

## A systematic review, evidence synthesis and meta-analysis of quantitative and qualitative studies evaluating the clinical effectiveness, the cost-effectiveness, safety and acceptability of interventions to prevent postnatal depression

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# Abstract

## A systematic review, evidence synthesis and meta-analysis of quantitative and qualitative studies evaluating the clinical effectiveness, the cost-effectiveness, safety and acceptability of interventions to prevent postnatal depression

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**Background:** Postnatal depression (PND) is a major depressive disorder in the year following childbirth, which impacts on women, their infants and their families. A range of interventions has been developed to prevent PND.

**Objectives:** To (1) evaluate the clinical effectiveness, cost-effectiveness, acceptability and safety of antenatal and postnatal interventions for pregnant and postnatal women to prevent PND; (2) apply rigorous methods of systematic reviewing of quantitative and qualitative studies, evidence synthesis and decision-analytic modelling to evaluate the preventive impact on women, their infants and their families; and (3) estimate cost-effectiveness.

**Data sources:** We searched MEDLINE, EMBASE, Science Citation Index and other databases (from inception to July 2013) in December 2012, and we were updated by electronic alerts until July 2013.

**Review methods:** Two reviewers independently screened titles and abstracts with consensus agreement. We undertook quality assessment. All universal, selective and indicated preventive interventions for pregnant women and women in the first 6 postnatal weeks were included. All outcomes were included, focusing on the Edinburgh Postnatal Depression Scale (EPDS), diagnostic instruments and infant outcomes. The quantitative evidence was synthesised using network meta-analyses (NMAs). A mathematical model was constructed to explore the cost-effectiveness of interventions contained within the NMA for EPDS values.

**Results:** From 3072 records identified, 122 papers (86 trials) were included in the quantitative review. From 2152 records, 56 papers (44 studies) were included in the qualitative review. The results were inconclusive. The most beneficial interventions appeared to be midwifery redesigned postnatal care [as shown by the mean 12-month EPDS score difference of  $-1.43$  (95% credible interval  $-4.00$  to  $1.36$ )], person-centred approach (PCA)-based and cognitive-behavioural therapy (CBT)-based intervention (universal), interpersonal psychotherapy (IPT)-based intervention and education on preparing for parenting (selective), promoting parent-infant interaction, peer support, IPT-based intervention and PCA-based and CBT-based intervention (indicated). Women valued seeing the same health worker, the involvement of partners and access to several visits from a midwife or health visitor trained in person-centred or cognitive-behavioural approaches. The most cost-effective interventions were estimated to be midwifery redesigned postnatal care (universal), PCA-based intervention (indicated) and IPT-based intervention in the sensitivity analysis (indicated), although there was considerable uncertainty. Expected value of partial perfect information (EVPPI) for efficacy data was in excess of £150M for each population. Given the EVPPI values, future trials assessing the relative efficacies of promising interventions appears to represent value for money.

**Limitations:** In the NMAs, some trials were omitted because they could not be connected to the main network of evidence or did not provide EPDS scores. This may have introduced reporting or selection bias. No adjustment was made for the lack of quality of some trials. Although we appraised a very large number of studies, much of the evidence was inconclusive.

**Conclusions:** Interventions warrant replication within randomised controlled trials (RCTs). Several interventions appear to be cost-effective relative to usual care, but this is subject to considerable uncertainty.

**Future work recommendations:** Several interventions appear to be cost-effective relative to usual care, but this is subject to considerable uncertainty. Future research conducting RCTs to establish which interventions are most clinically effective and cost-effective should be considered.

**Study registration:** This study is registered as PROSPERO CRD42012003273.

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# Glossary

**Beck Depression Inventory** A 21-item self-report scale used to determine depression severity. Items are scored on a 0–3 scale, giving a total score range of 0–63. Total scores within the 1–9 range indicate minimal depression, 10–18 indicate mild depression, 19–29 indicate moderate depression and 30–63 indicate severe depression.

**Center for Epidemiological Studies Depression Scale** A short self-report scale designed to measure depressive symptomology in the general population. The 20-item scale has a possible range of scores from 0 to 60, with higher scores indicating more symptoms, weighted by frequency of occurrence during the past week.

**Cognitive-behavioural therapy** The pragmatic combination of concepts and techniques from cognitive and behaviour therapies common in clinical practice. Cognitive-behavioural therapy aims to facilitate, through collaboration and guided discovery, recognition and re-evaluation of negative thinking patterns and practising new behaviours.

**Edinburgh Postnatal Depression Scale** The most widely used self-report scale designed to measure postnatal depression symptomology. The scale consists of a 10-item Likert format relating to depression and anxiety symptomology. Items are scored on a 0–3 scale to give a total range of 0–30. Total scores within the 12–30 range suggest significant depression.

**Indicated preventive interventions** Interventions offered to women at high risk of developing postnatal depression on the basis of psychological risk factors, above-average scores on psychological measures or other indications of a predisposition to postnatal depression but who did not meet diagnostic criteria for postnatal depression at that time.

**Interpersonal psychotherapy** A time-limited, structured and psychoeducational therapy which links depression to role transitions, interpersonal disputes, interpersonal sensitivity or losses. It facilitates understanding of recent events in these interpersonal terms and explores alternative ways of handling interpersonal situations.

**Multipara** A woman who has given birth two or more times.

**Network meta-analysis** An extension of a standard meta-analysis which enables a simultaneous comparison of all evaluated interventions in a single coherent analysis. Thus, all interventions can be compared with one another, including comparisons not evaluated within individual studies. To perform a network meta-analysis each study must be linked to at least one other study through having at least one intervention in common.

**Postnatal depression (also known as postpartum depression)** A non-psychotic depressive episode meeting standardised diagnostic criteria for a minor or major depressive disorder, beginning in or extending into the postnatal period.

**Selective preventive interventions** Interventions offered to women or subgroups of the population whose risk of developing postnatal depression was significantly higher than average, because they had one or more social risk factors.

**Universal preventive interventions** Interventions available for all women in a defined population not identified on the basis of increased risk for postnatal depression.



## List of abbreviations

AMED	Allied and Complementary Medicine Database	DSM-V	<i>Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition</i>
ASSIA	Applied Social Sciences Index and Abstracts	EP	Expert Patient
BDI	Beck Depression Inventory	EPA	eicosapentaenoic acid
CAM	complementary and alternative medicine	EPDS	Edinburgh Postnatal Depression Scale
CASP	Critical Appraisal Skills Programme	EVPI	expected value of perfect information
CBA	cognitive-behavioural approach	EVPII	expected value of partial perfect information
CBT	cognitive-behavioural therapy	GP	general practitioner
CEAC	cost-effectiveness acceptability curve	HADS	Hospital Anxiety and Depression Scale
CENTRAL	Cochrane Central Register of Controlled Trials	HIV	human immunodeficiency virus
CERQual	Confidence in the Evidence from Reviews of Qualitative research	HTA	Health Technology Assessment
CES-D	Center for Epidemiologic Studies Depression scale	ICD-10	<i>International Classification of Diseases, Tenth Edition</i>
CINAHL	Cumulative Index to Nursing and Allied Health Literature	ICER	incremental cost-effectiveness ratio
CLUSTER	Citations, Lead authors, Unpublished materials, Scholar searches, Theories, Early examples, Related projects	IPT	interpersonal psychotherapy
CODA	Convergence Diagnostic and Output Analysis	MBE	mind-body exercise
CORE-OM	Clinical Outcomes in Routine Evaluation-Outcome Measure	MCS	mental component summary
CPCI-S	Conference Proceedings Citation Index-Science	MDU	Midwifery Development Unit
CRCT	cluster randomised controlled trial	MIDIRS	Midwives Information and Resource Service
CrI	credible interval	NHS EED	NHS Economic Evaluation Database
DARE	Database of Abstracts of Reviews of Effects	NICE	National Institute for Health and Care Excellence
DHA	docosahexaenoic acid	NMA	network meta-analysis
DSM-IV	<i>Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition</i>	NMB	net monetary benefit
		PCA	person-centred approach
		PCS	physical component summary
		PHQ	Patient Health Questionnaire
		PICOS	population, intervention, comparators, outcomes, study designs

## LIST OF ABBREVIATIONS

PND	postnatal depression	RCT	randomised controlled trial
PoNDER	PostNatal Depression Economic evaluation and Randomised controlled trial	ROSE	Reach Out, Stand strong, Essentials for new mothers
PPI	patient and public involvement	SCAN	Schedule for Clinical Assessment in Neuropsychiatry
PRISM	Program of Resources, Information and Support for Mothers	SCID	Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses	SD	standard deviation
PSA	probabilistic sensitivity analysis	SF-12	Short Form questionnaire-12 items
PSI	Parenting Stress Index	SF-36	Short Form questionnaire-36 items
PSS	Perceived Stress Scale	SF-6D	Short-Form 6-Dimensions
PSSS	personal and social support strategy	STAI	State–Trait Anxiety Inventory
QALY	quality-adjusted life-year	TIDieR	template for intervention description and replication

# Plain English summary

## What was the problem?

Mental health problems during pregnancy and after childbirth can have an enduring effect on women and their developing babies. It is important to identify women with mental health problems as early as possible, in order to help them and their children.

## What did we do?

This research reviewed studies which looked at preventing depression in mothers with a baby less than 1 year of age. The studies examined interventions offered (1) to all women (which we called 'universal'), (2) to women at risk because of social circumstances ('selective') and (3) to women at higher risk because of a link to depression ('indicated'). We also reviewed what made interventions acceptable to women and whether or not interventions made the best use of NHS resources. Women who had experienced depression in pregnancy and after childbirth were involved in the research.

## What did we find?

The included studies did not reveal a clear pattern. Extra visits from a midwife, a health visitor trained in person-centred approaches (PCAs) or cognitive-behavioural therapy (CBT)-based approaches helped in universal coverage. Education on preparing for parenting or interpersonal therapy-based intervention seemed useful in the selective group. Helping parents interact with their baby, peer support and approaches based on CBT or PCA seemed favourable in the indicated group. The interventions which appeared to be most cost-effective were midwifery redesigned postnatal care (universal), education on preparing for parenting (selective) and PCA-based intervention (indicated).

The research confirmed that women valued seeing the same health-care worker (building trusting relationships) and their partners' involvement.

## What does this mean?

It is difficult to conclude on the value of these interventions and further research is necessary. We need better ways of measuring depression and its costs and need to involve more women in future research.



# Scientific summary

## Background

Postnatal depression (PND) is a serious public health issue, affecting 7–13% of women in the year following childbirth. The strongest predictors of PND are antenatal anxiety, depression history, lack of social support, low self-esteem, stressful life events, poor marital relationship and domestic violence. Severe PND is associated with suicide and infanticide, especially when a woman has psychotic symptoms.

The prevention of PND is an important neglected area in the UK, with NHS effort directed towards treatment rather than prevention. A range of psychological, educational, pharmacological, social support, alternative and other interventions has been explored to minimise the development, intensity and duration of maternal depressive symptoms and their potential impact on the infant. Previous systematic reviews provided conflicting reports about the effectiveness of PND preventive interventions.

Preventive approaches relevant to PND are:

- universal preventive interventions targeting a population not at increased risk for PND
- selective preventive interventions for women perceived to be at risk for PND because of social factors
- indicated preventive interventions for women at risk of PND because of history, predisposition or above average scores on psychological measures, but not meeting diagnostic criteria.

## Aims and objectives

The aims of this study were to:

1. evaluate the clinical effectiveness, cost-effectiveness, acceptability and safety of antenatal and postnatal interventions to prevent PND in pregnant and postnatal women
2. apply rigorous methods of systematic reviewing of quantitative and qualitative studies, evidence synthesis and decision-analytic modelling to evaluate the preventive impact on women, their infants and their families
3. and estimate cost-effectiveness.

The objectives were to:

- (a) determine the clinical effectiveness of antenatal and postnatal interventions for preventing PND (systematic review of quantitative research)
  - i. to identify moderators and mediators of the effectiveness of preventive interventions
  - ii. to undertake a network meta-analysis (NMA) of available evidence, as appropriate
- (b) provide a detailed service user and provider perspective on uptake, acceptability and potential harms of antenatal and postnatal interventions (systematic review of qualitative research)
  - i. to examine the main service models for prevention of PND in relation to the underlying programme theory and mechanisms, focusing on group- and individual-based approaches (realist synthesis)

- (c) to undertake a systematic review of economic evaluations in the area and identify other evidence needed to populate an economic model
- (d) to determine the potential value of collecting further data on input parameters (expected value of information analysis).

## Clinical effectiveness review methods

### Data sources

A comprehensive search of MEDLINE, MEDLINE In-Process & Other Non-Indexed Citations, EMBASE, The Cochrane Library (Cochrane Systematic Reviews, Database of Abstracts of Reviews of Effects, Cochrane Central Register of Controlled Trials, NHS Economic Evaluation Database, Health Technology Assessment databases), Cumulative Index to Nursing and Allied Health Literature, PsycINFO, Science Citation Index and Conference Proceedings (Web of Science), National Institute for Health Research Health Technology Assessment Programme, Applied Social Sciences Index and Abstracts; Allied and Complementary Medicine Database and Midwives Information and Resource Service Reference Database (from inception to July 2013) in December 2012 and electronic alerts update until July 2013. The following trial databases were searched (from inception to July 2013): Current Controlled Trials, ClinicalTrials.gov and the World Health Organization's International Clinical Trials Registry Platform. Reference tracking of relevant studies was performed. Reference lists of relevant reviews were scrutinised. Searches were restricted to English-language literature with no restriction by date.

### Inclusion/exclusion criteria

#### Population

The study population comprised all pregnant women (universal); pregnant women at risk of developing PND because of social factors (selective); pregnant women at risk of developing PND because of psychological risk factors, above average scores on psychological measures, indications of a predisposition to PND (indicated); all postnatal women in their first 6 postnatal weeks (universal) (or first postnatal year for the qualitative review); postnatal women at risk of developing PND because of social factors (selective); and postnatal women at risk of developing PND because of psychological risk factors, above average scores on psychological measures and indications of a predisposition to PND but not diagnosed with depression (indicated).

#### Interventions

All interventions suitable for pregnant women and women in the first 6 postnatal weeks were included.

#### Comparators

All usual care and enhanced usual-care control and active comparisons were considered.

#### Outcomes

In the review of the quantitative and the qualitative research, all outcomes reported were included. Key outcomes were measures of depressive symptoms such as the Edinburgh Postnatal Depression Scale (EPDS), depression diagnostic instruments and infant outcomes.

### Data extraction

The general principles recommended in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement were used. For the quantitative studies, two independent reviewers screened all records and extracted data; disagreements were resolved through consensus. The risk of bias of included randomised controlled trials (RCTs) was assessed using Cochrane's risk-of-bias tool. For the included qualitative studies, data extraction was undertaken by one reviewer using a tailored data extraction framework, developed to elicit data extraction elements related directly to the review question and 20% of extractions were checked by a second reviewer. The methodological quality of individual

studies was appraised by two reviewers independently using an abbreviated version of the Critical Appraisal Skills Programme (CASP) quality assessment tool for qualitative studies and the CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach was used to assess the certainty of the findings.

### Data synthesis

Extracted data and quality assessment variables were presented in tables with narrative description. The evidence was synthesised using a NMA, which enabled a simultaneous comparison of all evaluated interventions in a single coherent analysis. Evidence from RCTs presenting data at any assessment time up to 12 months postnatally was relevant to the decision problem. The analysis of the EPDS score data was conducted in two stages: (1) a treatment-effects model, in which the effect of each intervention was estimated relative to usual care; and (2) a baseline (i.e. usual-care) model, in which the absolute response to usual care was estimated. The estimates of treatment effects relative to usual care were combined with the baseline model to provide estimates of absolute responses for each intervention; these estimates were used as inputs to the economic model.

Qualitative meta-synthesis was undertaken by highlighting women's and service providers' issues around the acceptability of interventions, elucidating evidence around personal and social support strategies (PSSSs) employed by women, using the data extraction framework and thematic synthesis to aggregate the findings. Evidence about interventions from women and from service providers and evidence about PSSSs were presented separately.

## Clinical effectiveness summary results

For the quantitative studies, 3072 records were identified through electronic searches. In total, 122 papers (representing 86 unique studies of preventive interventions) were included, of which 37 studies were of universal preventive interventions, 20 were of selective interventions and 30 were of indicated interventions (one study included both indicated and universal preventive interventions). The highest levels of assessed risk of bias were for selection bias [9 of 86 RCTs (10.5%)] and for attrition and/or analysis bias [8 of 86 RCTs (9.3%)]. The universal preventive intervention studies had greater risks of bias than the selective and indicated preventive interventions; this was most notable for selection bias and attrition bias. There was a consistent lack of clarity about the allocation method, the use of a non-random process, how the baseline was defined and how this affected initiation of an intervention.

A further 23 relevant systematic reviews were identified which revealed one additional study.

### Universal preventive interventions

The results were inconclusive from the set of interventions which formed a network. The most beneficial interventions at 12 months, shown by difference in the mean EPDS score, appeared to be midwifery redesigned postnatal care [-1.43, 95% credible interval (CrI) -4.00 to 1.36], person-centred approach (PCA)-based intervention (-0.97, 95% CrI -3.54 to 1.71) and cognitive-behavioural therapy (CBT)-based intervention (-0.78, 95% CrI -3.41 to 1.91).

### Selective preventive interventions

Not all interventions were evaluable and the treatment effects were inconclusive. Interpersonal psychotherapy (IPT)-based intervention appeared to be beneficial as indicated by difference in mean 3-month EPDS score (-1.85, 95% CrI -5.60 to 2.14). Education on preparing for parenting appeared to be beneficial, as indicated by the difference in mean 6-month EPDS score (-1.32, 95% CrI -3.54 to 1.10).

### **Indicated preventive interventions**

Not all interventions were evaluable, and the NMA showed that, in general, the treatment effects were inconclusive. The difference in mean 6-month EPDS score was  $-4.25$  (95% CrI  $-7.78$  to  $0.43$ ) for IPT-based intervention. The difference in 12-month mean EPDS score was  $-2.18$  (95% CrI  $-5.39$  to  $1.15$ ) for PCA-based intervention and  $-2.18$  (95% CrI  $-5.39$  to  $1.15$ ) for CBT-based intervention. The difference in the 6-week mean EPDS score was  $-1.12$  (95% CrI  $-4.35$  to  $1.93$ ) for promoting parent–infant interaction for peer support and the difference in 3-month EPDS score was  $-0.93$  (95% CrI  $-5.11$  to  $3.32$ ).

### **Cost-effectiveness review methods**

A comprehensive search of published economic evaluations was performed. One reviewer independently screened titles and abstracts with discussion about uncertainty and consensus agreement. A mathematical model was constructed to explore the cost-effectiveness of interventions contained within the NMA versus usual care. An area under the curve approach was employed alongside mapping from the EPDS values to a preference-based utility score; Short Form 6-Dimensions (SF-6D). The time horizon was 1 year, amended to 2 years in a sensitivity analysis. Expected value of partial perfect information (EVPI) analyses were undertaken for efficacy data and for mapping the EPDS values to utility.

### **Cost-effectiveness summary results**

No economic evaluations were identified as appropriate for answering the decision problem and hence a de novo model was constructed. The cost of the interventions relative to usual care ranged from cost saving to an increase of £1200 per woman. Assuming a willingness to pay of £20,000 per quality-adjusted life-year (QALY), the most cost-effective interventions were estimated to be midwifery redesigned postnatal care, PCA-based intervention and CBT-based intervention (universal); education on preparing for pregnancy (selective); and PCA-based intervention (indicated). If a benefit of 2 years was assumed, then an IPT-based intervention was the most cost-effective indicated preventive intervention. However, there was considerable uncertainty in these results. The EVPI for efficacy data was very large, in excess of £150M for each population.

### **Qualitative review summary results**

For the qualitative studies, 2152 records were identified through all searches. There were 56 records included (representing 44 unique studies) which were examined at full text. In addition, 27 papers (representing 21 unique studies of preventive interventions) were included, of which 14 studies were of universal preventive interventions, three were of selective interventions and four were of indicated interventions. The studies varied in quality. Only six studies showed evidence of researcher reflexivity. No findings were assessed as being of high certainty by the CERQual approach. The remaining 29 papers (23 studies) were concerned with PSSSs to prevent PND.

Social support interventions provided emotional and informational support to women, and group-based approaches may be a useful supplement, provided that they do not prove to be too resource intensive or create unrealistic expectations of services. Continuity of care was confirmed as an important operator across several interventions in that it enabled women to build up a relationship of trust with their health-care provider.

## Discussion

We undertook a rigorous systematic review and identified all relevant publications concerning the clinical effectiveness and cost-effectiveness interventions to prevent PND. Although we appraised and summarised a very large number of studies, the results of the review were inconclusive. It is possible that usual care could be the most effective intervention in all three populations.

### Strengths

The analysis approach differs from that used in previous Cochrane reviews, which did not distinguish between interventions within studies in terms of control, comparator or preventive approach. Previous reviews used standardised effect sizes rather than EPDS values and also tended to not take into account the assessment time, often taking the latest assessment time. The qualitative review identified helpful features from the women's and service providers' perspectives, as well as preferences for potential improvement.

### Limitations

The NMA offers an advance on previous reviews. Nevertheless, there are some limitations with the current analysis: (1) some studies were omitted because they did not provide EPDS values, which may have introduced reporting or selection bias; (2) no adjustment was made for the lack of quality associated with some trials, and treatment effects may therefore be overstated; (3) the analysis assumed independence of outcomes within studies and independence of intervention effects between studies; and (4) infant outcomes were not examined in detail because of insufficient infant outcome data.

Limitations with the cost-effectiveness analyses are that (1) interventions that did not report EPDS values were omitted from the analyses; (2) the incremental costs for each strategy have, by necessity, been estimated in a simplistic manner and costs of restructuring services have not been included; (3) the possibility of erroneous grouping of trials as a single intervention within indicated preventive interventions; and (4) simplistic assumptions have been made in estimating the area under the curve when data were not available for all time points.

Limitations with providing a conclusion regarding the most cost-effective intervention are (1) absolute QALY gains estimated are small for all interventions; and (2) there is considerable uncertainty in the direction of the estimates of QALY change compared with usual care for all interventions.

The values of future research into the relative effectiveness of interventions were shown to be very high in all populations, in the order of hundreds of millions of pounds, which would be sufficient to cover the cost of such research. Although the relationship between EPDS values and utility was not shown to influence the decision, given current information, future research should include collection of utility data. In addition, detailed costing data for each intervention should be recorded.

### Research recommendations

Owing to the uncertainty associated with the results and the limitations highlighted above, our overall research recommendations and conclusions are tentative. Given the poor quality of the clinical effectiveness and cost-effectiveness evidence available, replication of some studies is needed within good-quality RCTs:

- as a universal preventive intervention: midwifery redesigned postnatal care, PCA-based intervention and CBT-based intervention
- as a selective preventive intervention: education on preparing for parenting, peer support and IPT-based intervention
- as an indicated preventive intervention: promoting parent–infant interaction; peer support (telephone-based and Newpin volunteer support); and CBT-, PCA- and IPT-based interventions.

## Conclusions

As far as we are aware this is the most comprehensive review of the clinical effectiveness and cost-effectiveness, acceptability and safety of antenatal and postnatal interventions for pregnant and postnatal women to prevent PND. Despite this, no definitive conclusions can be drawn regarding the most clinically effective or cost-effective intervention because of the uncertainty about the relative effectiveness of the interventions. Several interventions would warrant replication. Future RCTs estimating the effectiveness of interventions considered acceptable to pregnant and postnatal women and the clinical community should be undertaken using the EPDS. Given the EVPI values, future trials assessing the relative efficacies of promising interventions would appear to represent value for money.

## Study registration

This study is registered as PROSPERO CRD42012003273.

## Funding

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# Chapter 1 Background

This chapter details the background to the report and presents an overview of postnatal depression (PND): the size and importance of the problem, the need for prevention, current service provision and the approaches to interventions to prevent the condition.

## Description of health problem

Depression is a leading cause of life lived with disability. PND, also termed postpartum depression, is defined using standardised diagnostic criteria as a major depressive disorder in the year following childbirth.<sup>1</sup> PND has a wide range of symptoms measured in clinical practice and in research using symptom self-reports as a proxy for clinical assessment.<sup>1</sup> It is distinguished from the more transient 'baby blues' and the rarer and more acute puerperal psychosis. Severe PND is associated with suicide and infanticide, especially when the woman has psychotic symptoms.<sup>2</sup>

The *Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (DSM-V)*<sup>3</sup> does not recognise PND as a separate diagnosis, so, to be diagnosed, women must meet the criteria for depression. The specifier is 'with peripartum onset' (the most recent episode occurring during pregnancy and in the 4 weeks following delivery).<sup>4</sup> The following symptoms must be present for at least 2 weeks to fulfil the criteria for major depression: a depressed mood or a loss of interest or pleasure in daily activities which represents a change from normal mood; and a clinically significant distress or impairment in social, occupational, educational or other important areas of functioning. Five or more of the symptoms in *Box 1* must also be present for a major depressive episode to be determined.

In contrast, the World Health Organization's *International Classification of Diseases, Tenth Edition (ICD-10)* diagnosis code F53, is for mental disorders associated with the puerperium, that is postnatal or postpartum depression commencing within 6 weeks of delivery, that do not meet the criteria for disorders classified elsewhere.<sup>5</sup> ICD-10 also requires several symptoms to be endorsed for a diagnosis of depression and most cases of PND will meet criteria for disorders classified elsewhere. ICD-10 uses key symptoms of persistent sadness or low mood and/or loss of interest or pleasure, fatigue or low energy; at least one of these symptoms, most days, most of the time for at least 2 weeks. If any of these are present, associated symptoms such as disturbed sleep, poor concentration or indecisiveness, low self-confidence, poor or increased appetite, suicidal thoughts or acts, agitation or slowing of movements and guilt or self-blame define the degree of depression.

### BOX 1 Symptoms indicating a major depressive episode

1. Depressed mood most of the day, almost every day, indicated by subjective report or others' observations.
2. Reduced interest or pleasure in all (or nearly all) activities for most of the day, almost every day.
3. Significant weight loss or weight gain or decrease or increase in appetite almost every day.
4. Insomnia or hypersomnia almost every day.
5. Psychomotor agitation or retardation almost every day.
6. Fatigue or loss of energy almost every day.
7. Feelings of worthlessness or excessive or inappropriate guilt almost every day.
8. Diminished ability to think or concentrate, or indecisiveness, almost every day.
9. Recurrent thoughts of death, recurrent thoughts of suicide without a plan, a plan for committing suicide or a suicide attempt.

### Prevalence

Postnatal depression is a public health problem<sup>4,6</sup> which occurs in most cultures.<sup>6–8</sup> The prevalence of both major or minor depression during the first postnatal year is 7–13%.<sup>9</sup> Among a sample of more than 8000 women in England, 13% scored 13 or more (the threshold to identify women with probable major depression)<sup>2</sup> on the Edinburgh Postnatal Depression Scale (EPDS)<sup>10</sup> on at least one postnatal assessment.<sup>11</sup>

Some women recover by the time their infant is 6 months old, but in 50% of women depression can last for more than 6 months.<sup>12</sup> Although PND is defined as depression within the 12 months after the birth of an infant, a significant number of women remain depressed for over 1 year,<sup>13</sup> and some women remain depressed for 4 years.<sup>12</sup>

Although depression postnatally may not be different from depression occurring in non-pregnant women, some women become depressed for the first time postnatally, some experience postnatal recurrence of previous depression<sup>13</sup> and, for others, depression begins antenatally and continues postnatally.<sup>14–16</sup> Antenatal depression is the strongest predictor of PND,<sup>14</sup> being as common as PND, with 18.4% of women having depressive symptoms throughout pregnancy.<sup>17</sup> Antenatal anxiety is commonly comorbid with antenatal depression and also increases the likelihood of PND.<sup>14,15,18</sup>

Additional factors have consistently been associated with PND. Some PND may be biologically mediated and specifically linked to childbirth.<sup>1</sup> Some women with PND may be genetically more reactive to the environmental trigger for depression.<sup>19</sup> In other women, who have a general vulnerability to depression, PND may occur because childbirth is a stressor.<sup>1</sup> The strongest predictors of PND are antenatal anxiety and antenatal depression,<sup>14</sup> lack of social support, a history of depression, neuroticism, low self-esteem, stressful life events during pregnancy, poor marital relationship and domestic violence.<sup>1,20,21</sup> Women themselves have reported that the causes of their PND were lack of support, pressure to do things right, their personality (prone to mental health problems), pressure (work or money), hormonal changes and resurfaced memories.<sup>22</sup> As the aetiology is diverse, it is difficult to predict accurately which women will develop PND.

### Impact of health problem

The burden of PND can extend, in its most severe form, to suicide and, less frequently, infanticide.<sup>23</sup> The impact of PND on mothers is compounded by impairments to the mother–infant interaction<sup>24</sup> and impairments to the infant's longer-term emotional, cognitive, behavioural and social development.<sup>25,26</sup> The impact of withdrawn behaviour<sup>24</sup> and vocally communicated sadness<sup>27</sup> appears to be worsened when women live in poorer socioeconomic circumstances, and is worse if the infant is a boy<sup>28,29</sup> or if depression becomes a chronic problem.<sup>30,31</sup> Additional later risks for infants are mediated through the effect of chronic depression on the hypothalamic–pituitary–adrenal axis functioning in offspring, into adolescence.<sup>25,32,33</sup>

Depressed pregnant women have a greater risk of delivering a low-birthweight infant.<sup>34</sup> Antenatal depression is a risk factor for infant mood<sup>33,35</sup> and for depression in offspring at 18 years of age, with higher risk among offspring whose mothers are less educated.<sup>16,36</sup> There is a potential impact on fathers, around 10% of whom are at risk of depression, particularly during the 3–6 months after the infant is born.<sup>37</sup> This depression is moderately positively correlated with maternal depression, but it is unclear if there is an association or a causal influence, and the direction of the influence, if any, is unknown.<sup>37</sup> Furthermore, postnatal paternal depression is associated with depression in offspring.<sup>16</sup>

## Current service provision

### *Variation in service and uncertainty about best practice*

Free maternity care in the UK, delivered predominantly by midwives and obstetricians, provides opportunities for women to have contact with health-care services. The National Institute for Health and Care Excellence (NICE) provides evidence-based guidelines for antenatal, intrapartum and postnatal care, and for antenatal and postnatal mental health.<sup>38</sup> Among those at low obstetric and medical risk, nine antenatal consultations are recommended for women expecting their first baby and seven consultations for those expecting a subsequent child.<sup>39</sup> Most women give birth in hospital maternity units, or in free-standing or alongside midwifery units and stay in for less than 2 days; fewer than 3% give birth at home.<sup>40</sup>

Traditionally in the UK, hospital midwives have provided care in hospital for antenatal, labouring and postnatal women. Community midwifery teams have provided antenatal care in the community, and postnatal care during visits to the woman's home, community health centres and children's centres for up to 28 days after birth. Care is usually transferred on postnatal day 10 to the health visiting service and is provided by health visitors; specially trained public health nurses. Most health visitors now offer antenatal visits.

National Institute for Health and Care Excellence guidance<sup>38</sup> recommends that primary health-care professionals should routinely enquire about past and current mental illness, and family history of perinatal mental illness, at a woman's first appointment in early pregnancy, and postnatally (4–6 weeks and 3 or 4 months) to identify predictive risk factors. NICE guidance<sup>38</sup> also recommends that midwives enquire within the first 24 hours after birth about a woman's experience of her labour. In some locations, midwife-provided services have developed to provide an opportunity for women to discuss their birth experiences, but these do not always include access to formal psychological support.

The community midwife's role includes an increased focus on improving public health and current pre-registration midwifery education covers the identification of potential mental health issues for childbearing women. The Maternal Mental Health Pathway<sup>41</sup> guidance focuses on the health visitor's role in maternal mental health and wellbeing during pregnancy and postnatally, recognising the contribution of midwives, mental health practitioners and general practitioners (GPs).

