord. 200, 148–155. https://doi.org/10.1016/j.jad.2015.12.082.
Faircloth, C., Hoffman, D.M., Layne, L.L., 2013. Parenting in Global Perspective Negotiating Ideologies of Kinship, Self and Politics Relationships and Resources Edited By.
Falah-Hassani, K., Shiri, R., Dennis, C.L., 2017. The prevalence of antenatal and postnatal co-morbid anxiety and depression: a meta-analysis. Psychol. Med. 47, 2041–2053. https://doi.org/10.1017/S0033291717000617.
Fallon, V., Halford, J.C.G., Bennett, K.M., Harrold, J.A., 2018. Postpartum-specific anxiety as a predictor of infant-feeding outcomes and perceptions of infant-feeding behaviours: new evidence for childbearing specific measures of mood. Arch. Womens Ment. Health 21, 181–191. https://doi.org/10.1007/s00737-017-0775-0.
Fallon, V., Davies, S.M., Silverio, S.A., Jackson, L., De Pascalis, L., Harrold, J.A., 2021. Psychosocial experiences of postnatal women during the COVID-19 pandemic. A UK-wide study of prevalence rates and risk factors for clinically relevant depression and anxiety. J. Psychiatr. Res. 136, 157–166. https://doi.org/10.1016/j.jpsychires.2021.01.048.
Farr, S.L., Dietz, P.M., O'Hara, M.W., Burley, K., Ko, J.Y., 2014. Postpartum anxiety and comorbid depression in a population-based sample of women. J. Women's Health (Larchmt) 23, 120–128. https://doi.org/10.1089/jwh.2013.4438.
Fawcett, E.J., Fairbrother, N., Cox, M.L., White, I.R., Fawcett, J.M., 2019. The prevalence of anxiety disorders during pregnancy and the postpartum period: a multivariate Bayesian meta-analysis. J. Clin. Psychiatry 80. https://doi.org/10.4088/JCP.18r12527.
Field, T., 2018. Postnatal anxiety prevalence, predictors and effects on development: a narrative review. Infant Behav. Dev. 51, 24–32. https://doi.org/10.1016/j.infbeh.2018.02.005.
Fonseca, A., Monteiro, F., Canavarro, M.C., 2018. Dysfunctional beliefs towards motherhood and postpartum depressive and anxiety symptoms: uncovering the role of experiential avoidance. J. Clin. Psychol. 74, 2134–2144. https://doi.org/10.1002/jclp.22649.
Furtado, M., Chow, C.H.T., Owais, S., Frey, B.N., Van Lieshout, R.J., 2018. Risk factors of new onset anxiety and anxiety exacerbation in the perinatal period: a systematic review and meta-analysis. J. Affect. Disord. 238, 626–635. https://doi.org/10.1016/j.jad.2018.05.073.
George, A., Luz, R.F., De Tychey, C., Thilly, N., Spitz, E., 2013. Anxiety symptoms and coping strategies in the perinatal period. BMC Pregnancy Childbirth 13, 233. https://doi.org/10.1186/1471-2393-13-233.
Glasheen, C., Richardson, G.A., Fabio, A., 2010. A systematic review of the effects of postnatal maternal anxiety on children. Arch. Womens Ment. Health. https://doi.org/10.1007/s00737-009-0109-y.
Goodman, J.H., Watson, G.R., Stubbs, B., 2016. Anxiety disorders in postpartum women: a systematic review and meta-analysis. J. Affect. Disord. 203, 292–331. https://doi.org/10.1016/j.jad.2016.05.033.
Grant, K.-A., McMahon, C., Austin, M.-P., 2008. Maternal anxiety during the transition to parenthood: a prospective study. J. Affect. Disord. 108, 101–111. https://doi.org/10.1016/j.jad.2007.10.002.
Grant, K.-A., Bautovich, A., McMahon, C., Reilly, N., Leader, L., Austin, M.-P., 2012. Parental care and control during childhood: associations with maternal perinatal mood disturbance and parenting stress. Arch. Womens Ment. Health 15, 297–305. https://doi.org/10.1007/s00737-012-0292-0.