Other maternity support roles include maternity support workers and volunteers, such as breastfeeding peer supporters, counsellors and doula support (women who provide support to other women), during pregnancy, labour and birth and the early postnatal period.

Infrequently in the UK, and more commonly in the USA and a small number of other countries, CenteringPregnancy® (Centering Healthcare Institute, Boston, MA, USA) is available.<sup>42,43</sup> The CenteringPregnancy<sup>44</sup> approach provides group care to women at similar stages of pregnancy by means of a health assessment and provision of education and peer support. Health-care professionals help women to participate in their own care and to learn from each other about pregnancy and care of the new infant.

### *Identification of postnatal and antenatal depression*

There has been a lack of consistency in the routine approach to the identification of PND<sup>9,45,46</sup> by primary health-care professionals.<sup>47</sup> NICE advocates a case-finding approach for depressive symptoms,<sup>38</sup> based on two questions, the Patient Health Questionnaire (PHQ)-2, from the PHQ-9, as follows:<sup>48,49</sup> 'Over the last 2 weeks, how often have you been bothered by any of the following problems?' (1) 'Little interest or pleasure in doing things' and (2) 'Feeling, down, depressed, or hopeless'.<sup>49</sup> The EPDS,<sup>10</sup> the Hospital Anxiety and Depression Scale (HADS)<sup>50</sup> and the full PHQ-9 are to be used as follow-up tools as part of a fuller assessment process. The EPDS is frequently used as it performs well for major and minor depression,<sup>45</sup> and is acceptable to women and health-care professionals.<sup>51</sup> The EPDS is not used systematically throughout the UK to identify depressive symptoms during pregnancy or postnatally partly because it 'does not satisfy the National Screening Committee's criteria for the adoption of a screening strategy as part of national health policy'.<sup>52</sup>

### Current service costs

Apart from the distress for women and the potential long-term consequences for infants, there are additional public health, social and economic consequences of maternal depression.<sup>4</sup> The cost of PND to the UK government is estimated as £45M<sup>53</sup> to £61M per year.<sup>4</sup> For each exposed child, the estimated cumulative economic costs of adverse child development linked to a mother's depression is £8190.<sup>54</sup> The health-care costs associated with postnatal paternal depression have been estimated for fathers with depression as £11,041, for fathers at high risk of developing depression as £1075 and for fathers without depression as £945 at 2008 prices.<sup>55</sup> In New Zealand, the potential value for money of implementation of a PND screening programme was assessed and the programme was found to be cost-effective.<sup>56</sup> In contrast, following a cost-effectiveness analysis, a system to identify PND in the UK was reported not to represent value for money based on the assumed cost of false positives.<sup>57</sup> Little is known about the economic consequences of PND or the cost-effectiveness of interventions aiming to prevent or alleviate PND symptoms.<sup>58</sup> Substantial economic returns have been estimated for investment in the prevention of mental health problems, with potential long-term pay-offs continuing into adulthood.<sup>59</sup>

Despite the 'case-finding' approach to identify women at greater risk of PND, mainly based on earlier experience of mental health problems, little attention is paid to the prevention of PND, and no specific instruments are available to reliably predict PND among asymptomatic women. Some health visitors in the UK use the EPDS, but this practice varies nationally. It is likely that even less attention is paid to identifying depression and anxiety antenatally than postnatally.

## Description of technology under assessment

### Preventive interventions for postnatal depression

This section provides an overview of the rationale for the prevention of PND and a description of approaches that have been explored to prevent PND. There is evidence of the effectiveness of pharmacological<sup>60</sup> and psychological interventions<sup>61–63</sup> to treat PND within four main approaches: general counselling, interpersonal psychotherapy (IPT), cognitive-behavioural therapy (CBT) and psychodynamic therapy.<sup>1</sup> Prevention of a major depressive episode implies reducing the intensity, duration and frequency of depressive symptoms.<sup>64</sup>

NHS England has provided a £1.8M budget for public health responsibilities, covering screening, immunisation and health-visiting services.<sup>65</sup> Less than 5% of NHS funding in England is spent on prevention, of all conditions.<sup>65</sup> The Marmot *et al.*<sup>66</sup> review aims to strengthen the role and impact of ill-health prevention, prioritising prevention and early detection of mental health conditions and early intervention. Traditionally primary, secondary and tertiary prevention activities are designed, respectively, to reduce the risk of developing health problems, to identify and manage pre-symptomatic ill health and to reduce the impact of the disease.

Three levels of preventive intervention are relevant to the prevention of PND:<sup>67</sup>

1. Universal preventive interventions are available to all women in a defined population not identified on the basis of increased risk for PND.
2. Selective preventive interventions are offered to women or subgroups of the population whose risk of developing PND are significantly higher than average, because they have one or more social risk factors.
3. Indicated preventive interventions are offered to women at high risk of developing PND on the basis of psychological risk factors, above-average scores on psychological measures or other indications of a predisposition to PND but who do not meet diagnostic criteria for PND at that time.

Universal preventive approaches may be less stigmatising than selective preventive interventions, but little attention has been paid to universal prevention in pregnant women, partly because the cost of a universal programme is likely to be high<sup>63</sup> compared with a selective approach to identify higher-risk women. For example, 81% of women do not have an EPDS score 13 or more during pregnancy.<sup>14</sup> However, there is a rationale for providing a preventive intervention to women with subthreshold symptoms of depression who may otherwise go on to develop depression.<sup>18,64</sup>

The outcomes for a selective intervention depend on how the population and risks are identified and defined.<sup>63</sup> Although indicated preventive interventions for PND could be regarded as addressing prodromal symptoms and therefore are not actually preventive, they could be regarded as early intervention.<sup>68</sup>

The rationale for antenatal prevention of PND is based on data from the Avon Longitudinal Study of Parents and Children study<sup>14</sup> showing that 43.7% of women with an EPDS score 13 or more at 32 weeks of pregnancy experienced elevated symptoms postnatally. Aiming to prevent, identify and treat antenatal depression presupposes that this will lead to a reduction in antenatal maternal morbidity and severity, deleterious effects on the developing infant, postnatal maternal morbidity and severity and other adverse outcomes in the offspring.<sup>16,69</sup> Hence, investment during pregnancy and postnatally may yield future benefits and financial savings in different areas of health and social care.

## Evidence of preventive interventions

A wide range of support and treatment approaches have been explored because of the diverse aetiology of PND (physiological, social or psychological) with the aim of changing the mechanisms leading to PND.<sup>68</sup> Several interventions to prevent PND have been developed as modifications of promising interventions to treat PND. These are classified as psychotherapeutic, biological, pharmacological, educational or social support. Cochrane and other systematic reviews have provided some contradictory findings about the potential to prevent PND. Not enough is known about the effectiveness of these preventive interventions.

### *Psychological approaches to the prevention and treatment of depression*

The psychological literature attests to the large effort expended on research into differing psychological approaches to the prevention<sup>70</sup> and treatment of depression.<sup>71-75</sup> Although depression has often been the initial target condition for testing psychological approaches, it has equally often proved to be a more challenging condition when attempting to establish mechanisms of change that are specific to particular models of therapeutic interventions. A review of 101 randomised controlled trials (RCTs) on the treatment of major depression concluded that IPT, CBT and behaviour therapy are effective, while brief dynamic therapy and emotion-focused therapy are possibly effective.<sup>72</sup>

A different body of literature suggests relatively small differences between the outcomes of different psychological interventions for depression. An earlier review which controlled for researcher allegiance (belief in the superiority of a treatment) found small effect sizes from comparisons between specific therapies.<sup>73</sup> This finding has been broadly supported in a meta-analysis of 58 outcome studies for depression which made direct comparisons between specific therapies, which yielded similarly small effect sizes.<sup>74</sup> However, arguments suggesting that researcher allegiance bias is related to treatment effects have been both supported<sup>76</sup> and challenged.<sup>77</sup>

A wide-ranging review of the efficacy and effectiveness of psychological therapies in general concluded that they were broadly effective for depression with little difference between theoretically diverse interventions.<sup>78</sup> Estimates of the proportion of outcome variance attributable to components of therapy comprised the following: extra-therapeutic factors, 40% (e.g. delivered individually or in a group or the number of sessions); relationship, 30%; placebo/expectancy effects, 15%; and specific techniques, 15%.<sup>78,79</sup> A subsequent meta-analysis in which common factor control groups were employed supported these estimates.<sup>80</sup>

Extensive efforts have been afforded in relation to the development of measures<sup>81</sup> and the measurement of outcomes<sup>82</sup> in psychotherapeutic interventions, and the role of non-specific (common) factors, such as congruence, positive regard and empathy, has long been recognised.<sup>83,84</sup> The account of broadly similar outcomes despite diverse therapeutic interventions (termed the equivalence paradox)<sup>85</sup> has yielded sophisticated accounts to explain this phenomenon, with the existence of common factors persisting as one major explanatory source.<sup>85</sup> However, others have argued that there is no clear evidence supporting a causal link between common factors and therapeutic outcomes.<sup>86</sup> The debate is not so much focused on the validity of the concept but rather on the absence of experimental manipulation as a route to determining which common factors, if any, impact on therapeutic change. The concepts of hope and expectancy, among others, have been posited as common factors, but the main focus for research has been on the concept of the therapeutic relationship or alliance.

### **Educational interventions**

Attention has been paid to developing preventive strategies or interventions that focus on couple communication or parenting skills to ease the transition to parenthood.<sup>87</sup> Antenatal preparation for parenthood has traditionally focused on aspects of the woman's pregnancy and on preparation for childbirth, with less attention paid to what to expect when the infant arrives or to couple communication or parenting.<sup>88,89</sup> Dyadic relationship quality is adversely affected<sup>90</sup> in 67% of new mothers<sup>91</sup> and 45% of new fathers<sup>92</sup> during the first year of parenthood. Despite the central role of partner support in maternal mood,<sup>93</sup> new parent couples have reported being shocked by and unprepared for adverse changes in their relationship, feeling sad and bemused that no one had talked to them about the changes they would experience in their relationships.<sup>94</sup>

Some preventive educational interventions have been delivered universally to all expectant parents, making use of the opportunities to access this population through established antenatal care pathways, thereby reaching couples who may not otherwise seek such support.<sup>95</sup> These, and more targeted, approaches cover a variety of levels of intensity and format and timings.

### **Social support**

Social support is a multidimensional concept that incorporates appraisal, companionship, informational, motivational and instrumental support; that is '... information leading the subject to believe that they are cared for and loved, esteemed and a member of a network of mutual obligations'.<sup>96</sup> Social support involves both social relationships that are embedded, such as relationships with family members or friends, and those that are created.<sup>97</sup>

There are several pathways through which social relationships and social support can affect mental health. Social support can operate to promote health directly by enhancing feelings of well-being or by buffering the negative influences of stressful events. Integration in a social network might also directly produce positive psychological states, including sense of purpose, belonging and recognition of self-worth.<sup>98</sup> These positive states, in turn, might benefit mental health because of an increased motivation for self-care, as well as the modulation of the neuroendocrine response to stress.<sup>98</sup> Being part of a social network enhances the likelihood of accessing various forms of social support, which in turn protects against distress.<sup>99</sup> Members of a social network can exert a salutary influence on mental health by role modelling health-relevant behaviours.<sup>100</sup>

Several different psychosocial mechanisms link aspects of social relationships to physical and emotional well-being: social influence/social comparison, social control, role-based purpose and meaning (mattering), self-esteem, sense of control, belonging and companionship and perceived support availability.<sup>101</sup> Given the importance of social support on mental health outcomes, enhancing social support has been used as a strategy for both the prevention and treatment of PND.

### *Pharmacological interventions or supplements*

Some of the earliest interventions for the treatment and prevention of PND were hormonal. Uncontrolled studies used progesterone,<sup>102–104</sup> but no controlled studies have been conducted of progesterone or oestradiol, as either a treatment or prevention.

Compared with the results of trials supporting antidepressant treatment for major depression, there is relatively little evidence to guide the clinician in treating or preventing PND. The mainstay of treatment has been antidepressant medication but women are reluctant to take antidepressants,<sup>60</sup> as they are concerned about their safety when breastfeeding and the potential for side effects to disturb their interaction with their infant.<sup>105</sup>

It has been reported that fish consumption and omega-3 status after childbirth are not associated with PND,<sup>106</sup> but there is still interest in exploring the role of omega-3 fatty acids in PND, alone or combined with supportive psychotherapy.<sup>107</sup>

### *Complementary and alternative medicine*

This review adopts a generic definition of complementary and alternative medicine (CAM): 'A group of diverse medical and health-care systems, practices and products that are not presently considered to be part of conventional medicine'.<sup>108</sup> Although this definition meets with problems in many areas of medical practice, in that what were once regarded as CAM are now provided as part of conventional medical service, it works reasonably well in perinatal depression, as CAMs are not generally provided in perinatal services.

Complementary and alternative medicine is widely used by pregnant women in the Western world, particularly those who are highly educated and have high incomes,<sup>109</sup> often to reduce stress and improve mood; however, their use remains controversial.<sup>110</sup> Controversy extends beyond the definition of CAM, to the nature of the effects of CAM and to the quality of CAM research. CAM is also widely used by the general public, particularly women,<sup>111,112</sup> many of whom do not report its use to their doctors. It is often used to promote wellness in the positive holistic sense as well as in the management of symptoms and disease. CAM has been offered to women with the aim of treating both antenatal depression<sup>63,113–115</sup> and PND,<sup>63,116</sup> alone or in combination.

The CAM interventions most commonly explored in these studies include aromatherapy, massage, hypnosis and other forms of relaxation therapy, herbal medicine, mindfulness and meditation, acupuncture and general traditional Chinese medicine, Ayurvedic medicine and homeopathy. Acupuncture is a popular form of treatment for depression outside the perinatal period, and there is evidence that its effectiveness is equivalent to that of antidepressants<sup>117</sup> and that side effects are rare. Acupuncture in the context of antenatal depression was examined by a Cochrane review<sup>118</sup> that reported inconclusive evidence.

Mind–body therapies have also been used to treat depression in general and in the perinatal period specifically,<sup>116,119</sup> and for many there is some evidence of effectiveness.<sup>120</sup> Mindfulness has received specific attention in the context of perinatal depression<sup>121</sup> and is supported by an evidence base showing that it is effective in depression in general.<sup>122</sup>

Yoga and tai chi/qi gong are practised both alone and as a component of Ayurvedic and traditional Chinese medicine and are used by pregnant women to improve their health.<sup>110,119</sup> The health effects of these traditional medical approaches are held to extend beyond physical fitness, suppleness and strength, and they overlap with those of simple physical activity, which has also been investigated as an intervention to reduce depressive symptoms in pregnant women.<sup>123</sup>

## Summary

In summary, the prevention of PND is an important and somewhat neglected area in the UK in terms of the potential impact on women and their infants and families. Within the NHS, effort is currently directed towards treating identified depression in perinatal women, particularly postnatally. A range of psychological, educational, pharmacological social support and CAM interventions have been explored to minimise the development of and the intensity, duration, and frequency of depressive symptoms. The next chapter defines the decision problem.

## Chapter 2 Definition of the decision problem

### Decision problem

The focus of this report is the prevention of PND and optimisation of the mental health of pregnant and postnatal women, and consequently the health of their infants.

The population comprised all pregnant women (universal), pregnant women or subgroups whose risk of developing PND was significantly higher than average because they had one or more social risk factor (selective), and pregnant women at high risk of developing PND on the basis of psychological risk factors, above-average scores on psychological measures or other indications of a predisposition to PND or diagnosed depression (indicated). The population also included all postnatal women in their first 6 postnatal weeks (universal), postnatal women or subgroups whose risk of developing PND was significantly higher than average because they had one or more social risk factor (selective), and postnatal women at high risk of developing PND on the basis of psychological risk factors, above-average scores on psychological measures or other indications of a predisposition to PND (indicated), but not postnatal women diagnosed with depression.

All interventions suitable for pregnant women and women in the first 6 postnatal weeks were included. All usual care and enhanced usual-care control and active comparisons were considered. In the review of both the quantitative and the qualitative research literature, all outcomes were considered.

### Overall aim and objectives of assessment

The overall aim of the report was to evaluate the clinical effectiveness, cost-effectiveness, acceptability and safety of antenatal and postnatal interventions to prevent PND. The purpose of the study was to apply rigorous methods of systematic reviewing of quantitative and qualitative studies, evidence synthesis and decision-analytic modelling to evaluate the preventive impact on women and their infants and families.

The objectives of the review were as follows:

1. to determine the clinical effectiveness of antenatal interventions and postnatal interventions to prevent PND (systematic review of quantitative research)
  - a. to identify moderators and mediators of the effectiveness of preventive interventions
  - b. to undertake a meta-analysis of available evidence [including a network meta-analysis (NMA) as appropriate]
2. to provide a detailed service user and service provider perspective on the uptake, acceptability and potential harms of antenatal and postnatal interventions (systematic review of qualitative research)
  - a. to examine the main service models for prevention of PND in relation to the underlying programme theory and mechanisms, with a focus on group- and individual-based approaches (realist synthesis)
3. to undertake an economic analysis, including a systematic review of economic evaluations and the identification of other evidence needed to populate an economic model
4. to determine the potential value of collecting further information on all or some of the input parameters (expected value of information analysis).

### **Service user involvement**

The Nottingham Expert Patient (EP) committee is a group of women who have experienced the distressing effects of severe PND. Three of the women in the group were admitted to a mother and baby unit and all received community psychiatric care. The EP committee, established in 2009, has acted as the patients' 'voice', advising the East Midlands Perinatal Mental Health Clinical Network Board on how to develop local services to meet the needs of women who experience mental health problems in pregnancy and after childbirth. The EP committee has joined the newly formed National Perinatal Mental Health Clinical Reference Group to ensure that the experiences and views of patients inform and influence the planning and delivery of the specialised service.

The EP committee were pleased to be invited to contribute to this review, to be involved in the development of the research proposal and to provide patient and public involvement (PPI) advice throughout the research. The EP committee reviewed the draft research proposal and provided detailed feedback to the principal investigator. The EP committee has maintained involvement through contact with the principal investigator (JM), ad-hoc meetings, having an EP committee member sit on the Expert Clinical/Methodological Group and providing input into this report.

### **Service user feedback on the draft proposal**

The EP committee was initially somewhat sceptical that interventions could prevent PND. Early detection and treatment of PND was considered more of a priority than prevention. The importance of educating health professionals in the detection of and impact of PND was also highlighted. Further discussion and consideration led to collective acknowledgement that all members of the EP committee had experienced the most severe PND, which may not have been preventable. It was agreed that prevention, or at least a reduction in severity of moderate or mild PND, may be possible and worth investigating.

### **Service user feedback on the proposal and ongoing review**

The EP committee questioned the meaning of PND, especially with regard to the term 'depression', as for many of the women anxiety was the major symptom. The research team decided to include maternal anxiety or stress as a secondary outcome, with depression as the primary outcome.

It was suggested that both infanticide (although rare) and the decision to terminate a pregnancy (if PND had been experienced in a previous pregnancy) should be considered as outcomes. Maternal suicide (no longer the most common cause of maternal death)<sup>23</sup> was another potentially preventable outcome. It was agreed to cover these outcomes in the background section of this report. Family outcomes were also emphasised, as the entire EP committee reported the impact of their PND on their children and family members. Of particular note was the impact of their PND on partners, who also may become depressed or anxious.

The group discussed the distinction between prevention and treatment. The question was posed, 'When is an intervention considered treatment and when is it prevention?' One EP committee member had been on antidepressant medication before conceiving (although symptom free) because she experienced PND with her first child. This medication was increased at the end of the first trimester when she developed symptoms of anxiety. This also calls into question the term *postnatal* depression, as many women also become ill in the antenatal period. There was some debate around EPDS scores in the literature and the cut-off point for including studies as prevention studies. It was decided that trials in which included women had a raised EPDS but no diagnosis of PND would be classed as prevention studies.

## Service user feedback on acceptability of interventions to prevent postnatal depression

Given their relatively extreme experiences of PND, the EP committee's view on potential interventions to prevent PND was very open. When faced with a life-changing and potentially life-threatening illness, they felt the choice of intervention was likely to be focused on proven effectiveness.

Medication during pregnancy was perceived to be acceptable to women who have experienced PND in a previous pregnancy, especially severe PND. However, they felt that preventive medication was probably undesirable for those women in their first pregnancy who are asymptomatic but deemed 'at risk'. Other non-pharmacological interventions, such as those being investigated in this review, were considered more likely to be acceptable to the majority of pregnant women.

Overall, the acceptability of interventions to prevent PND was perceived to be influenced by many factors, not least whether or not a woman has a history of PND. The potential for prevention or lessening the severity of PND was viewed by the EP committee as a very encouraging and exciting prospect.



# Chapter 3 Review methods

## Overview of review methods

This chapter details the methods used to identify RCTs, systematic and other reviews and qualitative studies suitable for inclusion in the review. *Figure 1* illustrates the four phases of the review, including the data extraction, analysis and interpretation phases.

## Methods for reviewing and assessing clinical effectiveness

### *Search strategies for identification of studies*

The review of effectiveness of interventions to prevent PND constituted the central platform for this report. The objectives of the individual RCTs and the data available from them determined what NMAs were feasible. The analysis of effectiveness determined the subsequent qualitative synthesis and economic analyses. The leading candidate interventions, demonstrated in terms of potential effectiveness, became the focus for the realist synthesis. This filtered approach recognised that it would not be feasible to conduct rich interpretive explorations across the wide heterogeneity of possible interventions and, therefore, interpretive resources were focused where they were most likely to yield insights on current and future interventions.

### *Search strategy for randomised controlled trials and systematic reviews*

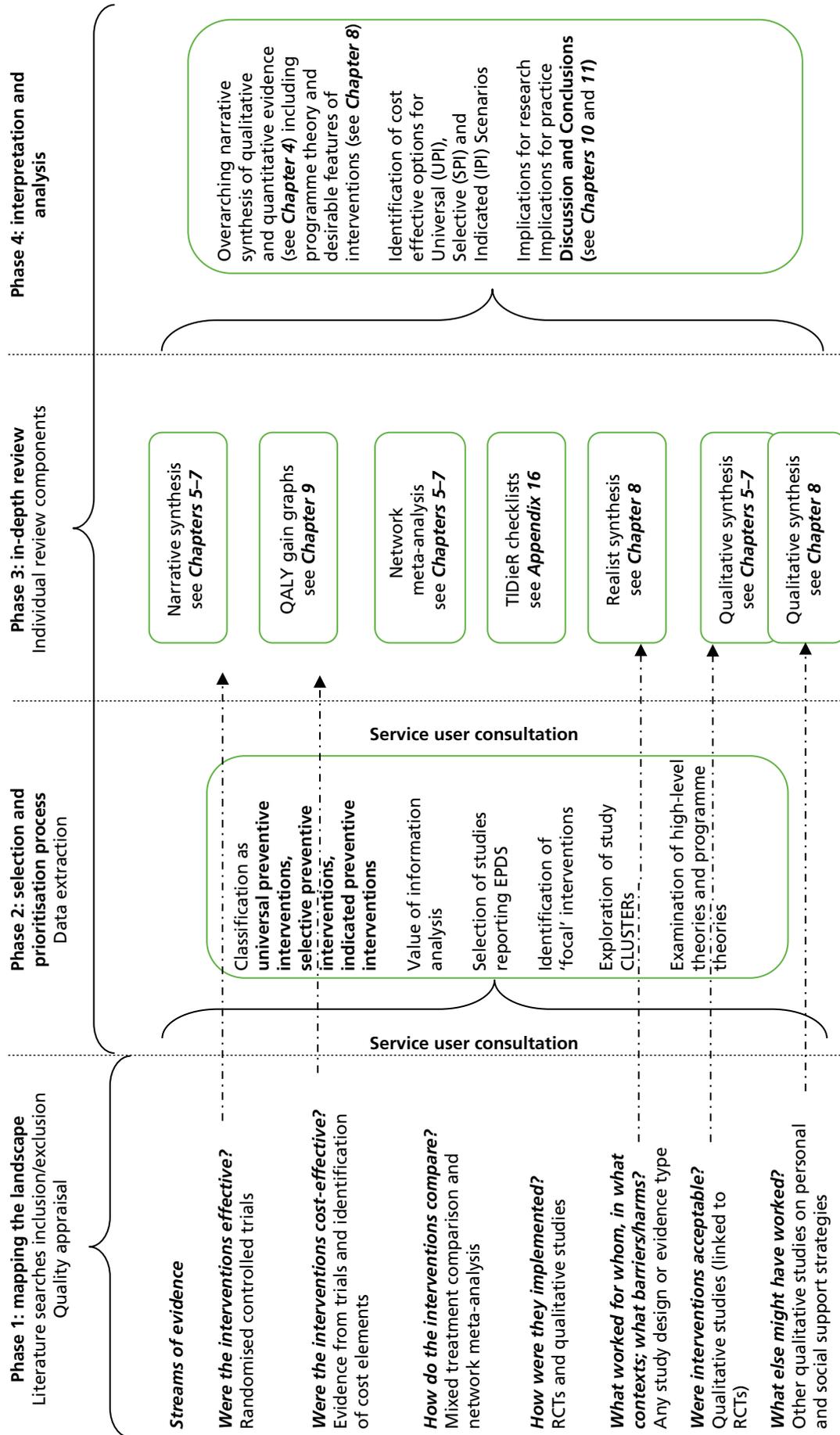
Search activities were as follows:

1. searches of electronic databases
2. searches of the internet
3. searches of specific websites
4. citation searches
5. reference lists of relevant studies
6. hand searches of relevant journals
7. scrutiny of references listed in reviews of the prevention of PND
8. suggestions from experts and those working in the field.

### Searches of electronic databases

A comprehensive search of 12 electronic bibliographic databases was undertaken to identify systematically clinical effectiveness literature comparing different interventions to prevent PND. The literature search strategy is presented in *Appendix 1*. The list of electronic bibliographic databases searched for published and unpublished clinical effectiveness research evidence is presented here:

- The Cochrane Library including the Cochrane Systematic Reviews Database, Cochrane Controlled Trials Register, Database of Abstracts of Reviews of Effects (DARE), Health Technology Assessment (HTA) and NHS Economic Evaluation Database (NHS EED) 1991; searched on 28 November 2012
- MEDLINE (via Ovid) 1946–week 3 November 2012; searched on 30 November 2012
- PreMEDLINE (via Ovid) 4 December 2012; searched on 5 December 2012
- EMBASE (via Ovid) 1974–4 December 2012; searched on 5 December 2012
- Cumulative Index to Nursing and Allied Health Literature (CINAHL; via EBSCOhost) 1982; searched on 11 December 2012
- PsycINFO (via Ovid) 1806–week 4 November 2012; searched on 5 December 2012
- Science Citation Index (via ISI Web of Science) 1899; searched on 5 December 2012
- Social Science Citation Index (via ISI Web of Science) 1956; searched on 5 December 2012



**FIGURE 1** Overview of review methods. Key: IPI, indicated preventive intervention; QALY, quality-adjusted life-year; SPI, selective preventive intervention; TIDieR, template for intervention description and replication; UPI, universal preventive intervention. This is an Open Access article<sup>124</sup>, distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 3.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/3.0/>.

- Applied Social Sciences Index and Abstracts (ASSIA) (via ProQuest) 1987; searched on 19 December 2012
- Allied and Complementary Medicine Database (AMED) (via Ovid) 1985–December 2012; searched on 5 December 2012
- Conference Proceedings Citation Index–Science (CPCI-S) (via ISI Web of Science) 1990; searched on 5 December 2012
- Midwives Information and Resource Service (MIDIRS) Reference Database 1991; searched on 24 July 2013.

Further searches for grey literature were conducted from January to March 2013 on additional resources. A list of the additional resources is presented in *Appendix 1*.

### Search strategy search terms

The search strategy was developed using an iterative approach. The search used a combination of thesaurus and free-text terms for postnatal and antenatal depression combined with terms for prevention or risk factors or generic terms for interventions. The search comprised four facets:

- Facet 1 comprised terms for the population (pregnant and postnatal women).
- Facet 2 comprised terms for prevention.
- Facet 3 comprised terms for known risk factors for PND.
- Facet 4 comprised generic terms for interventions.

Facet 1 was combined separately with facets 2, 3 and 4. The major search refinement was to reduce the number of search terms in facet 1, then extra terms were added for facets 2, 3 and 4. In addition, the searches were combined with search filters for specific study designs when appropriate. All searches were performed by an information specialist (AC) from November to December 2012. Copies of The Cochrane Library and all the other search strategies are presented in *Appendix 1*.

The search strategy was used to search the Cochrane Central Register of Controlled Trials (CENTRAL) and then to search other databases not indexed by Clinical Trials. CENTRAL runs sensitive strategies on MEDLINE and EMBASE to identify relevant published RCTs; therefore, MEDLINE and EMBASE were not searched retrospectively. Records were retrieved through planned manual searching of a journal or conference proceedings to identify all reports of RCTs and controlled clinical trials.<sup>125</sup> The search was run with a systematic reviews filter to find Cochrane and other systematic reviews. The number of RCT and systematic review results obtained for the various databases searched is presented in *Appendix 2*.

### Citation searches, reference lists, relevant journals and clinical experts

Reference tracking of all included and relevant studies was performed and reference lists of relevant reviews and systematic reviews were scrutinised to identify additional, relevant studies not retrieved by the electronic search to identify further potentially eligible RCTs. Searching of key journals, selected following consultation with clinical experts, was conducted using electronic table of contents alerts from January to July 2013 for 33 journals, presented in *Appendix 3*. Clinical advisors were also contacted about further potentially relevant RCTs.

### Search outcome summary for the randomised controlled trials

Search result citations were imported and merged into Reference Manager, version 12<sup>126</sup> (Thomson ResearchSoft, San Francisco, CA, USA), and duplicates were removed by Reference Manager or deleted manually (by JM and AC).

## Review protocol

The population, intervention, comparators, outcomes, study designs (PICOS) process was used to break down the research question into concepts and search terms. Recognising that systems of care differ internationally, rather than concentrating solely on UK-based RCTs, we were deliberately inclusive in our search to capture RCTs of all interventions, irrespective of their health-care context. The research protocol is registered on PROSPERO (registration number CRD42012003273).

### Inclusion and exclusion criteria for quantitative studies

#### Population

The population included women of all ages who were either pregnant or had given birth in the previous 6 weeks. The population was separated according to level of risk of PND into three levels, universal, selective or indicated, as follows:

- Universal: all women in a defined population not identified on the basis of increased risk of PND.
- Selective: women or subgroups of the population whose risk of developing PND was significantly higher than average because they had one or more social risk factors such as general vulnerability, aged less than 18 years, at risk of violence, ethnic minority, human immunodeficiency virus (HIV) positive, living in deprivation or financial hardship or poverty, or single, socially disadvantaged or unsupported.
- Indicated: women at high risk of developing PND on the basis of psychological risk factors, above-average scores on psychological measures or other indications of a predisposition to PND but who did not meet diagnostic criteria for PND at that time, such as antenatal depression, a raised symptom depression score and a history of PND or history of major depression.

The population dimension for the PICOS framework is presented in *Box 2*.

#### BOX 2 Population dimension of the PICOS framework for quantitative review

##### Included

Pregnant women (universal).

Postnatal women with a live baby born within the previous 6 weeks (universal).

Vulnerable pregnant or postnatal women who were aged less than 18 years; at risk of violence; an ethnic minority; HIV positive; living in deprivation, financial hardship or poverty; or single, socially disadvantaged or unsupported (selective).

Pregnant or postnatal women with a raised score on the antenatal risk questionnaire, Beck Depression Inventory, Center for Epidemiologic Studies Depression scale, the Cooper predictive index, depression symptom checklist, EPDS, HADS, Hamilton Depression Rating Scale, Health during pregnancy questionnaire; a past history of PND or major depression (indicated).

Pregnant women with a diagnosis of depression using Research Diagnostic Criteria or DSM-IV criteria (indicated).

##### Excluded

Postnatal women with a diagnosis of PND.

Pregnant women with comorbid psychiatric disorders.

Postnatal women with major medical problems.

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DSM-IV, *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition*.

## Interventions

The preventive interventions were also separated into three levels of preventive intervention according to the population for which the intervention was intended:

- Universal preventive interventions: interventions available for all women in a defined population not identified on the basis of increased risk of PND.
- Selective preventive interventions: interventions offered to women or subgroups of the population whose risk of developing PND was significantly higher than average because they had one or more social risk factors.
- Indicated preventive interventions: interventions offered to women at high risk of developing PND on the basis of psychological risk factors, above-average scores on psychological measures or other indications of a predisposition to PND but who did not meet diagnostic criteria for PND at that time.

Seven main classes of interventions were also categorised as presented in *Box 3*.

### BOX 3 Intervention dimension of the PICOS framework for quantitative review

#### Included

**Pharmacological agents or supplements:** prescribed antidepressants, calcium, dietary supplements, hormone therapy, thyroid therapy.

**Psychological:** the breadth of psychological interventions and approaches which comprise components of a psychotherapeutic approach.

**Social support:** home visits, telephone-based peer support, doula support, social support.

**Educational:** educational information booklets and classes.

**Organisation of maternity care:** alternative forms of contact with care providers, primary care strategies.

**CAM or other:** music, acupuncture, tai chi, yoga, pregnancy massage, aromatherapy, exercise and herbal medicine.

**Midwifery-led interventions:** different approaches to antenatal care, CenteringPregnancy, team midwife care, caseload midwifery.

#### Excluded

Treatment trials for women with PND.

Interventions initiated preconceptionally.

Interventions initiated more than 6 weeks postnatally.

### Comparators

All comparison arms for all eligible studies in all countries were included, whether usual care, enhanced usual care, or an active comparison group.

### Outcomes

The main outcome was a validated measure of symptoms of maternal depression or a diagnostic measure of depression from 6 weeks to 12 months postnatally. Other maternal outcomes of anxiety and well-being were included. Binary, categorical or continuous outcomes were included, whether as a single measure or assessed at more than one postbaseline treatment time point. The outcomes dimension is presented in *Box 4*.

### Study designs

The study designs dimension is presented in *Box 5*.

#### BOX 4 Outcome dimension of the PICOS framework for quantitative review

##### Included

Depression symptoms measured on a validated self-completed instrument.

Depression diagnosis.

Anxiety symptoms.

Diagnostic measure of anxiety.

Birth outcomes.

Infant outcomes.

Family outcomes.

##### Excluded

No measure of PND reported in the results.

Outcome measurements more than 12 months postnatally.

Outcome measurements less than 6 weeks postnatally.

Physiological measurement.

Unvalidated measures of depression.

**BOX 5** Study design dimension of the PICOS framework for quantitative review**Included**

RCTs.

Economic evaluations alongside RCTs.

Systematic reviews of the prevention of PND.

**Excluded**

Before-and-after studies.

Case-control studies.

Cohort studies.

Commentary or clinical overviews.

Cross-sectional surveys.

Description of a study.

Non-randomised control groups.

Non-systematic reviews.

Not a PND prevention trial.

Ongoing RCTs.

Protocols for a RCT.

Reviews not about prevention of PND.

Secondary analysis of data from a RCT.

Studies reported in non-English language.

Systematic reviews not about prevention of PND.

## Search strategy and outcome summary for the qualitative studies

### *Electronic databases*

The search for the clinical effectiveness evidence was run with a qualitative filter to identify qualitative studies. The list of electronic bibliographic databases searched is presented in *Appendix 1*. The search was run again with a mixed-methods filter (devised with AB) to find papers that used quantitative and qualitative methodology. The numbers of qualitative studies and mixed-methods studies retrieved for the various databases searched are presented in *Appendix 4*.

## Study selection

### *Study selection criteria and procedures for the quantitative review*

Two reviewers (JM and PS) independently screened the titles and abstracts to identify papers for possible inclusion. If no abstract was available, the full paper was retrieved for scrutiny. Full papers for RCTs were obtained if the abstract showed that the study fulfilled the inclusion criteria or it was unclear from the abstract whether or not the inclusion criteria were fulfilled. All full papers retrieved were independently reviewed by two reviewers. Papers were not excluded on quality at this selection stage. The full papers had to fulfil the inclusion criteria presented in *Tables 2–5*. Where there was no consensus following discussion about inclusion at the full-paper stage, a third reviewer or clinical expert (CLD, HS or SS-B) was consulted. The reasons for exclusion are presented in *Appendix 5*.

### *Study quality assessment checklists and procedures for the randomised controlled trials*

#### Risk-of-bias assessment

The quality of each paper was assessed independently by two reviewers (JM and PS) using the Cochrane Collaboration's tool for assessing risk of bias in randomised trials.<sup>126</sup> Any disagreements about risk of bias were resolved by a third reviewer. The risks assessed were:

- risk of selection bias (random sequence generation and allocation concealment)
- risk of performance bias (blinding of participants and personnel)
- risk of detection bias (blinding of outcome assessors)
- risk of attrition bias (incomplete outcome data)
- risk of reporting bias (selective reporting of the outcome, subgroups or analysis)
- risk of other sources of bias (any important concerns about other possible sources of bias such as funding source, adequacy of statistical methods used, type of analysis, baseline between-group imbalance in important prognostic factors).

The risks were assessed as low risk of bias, high risk of bias or unclear risk of bias. For each assessed risk, the reviewers provided a statement, description or direct quotation to support their judgement. A summary assessment of risk was made across all the risks, to inform the interpretation of plausible bias and summary risk of bias is presented in *Chapter 4*, the overview of results for quantitative and qualitative studies.

### *Data extraction for randomised controlled trials*

Data from the full papers were entered on to a specially designed, pre-piloted and tailored data extraction form, to summarise the intervention. The primary aim of the study was documented (PND prevention, antenatal well-being, birth outcomes, general health, general psychological well-being, infant outcomes or family outcomes). The intervention and comparison arms were described. The data extraction form indicating the main RCT characteristics is presented in *Appendix 6*.

Outcomes were recorded as maternal, neonatal and family outcomes, using mean [standard deviation (SD)] values when available and numbers and proportions of participants in specific outcome categories. The quality of the extracted data was checked (JM and PS).

### Potential moderators

Potential moderators are variables describing population characteristics, for which the intervention may have a different effect for different values of the moderator variable.<sup>127</sup> These were documented when there was some basis for believing that the maternal population characteristics might have a moderating effect on the outcomes, for example maternal age, parity, being a sole parent, history of mental health problems and history of PND. Baseline depression scores were recorded to estimate the population mean depression score for women who entered the studies.

### Potential mediators

Potential mediators are variables that could help explain the process by which an intervention was effective.<sup>127</sup> These were documented, such as the timing of the intervention, the provider, the number of sessions offered and whether the intervention was individual based or group based.

### Data synthesis of randomised controlled trials

A large number of RCTs and systematic reviews were eligible for inclusion according to our broad inclusion characteristics. We conducted a narrative description of the studies according to the level of preventive intervention (universal, selective or indicated), class of intervention and the context within which the RCTs were undertaken.

## Meta-analysis of randomised controlled trials

### Methods of evidence synthesis

The extracted data and quality assessment variables were presented, for each study, in structured tables and as a narrative description. Both conventional RCTs, in which individual women were randomised to interventions, and cluster RCTs (CRCTs) were eligible for inclusion. Estimates of treatment effect and standard error of treatment effects from CRCTs were included in the analyses after allowing for the cluster design.

The reference treatment, for comparative purposes and for estimating intervention effects, was defined as usual care. Usual care in the UK, Australia, Canada, France, Norway and the USA was assumed to be sufficiently similar to be interchangeable and was collectively defined as 'usual care' for the purpose of the analysis.

The evidence was synthesised using a NMA.<sup>128</sup> A NMA (also known as a mixed-treatment comparison or a multiple treatment comparison) is an extension of a standard (pairwise) meta-analysis. It allows evidence from RCTs comparing different interventions to be combined to provide an internally consistent set of intervention effects while respecting the randomisation used in individual studies. The NMA enables a simultaneous comparison of all evaluated interventions in a single coherent analysis; thus, all interventions can be compared with one another, including comparisons not evaluated within individual studies. The only requirement is that each study must be linked to at least one other study through having at least one intervention in common. The analysis preserves the within-study randomised treatment comparison of each study and assumes that there is consistency across evidence. As with standard pairwise meta-analyses, treatment effects are assumed to be exchangeable across studies. In addition, it is assumed that treatment effects are transitive such that if the effect of intervention 2 relative to intervention 1 is  $d_{21}$  and the effect of intervention 3 relative to intervention 1 is  $d_{31}$ , then the effect of intervention 3 relative to intervention 2 is  $d_{32} = d_{31} - d_{21}$ ; this allows a synthesis of direct and indirect evidence about intervention effects and a simultaneous comparison between interventions. Evidence from RCTs presenting data at any assessment time up to 12 months were considered relevant to the decision problem.

### Methods for the estimation of efficacy

#### Statistical model for Edinburgh Postnatal Depression Scale threshold score

The number of women who had an EPDS score greater than a specified threshold was available from several studies at four different postnatal stages depending on the study (i.e. 6 weeks, 3 months, 6 months and 12 months). Most studies used one threshold, although the thresholds varied across studies (i.e. threshold score of 10, 11, 12 and 13). One study<sup>129</sup> reported the number of women who had an EPDS score at two thresholds (i.e. 10 and 13).

The EPDS threshold scores were regarded as being ordered categorical data with categories 0–9, 10, 11, 12, 13 and 14 or more. We assumed an underlying proportional odds model such that:

$$\log\left(\frac{P(Y \leq j|x)}{1-P(Y \leq j|x)}\right) = \text{logit}(P(Y \leq j|x)) = \alpha_j + \beta x; j = 1, \dots, j-1; x = 0, 1, \quad (1)$$

where  $\alpha_j$  is the cumulative log-odds for the control intervention ( $x=0$ ) and  $\beta$  is the log-odds ratio for the experimental intervention ( $x=1$ ) relative to the control intervention. The model assumes that the cumulative log-odds ratios are independent of the threshold so that the effect of treatment does not depend on the threshold. Although this may be a strong assumption, it cannot be assessed in studies that use only one threshold, which are all but one study.

Studies were classified as follows:

- RCTs randomising women to interventions and reporting data using one threshold
- RCTs randomising women to interventions and reporting data using two thresholds
- CRCTs.

#### Randomised controlled trials randomising women to interventions and reporting data using one threshold

For RCTs, randomising women to interventions and reporting data using one threshold, we let  $r_{ik}$  be the number of women with a response greater than the threshold for each arm out of  $n_{ik}$  women for arm  $k$  in study  $i$ . We assumed that the data follow a binomial likelihood such that:

$$r_{ik} \sim \text{Binomial}(p_{ik}, n_{ik}), \quad (2)$$

where  $p_{ik}$  is the probability that a women has a response greater than the threshold in arm  $k$  of study  $i$ . The  $p_{ik}$  values are transformed to the real line using a logit link function such that:

$$\text{logit}(p_{ik}) = \mu_i + \delta_{i,bk} I_{\{k \neq 1\}}, \quad (3)$$

where

$$I_{\{u\}} = \begin{cases} 1; & \text{if } u \text{ is true} \\ 0; & \text{otherwise,} \end{cases} \quad (4)$$

$\mu_i$  is the study-specific baseline log-odds of having a response greater than the threshold in the control intervention of the study and  $\delta_{i,bk}$  is the study-specific log-odds ratios of having a response greater than the threshold in the intervention group compared with the control intervention,  $b$ .

## Randomised controlled trials randomising women to interventions and reporting data using two thresholds

For RCTs randomising women to interventions and reporting data using two thresholds, we fitted a proportional odds model using the freely available software package R (The R Foundation for Statistical Computing, Vienna, Austria) using the 'polr' function within the MASS package and obtained the sample estimate of the log-odds ratio,  $y_{i,bk}$ , and its standard error,  $V_{i,bk}$ , for intervention  $k$  relative to intervention  $b$  in study  $i$ . We assumed that the sample log-odds ratios arose from a normal likelihood such that:

$$y_{i,bk} \sim N(\delta_{i,bk}, V_{i,bk}). \quad (5)$$

## Cluster randomised controlled trials

For two-arm CRCTs (which reported data using one threshold), the sample estimate of the log-odds ratio,  $y_{i,bk}$ , and its adjusted standard error,  $V_{i,bk}$ , for intervention  $k$  relative to intervention  $b$  in study  $i$  were extracted and assumed to have arisen from a normal likelihood such that:

$$y_{i,bk} \sim N(\delta_{i,bk}, V_{i,bk}). \quad (6)$$

For three-arm CRCTs (which reported data using one threshold), the two intervention effects are correlated because they are both estimated relative to the same control. The likelihood function for study  $i$  was defined to be bivariate normal such that:

$$\begin{pmatrix} y_{i,b2} \\ y_{i,b3} \end{pmatrix} \sim BN \left[ \begin{pmatrix} \delta_{i,b2} \\ \delta_{i,b3} \end{pmatrix}, \begin{pmatrix} V_{i,b2} & se_{i,1}^2 \\ se_{i,1}^2 & V_{i,b3} \end{pmatrix} \right], \quad (7)$$

where  $y_{i,bk}$  and  $V_{i,bk}$  are as defined before, and  $se_{i,1}^2$  is the variance of the control intervention log-odds.

The population standard errors of the log-odds ratios and the population standard error of the control intervention in a three-arm cluster randomised trial were assumed to be known and equal to the sample estimates.

For a random (intervention)-effects model, we assumed that the study-specific log-odds ratios arose from a common population distribution such that:

$$\delta_{i,bk} \sim N(d_{1k} - d_{1b}, \tau^2), \quad (8)$$

where  $d_{1k}$  is the population log-odds ratios for intervention  $k$  relative to the reference intervention (i.e. usual care) and  $\tau$  is the between-study SD. We assumed a homogenous variance model in which the between-study SD was assumed to be common to all treatment effects. For multiarm trials, these univariate normal distributions are replaced by a multivariate normal distribution to account for correlation between treatment effects within a multiarm study.

Parameters were estimated using Markov chain Monte Carlo simulation conducted using the freely available software package WinBUGS 1.4.3. (MRC Biostatistics Unit, Cambridge, UK).<sup>130</sup>

The model was completed by giving the parameters prior distributions:

- Vague prior distributions for the trial-specific baselines,  $\mu_i \sim N(0,1000)$ .
- Vague prior distributions for the treatment effects relative to reference treatment,  $d_{1t} \sim N(0,1000)$ .

Weakly informative prior distribution for the between-study SD of treatment effects,  $\tau \sim HN(0, 0.32^2)$  [in addition, as a sensitivity analysis, the model was also run using the conventional vague prior distribution  $\tau \sim U(0,2)$ ].

Vague prior distributions were used for trial-specific baseline and treatment effect parameters. However, a weakly informative prior distribution was used for the between-study SD because there were insufficient studies with which to estimate it from the sample data alone; this prior distribution was chosen to ensure that, a priori, 95% of the study-specific odds ratios were within a factor of 2 from the median odds ratio for each treatment comparison.

Convergence of the Markov chains to their stationary distributions was assessed using the Gelman–Rubin statistic.<sup>131</sup> The chains converged within 25,000 iterations; a burn-in of 30,000 iterations was used. We retained a further 10,000 iterations of the Markov chain with which to estimate parameters.

Results are presented as odds ratios [and 95% credible intervals (CrIs)], the between-study SD (and its 95% CrI) and rankograms (i.e. the probability of treatment rankings). CrIs provide an x% interval such that there is a x% probability that the true parameter lies within the interval. Rankograms provide the probabilities of each treatment being ranked as the best, second best, and so on through to the lowest-ranked treatment. The between-study SD provides a measure of heterogeneity in treatment effects between studies; on the log-odds scale, a between-study SD less than 0.5 is indicative of mild heterogeneity, of between 0.5 and 1 is indicative of moderate heterogeneity and of greater than 1 is indicative of extreme heterogeneity.

### Statistical model for Edinburgh Postnatal Depression Scale mean scores

The analysis of the EPDS score data was conducted in two stages: (1) a treatment-effects model in which the effect of each intervention was estimated relative to usual care and (2) a baseline (i.e. usual-care) model in which the absolute response to usual care was estimated. The treatment-effects model provides estimates of relative treatment effects which are used to make inferences about the relative effects of interventions. The estimates of treatment effects relative to usual care were combined with the baseline model to provide estimates of absolute responses for each intervention; these estimates were used as inputs to the economic model.

#### Treatment-effects model

In general, each study provided data for each intervention in each study at baseline and at least one on-treatment assessment time. We excluded the baseline data from the treatment-effects model; the remaining data are longitudinal (i.e. repeated measures) and are correlated between times.

We began by supposing that we have observations,  $\mathbf{y}_{ij} = (\mathbf{x}_{ij}, \mathbf{S}_{ij})$ , for  $i = 1, 2, \dots, I$  and  $j = 1, 2, \dots, J$  for women in study  $i$  receiving intervention  $j$ , that is we suppose that the sample mean EPDS scores for women in study  $i$  receiving treatment  $j$  at times  $t$  can be denoted by the vector  $\mathbf{x}_{ij} = (x_{ij1}, \dots, x_{ijT})^T$ , and that the sample mean variance–covariance matrix,  $\mathbf{S}_{ij}$ , is:

$$\mathbf{S}_{ij} = \begin{pmatrix} S_{ij1}^2 & S_{ij1}S_{ij2}r_{12S_i} & \cdots & S_{ij1}S_{ij,T-1}r_{1,T-1,S_i} & S_{ij1}S_{ijT}r_{1TS_i} \\ S_{ij1}S_{ij2}r_{12S_i} & S_{ij2}^2 & \cdots & S_{ij2}S_{ij,T-1}r_{2,T-1,S_i} & S_{ij2}S_{ijT}r_{2TS_i} \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ S_{ij1}S_{ij,T-1}r_{1,T-1,S_i} & S_{ij,T-1}S_{ij,2}r_{T-1,2S_i} & \cdots & S_{ij,T-1}^2 & S_{ij,T-1}S_{ij,T}r_{T-1,T,S_i} \\ S_{ij1}S_{ijT}r_{1TS_i} & S_{ijT}S_{ij2}r_{T2S_i} & \cdots & S_{ijT}S_{ij,T-1}r_{T,T-1,S_i} & S_{ijT}^2 \end{pmatrix} \quad (9)$$

where the diagonal elements are the variances of the sample means at each time, the off-diagonal elements are the covariances between sample means at different times and the  $r_{ijs_i}$  are the sample estimates of the within-study correlation coefficients, which depend on study  $s_i$ .

Although the woman-specific EPDS scores are discrete in the range 0–30, and the underlying distribution of EPDS scores is unlikely to be normal, we appeal to the central limit theorem which states that as the sample size approaches infinity for any underlying distribution with finite mean and variance, then the distribution of the sample mean is normal. Therefore, we assume that the likelihood for the samples means for women in study  $i$ , receiving treatment  $j$  is:

$$\mathbf{x}_{ij}|\boldsymbol{\theta} \sim \mathbf{N}(\mathbf{v}_{ij}, \mathbf{s}_{ij}), \quad (10)$$

where  $\mathbf{v}_{ij} = (v_{ij1}, \dots, v_{ijT})^T$  represents the study-specific population mean vector of EPDS scores for treatment  $j$  in study  $i$ .

Published papers provided no information on the correlation between sample means at different times. Therefore, we began by assuming that the  $r_{jts_i}$  is zero. We also assumed that the population standard errors,  $\sigma_{ijt}/\sqrt{n_{ijt}}$  were known and equal to the sample standard errors,  $S_{ijt}$ , where  $\sigma_{ijt}$  are the population SDs of an individual observation for women in study  $i$ , receiving treatment  $j$  at time  $t$ .

The model for the treatment effects follows that for a NMA of repeated measures as presented by Dakin *et al.*<sup>132</sup> We estimate the treatment effects separately for each time such that:

$$v_{ijt} = \mu_{it} + \delta_{ijt}, \quad (11)$$

where  $\mu_{it}$  is the population mean EPDS score for the baseline treatment (which is allowed to vary between studies) in study  $i$  at time  $t$  and  $\delta_{ijt}$  is the population mean effect of treatment  $j$  in study  $i$  at time  $t$ .

We used an unconstrained baseline model in which the effect of the baseline treatment in each study is fixed at each time, thereby preserving the randomisation within each study. We assumed that the effects of treatment  $j$  in study  $i$  at time  $t$  arose from a normal distribution such that:

$$\delta_{ijt} \sim \mathbf{N}(d_{a_i, j, b_i, t} - d_{a_i, 1, b_i, t}, \boldsymbol{\tau}^2), \quad (12)$$

where  $a_{i,k}$  indicates the treatment used in the  $k$ th arm of study  $i$ . We assumed a homogeneous variance model in which the between-study SD was assumed to be common to all treatment effects and also across times. For multiarm trials, these univariate normal distributions are replaced by a multivariate normal distribution to account for correlation between treatment effects within a multiarm study.

Parameters were estimated using Markov chain Monte Carlo simulation conduction using WinBUGS 1.4.3.<sup>130</sup>

The model was completed by giving the parameters prior distributions:

- Vague prior distributions for the trial-specific baselines,  $\mu_i \sim \mathbf{N}(0, 1000)$ .
- Vague prior distributions for the treatment effects relative to reference treatment,  $d_{1t} \sim \mathbf{N}(0, 1000)$ .
- A weakly informative prior distribution for the between-study SD of treatment effects,  $\boldsymbol{\tau} \sim \text{HN}(0, 2)$ .

Vague prior distributions were used for trial-specific baseline and treatment effect parameters. However, a weakly informative prior distribution was used for the between-study SD because there were insufficient studies with which to estimate it from the sample data alone; this prior distribution has median 0.95 (95% CrI 0.04 to 3.17) and was chosen to ensure that, a priori, 95% of the study-specific differences between interventions in mean EPDS scores were within a range  $\pm 3.1$  for each treatment comparison.

Convergence of the Markov chains to their stationary distributions was assessed using the Gelman–Rubin statistic.<sup>131</sup> The chains converged within 25,000 iterations; therefore, a burn-in of 30,000 iterations was used. We retained a further 10,000 iterations of the Markov chain to estimate parameters.

Results are presented as differences between intervention in mean EPDS scores and 95% Crls, the between-study SD (and its 95% Crl) and rankograms (i.e. the probability of treatment rankings) at each time. Crls provide an  $x\%$  interval such that there is a  $x\%$  probability that the true parameter lies within the interval. Rankograms provide the probabilities of each treatment being ranked the best, second best, through to the lowest-ranked treatment. The between-study SD provides a measure of heterogeneity in treatment effects between studies; for continuous outcome measures the extent to which the between-study SD indicates mild, moderate or extreme heterogeneity depends on the scale of measurement and the variation within study.

### Baseline model

In general, studies in which the control intervention was usual care provided data at baseline and at least one on-treatment assessment time. Therefore, the data are longitudinal (i.e. repeated measures) and are correlated between times.

We began by supposing that we have observations  $\mathbf{y}_i = (\mathbf{x}_i, \mathbf{S}_i)$ , for  $i = 1, 2, \dots, l$ , for women in study  $i$ , that is we suppose that the sample mean EPDS scores for women in study  $i$ , receiving usual care at times  $t$ , can be denoted by the vector  $\mathbf{x}_i = (x_{i1}, \dots, x_{iT})^T$ , and that the sample mean variance–covariance matrix,  $\mathbf{S}_i$ , is:

$$\mathbf{S}_i = \begin{pmatrix} S_{i1}^2 & S_{i1}S_{i2}r_{12S_i} & \cdots & S_{i1}S_{i, T-1}r_{1, T-1, S_i} & S_{i1}S_{iT}r_{1TS_i} \\ S_{i1}S_{i2}r_{12S_i} & S_{i2}^2 & \cdots & S_{i2}S_{i, T-1}r_{2, T-1, S_i} & S_{i2}S_{iT}r_{2TS_i} \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ S_{i1}S_{i, T-1}r_{1, T-1, S_i} & S_{iT-1}S_{i, 2}r_{T-1, 2S_i} & \cdots & S_{iT-1}^2 & S_{iT-1}S_{i, T}r_{T-1, T, S_i} \\ S_{i1}S_{iT}r_{1TS_i} & S_{iT}S_{i2}r_{T2S_i} & \cdots & S_{iT}S_{i, T-1}r_{T, T-1, S_i} & S_{iT}^2 \end{pmatrix}, \quad (13)$$

where the diagonal elements are the variances of the sample means at each time, the off-diagonal elements are the covariances between sample means at different times and the  $r_{ijS_i}$  are the sample estimates of the within-study correlation coefficients, which depend on study  $S_i$ . In practice, not all women provide data at each time and the covariances depend on the number of women who provide data at each time as well as the number of women who provide data at both times. Therefore, the covariance between sample means within a study at times  $t$  and  $t'$  is:

$$\frac{n_{tt'}}{n_t n_{t'}} S_{i1}S_{i2}r_{12S_i}. \quad (14)$$

Although the woman-specific EPDS scores are discrete in the range 0–30, and the underlying distribution of EPDS scores is unlikely to be normal, we appeal to the central limit theorem which states that as the sample size approaches infinity for any underlying distribution with finite mean and variance, then the distribution of the sample mean is normal. Therefore, we assume that the likelihood for the samples means for women in study  $i$  is:

$$\mathbf{x}_i | \boldsymbol{\theta} \sim \mathbf{N}(\mathbf{v}_i, \mathbf{S}_i), \quad (15)$$

where  $\mathbf{v}_i = (v_{i1}, \dots, v_{iT})^T$  represents the study-specific population mean vector of EPDS scores for women in study  $i$ , receiving usual care at times  $t$ . Studies do not provide data at all times so that the number of times with data,  $T_i$ , in study  $i$  is such that  $1 \leq T_i \leq T$ .

Published papers provided no information on the correlation between sample means at different times. However, using individual woman-level data from the PoNDER (PostNatal Depression Economic evaluation and Randomised controlled trial), we obtained estimates of the correlation coefficients between sample

EPDS scores at baseline, 6 months and 12 months to be  $r_{b,6m} = 0.345$ ,  $r_{b,12m} = 0.369$  and  $r_{6m,12m} = 0.721$ . In the absence of any additional external evidence, we made the assumptions as follows:

$$r_{b,6w} = r_{b,3m} = r_{b,6m} = r_{6w,3m} = r_{6w,6m} = 0.345 \quad (16)$$

$$r_{b,12m} = r_{6w,12m} = 0.369 \quad (17)$$

$$r_{3m,6m} = r_{6m,12m} = r_{6m,12m} = 0.721. \quad (18)$$

The model for the baseline effects follows that presented by Wei and Higgins.<sup>133</sup> We let  $v_i \sim MVN(X_i\mu, X_i\Omega X_i^T)$  where  $X_i$  is a  $T_i \times T$  design matrix defining which of the  $T$  times are included in the study,  $\mu$  is a  $T \times 1$  vector of underlying mean EPDS scores across studies, and  $\Omega$  is a  $T \times T$  matrix representing the between study covariance matrix for all  $T$  times. Thus, the studies are linked through the parameters that characterise the distribution of the random effects.

All analyses were conducted in WinBUGS 1.4.3.<sup>130</sup> The model was completed by giving the parameters prior distributions:

- Vague prior distributions for the treatment effects relative to the reference treatment,  $d_{1t} \sim N(0, 1000)$ .
- Weakly informative prior distributions for the between-study SD of treatment effects,  $\tau \sim HN(0, 2)$ .
- Weakly informative prior distributions for the correlation coefficients  $U(-1, 1)$ .

Vague prior distributions were used for treatment effect parameters. However, a weakly informative prior distribution was used for the between-study SD because there were insufficient studies with which to estimate it from the sample data alone; this prior distribution has a median of 0.95 (95% CrI 0.04 to 3.17) and was chosen to ensure that, a priori, 95% of the study-specific differences in means lie within a range  $\pm 3.1$  for each treatment comparison.

Convergence of the Markov chains to their stationary distributions was assessed using the Gelman–Rubin statistic.<sup>131</sup> The chains converged within 10,000 iterations so a burn-in of 10,000 iterations was used. We retained a further 10,000 iterations of the Markov chain to estimate parameters after thinning the chains by retaining every 10th iteration to account for correlation between successive iterations of the Markov chain.

Results are presented as means (and 95% CrIs) and the between-study SD (and its 95% CrI) at each time.

The mean EPDS scores and the covariance matrix were extracted and were coupled with the treatment-effects model to generate absolute EPDS scores for each treatment as inputs to the economic model. Riley<sup>134</sup> showed that, in the context of multivariate meta-analyses, ignoring the within-study correlation can have substantial impact on parameter estimates and their correlation expect when the within-study variation is small relative to the between-study variation. Morrell *et al.*<sup>61</sup> provided information about usual care, cognitive–behavioural approach (CBA)-based intervention and a person-centred approach (PCA)-based intervention at baseline, 6 months and 12 months, and was used to estimate the within-study correlation coefficients.

## Methods for reviewing and assessing qualitative studies

### Study selection criteria and procedures for the effectiveness review

A two-stage sifting process for inclusion of studies (title and abstract then full paper sift) was undertaken. Titles and abstracts of the qualitative studies were scrutinised by one assessor (AS) using the inclusion and exclusion criteria. No papers were excluded on the basis of quality at this stage. Full papers were obtained for potentially included studies and for where the abstract provided too little information. One-fifth of the total citations identified by electronic database searching ( $n = 2313$ ) were checked for inclusion or exclusion by AB ( $n = 427$ ).

### ***Inclusion and exclusion criteria for qualitative studies***

The PICOS process was used to clarify the inclusion and exclusion criteria (Box 6).

## **Population**

### **BOX 6** Population dimension of the PICOS framework for qualitative studies

#### **Included**

Studies of populations of antenatal women and postnatal women, at any point postnatally (but with qualitative data concerning the first postnatal year), and health-care practitioners involved in delivering preventive interventions for PND were relevant.

#### **Excluded**

Studies of pregnant or postnatal women with diagnosed PND or other comorbid psychiatric disorders or major medical problems.

## **Comparators**

All comparators were considered, whether they were usual care, other controls or specific, alternative comparators.

## **Outcomes**

All outcome measures were considered. All types of data, including case studies, interview data and observations, were considered.

## **Study designs**

No study designs were excluded from the qualitative review (Box 7).

### **BOX 7** Study design dimension of the PICOS framework for the qualitative studies

#### **Included**

- Qualitative studies concerning acceptability to pregnant women and service providers, potential harm and adverse effects were extracted.
- Studies reporting qualitative research, qualitative data elicited via a survey or a mixed-methods study including qualitative data on the perspectives and attitudes of either: (1) those who had received preventive interventions for PND, regardless of modality, in order to examine issues of acceptability; or (2) from women who had not experienced PND, regarding PSSSs that they believed helped them to avoid the condition, in order to identify promising components of any candidate intervention.
- Qualitative data, embedded in trial reports or in accompanying process evaluations, to inform an understanding of how issues of acceptability were likely to affect the clinical effectiveness of current and potential interventions.
- Qualitative data, either from separately conceived research or embedded within quantitative study reports, reporting the acceptability of interventions to health-care practitioners.

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PSSSs, personal and social support strategies.

### **Study quality assessment checklists and procedures for qualitative studies**

Studies meeting the inclusion criteria were evaluated by two reviewers (AS and AB) using the CERQual (Confidence in the Evidence from Reviews of Qualitative research) approach,<sup>135</sup> which aims to assess how much certainty could be placed in the qualitative research evidence, and were rated as 'very low', 'low', 'moderate' or 'high'. A summary assessment was made for each study, based on the methodological quality of each included study and the coherence of the review findings (the extent to which a clear pattern was identifiable across the individual study data). Coherence was assessed by examining whether or not the review findings were consistent across multiple contexts and incorporated explanations for variation across individual studies. Coherence was strengthened when individual studies contributing to the findings were drawn from a wide range of settings.

The methodological quality of individual studies was appraised using an abbreviated version of the Critical Appraisal Skills Programme (CASP) quality assessment tool for qualitative studies.<sup>136</sup> Two reviewers (AS and AB) independently applied the set of quality criteria to each included study.