Guo, S., Carvajal-Aguirre, L., Victora, C.G., Barros, A.J.D., Wehrmeister, F.C., Vidaletti, L. P., Gupta, G., Matin, M.Z., Rutter, P., 2019. Equitable coverage? The roles of the private and public sectors in providing maternal, newborn and child health interventions in South Asia. BMJ Glob. Health 4. https://doi.org/10.1136/bmjgh-2019-001495.
Harrison, V., Moore, D., Lazard, L., 2020. Supporting perinatal anxiety in the digital age; a qualitative exploration of stressors and support strategies. BMC Pregnancy Childbirth 20. https://doi.org/10.1186/s12884-020-02990-0.
Harrison, V., Moulds, M.L., Jones, K., 2021a. Perceived social support and prenatal wellbeing; the mediating effects of loneliness and repetitive negative thinking on anxiety and depression during the COVID-19 pandemic. Women Birth. https://doi.org/10.1016/j.wombi.2020.12.014.
Harrison, V., Moulds, M.L., Jones, K., 2021b. Support from friends moderates the relationship between repetitive negative thinking and postnatal wellbeing during COVID-19. J. Reprod. Infant Psychol. 1–16. https://doi.org/10.1080/02646838.2021.1886260.
Hetherington, E., McDonald, S., Williamson, T., Patten, S.B., Tough, S.C., 2018. Social support and maternal mental health at 4 months and 1 year postpartum: analysis from the all our families cohort. J. Epidemiol. Community Health 1978 (72), 933–939. https://doi.org/10.1136/jech-2017-210274.
Hughes, C.T., Devine, R., Foley, S.D., Ribner, A., Mesman, J., Blair, C., 2020. Couples becoming parents: trajectories for psychological distress and buffering effects of social support. J. Affect. Disord. 265, 372–380. https://doi.org/10.1016/j.jad.2020.01.133.
Janevic, T., Maru, S., Nowlin, S., McCarthy, K., Bergink, V., Stone, J., Dias, J., Wu, S., Howell, E.A., 2021. Pandemic birthing: childbirth satisfaction, perceived health care bias, and postpartum health during the COVID-19 pandemic. Matern. Child Health J. 25, 860–869. https://doi.org/10.1007/s10995-021-03158-8.
Jones, K., Harrison, V., Moulds, M.L., Lazard, L., 2022. A qualitative analysis of feelings and experiences associated with perinatal distress during the COVID-19 pandemic. BMC Pregnancy Childbirth 22. https://doi.org/10.1186/s12884-022-04876-9.
Karukivi, M., Tolvanen, M., Karlsson, H., Karlsson, L., 2015. Alexithymia and postpartum anxiety and depression symptoms: a follow-up study in a pregnancy cohort. J. Psychosom. Obstet. Gynaecol. 36, 142–147. https://doi.org/10.3109/0167482X.2015.1089228.
Ladyman, C., Sweeney, B., Sharkey, K., Bei, B., Wright, T., Mooney, H., Huthwaite, M., Cunningham, C., Firestone, R., Signal, T.L., 2022. A scoping review of non-pharmacological perinatal interventions impacting maternal sleep and maternal mental health. BMC Pregnancy Childbirth 22. https://doi.org/10.1186/s12884-022-04844-3.
Law, K.H., Jackson, B., Guelfi, K., Nguyen, T., Dimmock, J.A., 2018. Understanding and alleviating maternal postpartum distress: perspectives from first-time mothers in Australia. Soc. Sci. Med. 204, 59–66. https://doi.org/10.1016/j.socscimed.2018.03.022.
Leach, L.S., Poyser, C., Fairweather-Schmidt, K., 2017. Maternal perinatal anxiety: a review of prevalence and correlates. Clin. Psychol. 21, 4–19. https://doi.org/10.1111/cp.12058.
Lee, E., Bristow, J., Faircloth, C., Macvarish, J., 2023. Parenting Culture Studies Second Edition.
Lefkovics, E., Rigó, J., Kovács, I., Talabér, J., Szita, B., Kecskeméti, A., Szabó, L., Somogyvári, Z., Baji, I., 2018. Effect of maternal depression and anxiety on mother's perception of child and the protective role of social support. J. Reprod. Infant Psychol. 36, 434–448. https://doi.org/10.1080/02646838.2018.1475726.
Lobel, M., Preis, H., Mahaffey, B., Schaal, N.K., Yirmiya, K., Atzil, S., Reuveni, I., Balestrieri, M., Penengo, C., Colli, C., Garzitto, M., Driul, L., Ilska, M., Brandt-Salmeri, A., Kołodziej-Zaleska, A., Caparros-Gonzalez, R.A., Castro, R.A., La Marca-Ghaemmaghami, P., Meyerhoff, H., 2022. Common model of stress, anxiety, and depressive symptoms in pregnant women from seven high-income Western countries at the COVID-19 pandemic onset. Soc. Sci. Med. 315. https://doi.org/10.1016/j.socscimed.2022.115499.
MacGregor, R., Hillman, S., Bick, D., 2020. Falling through the cracks: the impact of COVID-19 on postnatal care in primary care. Br. J. Gen. Pract. 70, 578–579. https://doi.org/10.3399/BJGP20X713573.

Marques, R., Monteiro, F., Canavarro, M.C., Fonseca, A., 2018. The role of emotion regulation difficulties in the relationship between attachment representations and depressive and anxiety symptoms in the postpartum period. J. Affect. Disord. 238, 39–46. https://doi.org/10.1016/j.jad.2018.05.013.
Martin, L.L., Tesser, A., 1996. Some ruminative thoughts. In: Wyer, R.S. (Ed.), Ruminative Thoughts. Advances in Social Cognition. Lawrence Erlbaum Associates, pp. 1–47.
Martini, J., Petzoldt, J., Einsle, F., Beesdo-Baum, K., Höfler, M., Wittchen, H.-U., 2015. Risk factors and course patterns of anxiety and depressive disorders during pregnancy and after delivery: a prospective-longitudinal study. J. Affect. Disord. 175, 385–395. https://doi.org/10.1016/j.jad.2015.01.012.
Matthies, L.M., Müller, M., Doster, A., Sohn, C., Wallwiener, M., Reck, C., Wallwiener, S., 2020. Maternal–fetal attachment protects against postpartum anxiety: the mediating role of postpartum bonding and partnership satisfaction. Arch. Gynecol. Obstet. 301, 107–117. https://doi.org/10.1007/s00404-019-05402-7.
Mesquita, A., Costa, R., Bina, R., Cadarso-Suárez, C., Gude, F., Díaz-Louzao, C., Dikmen-Yildiz, P., Osorio, A., Mateus, V., Domínguez-Salas, S., Vousoura, E., Levy, D., Alfayumi-Zeadna, S., Wilson, C.A., Contreras-García, Y., Carrasco-Portiño, M., Saldivia, S., Christoforou, A., Hadjigeorgiou, E., Felice, E., Buhagiar, R., Hancheva, C., Ajaz, E., Uka, A., Motrico, E., 2023. A cross-country study on the impact of governmental responses to the COVID-19 pandemic on perinatal mental health. Sci. Rep. 13. https://doi.org/10.1038/s41598-023-29300-w.
Micali, N., Simonoff, E., Treasure, J., 2011. Pregnancy and post-partum depression and anxiety in a longitudinal general population cohort: the effect of eating disorders and past depression. J. Affect. Disord. 131, 150–157. https://doi.org/10.1016/j.jad.2010.09.034.
Mikulincer, M., Shaver, P.R., 2012. An Attachment Perspective on Psychopathology.
Milgrom, J., Hirshler, Y., Reece, J., Holt, C., Gemmill, A.W., 2019. Social support-a protective factor for depressed perinatal women? Int. J. Environ. Res. Public Health 16. https://doi.org/10.3390/ijerph16081426.
Molnar, J., Kósa, K., Fekete, Z., Ákos, M., 2018. Postpartum anxiety and intrapsychic vulnerability reflected by early maladaptive schemas. European Journal of Mental Health 13, 70–81. https://doi.org/10.5708/EJMH.13.2018.1.6.