Review findings were subsequently graded as 'high', 'moderate', 'low' or 'very low' according to the CASP assessment, the number and richness of the data in the studies, the consistency of the data within the studies across study settings and populations and the relevance of the findings to the review question.

### **Data extraction strategy for qualitative studies**

Data extraction from included studies was undertaken by AS using a data extraction tool adapted and tailored for the qualitative review. A 20% sample of data extractions were checked by AB. When data for included studies were missing, reviewers attempted to contact the authors at their last known e-mail address.

Selective extraction of findings<sup>137</sup> was undertaken when the data were pertaining to an optimal intervention to be delivered antenatally or postnatally to prevent PND. A framework for extraction was developed to elicit data extraction elements related directly to the review question. The data extraction elements for the data extraction for the studies are presented in *Appendix 6*. The level of extracted evidence included information on characteristics of the intervention, identified in the results and discussion sections and author comments and interpretation.

### **Data synthesis for qualitative studies**

Qualitative meta-synthesis was undertaken by highlighting women's and service providers' issues around the acceptability of interventions, and elucidating evidence around regarding personal and social support strategies (PSSSs) applied by women, using the data extraction framework and thematic synthesis to aggregate the findings.<sup>138</sup> Evidence about interventions from women and service providers and evidence about PSSSs are presented separately (see *Appendix 7*).

## **Synthesis drawing upon realist approaches**

### **Identification of key potential CLUSTERS**

To exploit the potential of realist synthesis approaches requires rich conceptual and contextual data. Reporting limitations and the varied emphases of published reports make it unlikely that all relevant data are included in a single report of a study. However, the scale and expense of a RCT increases the likelihood that multiple research reports have been produced relating to the study of interest. Such reports may include supplementary qualitative work, process evaluations, student projects, pilot studies, feasibility studies and follow-up studies. All such papers may help us to understand the study context, mechanisms and outcomes. Therefore, a key task is to move from analysis of a single study report to a detailed examination of a cluster of related papers. Such forensic examination looks not only for directly related 'sibling studies', but also for tangentially related 'kinship' papers (i.e. papers that may represent replication of an existing programme in a different context, thus allowing for comparison and contrast).

Finally, syntheses, analyses and theoretical papers may locate the study within a wider context of exemplars or case studies, thereby expanding the potential for comparison. Selection of clusters is necessarily limited by the resources available for analysis. In-depth analysis, as typically performed for realist synthesis, typically precludes the comprehensive and exhaustive approaches prescribed by systematic review methods. In selecting focal study clusters, the team considered both the likely success of the programme and the availability of sibling and/or kinship study reports. At this stage, the Preparing for Parenthood cluster was excluded, as even though it possessed several companion reports the trial did not demonstrate potential effectiveness.

### **Searching for CLUSTER documents**

Searching for documents to populate a study cluster has, until recently, been viewed as essentially an unsystematic and arbitrary procedure. Conceptually it draws upon the long-established retrieval practices outlined in Bates' seminal paper<sup>139</sup> on 'berry picking' including 'backward chaining' (following up cited references) and 'forward chaining' (following up cited articles). Recent years have revealed a prodigious potential yield from supplementary documents. For example, a review by Jagosh *et al.*<sup>140</sup> revealed several clusters with an average of 12 reports per cluster. We used systematic methods previously developed by one of the authors of our study (AB) for implementing cluster to become CLUSTER searching, for which a full published description of the CLUSTER methods (Citations, Lead authors, Unpublished materials, Scholar searches, Theories, Early examples, Related projects) is openly available.<sup>141</sup> In essence, the research team undertook persistent pursuit of study links, contextual links and theoretical links from the source study or studies to other related reports which then, themselves, initiated a further cause for searching. CLUSTER searching is reliant on relatively rapid judgements on potential links between a referring document and its referent.<sup>141</sup> When papers shared a study identifier or acronym (e.g. PoNDER) or a RCT identifying number, such connections were easy to establish. However, more typically a sibling relationship between papers relies on similarities in authorship, study context and sponsoring institution. However, further checks involve pursuing cross-citation and co-citation so that a network of studies could be constructed.

### **Synthesis and construction of a theoretical model**

For the synthesis stage we developed a rapid realist review approach, provisionally labelled as 'best-fit realist synthesis'. This involves:

1. identification of a provisional 'best-fit' conceptual framework as a starting point for data analysis
2. population of the conceptual framework with 'if-then' statements from the identified articles
3. construction of pathways or chains from 'if-then' statements to surface potential mechanisms by which outcomes might be achieved
4. identification of existing theory underpinning individual mechanisms
5. development of a programme theory to explain how PND prevention programmes may work
6. testing of the programme theory with contextual data from included studies.

#### **Identification of provisional 'best fit' conceptual framework**

Given the prominence of group care approaches among the candidate interventions (e.g. CenteringPregnancy or IPT) the research team decided to focus initial analytical attempts on the group-care model and then to seek to highlight similarities and differences with behavioural interventions delivered on an individual basis, either via face to face or via telephone. A search was conducted on Google Scholar (Google Inc., Mountain View, CA, USA), harnessing its extensive full-text searching functionality, using the terms 'group care' OR 'group visits' AND 'health education' AND 'model' OR 'framework'.

#### **Population of the conceptual framework**

In examining CLUSTER documents the research team sought to identify mechanisms by which outcomes were achieved in a particular context. Mechanisms were operationalised by construction of a series of 'if-then' statements based on causal relationships advanced by the RCT, or hypothesised explanations proposed by either the qualitative research or derived from the 'Discussion' sections of the associated study reports.

### Construction of pathways or chains from 'if-then' statements

'If-then' statements were subsequently constructed into complete pathways or partial chains to form an embryonic basis for a theoretical model that attempted to explain how the intervention works for different populations in different contexts from first action through to ultimate outcome. Given the heterogeneity of the interventions present in the initial clusters, it is unsurprising to note the presence of different mechanisms (e.g. between group- and individual-based approaches) and yet common success factors, for example, the establishment of 'trust', whether this be between a woman and a health-care provider, between a woman and other members in her group, or between peers. This modelling process provided the facility to explain both generalisable mechanisms and specific areas of variance.

### Identification of existing theory underpinning individual mechanisms

Examination of mechanisms by which the interventions sought to meet the various needs of the pregnant women identified several key concepts. In several instances, these concepts were explicitly linked within the study to specific theory or an implicit connection was readily identifiable (e.g. by using terminology associated with a theory).

### Development of a programme theory

Based on the conceptual framework, and starting from the premises involved in the group-based model, the research team constructed a programme theory to explain how such a model might work in preventing PND. This overarching programme theory was then examined in more detail to identify where individual-based approaches were unable to meet the same programme requirements and either attempted to substitute for them (e.g. in substituting the resources of the individual peer supporter for the collective resources of facilitator plus group) or offered features not possible within the constraints of the group approach (e.g. in targeting and making application of strategies to the specific needs of the individual).

Data from included studies, quantitative and qualitative, were used to examine the evidence in support of the programme theory. Realist synthesis also accommodates the bringing to bear of a wider evidence base. In this review more proximate evidence was first accessed, identified via a CLUSTER searching approach,<sup>141</sup> and then expanded where necessary to a wider set of theoretical and empirical papers. For example, 'direct' qualitative data related to the experience of group-based interventions was used to identify the features of such approaches and this was then supplemented by theoretical understandings of the basis underpinning the interventions<sup>142</sup> and by middle-range theory examining mechanisms for PND.<sup>143</sup> In this way the explanatory power of the review was broadened beyond the tight focus prescribed by the inclusion criteria.

The supporting data may be limited and may be at a level of abstraction that makes it difficult to identify the exact mechanism by which cause achieves effect. As a consequence, synthesis is to a certain extent an interpretive process which may require the reviewer to identify hypothetical intermediate links in a chain<sup>144</sup> by which, for example, training leads to self-efficacy. A further challenge of this method relates to reliance on the detail and quality of reporting; while it is legitimate for the reviewer to generate potential explanations by which a particular outcome is affected, more typically these connections are advanced in the published literature. As a consequence certain explanations may be well rehearsed but poorly substantiated, whereas others may be novel and consequently unsupported. A key stage is therefore the subsequent validation of the 'if-then' statements such that they are supported by empirical data or at the very least they are internally consistent with a range of published data sources. To a certain extent the process is analogous with brainstorming processes in which idea generation is deliberately divorced from subsequent validation. In summary, a complete explanation is initially privileged over a high-quality one, with the realisation that a poorly constructed study may perversely yield valuable explanatory insights. Validation of 'if-then' statements therefore follows as an important supplemental stage.

## Integrating quantitative and qualitative findings

Methodological work to date has been unable to establish the superiority of conducting the qualitative and quantitative synthesis in parallel or of conducting quantitative followed by qualitative, qualitative followed by quantitative or some more iterative approach. Our choice of method of combining data has been determined by the needs of this particular review in which the quantitative data are the main focus and the qualitative data are used for their explanatory potential. Having initially intended to use methods similar to those described by Noyes *et al.*<sup>145</sup> to explore an effectiveness review in the light of supporting qualitative research data, further examination revealed significant heterogeneity across the types of behavioural intervention used within the included studies. We therefore decided to expand the explanatory potential of our study by drawing upon the methods of realist synthesis.

Typically, realist synthesis explores variation around a single programme type intended to achieve predefined outcomes with much of the variation relating to the population for whom the intervention works). Early examination revealed that most interventions to be included in the review gravitated primarily to either group- or individual-based approaches and we therefore decided to start by examining the programme theory for group-based approaches and then to re-examine this in the light of individual-based approaches. As mentioned previously, realist synthesis embraces the widest possible range of data sources. It therefore becomes a method by which quantitative and qualitative data might potentially be integrated. For example, an hypothesis generated by a qualitative report may be substantiated by a trial that formally establishes the mechanism of cause and effect. Alternatively, the qualitative report may enable the review to help explain how a particular outcome might be achieved. It may also specify aspects of an intervention considered important by women that may map to specific components either present in a current intervention or mooted for inclusion in a future intervention yet to be studied within a trial.

# Chapter 4 Overview of results for quantitative and qualitative studies

## Literature search for the quantitative review

The electronic searches identified 3072 references; following removal of duplicates, 2064 remained. A total of 180 additional records were identified from other sources. Following removal of duplicates, there were 2244 records to be screened, of which 1910 were excluded at title/abstract level. The full text of the remaining 256 records was examined, following which 122 (representing 86 unique studies) were included in the review and 134 were excluded. The 122 included papers reported 80 conventional RCTs in which individual women were randomised to interventions and six CRCTs.<sup>61,146–150</sup> The 86 RCTs were reported in multiple publications; one study<sup>61</sup> included two levels of analysis that were reported in different publications.<sup>151,152</sup> Throughout this review, these 86 RCTs are cited according to the first author of their corresponding original publications.

The search of ongoing trials in Clinical Trials.gov, Current Controlled Trials and UK Clinical Research Network Portfolio databases (carried out in September 2013) retrieved 47 potentially relevant records. However, none of these met the criteria for inclusion in the review.

A flow diagram outlining the process of identifying relevant literature and the 86 included RCTs, along with reasons for exclusion of full-text articles, is provided in *Figure 2*.

### Quantitative review study characteristics

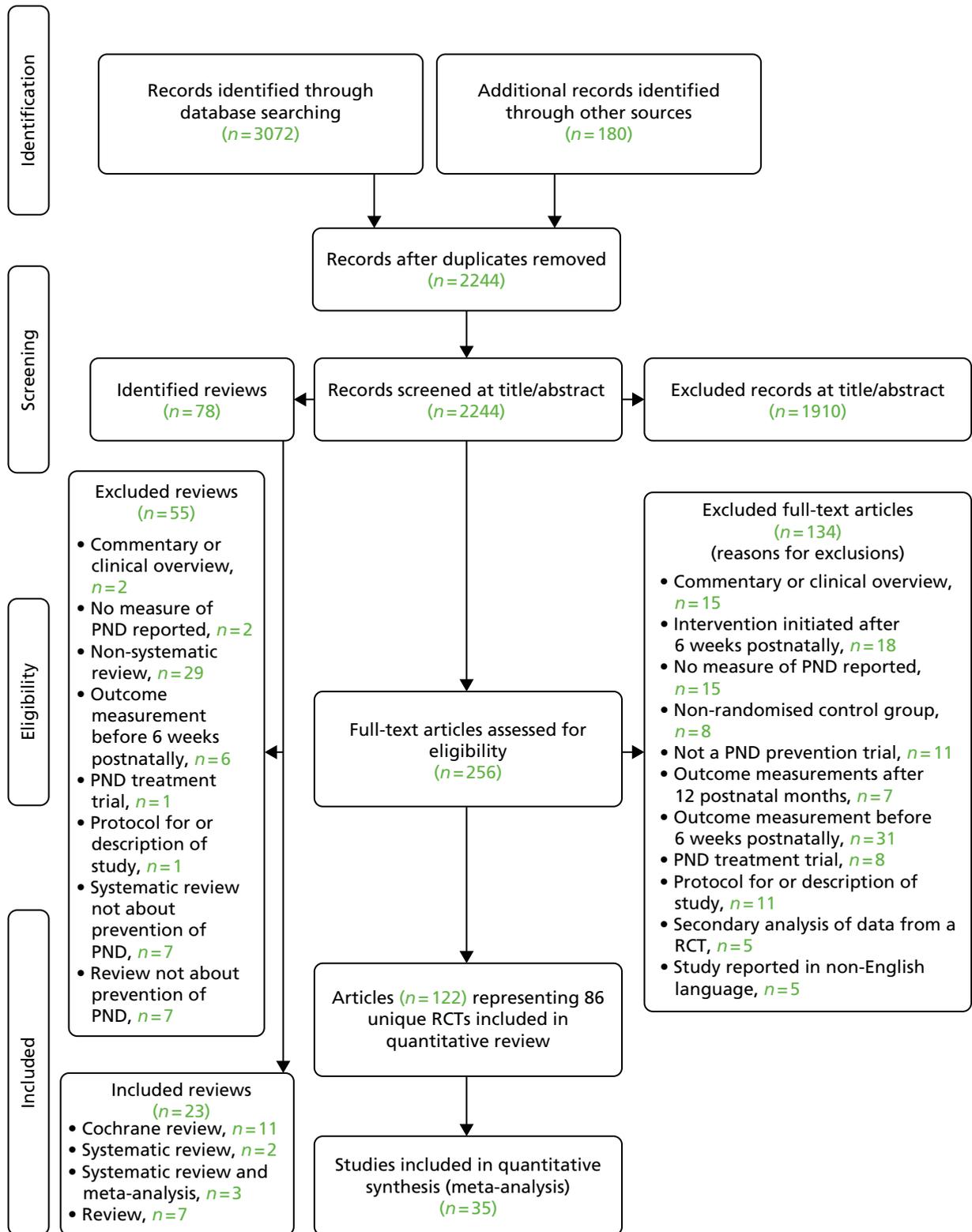
An overview of the 86 included RCTs is presented here.<sup>61,121,123,129,146–150,153–229</sup>

### Yield of systematic reviews

Twenty-three reviews were included (i.e. Austin *et al.*,<sup>230</sup> Bennett *et al.*,<sup>231</sup> Cuijpers *et al.*,<sup>68</sup> Dale *et al.*,<sup>232</sup> Dennis and Creedy,<sup>233</sup> Dennis,<sup>234</sup> Dennis,<sup>118</sup> Dennis,<sup>235</sup> Dennis and Kingston,<sup>236</sup> Dennis *et al.*,<sup>237</sup> Dennis,<sup>238</sup> Dodd and Crowther,<sup>239</sup> Fontein-Kuipers *et al.*,<sup>240</sup> Howard *et al.*,<sup>241</sup> Jans *et al.*,<sup>242</sup> Lawrie *et al.*,<sup>243</sup> Leis *et al.*,<sup>244</sup> Lumley *et al.*,<sup>245</sup> Marc *et al.*,<sup>246</sup> Miller *et al.*,<sup>247</sup> Sado *et al.*,<sup>248</sup> Shaw *et al.*<sup>249</sup> and Sockol *et al.*<sup>250</sup>), of which one provided an additional included study not identified in the searches.<sup>191</sup> The included reviews are summarised in *Appendix 8*.

### Quantitative review study characteristics

Some studies are reported in multiple references, for example Armstrong *et al.* 1999,<sup>164,251,252</sup> Brugha *et al.* 2000,<sup>188,253,254</sup> Chabrol *et al.* 2002,<sup>158,255,256</sup> Cooper *et al.* 2009,<sup>153,257</sup> Dennis *et al.* 2009,<sup>205,258</sup> Gamble *et al.* 2005,<sup>221,259,260</sup> Harrison-Hohner *et al.* 2001,<sup>208,261</sup> Ickovics *et al.* 2011,<sup>222,262</sup> Lumley *et al.* 2006,<sup>147,263</sup> MacArthur *et al.* 2002,<sup>146,264</sup> Makrides *et al.* 2010,<sup>211,265</sup> Morrell *et al.* 2000,<sup>199,266</sup> Morrell *et al.* 2009,<sup>61,151,152</sup> Petrou *et al.* 2006,<sup>174,267</sup> Reid *et al.* 2002,<sup>200,268</sup> Richter *et al.* 2014,<sup>203,269</sup> Rotheram-Borus *et al.* 2011,<sup>226,270</sup> Sen 2006,<sup>191,271</sup> Stamp *et al.* 1995,<sup>195,272</sup> Wisner *et al.* 2001,<sup>215,273</sup> Wisner *et al.* 2004<sup>216,274</sup> and Wolman *et al.* 1993.<sup>204,275,276</sup> Henceforth studies are referred to by the first identifying reference only.



**FIGURE 2** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart of studies included in the quantitative review.

## Level of preventive intervention

The 86 RCTs, one reporting both a universal preventive intervention level of analysis and an indicated preventive intervention level of analysis,<sup>61,151</sup> comprised:

- 37 trials reporting a universal preventive intervention<sup>61,123,129,146,147,150,153–157,180–187,197–200,207–212,217–220,225–228</sup>
- 20 trials reporting a selective preventive intervention<sup>149,158–163,188–192,201–204,213,221–223</sup>
- 30 trials reporting an indicated preventive intervention.<sup>61,121,148,164–179,193–196,205,206,214–216,224,229</sup>

## Study location

In total, 15 of the included RCTs were undertaken in the UK,<sup>61,146,149,150,174,177,188,191,199–201,206,213,219,224</sup> 31 in the USA,<sup>121,160,161,163,166–173,178–181,187,190,192,197,198,202,208,210,212,214–216,222,227,229</sup> 18 in Australia,<sup>123,147,159,164,165,182,184,185,189,195,196,211,217,218,220,221,223,225</sup> five in South Africa,<sup>153,203,204,209,226</sup> three in the China,<sup>154,157,162</sup> two in Canada,<sup>186,205</sup> two in Hong Kong,<sup>156,175</sup> two in the Republic of China (Taiwan)<sup>183,193</sup> and one each in France,<sup>158</sup> Germany,<sup>176</sup> Hungary,<sup>155</sup> Japan,<sup>228</sup> Mexico,<sup>194</sup> the Netherlands,<sup>207</sup> Norway<sup>129</sup> and Pakistan.<sup>148</sup>

## Participants

A total of 66,418 participants were randomised across the 86 trials, with the individual trial sample sizes ranging from 25 to 18,555 participants. The mean number of participants was 772.3 (SD 2210). The mean (SD) age of participants was 27.16 years (SD 4.06 years).

## Intervention class

Seven intervention types were identified across the 86 RCTs, these were:

1. psychological ( $n = 30$ )<sup>61,121,148,153–179</sup>
2. educational ( $n = 17$ )<sup>180–196</sup>
3. social support ( $n = 11$ )<sup>149,197–206</sup>
4. pharmacological agents or supplements ( $n = 10$ )<sup>207–216</sup>
5. midwifery-led interventions ( $n = 9$ )<sup>146,217–224</sup>
6. organisation of maternity care ( $n = 5$ )<sup>147,150,225–227</sup>
7. CAM and other ( $n = 4$ ).<sup>123,129,228,229</sup>

## Outcome assessment

The studies varied in their duration and assessment times: 6–8 weeks, 10–12 weeks, 3 or 4 months, 5 months, 6 months, 7 months, and 12 months postnatally.

Following the description of the overall study quality, the RCTs are described fully according to the level of preventive intervention in *Chapters 5–7*.

## Quality of quantitative studies

### Overall risk of bias of randomised controlled trials

#### Selection bias

Of all the 86 RCTs, 64 (74.4%) reported an adequate method for random sequence generation (low risk of bias), 16 (19.0%) were unclear about the allocation method (unclear risk of bias) and six (7.0%) had used a non-random process (high risk of bias). The greatest level of risk was associated with allocation concealment. Furthermore, 50 RCTs (58.1%) reported adequate treatment allocation concealment (low risk of bias), 27 (31.4%) were unclear (unclear risk of bias) and nine (10.5%) were at high risk of bias.

#### Performance bias

The nature of most of the interventions made blinding of participants and caregivers not possible, but it is unlikely that the lack of blinding could not have affected the results. Therefore, 73 RCTs (84.9%) were rated as being at low risk of performance bias for the assessment of blinding for participants and staff,

12 (14.0%) were rated as being at unclear risk of bias and one RCT (1.2%) was rated as at high risk of bias for failing to report blinding status of the women and study personnel. In 61 RCTs (71%), outcome assessors were reported to be blinded (low risk of bias), in 24 (28.0%) it was not clear if the outcome assessors were blinded (unclear risk of bias) and in one RCT the risk of bias was rated as high.

### **Attrition bias**

The risk of attrition bias was assessed as low for 51 (59.3%) RCTs, and unclear for 27 RCTs (31.4%); eight (9.3%) RCTs were assessed as being at high risk for selective outcome and/or analysis bias.

### **Reporting bias and other bias**

The risk of reporting bias was assessed as low in 74 RCTs (86%), unclear in eight RCTs (9.3%) and high in four RCTs (4.7%).

The risk of other bias (e.g. funding source or inappropriate analysis) was judged to be low for 54 RCTs (62.8%), unclear for 28 (32.6%) and high for four (4.7%).

Overall, the risks of bias were rated as higher for universal preventive intervention studies than for the selective and indicated preventive interventions; this was most notable for selection bias and attrition bias. The judgements about each risk of bias domain are presented in *Tables 1–3* for each included study according to the level of preventive intervention (universal, selective or indicated) and summarised in *Figure 3* for all included studies.

### **Quality of systematic and other reviews**

No quality assessment was undertaken for the systematic reviews.

## **Literature search for the qualitative review**

The electronic searches identified 2131 records after removal of duplicates and a further 20 records that were from other sources. Overall, 2151 records were screened by title and abstract and 1991 were excluded. The remaining 56 records (representing 44 unique studies) were included and the full text examined. A flow diagram outlining the identification of relevant included qualitative studies and reasons for exclusion of full-text articles is provided in *Figure 4*.

### **Qualitative studies level of preventive intervention**

Among the 21 studies (27 citations):

- Fourteen were studies of a universal preventive intervention. Twelve studies reported qualitative data on the perspectives and attitudes of those who had received universal preventive interventions for PND<sup>277–289</sup> (of these, two also reported perspectives and attitudes of service providers on universal preventive interventions<sup>287,288</sup> and two studies reported only on the perspectives and attitudes of service providers to preventive interventions).<sup>290,291</sup>
- Four studies presented data from those who had received a selective preventive intervention<sup>292–298</sup> (with one study additionally presenting data relating to an indicated population).<sup>296–298</sup> Of these, one study also reported perspectives and attitudes of service providers on selective preventive interventions.<sup>296–298</sup>
- Three studies presented data from those who had received an indicated preventive intervention.<sup>253,256,299,300</sup> One study, with a separate citation,<sup>301</sup> additionally reported on the perspectives of and attitudes of service providers on indicated preventive interventions.

These data are synthesised in *Chapters 5–7*. The remaining 29 (23 studies) citations about PSSSs that women believed helped prevent PND are synthesised in *Chapter 8*, the realist synthesis and are presented separately (see *Appendix 7*).

TABLE 1 Risk of bias for included universal preventive intervention RCTs: summary judgments about each risk-of-bias item

First author, year, reference number	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias
	Random sequence generation	Allocation concealment	Blinding of participants/personnel	Blinding of outcome assessors	Incomplete outcome data	Selective reporting of the outcome, subgroups, or analysis	Funding source, adequacy of statistical methods used, type of analysis (ITT/PP), baseline imbalance in important characteristics
Christie, 2011 <sup>150</sup>	Low	Low	Unclear	Low	Low	Low	Low
Cooper, 2009 <sup>153</sup>	Low	Unclear	Unclear	Low	Low	Low	Low
Doornbos, 2009 <sup>207</sup>	Low	Unclear	Low	Low	High	Low	Unclear
Feinberg, 2008 <sup>180</sup>	Unclear	Unclear	Unclear	Low	Low	Low	Low
Fujita, 2006 <sup>228</sup>	Unclear	Unclear	Low	Low	High	Low	Unclear
Gao, 2010 <sup>154</sup>	Low	Low	Low	Low	Low	Low	Low
Gjerdingen, 2002 <sup>181</sup>	Low	Unclear	Unclear	Low	Unclear	High	High
Gunn, 1998 <sup>225</sup>	Low	Low	Low	Low	Low	Low	Low
Harrison-Hohner, 2001 <sup>208</sup>	Low	Low	Unclear	Unclear	High	High	High
Hayes, 2001 <sup>182</sup>	Low	Low	Low	Unclear	Low	Low	Unclear
Ho, 2009 <sup>183</sup>	High	High	Low	Low	Low	Low	Unclear
Hodnett, 2002 <sup>197</sup>	Low	Low	Low	Unclear	Low	Low	Low
Kieffer, 2013 <sup>198</sup>	Low	Low	Low	Low	Low	Low	Low
Kozinsky, 2012 <sup>155</sup>	High	High	Unclear	Unclear	Unclear	High	High
Lawrie, 1998 <sup>209</sup>	Low	Low	Low	Low	Low	Low	Low
Leung, 2012 <sup>156</sup>	Low	Low	Low	Low	Low	Low	Low
Llorente, 2003 <sup>210</sup>	Low	Low	Low	Unclear	Unclear	Low	Unclear
Lumley, 2006 <sup>147</sup>	Low	Unclear	Low	Low	Unclear	Low	Low
MacArthur, 2002 <sup>146</sup>	Low	Low	Low	Low	Low	Low	Low

continued

**TABLE 1** Risk of bias for included universal preventive intervention RCTs: summary judgments about each risk-of-bias item (*continued*)

First author, year, reference number	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias
	Random sequence generation	Allocation concealment	Blinding of participants/personnel	Blinding of outcome assessors	Incomplete outcome data	Selective reporting of the outcome, subgroups, or analysis	Funding source, adequacy of statistical methods used, type of analysis (ITT/PP), baseline imbalance in important characteristics
Makrides, 2010 <sup>211</sup>	Low	Low	Low	Low	Low	Low	Low
Mao, 2012 <sup>157</sup>	Low	Low	Low	Low	Low	Low	Unclear
Matthey, 2004 <sup>184</sup>	Unclear	Unclear	Low	Low	Low	Low	Unclear
Milgrom, 2011 <sup>185</sup>	Low	Low	Low	Unclear	Unclear	Low	Low
Mokhber, 2011 <sup>212</sup>	Unclear	Unclear	Low	Low	Unclear	Low	Unclear
Morrell, 2000 <sup>199</sup>	Low	Low	Low	Low	Low	Low	Low
Morrell, 2009 <sup>61</sup>	Low	Low	Low	Low	Low	Low	Low
Norman, 2010 <sup>123</sup>	Low	Low	Low	Low	Unclear	Unclear	Unclear
Priest, 2003 <sup>217</sup>	Low	Unclear	Low	Low	Low	Low	Low
Reid, 2002 <sup>200</sup>	Low	Low	Low	Low	Low	Low	Low
Rotheram-Borus, 2011 <sup>226</sup>	Low	Low	Low	Low	Low	Low	Low
Sealy, 2009 <sup>186</sup>	High	High	Low	Low	Unclear	Low	Unclear
Selkirk, 2006 <sup>218</sup>	High	High	High	Low	High	Low	Low
Serwint, 1991 <sup>227</sup>	High	High	Low	Low	Low	Low	Low
Shapiro, 2005 <sup>187</sup>	Unclear	Unclear	Low	High	High	Low	Unclear
Shields, 1997 <sup>219</sup>	Low	Unclear	Low	Low	Unclear	Unclear	Low
Songøygard, 2012 <sup>129</sup>	Low	Low	Low	Low	Unclear	Unclear	Unclear
Waldenstrom, 2000 <sup>220</sup>	Low	Low	Low	Low	Unclear	Low	Low

Key: high, high risk of bias; ID, identification; ITT, intention to treat; low, low risk of bias; PP, per protocol; unclear, unclear risk of bias.

TABLE 2 Risk of bias for included selective preventive intervention RCTs: summary judgments about each risk-of-bias item

First author, year, reference number	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias
	Random sequence generation	Allocation concealment	Blinding of participants/personnel	Blinding of outcome assessors	Incomplete outcome data	Selective reporting of the outcome, subgroups, or analysis	Funding source, adequacy of statistical methods used, type of analysis (ITT/PP), baseline imbalance in important characteristics
Barnes, 2009 <sup>149</sup>	Unclear	Unclear	Low	Low	Unclear	Low	Unclear
Brugha, 2000 <sup>188</sup>	Low	Unclear	Low	Unclear	Low	Low	Low
Buist, 1999 <sup>89</sup>	Unclear	Unclear	Low	Low	Unclear	Unclear	Unclear
Chabrol, 2002 <sup>158</sup>	Unclear	High	Low	Unclear	Unclear	Low	Unclear
Cupples, 2011 <sup>201</sup>	Low	Low	Low	Low	Low	Low	Low
Gamble, 2005 <sup>221</sup>	Low	Low	Low	Low	Low	Low	Low
Hagan, 2004 <sup>159</sup>	Low	Low	Low	Low	Low	Low	Low
Harris, 2002 <sup>213</sup>	Low	Unclear	Low	Low	Unclear	Unclear	Unclear
Howell, 2012 <sup>190</sup>	Low	Low	Low	Low	Low	Low	Low
Ickovics, 2011 <sup>222</sup>	Low	Low	Low	Low	Low	Low	Low
Logsdon, 2005 <sup>202</sup>	Low	Unclear	Unclear	Low	Unclear	Low	Unclear
Phipps, 2013 <sup>160</sup>	Low	Low	Low	Low	Low	Low	Low
Richter, 2014 <sup>203</sup>	Low	Low	Low	Unclear	High	Unclear	Unclear
Sen, 2006 <sup>191</sup>	Low	Low	Low	Low	Low	Low	Low
Silverstein, 2011 <sup>161</sup>	Low	Low	Low	Low	Low	Low	Low
Small, 2000 <sup>223</sup>	Low	Low	Low	Low	Low	Low	Low
Tam, 2003 <sup>162</sup>	Low	Low	Unclear	Unclear	Unclear	Low	Unclear
Walkup, 2009 <sup>192</sup>	Low	Low	Low	Low	Unclear	Low	Low
Wolman, 1993 <sup>204</sup>	Low	Low	Low	Unclear	Unclear	Low	Low
Zlotnick, 2011 <sup>163</sup>	Low	Low	Low	Unclear	Low	Low	Low

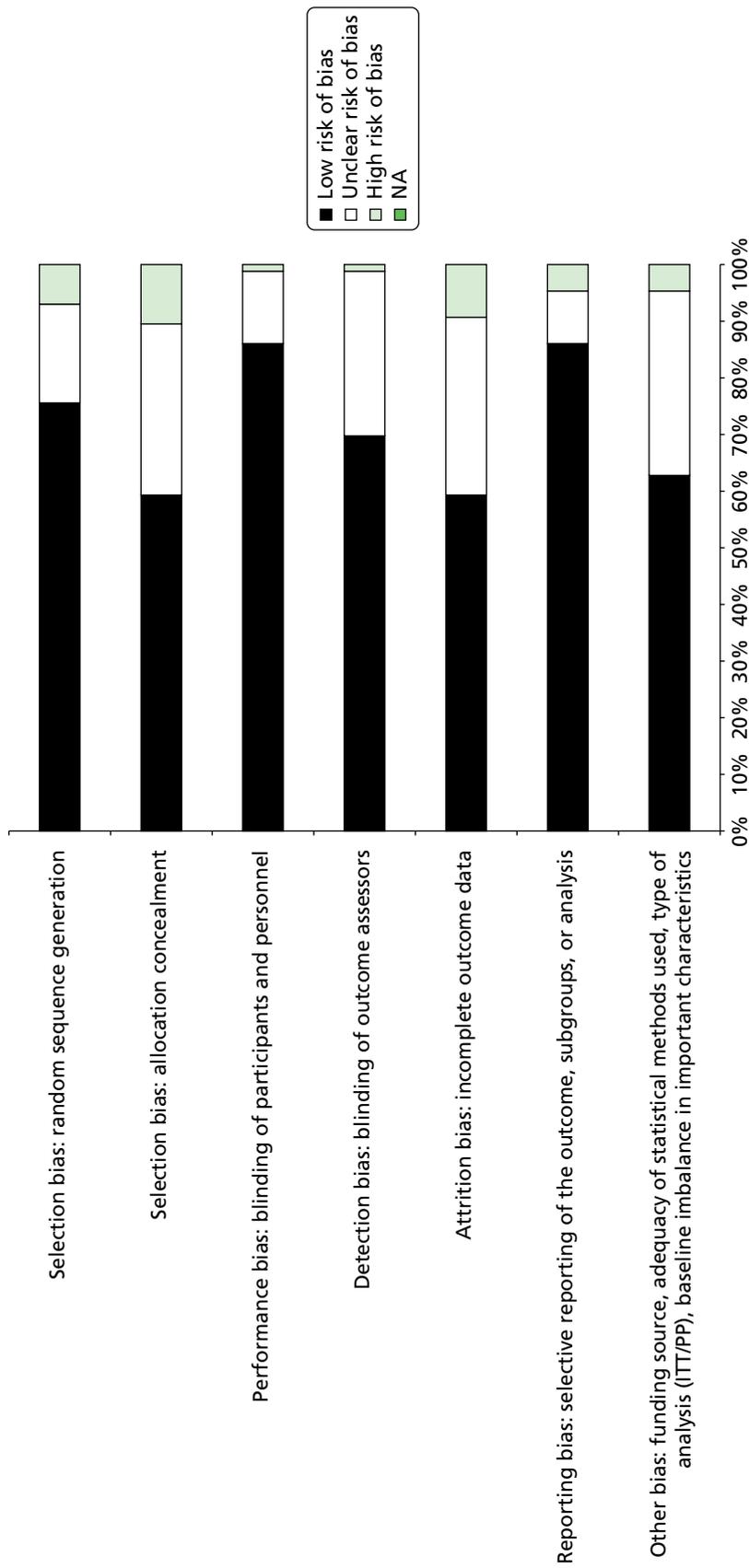
Key: high, high risk of bias; ID, identification; ITT, intention to treat; low, low risk of bias; PP, per protocol; unclear, unclear risk of bias.