Moss, K.M., Skouteris, H., Wertheim, E.H., Paxton, S.J., Milgrom, J., 2009. Depressive and anxiety symptoms through late pregnancy and the first year post birth: an examination of prospective relationships. Arch. Womens Ment. Health 12, 345–349. https://doi.org/10.1007/s00737-009-0086-1.
Moulds, M.L., Black, M.J., Newby, J.M., Hirsch, C.R., 2018. Repetitive negative thinking and its role in perinatal mental health. Psychopathology 51, 161–166. https://doi.org/10.1159/000488114.
Moulds, M.L., Bisby, M.A., Black, M.J., Jones, K., Harrison, V., Hirsch, C.R., Newby, J.M., 2022. Repetitive negative thinking in the perinatal period and its relationship with anxiety and depression. J. Affect. Disord. https://doi.org/10.1016/j.jad.2022.05.070.
Moustafa, A.A., Crouse, J.J., Herzallah, M.M., Salama, M., Mohamed, W., Misiak, B., Frydecka, D., Al-Dosari, N.F., Megreya, A.M., Mattock, K., 2020. Depression following major life transitions in women: a review and theory. Psychol. Rep. 123, 1501–1517. https://doi.org/10.1177/0033294119872209.
Muka, T., Glisic, M., Milic, J., Verhoog, S., Bohlius, J., Bramer, W., Chowdhury, R., Franco, O.H., 2020. A 24-step guide on how to design, conduct, and successfully publish a systematic review and meta-analysis in medical research. Eur. J. Epidemiol. 35, 49–60. https://doi.org/10.1007/s10654-019-00576-5.
Oddo-Sommerfeld, S., Hain, S., Louwen, F., Schermelleh-Engel, K., 2016. Longitudinal effects of dysfunctional perfectionism and avoidant personality style on postpartum mental disorders: pathways through antepartum depression and anxiety. J. Affect. Disord. 191, 280–288. https://doi.org/10.1016/j.jad.2015.11.040.
Osborne, L.M., Betz, J.F., Yenokyan, G., Standeven, L.R., Payne, J.L., 2019. The role of Allopregnanolone in pregnancy in predicting postpartum anxiety symptoms. Front. Psychol. 10, 1033. https://doi.org/10.3389/fpsyg.2019.01033.
Osnes, R.S., Roaldset, J.O., Follestad, T., Eberhard-Gran, M., 2019. Insomnia late in pregnancy is associated with perinatal anxiety: a longitudinal cohort study. J. Affect. Disord. 248, 155–165. https://doi.org/10.1016/j.jad.2019.01.027.
Osnes, R.S., Eberhard-Gran, M., Follestad, T., Kallestad, H., Morken, G., Roaldset, J.O., 2020. Mid-pregnancy insomnia is associated with concurrent and postpartum maternal anxiety and obsessive-compulsive symptoms: a prospective cohort study. J. Affect. Disord. 266, 319–326. https://doi.org/10.1016/j.jad.2020.01.140.
Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S., McGuinness, L.A., Stewart, L.A., Thomas, J., Tricco, A.C., Welch, V.A., Whiting, P., Moher, D., 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. The BMJ 372. https://doi.org/10.1136/bmj.n71.
Puhan, M.A., Soesilo, I., Guyatt, G.H., Schünemann, H.J., 2006. Combining scores from different patient reported outcome measures in meta-analyses: when is it justified? Health Qual. Life Outcomes 4. https://doi.org/10.1186/1477-7525-4-94.
Reck, C., Stehle, E., Reinig, K., Mundt, C., 2009. Maternity blues as a predictor of DSM-IV depression and anxiety disorders in the first three months postpartum. J. Affect. Disord. 113, 77–87. https://doi.org/10.1016/j.jad.2008.05.003.
Rees, S., Channon, S., Waters, C.S., 2019. The impact of maternal prenatal and postnatal anxiety on children's emotional problems: a systematic review. Eur. Child Adolesc. Psychiatry 28, 257–280. https://doi.org/10.1007/s00787-018-1173-5.
Saving Babies' Lives Version Two A Care Bundle for Reducing Perinatal Mortality, 2019.