**TABLE 3 Risk of bias for included indicated preventive intervention RCTs: summary judgements about each risk-of-bias item**

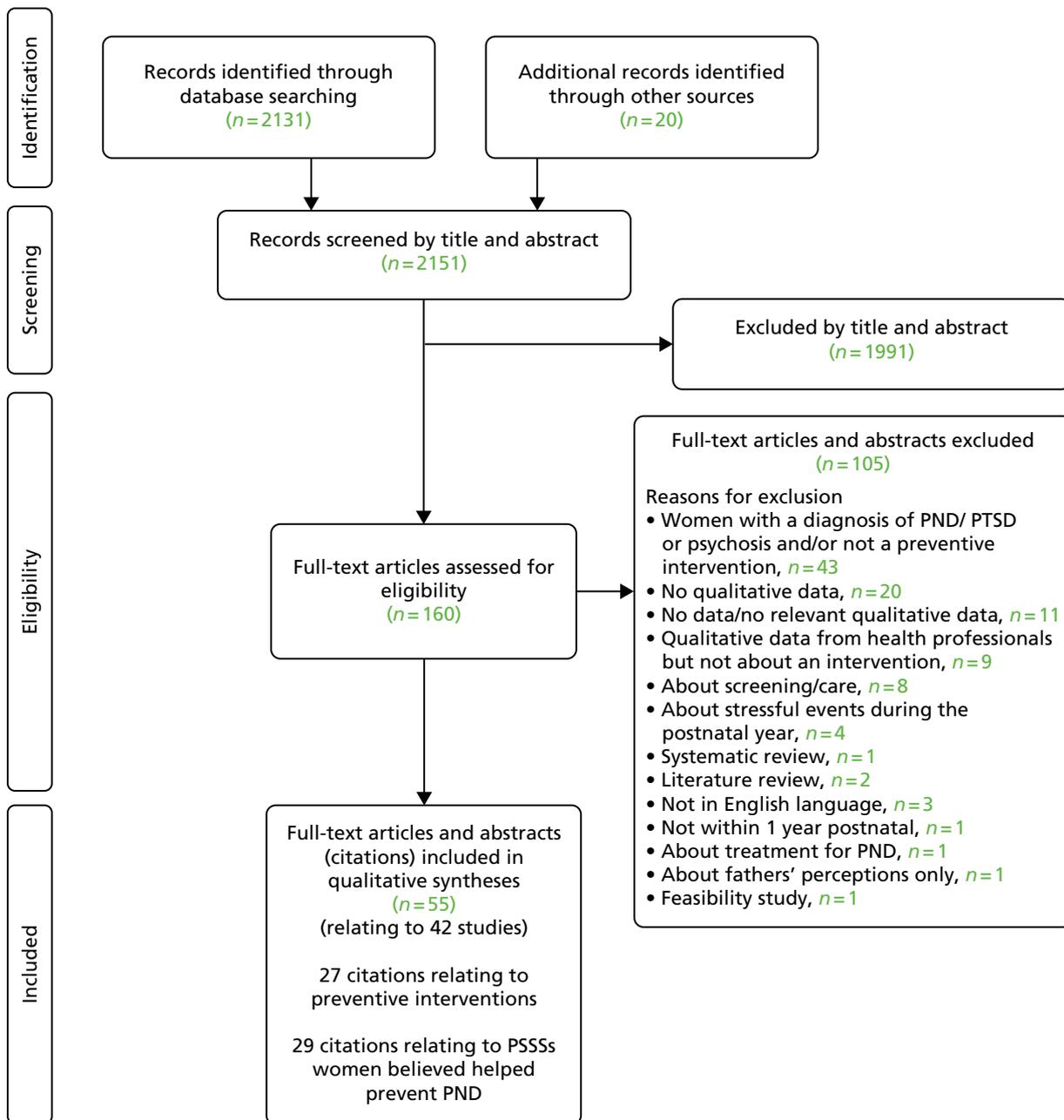
First author, year, reference number	Selection bias		Performance bias		Detection bias	Attrition bias	Reporting bias	Other bias
	Random sequence generation	Allocation concealment	Blinding of participants/personnel	Blinding of outcome assessors	Incomplete outcome data	Selective reporting of the outcome subgroups or analysis	Funding source adequacy of statistical methods used type of analysis (ITT/PP) baseline imbalance in important characteristics	
Armstrong, 1999 <sup>164</sup>	Low	Low	Low	Low	Low	Low	Low	Low
Austin, 2008 <sup>165</sup>	Low	Unclear	Low	Low	Unclear	Unclear	Unclear	Unclear
Crockett, 2008 <sup>166</sup>	Unclear	Unclear	Low	Unclear	Low	Low	Low	Unclear
Dennis, 2009 <sup>205</sup>	Low	Low	Low	Low	Low	Low	Low	Low
El-Mohandes, 2008 <sup>167</sup>	Low	Low	Low	Low	Low	Low	Low	Low
Ginsburg, 2012 <sup>168</sup>	Unclear	Unclear	Low	Unclear	Unclear	Low	Low	Unclear
Gorman, 1997 <sup>169</sup>	Unclear	Unclear	Unclear	Low	Low	Low	Low	Low
Grote, 2009 <sup>170</sup>	Low	Unclear	Low	Unclear	Low	Low	Low	Low
Harris, 2006 <sup>206</sup>	Low	Low	Low	Unclear	Unclear	Unclear	Unclear	Unclear
Heh, 2003 <sup>193</sup>	High	High	Low	Low	Low	Low	Low	Unclear
Lara, 2010 <sup>194</sup>	Low	Low	Low	Unclear	High	Low	Low	High
Le, 2011 <sup>171</sup>	Low	Low	Low	Unclear	Low	Low	Low	Low
Manber, 2004 <sup>229</sup>	Unclear	Unclear	Unclear	Unclear	Unclear	Low	Low	Unclear
Marks, 2003 <sup>224</sup>	Low	Low	Unclear	Unclear	Low	Low	Low	Unclear
McKee, 2006 <sup>172</sup>	Unclear	Unclear	Low	Unclear	High	Low	Low	Unclear
Morrell, 2009 <sup>61</sup>	Low	Low	Low	Low	Low	Low	Low	Low
Mozurkewich, 2013 <sup>214</sup>	Low	Low	Low	Low	Low	Low	Low	Low
Munoz, 1998 <sup>173</sup>	Low	Low	Low	Unclear	Low	Low	Low	Low
Petrou, 2006 <sup>174</sup>	Low	Low	Low	Low	Low	Low	Low	Low
Rahman, 2008 <sup>148</sup>	Low	Low	Low	Low	Low	Low	Low	Low
Stamp, 1995 <sup>195</sup>	Low	Low	Low	Low	Low	Low	Low	Low

First author, year, reference number	Selection bias		Performance bias	Detection bias	Attrition bias	Reporting bias	Other bias
	Random sequence generation	Allocation concealment	Blinding of participants/personnel	Blinding of outcome assessors	Incomplete outcome data	Selective reporting of the outcome subgroups or analysis	Funding source adequacy of statistical methods used type imbalance in important characteristics
Tiwari, 2005 <sup>175</sup>	Low	Low	Low	Low	Low	Low	Low
Vieten, 2008 <sup>121</sup>	Unclear	Unclear	Low	Low	Unclear	High	Unclear
Webster, 2003 <sup>196</sup>	Low	Low	Low	Low	Unclear	Low	Low
Weidner, 2010 <sup>176</sup>	Low	High	Low	Low	Unclear	Low	Low
Wilson, 2013 <sup>177</sup>	Low	High	Low	Unclear	Unclear	Low	Low
Wisner, 2001 <sup>215</sup>	Low	Low	Low	Low	Low	Low	Low
Wisner, 2004 <sup>216</sup>	Low	Low	Low	Low	Low	Low	Low
Zlotnick, 2001 <sup>178</sup>	Unclear	Unclear	Low	Unclear	Low	Low	Low
Zlotnick, 2006 <sup>179</sup>	Low	Unclear	Low	Unclear	Low	Low	Low

Key: high, high risk of bias; ID, identification; ITT, intention to treat; low, low risk of bias; PP, per protocol; unclear, unclear risk of bias.



**FIGURE 3** Risk-of-bias graph for all included RCTs: authors' judgements about each risk-of-bias item. Key: ITT, intention to treat; NA, not applicable; PP, per protocol.



**FIGURE 4** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart of studies included in the qualitative review.

Key: PTSD, post-traumatic stress disorder.

## Qualitative review study characteristics

### Study location

Of the included studies, two were undertaken in the UK,<sup>253,254,287</sup> seven in the USA,<sup>283,284,286,291–298</sup> one in Sweden,<sup>277</sup> one in Ireland,<sup>278,279</sup> four in Australia,<sup>280,288,289,300</sup> three in Canada<sup>281,285,290,299,301</sup> and one in China.<sup>282</sup>

### Participants

The studies contained qualitative data from 940 service users (when reported) and from 29 service providers (when reported). Service provider data came from four clinicians,<sup>296–298</sup> three nurses,<sup>288</sup> two certified nurse-midwives and two medical assistants,<sup>293–295</sup> three physicians,<sup>290</sup> four certified nurse midwives, five health centre staff and five administrators,<sup>284</sup> from support workers, midwives and health visitors<sup>287</sup> and from peer volunteers.<sup>301</sup> The age range of the women was reported in eight studies. Age ranged from 13 to 45 years. Ethnicity was reported in 13 studies.<sup>280,282–286,290,292–298,300</sup> For further details of participant characteristics see *Appendix 9*.

### Intervention class

A total of 19 qualitative studies corresponded to the seven intervention classes which were identified previously across the RCTs. These were:

1. psychological ( $n = 3$ ; six reports)<sup>253,254,282,296–298</sup>
2. educational ( $n = 0$ )
3. social support ( $n = 3$ ; four reports)<sup>281,287,299,301</sup>
4. pharmacological agents or supplements ( $n = 0$ )
5. midwifery-led interventions ( $n = 8$ ; 11 reports)<sup>277,283–285,289–295</sup>
6. organisation of maternity care ( $n = 2$ )<sup>288,300</sup>
7. CAM and other ( $n = 3$ ; four reports).<sup>278–280,286</sup>

## Qualitative review study characteristics: personal and social support strategy studies

A total of 23 studies ( $n = 29$  citations) reported qualitative data on perspectives and attitudes of women who had not experienced PND, regarding PSSSs that they believe helped them to prevent the condition.<sup>7,302–325</sup> This included five citations from three intervention studies which included PSSS evidence.<sup>286,292,296–298</sup>

### Study location

Ten studies were conducted in the UK,<sup>304,306–315,319,321,322,324</sup> seven studies were conducted in the USA,<sup>286,292,296–298,302,303,318,320</sup> one in Switzerland,<sup>316</sup> one in Canada,<sup>317</sup> one in Norway,<sup>323</sup> one in India,<sup>325</sup> one in China<sup>305</sup> and one in multiple centres.<sup>7</sup>

### Participants

The total number of reported participants contributing qualitative evidence was 801 (one study did not provide the number of participants who contributed to qualitative findings).<sup>7</sup> Fifteen studies provided data from participants who were part of the general population in the country of study, whereas the remaining studies examined evidence from minority groups within the country of study. The minority groups either were a culturally different group based within the country of study ( $n = 5$ )<sup>304,306–311,314,318</sup> or were a selective group ( $n = 3$ ).<sup>292,296–298,315</sup> For details of participant characteristics, see *Appendix 9*.

### Quality of the qualitative intervention studies

All studies met the requirement to report either qualitative research or qualitative data within mixed-methods studies, indicated in *Table 4*. All included studies also adequately described the context and aims of the study. Few (29%) demonstrated evidence of researcher reflexivity (i.e. awareness of the researcher's contribution to the construction of meanings throughout the research process and an acknowledgement of the impossibility of remaining 'outside' one's subject matter while conducting research); among those which did, these descriptions were brief. A number of studies illustrated that reflexivity in the research process had been incorporated, such as making changes to the interview guide as necessary and responding to participants' wishes. All 21 studies provided adequate descriptions of recruitment methods, just over half ( $n = 13$ ) provided adequate descriptions of data collection methods, although such descriptions tended to be brief. The study methods used involved interview methods in nine studies, supplemented by other methods such as focus groups and observation in three studies. Qualitative data came from open-ended questions as part of a questionnaire in three studies. Two studies used focus groups and one study used online messages. Twelve studies provided an adequate description of data analysis methods, and 13 studies provided sufficiently in-depth, detailed and rich data. The absence of detail in the remaining studies may have been, in part, because of limitations imposed by journal reporting requirements.

### Certainty of the review findings: intervention studies

The CERQual approach<sup>137</sup> was used to assess the certainty of the review findings, graded as 'very low', 'low', 'moderate' or 'high'. A summary assessment was based on the CASP quality assessment finding,<sup>136</sup> the number and richness of the study data, the consistency of the data across study settings and populations, and the relevance of the finding to the review question. There were 37 findings in women's evidence: nine were assessed as of moderate certainty, 25 as low and three as of very low certainty. For service providers' evidence, there were 25 findings: one finding was assessed as being of moderate certainty, 18 as of low certainty and six as of very low certainty. No findings were assessed as high certainty.

### Overview of main findings from qualitative intervention studies (all levels)

#### Psychological

Women reported that IPT served to promote the development of relationships with other group members, which had a normalising effect.<sup>282-285</sup> It facilitated gaining support from family members. Women also reported that they appreciated the support of the midwife as part of the intervention. Participants reported learning useful and applicable practical strategies.<sup>282</sup> IPT facilitated the gaining of knowledge and the active participation of women in their own health care specifically, in realistic information about motherhood and in the empowerment to ask for help.

**TABLE 4** Qualitative studies: quality assessment of the studies of universal preventive interventions

Question	Yes/somewhat, ( $n = 21$ studies)
1 Is the study qualitative research/or provide qualitative data?	21/21
2 Is the study context and aims clearly described?	21/21
3 Is there evidence of researcher reflexivity?	6/21
4 Are the sampling methods clearly described and appropriate for the research question?	21/21
5 Are the methods of data collection clearly described and appropriate to the research question?	13/21
6 Is the method of analysis clearly described and appropriate to the research question?	12/21
7 Are the claims made supported by sufficient evidence? That is, did the data provide sufficient depth, detail and richness?	13/21

This table is adapted from the CASP checklist for qualitative studies<sup>136</sup> (URL: [www.casp-uk.net](http://www.casp-uk.net), under Creative Commons licence).

### Educational

The Preparing for Parenthood intervention was aimed at improving women's knowledge and active participation in their own health care,<sup>253,254</sup> specifically gaining information about sensitive subjects such as PND. Although appearing to want information about PND, women who attended the Preparation of Parenthood intervention were reluctant to ask for information because of the fear of stigma. Other women appeared to avoid information about PND; authors interpreted this as a belief that lack of knowledge could operate as a protective factor. Although most women reported benefits of the group environment, a few did not want to join because of privacy concerns. Most participants valued the opportunity provided for their partner to join the group and were interested in the partner involvement session.

### Social support

The qualitative review demonstrated that both women and service providers felt the support group and support intervention adequately provided emotional and informational support, reassurance and validation. Participants of the support worker intervention<sup>287</sup> reported that the intervention would have been more beneficial if it were more intensive. Concerns articulated by service providers included worries about their own ability to deal with unpredictable situations and women's overdependence on the service.<sup>287,288</sup>

### Midwifery-led interventions

Peer support, partner support and support from health professionals were particularly helpful aspects of the CenteringPregnancy intervention.<sup>277,283,285,289-294</sup> Specifically, a supportive environment and the opportunity to share experiences were appreciated. However, some women reported a dislike for the group environment and the inclusion of partners because of concerns regarding privacy.<sup>277</sup> Some partners also felt uncomfortable with their own inclusion for similar reasons.<sup>277</sup> Women felt the health professionals were able to pay more attention to their own concerns and offer them more solutions,<sup>285</sup> although the skill of the midwife was an important factor in the success of the intervention.<sup>277</sup> Service providers felt the intervention promoted better communication between providers and users and between health providers. They were able to develop better relationships with the intervention recipients and the enhanced communication served to facilitate information exchange.<sup>290</sup> Education and information about pregnancy and the postnatal period were valued.<sup>283,284,293,294</sup> However, the evidence indicated<sup>283,289</sup> that some women wanted more, and more intensive, education on issues relating to labour, birth and parenting, particularly about the early weeks of parenting.

### Organisation of maternity care

The support women received from the health professionals delivering the service was felt to be helpful,<sup>288,300</sup> although a lack of understanding of the role of the maternal and child health nurse created a potential barrier to accessing the service.<sup>288</sup> Women reported that they felt able to rely on the service, particularly if they needed the service urgently.<sup>300</sup> However, concerns included feeling intimidated by the thought of referral to the specialist perinatal and infant mental health service,<sup>300</sup> worries about stigma associated with using the service<sup>288</sup> and concerns about being ready to be discharged.<sup>300</sup>

### Complementary and alternative medicine or other intervention

Women reported that the CAM interventions provided peer support, specifically by the sharing of experiences and birth stories, and the facilitation of family support.<sup>278-280,286</sup> They reported the practical use of strategies learned during the intervention.<sup>278,279,286</sup> However, some difficulty in being able to apply learned techniques in practice was expressed,<sup>286</sup> together with a concern that the use of the learned strategies could result in unexpected emotional responses.<sup>278,279</sup> The interventions facilitated preparation for birth, both emotionally<sup>278-280</sup> and physically.<sup>280</sup>

Tables 5–12 provide a synthesis of the qualitative evidence across all types of intervention.

TABLE 5 Synthesis of findings across all intervention studies: what helped?

Meta-theme	Subtheme	Mechanism (with examples)	Evidence source: CASP <sup>a</sup>	Certainty in CERQual <sup>137</sup>
Support	Peer support	Peer support, providing reassurance, normalisation of experiences, emotional support, practical advice and informational advice. Achieved through reading about peer experiences, <sup>281</sup> sharing experiences <sup>277,283</sup> and through the development of friendship and relationships and forming a connection with others <sup>280</sup>	Moderate (x 6)/low	Moderate
	Family support	Practical and emotional support from the family facilitated by educating family members, through provision for men/partners to join the group to be supported <sup>283</sup> and partners being encouraged to be actively involved in intervention <sup>289</sup> through family joining the group and participants teaching their partner or mother the song learned in the group <sup>278,279</sup>	Moderate (x 3)/low	Moderate
		Educating the intervention recipients about 'doing the month' served to facilitate development of a relationship with the mother-in-law, leading to her providing practical support <sup>282</sup>	Moderate	Moderate
	Health professional support	Health professionals leading the intervention were seen as having concern for participants, providing emotional and practical support. Specifically, discussions with nurses, <sup>288</sup> support workers <sup>287</sup> or social support from the midwife, through telephone follow-up <sup>282</sup> were reported as being helpful	Moderate (x 3)/low (x 2)	Moderate
	Partner support	Partners' support in applying techniques learned through the intervention, which went on to facilitate better communication between the partners <sup>286,289</sup>	High/low	Low
Empowerment	Education/active participation in own health care	Participants empowered by being allowed to weigh themselves, <sup>283</sup> providing education and information <sup>280,282,284</sup>	Moderate	Moderate
	Learning practical strategies/skills/knowledge	Learning practical strategies, such as singing, <sup>278,279</sup> problem-solving skills, mind-body exercises and techniques <sup>286</sup> to be applied during pregnancy or in the postpartum period. These included the ability to calm the infant, <sup>278,279</sup> the gaining of information about sensitive subjects such as PND <sup>282</sup> and realistic information about motherhood; thus helping participants accept the reality of early motherhood <sup>282</sup>	Moderate/high/moderate	Moderate
	Self-esteem	Yoga provided emotional preparation for birth <sup>280</sup>	Moderate	Low
Interventions promoted abilities in dealing with offers of support and asking for support, and developing a good relationship with mother-in-law, to be empowered to ask for help <sup>282</sup>		Moderate	Low	

continued

**TABLE 5** Synthesis of findings across all intervention studies: what helped? (continued)

Meta-theme	Subtheme	Mechanism (with examples)	Evidence source: CASP <sup>a</sup>	Certainty in CERQual <sup>137</sup>
Time out/ relaxation/ socialisation	–	Reduction of stress and anxiety, and countering isolation by the provision of socialisation in a group <sup>278,279</sup> or via a one-to-one intervention <sup>287</sup>	Moderate/ moderate/low	
Physical preparation/ recovery	–	Yoga practice as part of the group intervention promoted preparation for birth and quicker physical recovery from birth <sup>280</sup>	Moderate	Low
Reduced waiting times	–	A group, rather than individual, format resulted in reduced waiting times <sup>289</sup>	Low	Very low
Continuity of care	–	Group intervention promoted continuity of care <sup>277</sup>	Moderate	Low
Connecting with the baby	–	Yoga aspect of group intervention promoted connection with unborn baby <sup>280</sup>	Moderate	Low
Safe space	–	Group intervention provided a safe space <sup>280</sup>	Moderate	Low

a Multiple ratings indicate that the results have been synthesised from two or more studies.

**Note**

Certainty is based on quality of individual studies rated as ‘very low’, ‘low’, ‘moderate’ or ‘high’.

**TABLE 6** Synthesis of findings across all intervention studies: what did not help?

An intervention for the prevention of PND was unhelpful when it resulted in a perception of	Evidence source: CASP	Certainty in CERQual <sup>137</sup>
Lack of support, as a result of partners feeling uncomfortable with discussions and thus disengaging <sup>283</sup>	Moderate	Moderate
Inability to implement learned strategies without the support of the group <sup>286</sup>	High	Moderate
Difficult to raise questions with partners present at group intervention <sup>84,283</sup>	Moderate	Moderate
An unexpected emotional response because of the application of the strategies learned in the group (singing) resulting in a ‘profound’ emotional response <sup>85,279</sup>	Moderate	Low
Feeling rushed by health professionals during the intervention <sup>90</sup>	Moderate	Low
Lack of privacy during the intervention <sup>90</sup>	Moderate	Low
Lack of consideration for workload, specific to a service in a military setting <sup>90</sup>	Moderate	Low
Midwife being too controlling, and not asking about the wishes of the group <sup>84</sup>	Moderate	Low
Service was not family centred and older children were not welcome at the service <sup>90</sup>	Moderate	Low
Service providers were scrimping and cost-saving on care (women were asked to deliver their own samples to the laboratory) <sup>90</sup>	Moderate	Low
Not being able to implement strategies because of forgetfulness <sup>3</sup>	High	Low
Format of the sessions was not ideal because a 2-hour session was too long <sup>96</sup>	Low	Low
A long interval between first and second group meetings <sup>84</sup>	Moderate	Moderate
Group format was disliked <sup>84</sup>	Moderate	Low

**TABLE 7** Synthesis of findings across all intervention studies: service delivery

An intervention for prevention of PND should have included	Evidence source: CASP	Certainty in CERQual <sup>137</sup>
Education, specifically about the early weeks of parenting <sup>289</sup>	Low	Very low
More intensive intervention, more visits and longer visits <sup>287</sup>	Low	Very low
Something different from the mainstream (CAM) <sup>280</sup>	Moderate	Low
Structure to the group aspect <sup>280</sup>	Moderate	Low
More drinks/refreshments <sup>283</sup>	Moderate	Low

**TABLE 8** Synthesis of findings across all intervention studies: service delivery barriers to participation

Barriers to participation included	Evidence source: CASP <sup>a</sup>	Certainty in CERQual <sup>137</sup>
Poor access to the service, including practical difficulties in getting to appointments and physical limitations (bleeding) which hindered attendance <sup>283</sup>	Moderate	Low
Unhelpful front-desk staff, long waits and 'brush-offs' <sup>283</sup>	Moderate	Low
Not understanding role of the service provider <sup>288</sup>	Moderate	Low
Not associating the depression with pregnancy/postpartum period <sup>286,288</sup>	Moderate/high	Moderate
Perceived stigma related to the admission of not being able to cope <sup>286,288</sup>	Moderate/high	Moderate
Being unable to see use of strategies learned during pregnancy for the postpartum period <sup>286</sup>	High	Low
Being unable to find the time to implement strategies learned <sup>286</sup>	High	Low

a Multiple ratings indicate that the results have been synthesised from a number of studies.

**TABLE 9** Synthesis of findings across all intervention studies: health-care professionals' views on what helped

Things helpful for the intervention recipients	Evidence source: CASP <sup>a</sup>	Certainty in CERQual <sup>137</sup>
Peer support through sharing experiences providing reassurance, normalisation of experiences, emotional support, practical support and informational advice <sup>287,290,291</sup>	Moderate/moderate/low	Moderate
Education, group environment provided more opportunity for teaching <sup>284,291</sup>	Moderate	Low
Women's active participation in their own health care (empowerment); the group environment allowed more time to be allocated to this <sup>284,290</sup>	Moderate	Low
Better communication between provider and user, facilitating information exchange in the group setting <sup>290</sup>	Moderate	Low
Health professional developed better relationships with service users in the group setting <sup>290</sup>	Moderate	Low
Provision of richer care provided in a group setting <sup>290,291</sup>	Moderate	Low
Women's enthusiasm about a group setting served to increase participation <sup>284</sup>	Moderate	Low
Group setting allowed more women to be seen in same amount of time, thereby addressing waiting time issues <sup>284</sup>	Moderate	Low
Sensitivity to the women and a subtle and non-threatening manner in approach to issues <sup>288</sup>	Moderate	Low

#### **Things helpful for the health professionals delivering the intervention**

Group setting resulted in more efficient use of time <sup>290</sup>	Moderate	Low
Health professionals found delivering the group intervention enjoyable, satisfying and a rewarding experience <sup>290,291</sup>	Moderate	Low
Delivering an innovative (group) intervention brought recognition to the site (health centre) <sup>284</sup>	Moderate	Low

a Multiple ratings indicate that the results have been synthesised from a number of studies.

**TABLE 10** Synthesis of findings across all intervention studies: health-care professionals' views on what did not help

Things that health professionals thought did not help prevent PND	Evidence source: CASP <sup>a</sup>	Certainty in CERQual <sup>137</sup>
Restricting service to selective groups, through staff and provider bias, for example only for teens <sup>291</sup>	Moderate	Low
Difficulties in funding the service <sup>284,291</sup>	Moderate	Low
Difficulties in facilitating access to the service because of work conflicts for service providers and transportation difficulties for women attending groups, and also for support workers travelling to women's homes to deliver the one-to-one intervention <sup>287,291</sup>	Moderate/low	Low
Women's resistance to the intervention or discontinuation of the intervention because of participants' resistance to a group format <sup>291</sup> or the individual support worker visit was anxiety inducing <sup>287</sup>	Moderate/low	Low
Group interventions result in provider having less opportunity for one-to-one care <sup>284</sup>	Moderate	Low
Inability to address deeply personal issues in group setting. Service providers felt that deeper issues were not appropriate to be discussed in a group setting <sup>284</sup>	Moderate	Low
Scheduling difficulties as while one provider was doing group care the other had to deal with everything else <sup>284</sup>	Moderate	Low
Potential for participants to become dependent on the intervention <sup>287</sup>	Low	Very low
Potential conflicts or threats to provider roles <sup>287</sup>	Low	Very low
Potential for invasion of participant privacy <sup>287</sup>	Low	Very low
Being unable to deal with unpredictable situations or those for which they were unqualified. Anxieties about their own abilities, skills and helpfulness <sup>287</sup>	Low	Very low

<sup>a</sup> Multiple ratings indicate that the results have been synthesised from a number of studies.

**TABLE 11** Synthesis of findings across all intervention studies: health-care professionals' views on service delivery

Health professionals' thought an intervention for prevention of PND should include:	Evidence source: CASP	Certainty in CERQual
Closer integration with other service providers (primary care team) <sup>287</sup>	Low	Very low
Target vulnerable groups <sup>287</sup>	Low	Very low

**TABLE 12** Qualitative studies: quality assessment of PSSSs

Question	Yes/somewhat, (n = 23 studies)
1 Is the study qualitative research/or does it provide qualitative data?	23/23
2 Is the study context and are the aims clearly described?	23/23
3 Is there evidence of researcher reflexivity?	16/23
4 Are the sampling methods clearly described and appropriate for the research question?	21/23
5 Are the methods of data collection clearly described and appropriate to the research question?	21/23
6 Is the method of analysis clearly described and appropriate to the research question?	18/23
7 Are the claims made supported by sufficient evidence, i.e. did the data provide sufficient depth, detail and richness?	20/23

This table is adapted from CASP checklist for qualitative studies<sup>136</sup> (URL: [www.casp-uk.net](http://www.casp-uk.net), under Creative Commons licence).

### **Quality of the qualitative personal and social support strategy studies**

As shown in *Table 12*, all included studies reported either qualitative research or qualitative data within mixed-methods studies. All included studies adequately described the context and aims of the study. Sixteen of the 23 studies demonstrated evidence of researcher reflexivity. As in the intervention studies, few PSSS studies made explicit reference to researcher reflexivity, and in those which did descriptions were often brief. Most studies adequately described recruitment methods ( $n = 21$ ) and data collection methods ( $n = 21$ ), although such descriptions tended to be brief. Eighteen studies used interview methods, four used focus groups and one study used an online survey. Eighteen of 23 of studies provided an adequate description of data analysis methods, and 20 of the 23 studies provided sufficiently in-depth, detailed and rich data.

### **Certainty of the review findings personal and social support strategy studies**

The CERQual approach<sup>137</sup> was applied to assess the certainty of the review findings, graded as low, moderate or high. In each case a summary assessment was made of the CASP quality assessment finding, the number of studies contributing to the finding, the consistency of study setting and the population. The PSSS data yielded 19 findings: one assessed as high certainty, 11 assessed as moderate certainty and seven assessed as low certainty.

The findings were used to inform the realist synthesis and are presented in *Chapter 8*.

### **Qualitative studies further analysis by level of preventive intervention: universal, selective and indicated**

Further quantitative and qualitative results are presented in *Chapter 5* (37 universal preventive interventions trials, 14 qualitative studies), *Chapter 6* (20 selective preventive interventions trials, four qualitative studies) and *Chapter 7* (30 indicated preventive interventions trials, three qualitative studies). One study presented two levels of intervention and analysis.<sup>61</sup>



## Chapter 5 Results for universal preventive intervention studies

### Characteristics of randomised controlled trials of universal preventive interventions

There were 37 RCTs included in the universal preventive interventions group,<sup>61,123,129,146,147,150,153–157,180–187,197–200,207–212,217–220,225–228,266,287</sup> in the seven intervention classes defined as:

1. psychological ( $n = 6$ )<sup>61,153–157</sup>
2. educational ( $n = 8$ )<sup>180–187</sup>
3. social support ( $n = 4$ )<sup>197–200,266,287</sup>
4. pharmacological agents or supplements ( $n = 6$ )<sup>207–212</sup>
5. midwifery-led interventions ( $n = 5$ )<sup>146,217–220</sup>
6. organisation of maternity care ( $n = 5$ )<sup>147,150,225–227</sup>
7. CAM or other ( $n = 3$ ).<sup>123,129,228</sup>

The results are presented in this order for the RCTs of universal preventive interventions. There was limited replication of interventions across the trials. The 37 universal preventive intervention trials are described first by their intervention context, mechanisms and measured outcomes within the seven classes.

### Description of qualitative studies of universal preventive interventions

There were 14 studies relating to 15 citations reporting qualitative data on universal preventive interventions for PND.<sup>277–291</sup> Twelve studies relating to 13 citations reported the perspectives and attitudes of women who had received an intervention.<sup>277–289</sup> Four studies reported perspectives and attitudes of service providers of universal preventive interventions.<sup>286,287,290,291</sup>

The qualitative studies related to five of the seven intervention classes:

1. psychological ( $n = 1$ )<sup>282</sup>
2. social support ( $n = 2$ )<sup>281,287</sup>
3. midwifery-led interventions ( $n = 7$ )<sup>277,283–285,289–291</sup>
4. organisation of maternity care ( $n = 1$ )<sup>288</sup>
5. CAM or other ( $n = 3$ ).<sup>278–280,286</sup>

For ease of reference the universal preventive interventions have been given short-version descriptive labels (*Table 13*).

**TABLE 13** Universal preventive interventions: short-version descriptive labels

First author, year, reference number	Short-version descriptive label	Fuller description
Gunn, 1998 <sup>225</sup>	Early contact with care provider	A postnatal check-up with a GP 1 week after hospital discharge
Harrison-Hohner, 2001 <sup>208,261</sup>	Calcium	2000 mg of elemental calcium per day during pregnancy
Hodnett, 2002 <sup>197</sup>	Support in labour	Continuous labour support by a specially trained nurse
Lumley, 2006 <sup>147,263</sup>	Primary care- and community-based strategies	Complex multifaceted primary care- and community-based strategies
MacArthur, 2002; <sup>146</sup> 2003 <sup>264</sup>	Midwifery redesigned postnatal care	Redesigned midwifery-led community postnatal care
Makrides, 2010 <sup>211,265</sup>	DHA	800 mg of DHA in DHA-rich fish oil capsules in pregnancy
Matthey, 2004 <sup>184</sup>	Baby play	A session focused on the importance of play with a baby, with videotapes and discussion on how parents can play with infants
Matthey, 2004 <sup>184</sup>	Education on preparing for parenting	A session focusing on postpartum psychosocial issues related to becoming first-time parents
Mokhber, 2011 <sup>212</sup>	Selenium	100 µg of selenium as selenium yeast daily during pregnancy
Morrell, 2000; <sup>199,266</sup> 2002 <sup>287</sup>	Social support	Up to 10 home visits in the first postnatal month by a community postnatal support worker
Morrell, 2009 <sup>61,151,152,326</sup>	CBT-based intervention	HV training in the assessment of postnatal women, with CBA sessions for eligible women
Morrell, 2009 <sup>61,151,152,326</sup>	PCA-based intervention	HV training in the assessment of postnatal women, combined with PCA sessions for eligible women
Norman, 2010 <sup>123</sup>	Exercise	An 8-week 'Mother and Baby' programme, of specialised exercise provided by a physical therapist combined with parenting education
Norman, 2010 <sup>123</sup>	Educational information	An 8-week 'Mother and Baby' programme, with parenting education
Sealy, 2009 <sup>186</sup>	Booklet on PND	An educational pamphlet 'Why is everyone happy but me?' mailed at 4-weeks postpartum, that explained the symptoms of PPD and identified local services for PPD
Shields, 1997 <sup>219</sup>	Midwife-managed care	A new programme of midwife-managed care (Midwifery Development Unit)
Songøygard, 2012 <sup>129</sup>	Exercise	A 12-week exercise programme of aerobic and strengthening exercises, during pregnancy; a weekly physiotherapy-led group session and home exercises encouraged twice a week
Waldenstrom, 2000 <sup>220</sup>	Midwifery team care	Team midwife care: eight midwives who provided antenatal and intrapartum care and follow-up visits to the postnatal ward

Key: DHA, docosahexaenoic acid; HV, health visitor; PPD, postpartum depression.

## Universal preventive interventions: psychological interventions

### *Characteristics and main outcomes of randomised controlled trials of universal preventive interventions of psychological interventions*

Of the 37 universal preventive interventions, six studies evaluated a psychological intervention,<sup>61,153–157</sup> including promotion of parent–infant interaction,<sup>153</sup> psychoeducation,<sup>155</sup> IPT,<sup>154,157</sup> CBT-based interventions<sup>61,157</sup> and PCA. Comparators included usual care in specific countries<sup>61,153,154,156,157</sup> and educational information.<sup>155</sup> Three studies provided the intervention using a group format,<sup>154–156</sup> whereas two involved individual sessions<sup>61,153</sup> and one combined both group and individual sessions.<sup>157</sup> Two trials provided interventions in the home setting,<sup>61,153</sup> whereas in the other four trials the intervention was provided in the antenatal setting.<sup>154–157</sup> Three trials provided the intervention in the antenatal period only,<sup>155–157</sup> whereas one trial initiated the intervention postnatally<sup>61</sup> and two trials provided the intervention across the perinatal period both during pregnancy and following childbirth.<sup>153,154</sup> The interventions were provided by different health-care providers including community workers,<sup>153</sup> midwives,<sup>154</sup> health visitors,<sup>155</sup> psychologists<sup>156</sup> and obstetricians,<sup>157</sup> with the number of intervention contacts ranging from two<sup>154</sup> to 16<sup>153</sup> and with the duration of contact ranging from 1 to 2 hours.

A summary of the characteristics and main outcomes is provided in *Table 14*. In the psychological intervention trials, PND was assessed using various measures including the EPDS,<sup>61,153,154,156,157</sup> General Health Questionnaire,<sup>154</sup> Leverton Questionnaire,<sup>155</sup> the Short Form questionnaire-36 items (SF-36) mental component summary (MCS),<sup>328</sup> the Clinical Outcomes in Routine Evaluation-Outcome Measure (CORE-OM),<sup>151</sup> the PHQ-9<sup>157</sup> and the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders* (SCID).<sup>157</sup> The State–Trait Anxiety Inventory (STAI) was the only anxiety outcome reported<sup>151</sup> and the Perceived Stress Scale (PSS) the only stress outcome.<sup>156</sup> Family outcomes included the Dyadic Adjustment Scale,<sup>61</sup> the Parenting Stress Index (PSI),<sup>151</sup> the Relationship Efficacy Measure,<sup>156</sup> the Satisfaction with Interpersonal Relationships Scale<sup>154</sup> and mother–infant interaction (maternal sensitivity and intrusiveness).<sup>153</sup> The three infant outcomes reported were the Ainsworth Strange Situation Assessment of Infant Attachment,<sup>153</sup> the Behaviour Screening Questionnaire<sup>61</sup> and the Checklist for Autism in Toddlers.<sup>61</sup> General health and other outcomes included the Short Form questionnaire-12 items (SF-12), the SF-36 physical component summary (PCS), the Short-Form questionnaire-6 Dimensions (SF-6D)<sup>61</sup> and the Subjective Happiness Scale.<sup>156</sup>

### *Description and findings from qualitative studies of universal preventive interventions of psychological interventions*

A description of the qualitative study evaluating a psychological intervention is provided in *Table 15*.

#### Support

The qualitative study of a psychological intervention was IPT based and was conducted in China.<sup>282</sup> Data from participants demonstrated that the intervention promoted the development of relationships and connection with other group members, normalised their experience,<sup>282</sup> helped them to harness support from family members<sup>282</sup> and educated them about the Chinese cultural ritual known as ‘doing the month’ (which they had felt was unscientific and out of date) and how it could help them to develop a better relationship and elicit support from their mother-in-law.<sup>282</sup> Women appreciated the social support they received from the midwife through a telephone follow-up.<sup>282</sup>

#### Learning practical strategies

Participants learned useful and applicable practical strategies as part of the intervention,<sup>282</sup> gaining knowledge and skills to cope with the postpartum period.<sup>282</sup>

#### Education/active participation in own health care

The intervention promoted knowledge gain and active participation in their own health care.<sup>282</sup> Specifically, participants reported that they were able to gain realistic information about motherhood, that it helped them to accept the reality of early motherhood<sup>282</sup> and that they felt empowered to ask for help.<sup>282</sup>

**TABLE 14** Universal preventive interventions: characteristics and main outcomes of RCTs of psychological interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
CBT-based intervention	Mao, 2012 <sup>157</sup>	China	204	Antenatal setting	Antenatal	Individually and group	Obstetrician
CBT-based intervention and PCA-based intervention	Morrell, 2009 <sup>61,151,152,326</sup>	UK	2241	Home visits	Postnatal	Individually	Health visitor
IPT-based intervention	Gao, 2010; <sup>154</sup> 2012 <sup>327</sup>	China	194	Antenatal setting	Antenatal and postnatal	Group	Midwife

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in China	4	90	EPDS mean score (Chinese version), PHQ-9 score (Chinese version), SCID	–	<p><i>On completion of the program, IG reported significantly lower mean PHQ-9 and EPDS scores than CG<sup>157</sup></i></p> <p>The mean EPDS score at 6 weeks postnatally was lower in the intervention group (mean 6.45, SD 1.09) than in the control group (mean 9.23, SD 2.91) (<math>t = 1.95</math>; <math>p = 0.04</math>)</p> <p><i>Fewer participants from the IG were diagnosed as having PND using the SCID for DSM-IV<sup>157</sup></i></p>	Unclear
Usual care in the UK	1	–	EPDS score 12 or more, SF-12 MCS score, CORE-OM score	STAI, DAS, PSI, BSQ, CHAT, SF-12, PCS, SF-6D	<p><i>At 6 months, among all of the women who had returned both a 6-week and a 6-month questionnaire, 16.4% in CG scored 12 or more on the EPDS versus 11.7% in IG. Absolute difference was 4.7% (95% CI 0.7% to 8.6%) (<math>p = 0.003</math>)<sup>61</sup></i></p> <p><i>Mean EPDS score was 6.4 (SD 5.2) in CG and 5.5 (SD 4.7) in IG. Difference was statistically significant (<math>p = 0.001</math>)<sup>61</sup></i></p>	Low
Usual care in China	2	90	EPDS score 13 or more (Chinese version) GHQ score 4 or more	SWIRS (devised by first author)	<p><i>Women receiving the childbirth psychoeducation programme had significantly better psychological well-being (<math>t = -3.33</math>, <math>p = 0.001</math>), fewer depressive symptoms (<math>t = -3.76</math>, <math>p = 0.000</math>) and better interpersonal relationships (<math>t = 3.25</math>, <math>p = 0.001</math>) at 6 weeks postpartum compared with those who received only routine childbirth education<sup>152</sup></i></p>	Low

continued

**TABLE 14** Universal preventive interventions: characteristics and main outcomes of RCTs of psychological interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
IPT-based intervention	Leung, 2012 <sup>156</sup>	China (Hong Kong)	156	Antenatal setting	Antenatal	Group	Psychologist
Promoting parent–infant interaction	Cooper, 2009 <sup>153</sup>	South Africa	449	Home visits	Antenatal and postnatal	Individually	Community worker (Lay)
Psychoeducational intervention	Kozinsky, 2012 <sup>155</sup>	Hungary	1762	Antenatal setting	Antenatal	Group	Hungarian health visitors

Key: ASSA, Ainsworth Strange Situation Assessment of Infant Attachment; BSQ, Behaviour Screening Questionnaire; CG, control group; CHAT, Checklist for Autism in Toddlers; CI, confidence interval; DAS, Dyadic Adjustment Scale; df, degrees of freedom; GHQ, General Health Questionnaire; high, high risk of bias; IG, intervention group; low, low risk of bias; OR, odds ratio; REM, Relationship Efficacy Measure; SHS, Subjective Happiness Scale; SWIRS, Satisfaction with Interpersonal Relationships Scale; unclear, unclear risk of bias.  
Effect statistically significant at a conventional  $p$ -value, of  $p < 0.05$ .

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in Hong Kong	2 or more	–	EPDS score 13 or more	PSS (four-items), REM, SHS	<i>Intention-to-treat analysis showed IG had significantly lower perceived stress and greater happiness than CG immediately after the intervention (in pregnancy). Effects not sustained at postnatal follow-up<sup>156</sup></i>	Low
Usual care in South Africa	16	60	EPDS mean score, SCID (DSM-IV)	Mother–infant interaction, maternal sensitivity and intrusiveness, ASSA	At 6 months and 12 months postnatally, the SCID indicated non-statistically significant differences in depression in the intervention and control group ( $\chi^2 = 0.85$ , $df = 1$ , $p = 0.36$ at 6 months; $\chi^2 = 1.16$ , $df = 1$ , $p = 0.21$ at 12 months)  <i>With regard to maternal depressive symptoms (the continuous EPDS), the mean scores for those in the IG were lower at both assessments than were those for the CG, but the benefit of treatment was significant only at 6 months (<math>z = 2.05</math>, <math>p = 0.041</math> at 6 months; <math>z = 0.24</math>, <math>p = 0.813</math> at 12 months)<sup>153</sup></i>	Unclear
Educational information	4	180	Leverton Questionnaire score	–	Leverton scores appeared to indicate a reduction in the risk of depression in the intervention group (OR = 0.69). The risk was reduced by around 18% among women who were depressed in pregnancy and 0.5% in women not depressed in pregnancy  At 6 weeks postnatally, the prevalence of depression was 12.7% in the intervention group and 17.5% in the control group ( $\chi^2$ ; $p < 0.01$ ; OR 0.68). Leverton scores were 9.43 ( $\pm 2.168$ ) vs. 10.12 ( $\pm 3.632$ ) in the intervention and control groups, respectively	High

TABLE 15 Qualitative study of universal preventive interventions: description of study evaluating a psychological intervention

First author	CASP quality grading	Country	Intervention details							
			Name	Setting	Delivered antenatal/postnatal	Group/individual	Numbers in group	Number of sessions	Duration of session (minutes)	Facilitator/service provider
Gao <sup>282</sup>	Moderate	China	IPT-oriented programme	Secondary care – teaching hospital	Antenatal and postnatal	Group and individual	NR	Two classes and a postnatal follow-up telephone call	90	Midwife

Key: NR, not reported.

## Universal preventive interventions: educational interventions

### *Characteristics and main outcomes of randomised controlled trials of universal preventive interventions of educational interventions*

Eight included studies evaluated an educational intervention for the universal prevention of PND, none of which were conducted in the UK.<sup>180,182–187</sup> Two main types of educational interventions were identified: education on preparing for parenting<sup>180,181,184,185,187</sup> and various advisory booklets on PND.<sup>182,183,186</sup> Comparisons were made with usual care in specific countries<sup>180–184,186</sup> and educational information.<sup>185</sup> Four trials provided the educational intervention via group format,<sup>180,181,184,187</sup> while the remaining four trials involved individual sessions.<sup>182,183,185,186</sup> Only one trial provided the intervention in the home setting.<sup>186</sup> Four trials provided the intervention in the antenatal period only,<sup>181,182,185,187</sup> whereas two trials initiated the intervention postnatally<sup>183,186</sup> and two trials provided the intervention across the perinatal period both during pregnancy and following childbirth.<sup>180,184</sup> The interventions were provided by psychologists,<sup>180,181,184,185</sup> midwives<sup>182</sup> and nurses.<sup>183,186</sup> The number of contacts ranged from two to eight and the duration of contact ranged from 30 minutes to 4 hours.

A summary of the characteristics and main outcomes is provided in *Table 16*. No qualitative studies were found for educational interventions as a universal preventive intervention.

## Universal preventive interventions: social support

### *Characteristics and main outcomes of randomised controlled trials of universal preventive interventions of social support*

Of the 37 RCTs of universal preventive interventions, four (11%) evaluated a social support intervention,<sup>197–200</sup> two of which were conducted in the UK.<sup>199,200</sup> Several types of social support were identified including support in labour<sup>197</sup> and self-help support.<sup>200</sup> Comparisons were made with usual care in specific countries<sup>197,199,200</sup> and educational information.<sup>198</sup> One intervention involved a group session,<sup>200</sup> two studies involved individual sessions<sup>197,199</sup> and one involved both group and individual sessions.<sup>198</sup> One study took place in the home setting.<sup>199</sup> None of the studies were undertaken in the antenatal period only, two were in the postnatal period only,<sup>199,200</sup> two were in a combination of both antenatal and postnatal periods<sup>198</sup> and one was at the stage of labour.<sup>197</sup> As with other types of included interventions, these were provided by different health-care providers: community workers,<sup>198</sup> midwives,<sup>200</sup> nurses<sup>197</sup> and support workers.<sup>198</sup> The number of contacts ranged from one to 14 but duration of contact (10–378 minutes) was reported in only one study.<sup>199</sup>

A summary of the characteristics and main outcomes is provided in *Table 17*.

### *Description and findings from qualitative studies of universal preventive interventions of social support*

Of the two qualitative studies of social support included in the universal preventive interventions category, one was conducted in the UK<sup>287</sup> and one in Canada.<sup>281</sup> One intervention was an online discussion group<sup>281</sup> and the other a postnatal support worker intervention.<sup>287</sup> Further details are provided in *Table 18*.

## Findings from qualitative studies of universal preventive interventions of social support

### *Support*

Participants reported that helpful aspects of the intervention were emotional and informational support, the development of relationships with peers,<sup>281,287</sup> reassurance and validation (appraisal support), normalisation of their feelings, practical advice<sup>281</sup> and practical support.<sup>287</sup>

**TABLE 16** Universal preventive interventions: characteristics and main outcomes of RCTs of educational interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Booklet on PND	Hayes, 2001; <sup>182</sup> 2004 <sup>329</sup>	Australia	188	Antenatal setting	Antenatal	Individually	Midwife
Booklet on PND	Ho, 2009 <sup>183</sup>	Taiwan	200	Primary care	Postnatal	Individually	Postpartum ward nurse
Booklet on PND and available services	Sealy, 2009 <sup>186</sup>	Canada	256	Home visits	Postnatal	Individually	Nurse
Education on preparing for parenting	Feinberg, 2008 <sup>180</sup>	USA	169	Antenatal setting	Antenatal and postnatal	Group	Psychologist
Education on preparing for parenting	Gjerdengen, 2002 <sup>181</sup>	USA	151	Antenatal setting	Antenatal	Group	Psychologist
Education on preparing for parenting	Matthey, 2004 <sup>184</sup>	Australia	268	Antenatal setting	Antenatal and postnatal	Group	Psychologist

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Usual care in Australia	1	–	POMS	NSSQ	<i>Significant and steady reduction in scores (overall and on the subscales) was observed over time for both groups that showed significant improvement in symptoms of depression. No difference when comparing IG vs. CG<sup>182</sup></i>	Unclear
Usual care in Taiwan	1	–	EPDS score 10 or more (Chinese version)	–	<i>No significant difference for IG vs CG at 6 weeks (<math>\chi^2 = 1.90</math>, <math>df = 1</math>, <math>p = 0.17</math>) and 3 months postpartum (<math>\chi^2 = 1.02</math>, <math>df = 1</math>, <math>p = 0.31</math>)<sup>183</sup></i>	High
Usual care in Canada	1	–	EPDS score 12 or more	The Parkyn tool	<i>Women in IG had EPDS scores significantly lower than women in CG, IG 4.14; CG 5.01; <math>t = 2.180</math>; <math>df = 254</math>; <math>p = 0.030</math><sup>186</sup></i>	High
Usual care in the USA	8	–	CES-D (subset of 7 items)	–	<i>Intent-to-treat analyses indicated significant program effects on coparental support, maternal depression and anxiety, distress in the parent–child relationship, and several indicators of infant regulation<sup>180</sup></i>  <i>Results indicate a significant intervention effect on maternal depression and anxiety<sup>180</sup></i>	Unclear
Usual care in the USA	2	30	SF-36 5-item mental health scale	Partner satisfaction and caring, SF-36 5-items	<i>No significant group differences on postpartum health or work outcomes<sup>181</sup></i>	High
Usual care in Australia	7	120	CES-D, DIS, (DSM-IV), EPDS, POMS	SOS, CSEI	<i>No significant effects were obtained for either measure of caseness at 6 months postpartum<sup>184</sup></i>  <i>Findings point strongly to differential effects of an intervention dependent upon the woman's level of self-esteem<sup>184</sup></i>	Unclear

continued

**TABLE 16** Universal preventive interventions: characteristics and main outcomes of RCTs of educational interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Education on preparing for parenting	Milgrom, 2011 <sup>185</sup>	Australia	143	Telephone	Antenatal	Individually	Psychologist
Education on preparing for parenting	Shapiro, 2005 <sup>187</sup>	USA	38	Antenatal setting	Antenatal	Group	Psychologist

Key: BDI, Beck Depression Inventory; CES-D, Center for Epidemiologic Studies Depression scale; CG, control group; CSEI, Coopersmith's Self-Esteem Inventory; DASS, Depression Anxiety Stress Scale-short form; DIS, Diagnostic Interview Schedule; df, degrees of freedom; DSM-IV, *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition*; high, high risk of bias; IG, intervention group; low, low risk of bias; NSSQ, Norbeck Social Support Questionnaire; POMS, Profile of Mood States; RAC, Risk Assessment Checklist; SCL, Symptom Checklist; SOS, Significant Others Scale; unclear, unclear risk of bias.  
Effect statistically significant at a conventional  $p$ -value of  $p < 0.05$ .

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Educational information	8	–	BDI, DASS score, EPDS score 13 or more	RAC	<p><i>Significantly fewer cases scoring above threshold for mild to severe depression/ anxiety symptoms postnatally vs. routine care</i><sup>185</sup></p> <p><i>IG reported significantly lower levels of depression (BDI-II) post-treatment than participants in routine care (<math>F_{1,86} = 7.82, p &lt; 0.01</math>. Cohen's <math>d = 0.6</math>)</i><sup>185</sup></p>	Unclear
Usual care in the USA	2	420	SCL score (data extracted using digitising software)	Marital Adjustment Test	<p><i>In general, intervention was effective compared to CG for wife and husband marital quality, for wife and husband postpartum depression</i><sup>187</sup></p> <p><i>The major change in postpartum depression was from 3 months to 1 year: CG increased and IG decreased, <math>t(32) = 2.13, p &lt; 0.05</math></i><sup>187</sup></p>	High

**TABLE 17** Universal preventive interventions: characteristics and main outcomes of RCTs of social support

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Self-help support	Reid, 2002 <sup>200,268</sup>	UK	1004	Primary care	Postnatal	Group	Midwife group facilitator
Social support	Kieffer, 2013 <sup>198</sup>	USA	278	Antenatal setting	Antenatal and postnatal	Individually and group	Community health worker
Social support	Morrell, 2000 <sup>199,266,287</sup>	UK	623	Home visits	Postnatal	Individually	Postnatal support worker
Support in labour	Hodnett, 2002 <sup>197</sup>	Canada	6915	Labour ward	Labour	Individually	Nurse

Key: CES-D, Center for Epidemiologic Studies Depression scale; CG, control group; CI, confidence interval; DUFSS, Duke Functional Social Support Scale; high, high risk of bias; IG, intervention group; LAS, Labor Agency Scale; low, low risk of bias; LSQ, Labour Support Questionnaire; MOMs, Mothers on the Move; SSQ6, Social Support Questionnaire; unclear, unclear risk of bias.  
Effect statistically significant at a conventional  $p$ -value of  $p < 0.05$ .

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in the UK	2 or more	–	EPDS score 12 or more	–	<i>There were no significant differences in EPDS scores between the control and trial arms at 3 and 6 months, nor were there differences in the SF-36 and the SSQ6 scores</i>	Low
Educational information	14	–	CES-D score 16 or more	–	<i>IG less likely than CG to be at risk for depression at follow-up<sup>198</sup></i>  <i>From baseline to postpartum, the mean CES-D score of the MOMs group decreased 1.45 points more than the mean CES-D score of the CG, although this difference in overall change scores was not significant (95% CI –3.26, 0.37; p = 0.12)<sup>198</sup></i>	Low
Usual care in the UK	10	Range 10–378	EPDS score 12 or more	Breastfeeding, SF-36, DUFSS, resource use, costs	At 6 weeks no significant improvement in health status among the women in the IG	Low
Usual care in the USA	1	–	EPDS score 13 or more	Caesarean delivery, LAS, LSQ	No significant differences in women's perceived control during childbirth or in depression, measured at 6–8 weeks postpartum. A total of 245 women in IG (8.7%) had evidence of postpartum depression vs. 277 women (10.1%) in CG ( $p = 0.08$ )	Unclear

TABLE 18 Qualitative studies of universal preventive interventions: description of studies evaluating social support

First author, year, reference number	CASP Quality Grading	Intervention details								
		Country	Name	Setting	Delivered antenatal/postnatal	Group/individual	Number in group	Number of sessions	Duration of session	Facilitator/service providers
Evans, 2012 <sup>281</sup>	Moderate	Canada	Online discussion support group	Online forum	Postnatal	Virtual group (online forum)	NA	NA	NA	Peers
Morrell, 2000 <sup>199,266</sup> 2002 <sup>287</sup>	Low	UK	Postnatal support worker intervention	Home visits	Postnatal	Individual	NA	Up to 10 sessions	Up to 3 hours	Support workers trained to NVQ level 2 for the role

Key: NA, not applicable; NVQ, National Vocational Qualification.

*I would just like to say the support worker who came to help me was fantastic. I had twins by caesarean so I couldn't move around too good. She sent me off to bed and when I'd get up the house would be straight, ironing done, babies bathed and my 3-year-old amused. I was brilliant. I think the support worker is good and hope you can carry it on.*

*Participant*<sup>287</sup>

Providers of the support worker intervention reported that it provided women with emotional, informational and appraisal support.<sup>287</sup> However, one concern about the interventions was whether or not women would become overdependent on the additional support.<sup>287</sup>

### **Service delivery**

Participants<sup>287</sup> reported that the intervention would be more beneficial if it were more intensive, for example if visits were longer and/or more frequent. Midwives raised concern about the support worker's role threatening their own role. Service providers were concerned that the intervention represented an invasion of the women's privacy<sup>287</sup> and were worried that they would be unable to deal with unpredictable situations which they were not qualified to address. In the study, the authors suggested that service providers wanted closer integration with other service providers such as the primary care team and that the intervention should be targeted at vulnerable groups.<sup>287</sup>

## **Universal preventive interventions: pharmacological agents or supplements**

### ***Characteristics and main outcomes of randomised controlled trials of universal preventive intervention of pharmacological agents or supplements***

Of the six trials that evaluated a specific supplement or drug for the universal prevention of PND, none were conducted in the UK.<sup>207-212</sup> Several types of pharmacological agents or supplements were identified including docosahexaenoic acid (DHA) at different doses,<sup>207,210,211</sup> calcium,<sup>208</sup> norethisterone ethanate<sup>209</sup> and selenium.<sup>212</sup> All six studies compared the interventions with usual care in specific countries.<sup>207-212</sup> All six studies involved individual sessions.<sup>207-212</sup> Three studies took place in the antenatal period<sup>208,211,212</sup> and two in the postnatal period;<sup>209,210</sup> one combined both antenatal and postnatal periods.<sup>207</sup> Included interventions were all delivered by the provider. A summary of the characteristics and main outcomes is provided in *Table 19*. No qualitative studies were identified of pharmacological agents or supplements aimed at a universal population.

## **Universal preventive interventions: midwifery-led interventions**

### ***Characteristics and main outcomes of randomised controlled trials of universal preventive interventions of midwifery-led interventions***

Of the five studies<sup>146,217-220</sup> evaluating midwifery-led interventions for the universal prevention of PND, two were conducted in the UK.<sup>146,219</sup> Several types of midwifery-led interventions were identified, including midwifery redesigned postnatal care,<sup>146</sup> midwife-led debriefing or counselling after childbirth,<sup>217,218</sup> midwife-managed care<sup>219</sup> and team midwife care.<sup>220</sup> Comparisons were made with usual care in specific countries.<sup>146,217-220</sup> All six trials involved individual sessions.<sup>146,217-220</sup> None of the trials provided the intervention only antenatally; three initiated the intervention postnatally,<sup>146,217,264</sup> and two trials initiated the intervention during the pregnancy and continued it postnatally.<sup>219,220</sup> The provision of the midwifery care varied in the number of contacts, with duration ranging from 15 minutes to 1 hour. A summary of the characteristics and main outcomes is provided in *Table 20*.

**TABLE 19** Universal preventive interventions: characteristics and main outcomes of RCTs of pharmacological agents or supplements

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Calcium	Harrison-Hohner, 2001 <sup>208,261</sup>	USA	468	Antenatal setting	Antenatal	Individually	Prescriber
DHA	Doornbos, 2009 <sup>207</sup>	The Netherlands	119	Antenatal setting	Antenatal and postnatal	Individually	Prescriber
DHA 200 mg/day	Llorente, 2003 <sup>210</sup>	USA	89	Postnatal setting	Postnatal	Individually	Prescriber
DHA 800 mg	Makrides, 2010 <sup>211,265</sup>	Australia	2399	Antenatal setting	Antenatal	Individually	Prescriber
Norethisterone ethanate 200 mg administered intramuscularly	Lawrie, 1998 <sup>209</sup>	South Africa	180	Postnatal setting	Postnatal	Individually	Prescriber
Selenium	Mokhber, 2011 <sup>212</sup>	Iran	166	Antenatal setting	Antenatal	Individually	Prescriber

Key: BDI, Beck Depression Inventory; BSID, Bayley Scales of Infant Development; CG, control group; CI, confidence interval; high, high risk of bias; low, low risk of bias; MADRS, Montgomery–Åsberg Depression Rating Scale; OOS, Obstetric Optimality Score; SCID-CV, Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders*, clinician version; unclear, unclear risk of bias.  
Effect statistically significant at a conventional  $p$ -value of  $p < 0.05$ .