Schwab-Reese, L.M., Ramirez, M., Ashida, S., Peek-Asa, C., 2017a. Psychosocial employment characteristics and postpartum maternal mental health symptoms. Am. J. Ind. Med. 60, 109–120. https://doi.org/10.1002/ajim.22666.
Schwab-Reese, L.M., Schafer, E.J., Ashida, S., 2017b. Associations of social support and stress with postpartum maternal mental health symptoms: main effects, moderation, and mediation. Women Health 57, 723–740. https://doi.org/10.1080/03630242.2016.1181140.
Seymour, M., Giallo, R., Cooklin, A., Dunning, M., 2015. Maternal anxiety, risk factors and parenting in the first post-natal year. Child Care Health Dev. 41, 314–323. https://doi.org/10.1111/cch.12178.
Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., Stewart, L.A., Altman, D.G., Booth, A., Chan, A.W., Chang, S., Clifford, T., Dickersin, K., Egger, M., Gøtzsche, P.C., Grimshaw, J.M., Groves, T., Helfand, M., Higgins, J., Lasserson, T., Lau, J., Lohr, K., McGowan, J., Mulrow, C., Norton, M., Page, M., Sampson, M., Schünemann, H., Simera, I., Summerskill, W., Tetzlaff, J., Trikalinos, T.A., Tovey, D., Turner, L., Whitlock, E., 2015. Preferred reporting items for systematic review and meta-analysis protocols (prisma-p) 2015: elaboration and explanation. BMJ (Online) 349, 1–25. https://doi.org/10.1136/bmj.g7647.
Stein, A., Lehtonen, A., Harvey, A.G., Nicol-Harper, R., Craske, M., 2009. The influence of postnatal psychiatric disorder on child development: is maternal preoccupation one of the key underlying processes? Psychopathology 42, 11–21. https://doi.org/10.1159/000173699.
Stein, A., Craske, M.G., Lehtonen, A., Harvey, A., Savage-McGlynn, E., Davies, B., Goodwin, J., Murray, L., Cortina-Borja, M., Counsell, N., 2012. Maternal cognitions and mother-infant interaction in postnatal depression and generalized anxiety disorder. J. Abnorm. Psychol. 121, 795–809. https://doi.org/10.1037/a0026847.
Tendais, I., Figueiredo, B., 2016. Parents' anxiety and depression symptoms after successful infertility treatment and spontaneous conception: does singleton/twin pregnancy matter? Hum. Reprod. 31, 2303–2312. https://doi.org/10.1093/humrep/dew212.
The NHS Long Term Plan, 2019.
Tomfohr-Madsen, L.M., Racine, N., Giesbrecht, G.F., Lebel, C., Madigan, S., 2021. Depression and anxiety in pregnancy during COVID-19: a rapid review and meta-analysis. Psychiatry Res. 300, 113912. https://doi.org/10.1016/j.psychres.2021.113912.
Wardrop, A.A., Popadiuk, N.E., 2013. The qualitative report women' s experiences with postpartum anxiety: expectations, relationships, and sociocultural influences recommended APA citation. Qual. Rep. 18, 1–21.
Wenzel, A., Haugen, E.N., Jackson, L.C., Brendle, J.R., 2005. Anxiety symptoms and disorders at eight weeks postpartum. J. Anxiety Disord. 19, 295–311. https://doi.org/10.1016/j.janxdis.2004.04.001.
WHO, UNICEF, UNFPA, World Bank Group, UNDESA/Population Division, 2023. Trends in Maternal Mortality 2000 to 22020.
Yelland, J., Sutherland, G., Brown, S.J., 2010. Postpartum anxiety, depression and social health: findings from a population-based survey of Australian women. BMC Public Health 10, 771. https://doi.org/10.1186/1471-2458-10-771.
van der Zee-van den Berg, A.I., Boere-Boonekamp, M.M., Groothuis-Oudshoorn, C.G.M., Reijneveld, S.A., 2021. Postpartum depression and anxiety: a community-based study on risk factors before, during and after pregnancy. J. Affect. Disord. 286, 158–165. https://doi.org/10.1016/j.jad.2021.02.062.