Comparison group	Number of contacts	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in the USA	2 or more	EPDS score 14 or more	Norbeck's modified Sarason's Life Events Survey	<p>There was a trend among 293 women who scored 14 or more on the 6-week EPDS towards less depression in the intervention group. At 12 weeks postnatally, the intervention group were less depressed (<math>p = 0.04</math>)</p> <p>The authors suggested that calcium supplementation could have had a preventive effect at one centre, but no effect at another and that these outcomes were difficult to explain</p>	High
Usual care in the Netherlands	2 or more	EPDS score 12 or more (Dutch version)	OOS	IG did not differ in mean EPDS scores or changes in EPDS scores, nor in incidence or severity of postpartum blues	High
Usual care in the USA	2 or more	BDI, EPDS mean score, SCID-CV	Plasma phospholipid, DHA acid content	After 4 months, no difference between groups in either self-rating or diagnostic measures of depression	Unclear
Usual care in Australia	2 or more	EPDS score 13 or more	BSID	The percentage of women with high levels of depressive symptoms during the first 6 months postpartum did not differ for IG vs. CG (9.67% vs. 11.19%; adjusted relative risk, 0.85; 95% CI 0.70 to 1.02; $p = 0.09$ )	Low
Usual care in South Africa	1	EPDS score 12 or more, MADRS	Breastfeeding, vaginal bleeding, somatic complaints	<p><i>Mean depression scores significantly higher in IG vs. CG at 6 weeks postpartum (mean MADRS score 8.3 vs. 4.9: <math>p = 0.0111</math>; mean EPDS score 10.6 vs. 7.5: <math>p = 0.0022</math>)</i><sup>209</sup></p>	Low
Usual care in Iran	2 or more	EPDS score 13 or more (Iranian version)	–	Mean EPDS score in selenium group significantly lower than in CG ( $p < 0.05$ )	Unclear

**TABLE 20** Universal preventive interventions: characteristics and main outcomes of RCTs of midwifery-led interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Midwife-led debriefing or counselling after childbirth	Priest, 2003; <sup>217</sup> Henderson, 1998 <sup>330</sup>	Australia	1745	Postnatal setting	Postnatal	Individually	Midwife
Midwife-led debriefing or counselling after childbirth	Selkirk, 2006 <sup>218</sup>	Australia	149	Postnatal setting	Postnatal	Individually	Midwife
Midwife-managed care	Shields, 1997 <sup>219</sup>	UK	1299	Antenatal setting	Antenatal and postnatal	Individually	Midwife

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Usual care in Australia	1	Range 15–60	EPDS score 13 or more, SCID, SADs	IoE Scale (revised) (psychological trauma)	No significant differences for CG vs. IG in scores on IoE Scale or EPDS at 2, 6 or 12 months postpartum or in the proportions of women who met diagnostic criteria for a stress disorder (intervention 0.6% vs. control 0.8%; $p=0.58$ ) or major or minor depression [intervention, 17.8% vs. control, 18.2%; relative risk 0.99 (95% CI 0.87 to 1.11)] during the postpartum year. No differences in median time to onset of depression [intervention 6 (interquartile range 4–9) weeks vs. control 4 <sup>3–8</sup> weeks; $p=0.84$ ], or duration of depression (intervention 24 <sup>12–46</sup> weeks vs. control 22 <sup>10–52</sup> weeks; $p=0.98$ )	Unclear
Usual care in Australia	1	Range 30–60	EPDS mean score, SCL-90	STAI, IES, DAS, FAD, PSI, IIS, POBS	<i>No significant differences for IG vs. CG on measures of personal information, depression, anxiety, trauma, perception of the birth, or parenting stress at any assessment points, postpartum<sup>218</sup></i>	High
Usual care in the UK	2 or more	–	EPDS mean score (question 10 on self-harm was excluded)	Infant feeding	<i>EPDS has not been validated as a 9-item scale. It was not possible to give a 'true' measure of point prevalence of PND<sup>219</sup></i>  The mean scores for women in the MDU were lower than those for the traditional care group (8.1, SD 4.9 vs. 9.0, SD 4.9). 16.7% of women in the MDU vs. 23.2% women in usual care had an EPDS score 13 or more (95% CI –12.1% to –0.9%)	Unclear

continued

**TABLE 20** Universal preventive interventions: characteristics and main outcomes of RCTs of midwifery-led interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Midwifery-redesigned postnatal care	MacArthur, 2002; <sup>146</sup> 2003 <sup>264</sup>	UK	2064	Postnatal setting	Postnatal	Individually	Midwife
Team midwife care	Waldenstrom, 2000 <sup>220</sup>	Australia	1000	Antenatal setting	Antenatal and postnatal	Individually	Midwife

Key: CI, confidence interval; DAS, Dyadic Adjustment Scale; FAD, Family Assessment Device; high, high risk of bias; IES, Impact of Events Scale; IoE, Impact of Events scale; IIS, Intrapartum Intervention Scale; low, low risk of bias; MDU, Midwifery Development Unit; POBS, Perception of Birth Scale; SADs, Schedule for Affective Disorders; SCL-90, Symptom Checklist-90; SD, standard deviation; unclear, unclear risk of bias. Effect statistically significant at a conventional  $p$ -value of  $p < 0.05$ .

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Usual care in the UK	2 or more	–	EPDS score 13 or more, SF-36 MCS	SF-36 PCS	<i>Women's mental health measures were significantly better in the IG (MCS, 3.03 [95% CI 1.53–4.52]; EPDS –1.92 [–2.55 to –1.29]; EPDS 13 + odds ratio 0.57 [0.43–0.76]) than in controls, but the physical health score did not differ<sup>146</sup></i>	Low
Usual care in Australia	2 or more	–	EPDS score 13 or more	–	<i>Team midwife care associated with increased satisfaction. Differences between groups most noticeable for intrapartum care and least noticeable for postpartum care. No differences for team midwife care vs. standard care in medical interventions or in women's emotional well-being 2 months after the birth<sup>220</sup></i>	Unclear

### **Description and findings from qualitative studies of universal preventive interventions of midwifery-led interventions**

Seven qualitative reports were identified of women's experiences of midwifery-led interventions.<sup>277,283-285,289-291</sup> All seven reports related to the CenteringPregnancy initiative (Table 21).

#### **Findings from the qualitative studies of universal preventive interventions of midwifery-led interventions**

##### **Peer support**

Several respondents in the seven studies<sup>277,283-285,289-291</sup> reported gaining support, particularly in the CenteringPregnancy intervention. Service providers were positive about their experience and thought the intervention facilitated peer support.<sup>290,291</sup> In addition, the women felt that they had benefited from a supportive environment and from sharing experiences:<sup>277,283,289</sup>

*I really enjoyed having others who were at the same stage of pregnancy as me to talk to and compare feelings and symptoms.*

*Participant*<sup>289</sup>

Women talked about building relationships with peers,<sup>283,289</sup> receiving reassurance and normalisation of their experiences during the pregnancy, during birth and postnatally.<sup>289</sup> Women also valued the emotional, informational and appraisal support received from peers.<sup>289</sup> One woman did not find the group environment helpful:

*It wasn't a good idea in the beginning of the pregnancy. I would not want the pregnancy be open to the public.*

*Participant*<sup>277</sup>

##### **Partners**

Respondents felt that their partners needed and appreciated the support from the intervention:<sup>283,289</sup>

*It was good for the husbands. They all came and it was nice [that] they were included . . . my husband liked it because before he had to wait in the waiting room and now he was involved.*

*Participant*<sup>283</sup>

Some women felt more of the intervention focus should be on partners;<sup>277</sup> although one woman was ambivalent:<sup>277,283</sup>

*I think it's good if they can come, but when they were present, there were things you did not want to ask in front of others. I did not want to raise questions in front of them.*

*Participant*<sup>277</sup>

Authors' interpretations<sup>277,283</sup> revealed either that partners had difficulty contributing to the group because of shyness<sup>277</sup> or that women felt that partners were uncomfortable with intimate discussions.<sup>283</sup>

##### **Service providers' skills**

Participants found the midwives' support and group skills in running the intervention helpful,<sup>277,285,289</sup> because they were able to pay attention to women's concerns and offer women solutions,<sup>277,285</sup> although some midwives required more training to lead groups:

*I was disappointed that the midwife did not ask about the wishes of the group.*

*Participant*<sup>277</sup>

TABLE 21 Qualitative studies of universal preventive interventions: description of studies evaluating midwifery-led interventions

Name	CASP quality grading	First author, year, reference number	Country	Setting	Delivered antenatal/postnatal	Group/individual	Number of women in group	Number of sessions	Duration of session (hours)	Facilitator/service providers
CenteringPregnancy	Moderate	Andersson, 2012 <sup>277</sup>	Sweden	Secondary care – antenatal clinic	Antenatal and postnatal	Group and individual	6–8	NR	NR	Midwives
CenteringPregnancy	Moderate	Kennedy, 2009 <sup>283</sup>	USA	Secondary care – air force base/US Navy hospital	Antenatal (one postnatal reunion) from 12–16 weeks of pregnancy	Group and individual	8–12	10	2	Midwives/nurse
CenteringPregnancy	Moderate	Klima, 2009 <sup>284</sup>	USA	Secondary care – antenatal clinic	Antenatal and postnatal	Group and individual	4–10	NR	NR	Certified nurse-midwives
CenteringPregnancy	Moderate	McNeil, 2012 <sup>285</sup>	Canada	Secondary care – antenatal clinic	Antenatal and postnatal	Group and individual	8–12	10	2	Family physician and a perinatal educator
CenteringPregnancy	Moderate	McNeil, 2013 <sup>290</sup>	Canada	Secondary care – antenatal clinic	Antenatal and postnatal	Group and individual	8–12	10	2	Family physician and a perinatal educator
CenteringPregnancy	Low	Teate, 2011 <sup>289</sup>	Australia	Secondary care – antenatal clinic/ community health centres	Antenatal and postnatal	Group and individual	8–12	NR	NR	Midwives, student midwives, social workers
CenteringPregnancy	Moderate	Tanner-Smith, 2012 <sup>291</sup>	USA	Secondary care – antenatal clinic/ community health centres – multisite	Antenatal and postnatal	Group and individual	8–12	NR	NR	NR

Key: NR, not reported.

Participants felt midwives should focus more on their partners.<sup>277</sup> Others appreciated the midwife's skills, knowledge, warmth, providing suggestions for group discussion and allowing unstructured discussion.<sup>277</sup> Service providers felt the intervention improved communication between them and participants which promoted a better relationship and facilitated information exchange.<sup>290</sup> Service providers said they enjoyed delivering the intervention, and found it a satisfying and rewarding experience in that it provided richer care to women.<sup>290,291</sup>

### **Active participation/education**

Another important theme related to how participants might actively participate in their own health care, including the provision of education and the gaining of information and knowledge.<sup>283-285,289</sup> Several respondents said that they valued receiving education and information about pregnancy and the postnatal period.<sup>283,284</sup> The women felt empowered by being allowed to undertake certain health monitoring tasks, such as weighing themselves and taking their own blood pressure.<sup>283</sup> In two studies,<sup>283,289</sup> the women wanted more and more intensive education on issues relating to labour, birth and parenting and the early weeks of parenting:

*At the time, we were given ample information. I was very well informed for my birth. More information about coping with a newborn would be helpful.*

Participant<sup>289</sup>

### **Group setting**

Service providers in two studies reported that, compared with individual care, the group environment provided more opportunity for teaching and enhanced education.<sup>284,291</sup> Providers across studies felt that the intervention encouraged women to be active participants in their own health care.<sup>284,290</sup> They reported that women were enthusiastic about the group setting, and this enthusiasm served to increase participation.<sup>284</sup>

### **Service delivery and barriers to participation**

Practical aspects relating to how the service is delivered has important implications regarding intervention up-take. Participants reported the format reduced waiting times<sup>285,289</sup> and promoted continuity of care.<sup>277</sup> In a study in a US military setting,<sup>283</sup> participants found 'front-desk staff' unhelpful:

*You would have to wait for a really long time on the phone or for them to call back. And then it felt like they just brushed you off.*

Participant<sup>283</sup>

They complained about the lack of child care and consideration for children.<sup>283</sup> Participants reported they felt they had few assessments and that they experienced 'scrimping and cost saving' as they were asked to undertake tasks such as taking samples to the laboratory. They felt they would not have had to undertake these activities if their care been delivered in a civilian setting.<sup>283</sup>

### **Suggested improvements**

Ways suggested to improve the service were to reduce the period of time between first and second group meetings,<sup>277</sup> to reduce the 2-hour session,<sup>289</sup> to address the rushed feeling,<sup>283</sup> to improve the lack of privacy,<sup>277,283</sup> to address the lack of healthy snacks<sup>283</sup> and to add individual appointments:

*As a first-time mom, you need more reassurance to talk with a caregiver. Or perhaps have an open time where you can go in – perhaps before or after to talk with them.*

Participant<sup>283</sup>

Service providers reported the group intervention helped to address waiting time issues in one study<sup>284</sup> and suggested that the intervention was a more efficient use of time:<sup>290</sup>

*I can't impart everything I've learned from 20 years of delivering babies in . . . five 7-minute visits . . . but, I can get more of that across in . . . all their 2-hour groups.*

Participant<sup>290</sup>

The intervention was still restricted to groups, such as teenagers, because of provider bias.<sup>291</sup> There were difficulties gaining funding to keep the intervention running<sup>284,291</sup> and attendance difficulties because of transport or work conflict issues. Some women were resistant to the group format,<sup>291</sup> which service providers felt did not allow 'deeper issues' to be addressed.<sup>284</sup> Service providers reported concerns that the group intervention took a provider away from one-to-one care<sup>284</sup> and that they experienced difficulties with scheduling:

*There is no system for scheduling. While one provider does the group, the other provider gets dumped on.*

*Participant*<sup>284</sup>

## Universal preventive interventions: organisation of maternity care

### *Characteristics and main outcomes of randomised controlled trials of universal preventive interventions of organisation of maternity care*

Of the five studies<sup>147,150,225–227</sup> evaluating the organisation of maternity care for the universal prevention of PND, only one was conducted in the UK.<sup>150</sup> Several types of organisation of maternity care interventions were identified, including planned health visitor visits,<sup>150</sup> early contact with care provider,<sup>225</sup> primary care and community care strategies,<sup>147</sup> programmes for HIV, alcohol and mental health<sup>226</sup> and early contact with care provider.<sup>227</sup> Comparisons were made with usual care in specific countries.<sup>147,225–227</sup> All five studies involved individual contacts.<sup>147,150,225–227</sup>

None of the studies were undertaken in only the antenatal period, three in only the postnatal period<sup>150,225,227</sup> and two used a combination of both antenatal and postnatal periods.<sup>226,227</sup> The interventions were provided by different health-care providers including health visitors,<sup>150</sup> GPs,<sup>225</sup> primary care nurses, community development workers,<sup>147</sup> community health workers, peer mentors,<sup>226</sup> paediatric house officer or nurse practitioners.<sup>227</sup> The number of contacts varied greatly. A summary of the characteristics and main outcomes is provided in *Table 22*.

### *Description and findings from qualitative studies of universal preventive interventions of organisation of maternity care*

One qualitative study<sup>288</sup> reported women's experiences of interventions aimed at a universal population involving the organisation of maternity care (*Table 23*).

## Findings from qualitative studies of universal preventive interventions of organisation of maternity care

### *Support*

Women found the service provider's support helpful<sup>288</sup> and appreciated the infant welfare sister's concern expressed for them and the baby. They also talked about the nurse as maternal figure for themselves:

*She's a supplement to my own mother. She's easy to talk to. I depend on her. She's not just there to take care of the baby but for the mothers too. She started a group for us new mothers.*

*Participant*<sup>288</sup>

However, this positive effect may have become a barrier to effective service use in situations in which women reported that they did not understand the role of the maternal and child health nurse.<sup>288</sup> One woman reported:

*... I never thought I had a right to talk about emotional problems as I was never told what the role of the nurse covers.*

*Participant*<sup>288</sup>

**TABLE 22** Universal preventive interventions: characteristics and main outcomes of RCTs of organisation of maternity care

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Early contact with care provider	Gunn, 1998 <sup>225</sup>	Australia	475	Primary care	Postnatal	Individually	GP
Early contact with care provider	Serwint, 1991 <sup>227</sup>	USA	251	Postnatal setting	Postnatal	Individually	Paediatric house officer or nurse practitioner
Primary care and community care strategies	Lumley, 2006 <sup>147,263</sup>	Australia	18,555	Primary care	Antenatal and postnatal	Individually	Primary care nurse and community development worker
Program for HIV, alcohol, mental health	Rotheram-Borus, 2011; <sup>226</sup> le Roux, 2013 <sup>270</sup>	South Africa	1144	Antenatal setting	Antenatal and postnatal	Individually	Community health worker (peer mentors)

Comparison group	Number of contacts	Duration of contact	Depression outcomes	Other outcomes	Main findings	Risk of bias
Usual care in Australia	1	–	EPDS score 13 or more	Breastfeeding, SF-36	<i>No significant differences between groups in: EPDS and SF-36 scores; number of problems; breastfeeding rates; or satisfaction with general practitioner care. IG less likely to attend for their check-up (76.4% vs. 88.4%; p = 0.001)<sup>225</sup></i>	Low
Usual care in the USA	1	–	CES-D	Maternal knowledge, use of services	No differences for IG vs. CG for emergency room utilisation, percentage who received immunisations by 90 days of age, maternal knowledge of infant care, maternal anxiety, or postpartum depression	High
Usual care in Australia	2 or more	–	EPDS score 13 or more, SF-36 MCS	SF-36 PCS	There were no differences in mean scores for the MCS or EPDS. There were no differences in the proportion of women scoring 13 or more on the EPDS. There were also no differences in the mean PCS scores  <i>The combination of primary care and community based strategies did not reduce the symptoms of depression or improve the physical health of women at 6 months postnatally</i>	Unclear
Usual care in South Africa	11	–	EPDS score 14 or more, GHQ	–	<i>PIP is a model for countries facing significant reductions in HIV funding whose families face multiple health risks. Healthcare, maternal depression, social support, and % of mothers securing the child grant were similar across conditions<sup>270</sup></i>	Low

continued

**TABLE 22** Universal preventive interventions: characteristics and main outcomes of RCTs of organisation of maternity care (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Six planned health visitor visits	Christie, 2011 <sup>150</sup>	UK	295	Home visits	Postnatal	Individually	Health visitor

Key: CES-D, Center for Epidemiologic Studies Depression scale; CI, confidence interval; GHQ, General Health Questionnaire; high, high risk of bias; low, low risk of bias; OR, odds ratio; PES, Parenting Expectations Survey; PIP, Philani Intervention Programme; unclear, unclear risk of bias.  
Effect statistically significant at a conventional  $p$ -value of  $p < 0.05$ .

Comparison group	Number of contacts	Duration of contact	Depression outcomes	Other outcomes	Main findings	Risk of bias
Health visitor single visit	6	–	EPDS	PSI, role restriction attachment self-efficacy, PES, baby nurture, breastfeeding, use of services, satisfaction	There were no differences in outcomes for the intervention group compared with the control group, apart from the EPDS score which was higher (indicating more symptoms of depression) in the intervention group at 8 weeks postnatally. Compared with the control group, women in the intervention group reported higher levels of satisfaction and lower use of emergency services up to 8 weeks postnatally	Unclear

TABLE 23 Qualitative studies of universal preventive interventions: description of studies evaluating organisation of maternity care

First author, year, reference number	Intervention details							CASP quality grading		
	Country	Name	Setting	Delivered antenatal/postnatal	Group/individual	Number of women in group	Number of sessions		Duration of session	Facilitator/service providers
Scott, 1987 <sup>88</sup>	Australia	Maternal and child health nurses	Secondary care – maternal and child health centres	Postnatally	Individual	NA	Multiple contact	NA	Nurses	Moderate

Key: NA, not applicable.

### *Service delivery and barriers to participation*

Women reported that they did not understand that depression was associated with the baby and, therefore, did not talk to the nurse about their feelings, or they were worried about stigma if they approached the nurse for emotional support.<sup>288</sup>

## **Universal preventive interventions: complementary and alternative medicine or other**

### *Characteristics and main outcomes of randomised controlled trials of universal preventive interventions of complementary and alternative medicine or other*

None of the three studies<sup>123,129,228</sup> evaluating the CAMs for the universal prevention of PND were conducted in the UK. Several types of CAMs interventions were identified including baby massage<sup>228</sup> and exercise.<sup>123,129</sup> Comparisons were made with usual care in specific countries<sup>129,228</sup> and educational information.<sup>123</sup> All three studies involved individual sessions. One was undertaken in the antenatal period only<sup>129</sup> and two in the postnatal period only.<sup>123,228</sup> The provider of these interventions was a massage instructor<sup>228</sup> or physical therapist.<sup>123,129</sup> The number of contacts varied and the length of contact was 1 hour in two studies.<sup>123,129</sup> A summary of the characteristics and main outcomes is provided in *Table 24*.

### *Description and findings of qualitative studies of universal preventive interventions of complementary and alternative medicine or other*

Three qualitative studies<sup>278–280,286,288</sup> reported women's experiences of interventions aimed at a universal population involving the CAMs or other intervention (*Table 25*).

### **Support**

Support was an important theme in studies of a group mind–body exercise (MBE) intervention,<sup>286</sup> a singing lullabies group intervention<sup>278,279</sup> and a yoga and discussion group.<sup>280</sup> In two studies,<sup>278–280</sup> the benefit of peer support was reported by participants, especially the sharing of experiences and birth stories and in the development of connections with their fellow group members:

*... (when I was giving birth) ... I thought of all the women in the lullaby project having their babies ... it just connected me and I didn't feel so nervous ...*

*Participant*<sup>278,279</sup>

Women who took part in the MBE techniques reported that when partners supported them in applying the MBE techniques this facilitated communication between them and their partners.<sup>286</sup> Participants reported that family support was also facilitated by teaching the songs learned in the lullaby intervention.<sup>278,279</sup> The study author reported that participants found it difficult to apply MBE techniques learned during the intervention without group support.<sup>286</sup>

**TABLE 24** Universal preventive interventions: characteristics and main outcomes of RCTs of CAM or other

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Baby massage	Fujita, 2006 <sup>228</sup>	Japan	57	Postnatal setting	Postnatal	Individually	Massage instructor
Exercise	Norman, 2010 <sup>123</sup>	Australia	161	Postnatal setting	Postnatal	Group	Physical therapist
Exercise	Songøygard, 2012 <sup>129</sup>	Norway	855	Antenatal setting	Antenatal	Group	Physiotherapist

Key: high, high risk of bias; low, low risk of bias; PABS, Positive Affect Balance Scale; POMS, Profile of Mood States; unclear, unclear risk of bias.  
Effect statistically significant at a conventional  $p$ -value of  $p < 0.05$ .

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Usual care in Japan	2 or more	–	POMS, (Japanese version)	Salivary cortisol	<i>Significant differences in the POMS score seen in depression and vigor between two groups at 3 months. No significant differences in the salivary cortisol levels. 3 months after delivery scores had improved more positively in depression and vigor in IG vs. CG (D; t = -2.57, p = .02, V; t = 2.39, p = .02)<sup>228</sup></i>	High
Educational information	8	60	EPDS score 13 or more	PABS	There was a reduction in mean EPDS score in the Mother and Baby Program intervention group at 8 weeks, compared with the education-only group, maintained for 4 weeks	Unclear
Usual care in Norway	12	60	EPDS score 10 or more, EPDS score 13 or more	–	<i>14/379 (3.7%) women in IG and 17 of 340 (5.0%) in CG had an EPDS score of 10 or more (p = 0.46), and 4/379 (1.2%) women in IG and 8/340 (2.4%) in CG had an EPDS score of 13 or more (p = 0.25)<sup>129</sup></i>	Unclear

TABLE 25 Qualitative studies of universal preventive interventions: description of studies evaluating CAM or other

Name	CASP quality grading	First author, year, reference number	Country	Setting	Delivered antenatal/postnatal	Group/individual	Number of women in group	Number of sessions	Duration of session (minutes)	Facilitator/service providers
Singing lullabies	Moderate	Carolan, 2012 <sup>278,279</sup>	Ireland	Secondary care – antenatal clinic	Antenatally	Group	6	4	45	Musicians
Yoga and discussion group	Moderate	Doran, 2013 <sup>280</sup>	Australia	Secondary care – community based feminist non-government women's health centre	Antenatally and postnatally	Group	NR	Ongoing/flexible	NR	Midwife and a yoga teacher
Mind-body exercise techniques	High	Migl, 2009 <sup>286</sup>	USA	Secondary care – prenatal support group	Antenatally	Group	NR	5 weekly sessions	NR	NR

Key: NR, not reported.

## Learning practical strategies

Beneficial aspects of the interventions were reported by participants as the practical use of strategies learned during the intervention.<sup>278,279,286</sup> Participants reported that they served to prevent panic attacks, combat physical symptoms of stress and could be used in combination with existing strategies.<sup>286</sup> Participants in one study<sup>286</sup> reported that they valued techniques that were easy to use in any setting and for a short period and being able to take the specific parts of the intervention they needed:

*[MBE was] ... something new and easy to use in almost any setting and for period a short period of time ...*  
Participant<sup>286</sup>

However, in one study<sup>278,279</sup> it was reported that the use of the learned strategies could result in unexpected emotional responses:

*... I was told you're going to get blue ... so I was expecting that. I didn't expect [what happened] ...*  
*At first I'd start crying was when I was singing that song ... I was crying at the time. It was so strong ...*  
Participant<sup>278,279</sup>

In one study<sup>286</sup> the authors reported that the women found it difficult to allocate time to use the practical strategies learned, forgot to implement the strategies or were resistant to using techniques because of stigma in that they felt certain MBE techniques were not accepted by wider society. One woman reported that she could not see the value in the use of the techniques during the postpartum period.<sup>286</sup>

## Empowerment (self-esteem)

Women in two interventions reported that the intervention facilitated preparation for birth.<sup>278-280</sup> This was both emotionally through stress reduction and confidence building,<sup>278-280</sup> and physically through yoga techniques.<sup>280</sup>

## Results from network meta-analysis for universal preventive interventions for Edinburgh Postnatal Depression Scale threshold score

A NMA is an extension of a standard meta-analysis that enables a simultaneous comparison of all evaluated interventions in a single coherent analysis. In this way, all interventions can be compared with one another, including comparisons not evaluated within individual studies. The only requirement is that each study must be linked to at least one other study through having at least one intervention in common.

Among the trials excluded because they could not be connected to the main network (see *Appendix 10, Table of universal preventive intervention studies omitted from network meta-analysis*), three were conducted in South Africa,<sup>153,209,226</sup> three in China,<sup>154,156,157</sup> one in Japan,<sup>228</sup> one in the Republic of China (Taiwan)<sup>183</sup> and one in Hungary.<sup>155</sup> Three of these trials were at high risk of bias<sup>155,183,228</sup> and two were of uncertain risk of bias.<sup>153,157</sup>

Among the other excluded trials, three had no usual-care comparator.<sup>150,185,198</sup> Six trials did not report an EPDS score<sup>180-182,187,227,329</sup> and in two the EPDS score was unusable.<sup>200,268</sup> Two trials of social support, one conducted in the UK<sup>200</sup> and one in the USA,<sup>198</sup> were at low risk of bias and found no evidence of an effect. There were five studies at high risk of bias.<sup>181,187,207,218,227</sup> In all of the other studies the risk of bias was unclear. Three of these studies did not have negative results.<sup>150,180,185</sup> A US trial of education on preparing for parenting found 'a [statistically] significant intervention effect on maternal depression and anxiety'<sup>180</sup> using a subset of seven items from the Center for Epidemiologic Studies Depression (CES-D) scale. An Australian trial of education on preparing for parenting found 'participants in the intervention reported significantly lower levels of depression [Beck Depression Inventory (BDI-II)] post-treatment than participants in routine care'.<sup>185</sup> A UK-based trial of six planned health visitor visits<sup>150</sup> found that the 'intervention had no impact on most outcomes; however, it was associated with an increased EPDS score at eight weeks (before accounting for outliers) but not at seven months'.

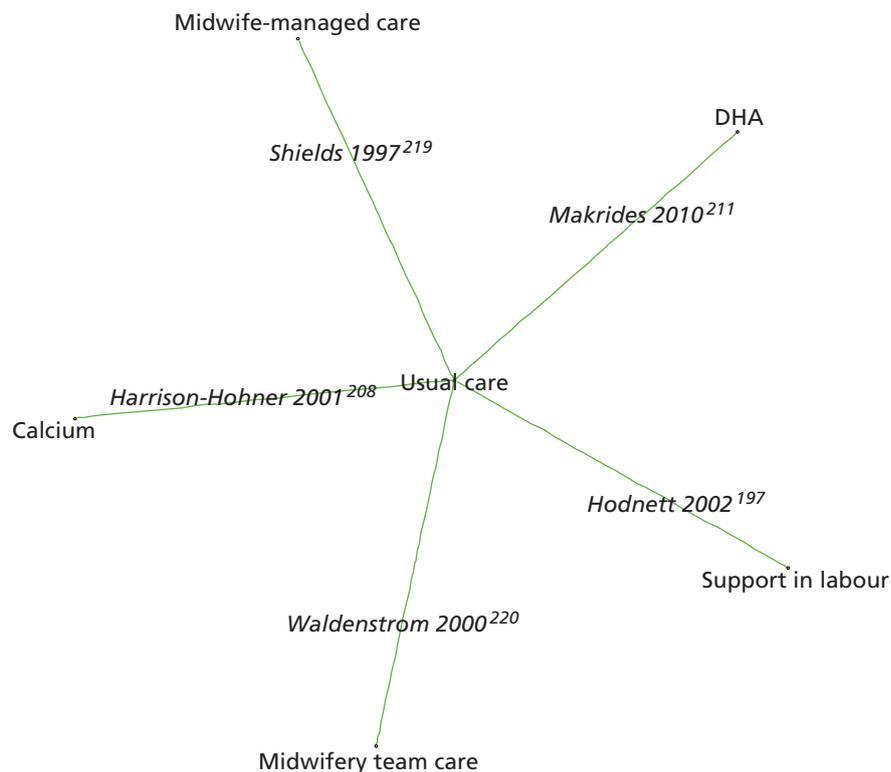
### Results for universal preventive interventions for Edinburgh Postnatal Depression Scale threshold score at 6 weeks postnatally

Data were available from five studies presenting the EPDS threshold score at 6 weeks postnatally.<sup>197,208,211,219,220</sup> The results for the five universal preventive intervention trials presenting an EPDS threshold score are combined here. A NMA compared the effects of support in labour,<sup>197</sup> midwife-managed care,<sup>219</sup> DHA,<sup>211</sup> calcium<sup>208</sup> and team midwife care<sup>220</sup> relative to usual care on EPDS threshold. *Figure 5* presents the network of evidence. There were five intervention effects (relative to usual care) to estimate from five studies.

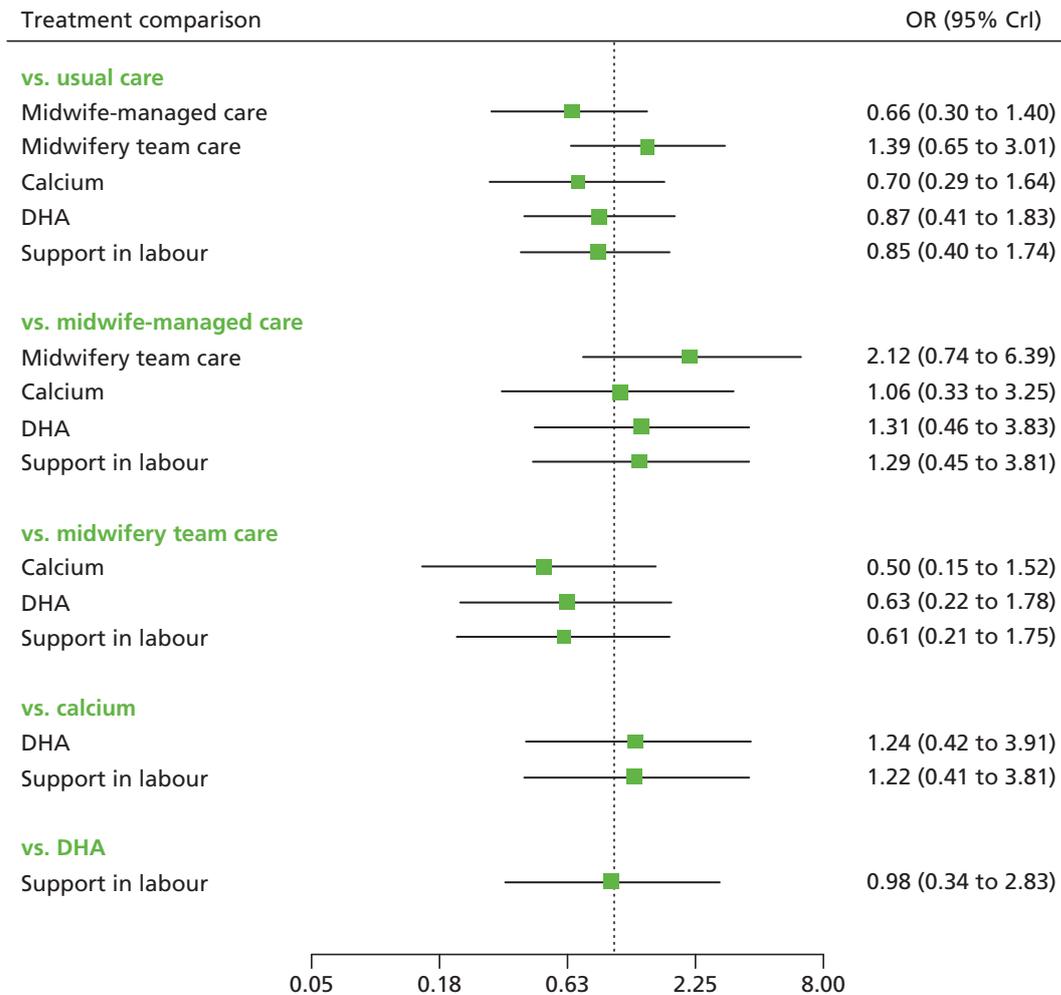
*Figure 6* presents the odds ratios of each intervention relative to usual care and *Figure 7* presents the probabilities of treatment rankings. The total residual deviance was 10.04, which is compared with the total number of data points, 10, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.26 (95% CrI 0.01 to 0.72), which implies mild heterogeneity of intervention effects between studies.

For all interventions except midwifery team care the odds ratio was less than 1, suggesting a beneficial effect compared with usual care. However, none of the comparisons were statistically significant at a conventional 5% level (see *Figure 6*). The interventions with the highest probabilities of being the best were midwife-managed care and calcium (probability 0.43 and 0.36, respectively).

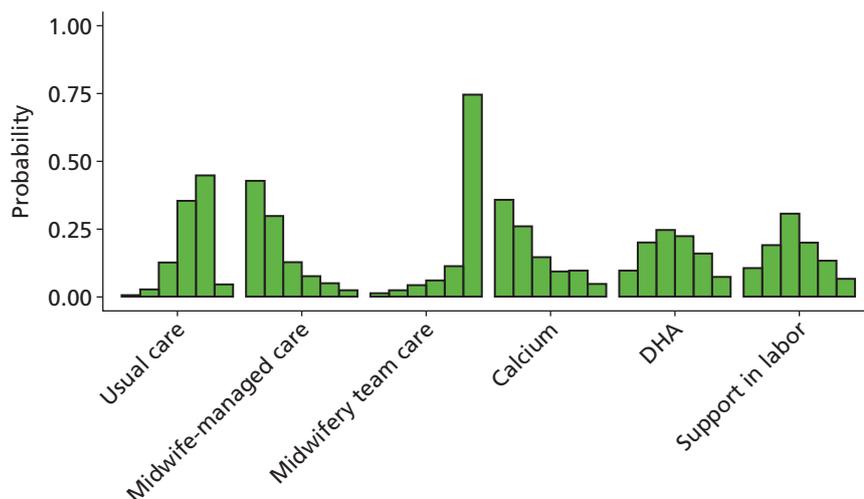
Midwifery team care was associated with an increased odds ratio compared with usual care (1.39, 95% CrI 0.65 to 3.01) and had a 74% chance of being the least effective among the six interventions (see *Figure 7*).



**FIGURE 5** Universal preventive interventions EPDS threshold score at 6 weeks postnatally: network of evidence.



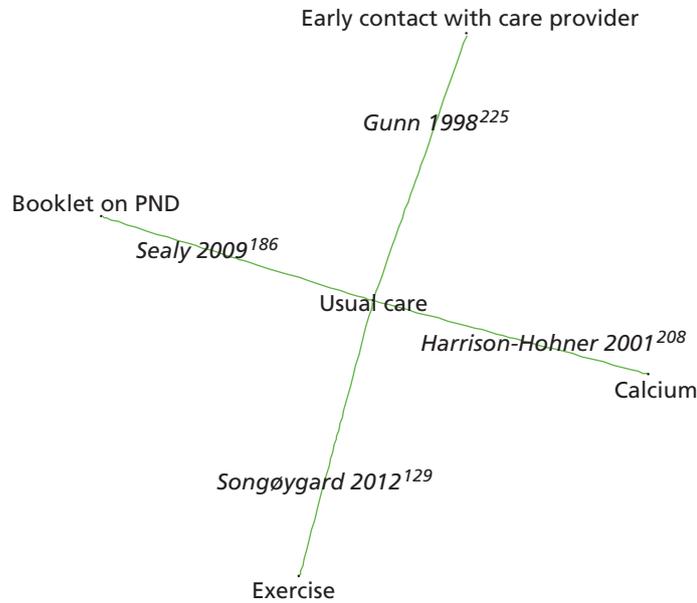
**FIGURE 6** Universal preventive interventions EPDS threshold score at 6 weeks postnatally: odds ratios for all treatment comparisons. Key: OR, odds ratio.



**FIGURE 7** Universal preventive interventions EPDS threshold score at 6 weeks postnatally: probability of treatment rankings (ranks 1–6).

### Results for universal preventive interventions for Edinburgh Postnatal Depression Scale threshold score at 3 months postnatally

A NMA was used to compare the effects of calcium,<sup>208</sup> booklet on PND,<sup>186</sup> exercise<sup>129</sup> and early contact with care provider<sup>225</sup> relative to usual care on EPDS threshold. Data were available from four studies comparing five interventions. *Figure 8* presents the network of evidence. There were four intervention effects to estimate from four studies.<sup>129,186,208,225</sup>



**FIGURE 8** Universal preventive interventions EPDS threshold score at 3 months postnatally: network of evidence.

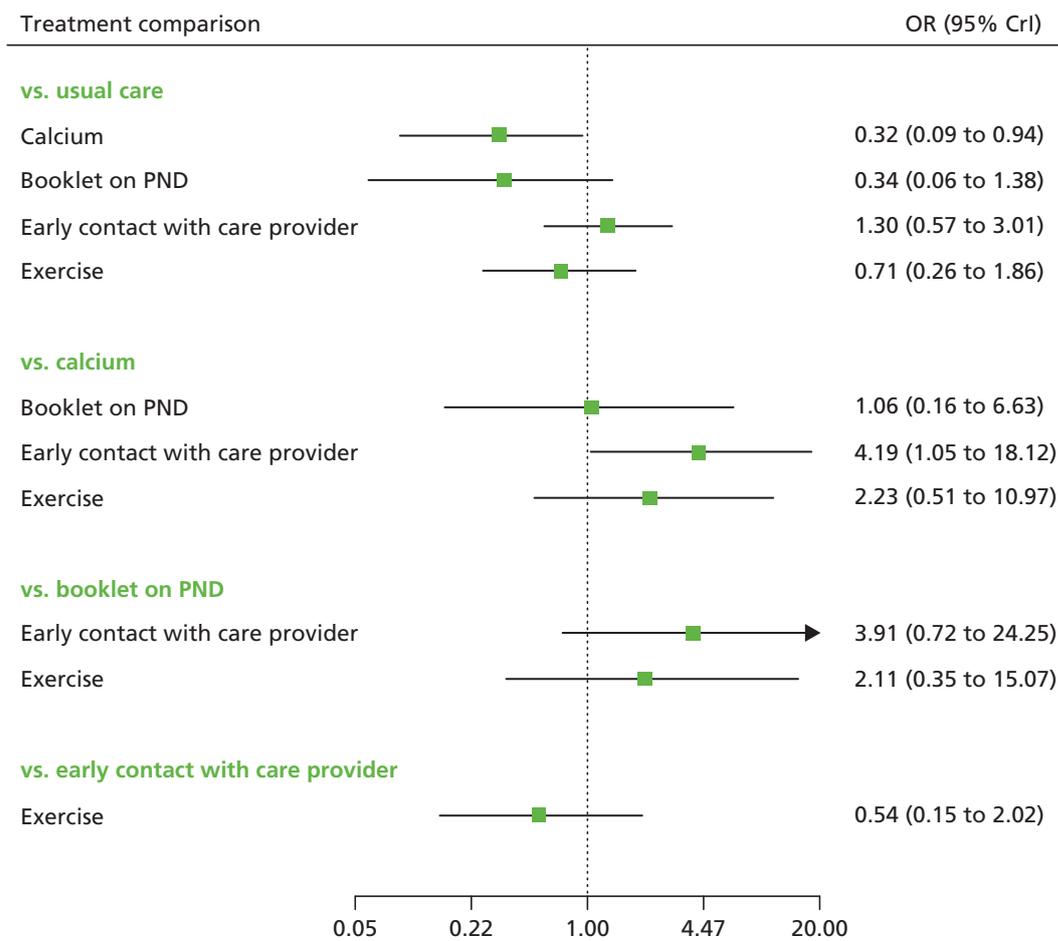
*Figure 9* presents the odds ratios of each intervention relative to usual care and *Figure 10* presents the probabilities of treatment rankings. The total residual deviance was 7.04, which is compared with the total number of data points, seven, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.23 (95% CrI 0.00 to 0.74), which implies mild heterogeneity between studies in intervention effects.

The odds ratios of calcium, a booklet on PND and exercise were less than 1, suggesting a beneficial effect compared with usual care. Early contact with care provider had an odds ratio greater than 1, suggesting a worsening effect (see *Figure 9*). However, only the effect of calcium was statistically significant at a conventional 5% level. The interventions with the highest probabilities of being the best were calcium and booklet on PND (probability 0.48 and 0.45, respectively).

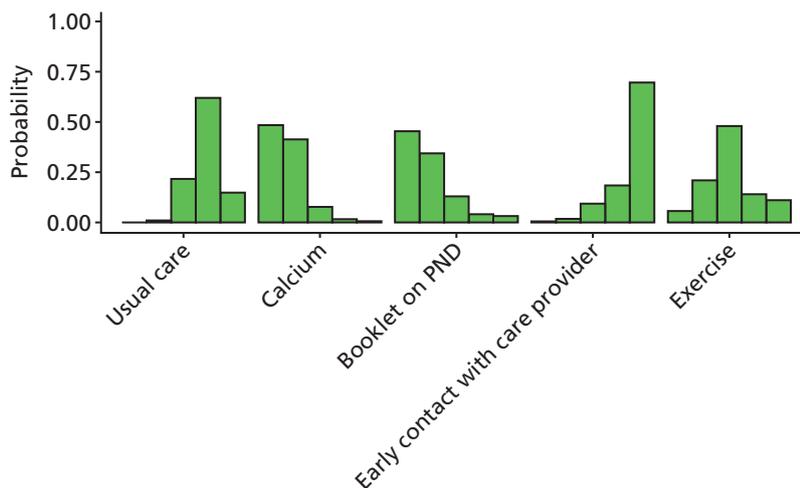
### Results for universal preventive interventions for Edinburgh Postnatal Depression Scale threshold score at 6 months postnatally

A NMA was used to compare the effects of DHA,<sup>211</sup> CBT-based intervention,<sup>61</sup> PCA-based intervention,<sup>61</sup> primary care and community care strategies<sup>147</sup> and early contact with care provider<sup>225</sup> relative to usual care on EPDS threshold. Data were available from four studies comparing six interventions. *Figure 11* presents the network of evidence. There were five intervention effects to estimate from four studies.<sup>61,147,211,225</sup>

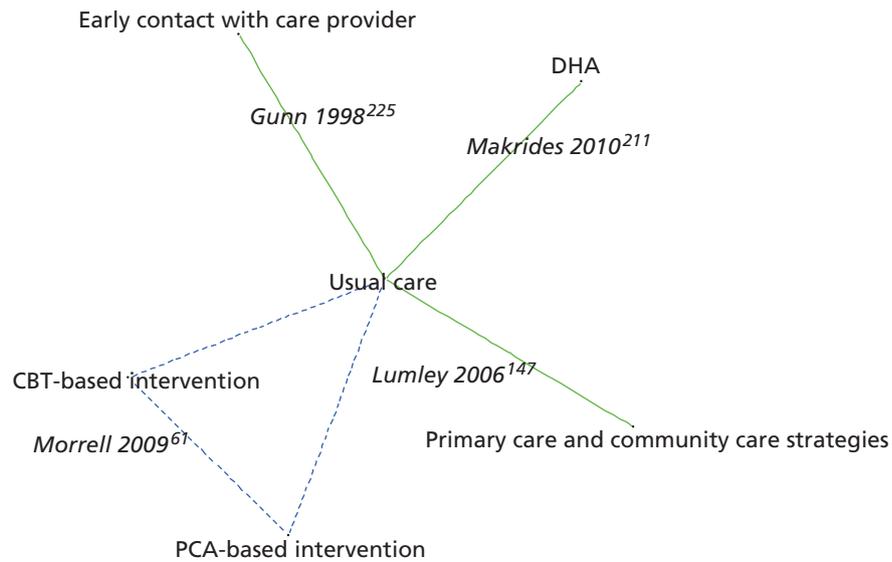
*Figure 12* presents the odds ratios of each intervention relative to usual care and *Figure 13* presents the probabilities of treatment rankings. The total residual deviance was 7.04, which is compared with the total number of data points, seven, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.22 (95% CrI 0.00 to 0.71), which implies mild heterogeneity of intervention effects between studies.



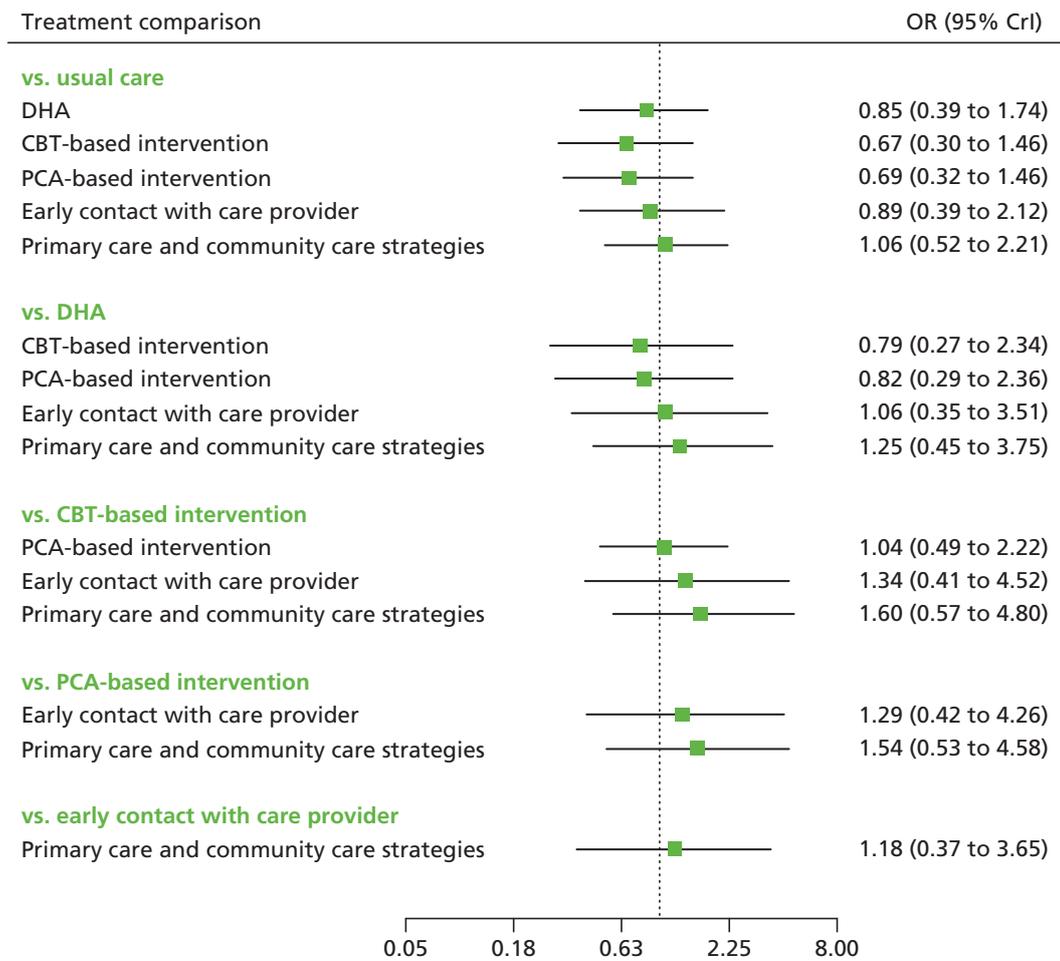
**FIGURE 9** Universal preventive interventions EPDS threshold score at 3 months postnatally: odds ratios for all treatment comparisons. Key: OR, odds ratio.



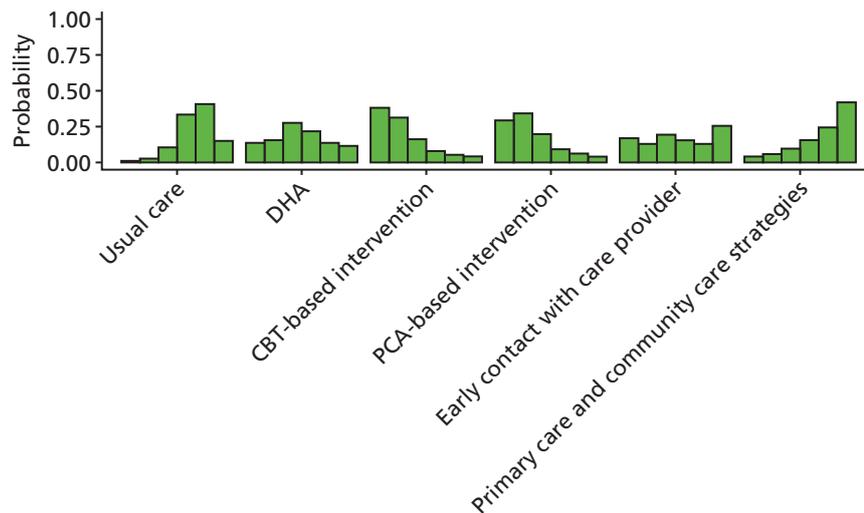
**FIGURE 10** Universal preventive interventions EPDS threshold score at 3 months postnatally: probability of treatment rankings (ranks 1–5).



**FIGURE 11** Universal preventive interventions EPDS threshold score at 6 months postnatally: network of evidence. Dashed lines represent three-arm trials.



**FIGURE 12** Universal preventive interventions EPDS threshold score at 6 months postnatally: odds ratios all treatment comparisons. Key: OR, odds ratio.

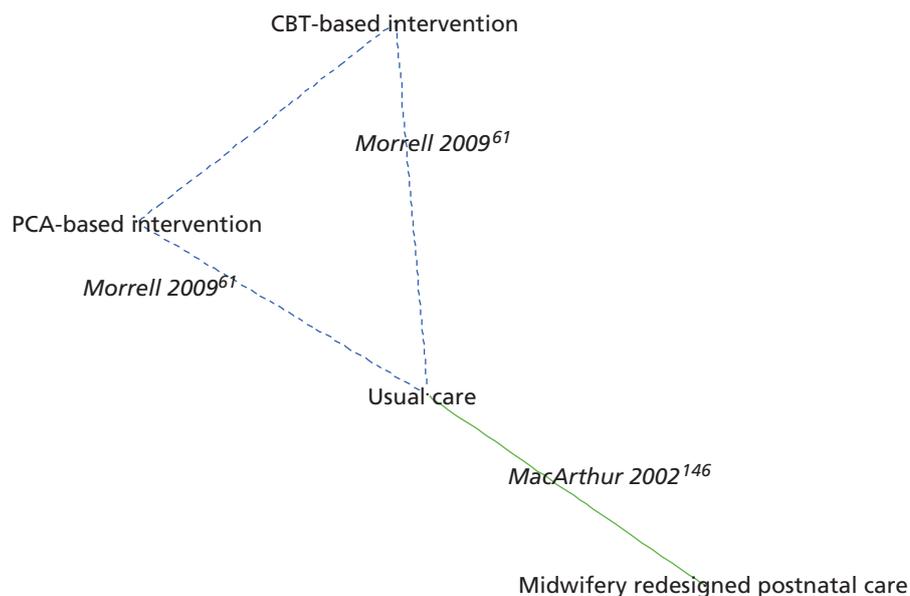


**FIGURE 13** Universal preventive interventions EPDS threshold score at 6 months postnatally: probability of treatment rankings (ranks 1–6).

For all interventions except primary care and community care strategies the odds ratio compared with usual care was less than 1, suggesting a beneficial effect. However, none of the comparisons were statistically significant at a conventional 5% level (see *Figure 12*). The interventions with the highest probabilities of being the best were CBT-based intervention and PCA-based intervention (probabilities 0.38 and 0.29, respectively) (see *Figure 13*).

### Results for universal preventive interventions for Edinburgh Postnatal Depression Scale threshold score at 12 months postnatally

A NMA was used to compare the effects of CBT-based intervention,<sup>61</sup> PCA-based intervention<sup>61</sup> and midwifery redesigned postnatal care<sup>146</sup> relative to usual care on EPDS threshold. Data were available from two studies comparing four interventions. *Figure 14* presents the network of evidence. There were three intervention effects to estimate from two studies.<sup>61,146</sup>



**FIGURE 14** Universal preventive interventions EPDS threshold score at 12 months postnatally: network of evidence.

All three interventions were associated with a beneficial effect, although the results were statistically inconclusive (Figure 15). The probability of the intervention being the best was 0.43, 0.32 and 0.25 for midwifery redesigned postnatal care,<sup>146</sup> CBT-based intervention<sup>61</sup> and PCA-based intervention,<sup>61</sup> respectively (Figure 16).

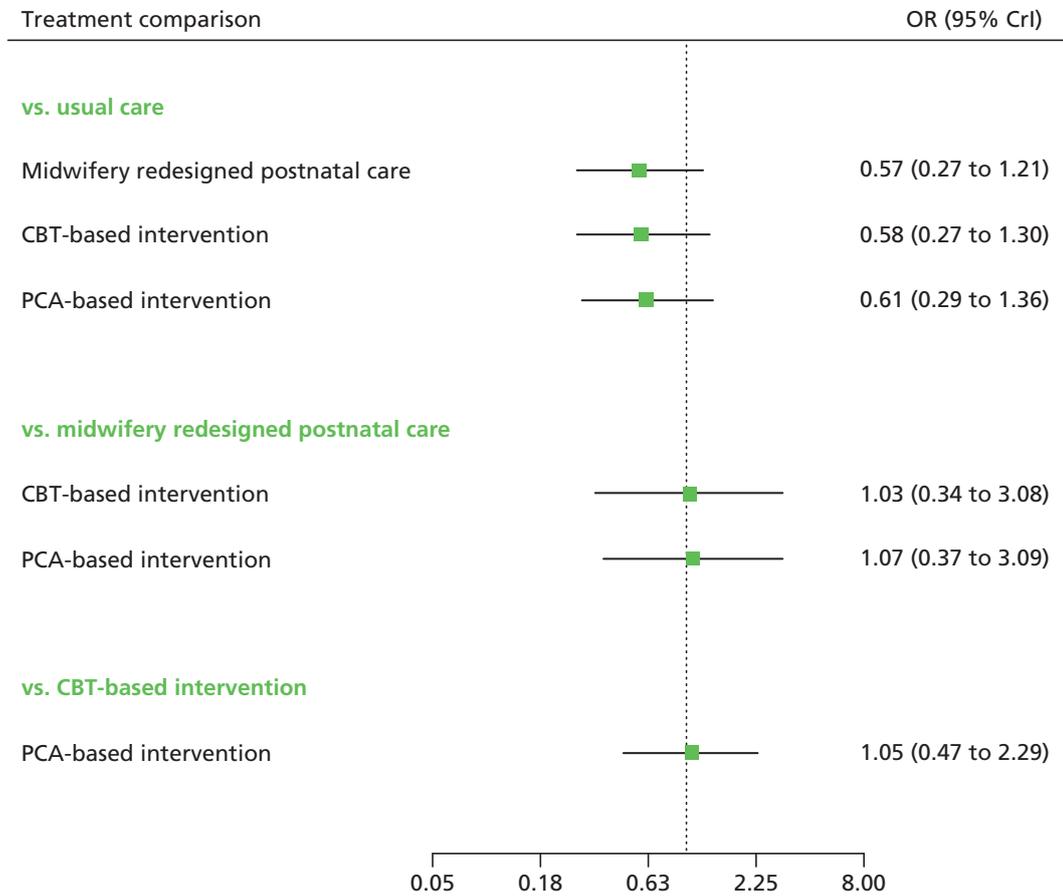


FIGURE 15 Universal preventive interventions EPDS threshold score at 12 months postnatally: odds ratios for all treatment comparisons. Key: OR, odds ratio.

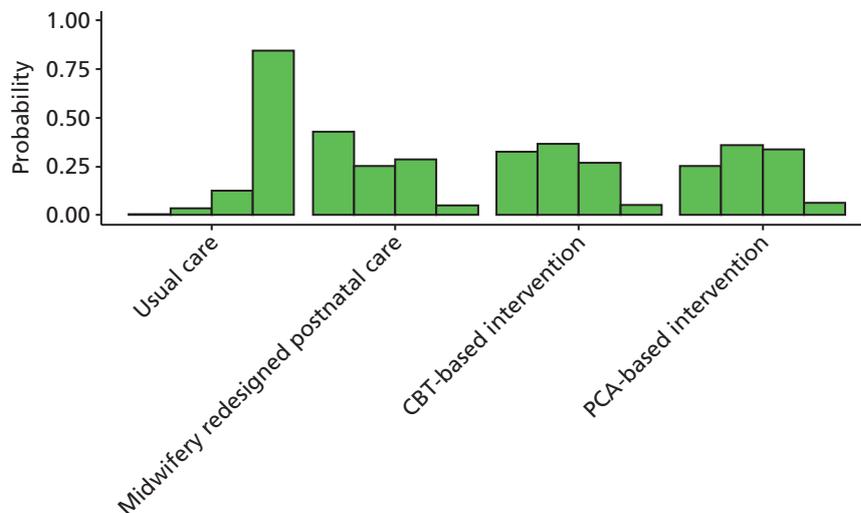


FIGURE 16 Universal preventive interventions EPDS threshold score at 12 months postnatally: probability of treatment rankings (ranks 1–4).

### Summary of results from network meta-analysis for universal preventive interventions for Edinburgh Postnatal Depression Scale threshold score

In general, the intervention effects were inconclusive, although calcium was associated with a statistically significant benefit relative to usual care at 3 months. Intervention effects tended to vary over time. The interventions most likely to be the best among those evaluable at each assessment were:

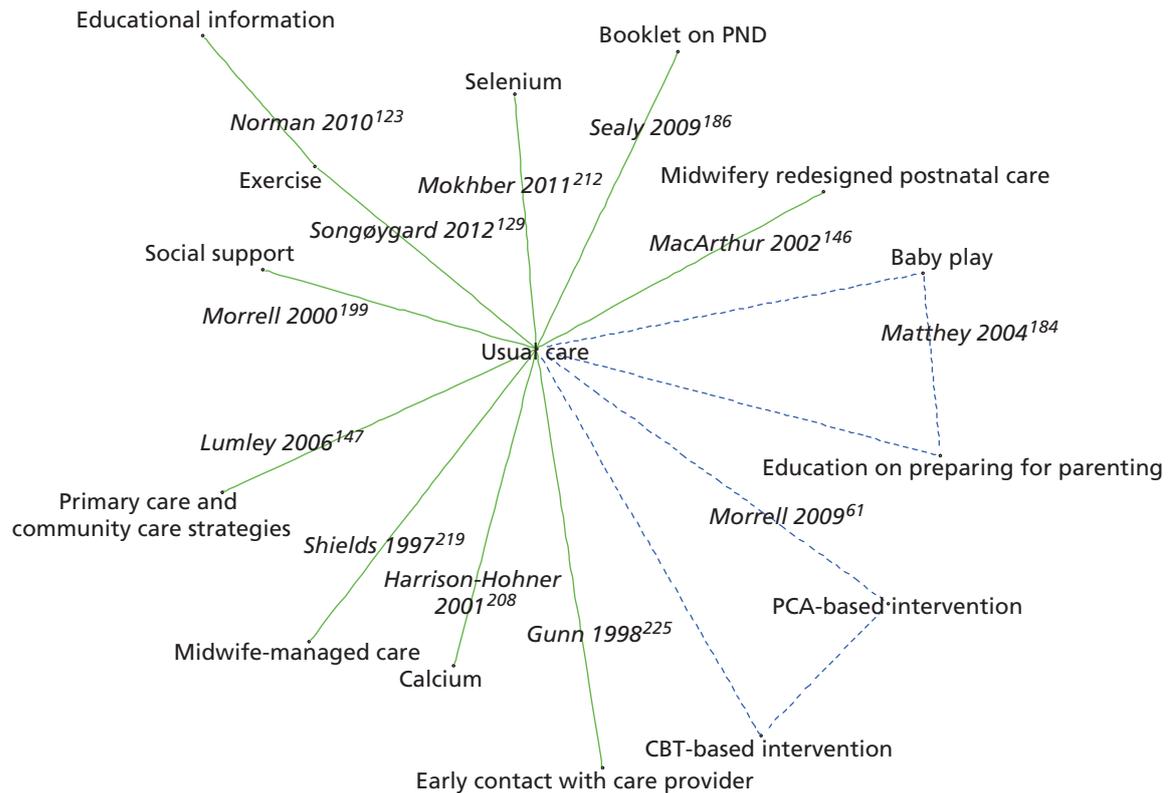
- at 6 weeks postnatally, midwife-managed care<sup>219</sup> and calcium<sup>208</sup> (the included studies were of unclear and high risk of bias, respectively)
- at 3 months postnatally, booklet on PND<sup>186</sup> and calcium<sup>208</sup> (the included studies were both at high risk of bias)
- at 6 months postnatally, CBT-based intervention<sup>61</sup> and PCA-based intervention<sup>61</sup>
- at 12 months postnatally midwifery redesigned postnatal care,<sup>146</sup> CBT-based intervention<sup>61</sup> and PCA-based intervention.<sup>61</sup>

However, there was considerable uncertainty associated with the results and none of the probabilities of being the best intervention exceeded 0.5.

A weakly informative prior distribution was used for the between-study SD because there were insufficient studies with which to estimate it from the sample data alone. This prior distribution was chosen to ensure that, a priori, 95% of the study-specific odds ratios were within a factor of 2 of the median odds ratio for each treatment comparison. The sensitivity analysis is presented for completeness in *Appendix 11*.

### Results from network meta-analysis for universal preventive interventions for Edinburgh Postnatal Depression Scale mean scores

A NMA was used to compare the effects of baby play,<sup>184</sup> booklet on PND,<sup>186</sup> calcium,<sup>208</sup> CBT-based intervention,<sup>61</sup> early contact with care provider,<sup>225</sup> education on preparing for parenting,<sup>184</sup> educational information,<sup>123</sup> exercise,<sup>129</sup> midwife-managed care,<sup>219</sup> midwifery redesigned postnatal care,<sup>146</sup> PCA-based intervention,<sup>61</sup> primary care and community care strategies,<sup>147</sup> selenium<sup>212</sup> and social support,<sup>199</sup> relative to usual care on EPDS mean scores. Data were available from 12 studies comparing 15 interventions so that there were 14 intervention effects (relative to usual care) to estimate from 12 studies.<sup>61,123,129,146,147,184,186,199,208,212,219,225</sup> *Figure 17* presents the network of evidence.



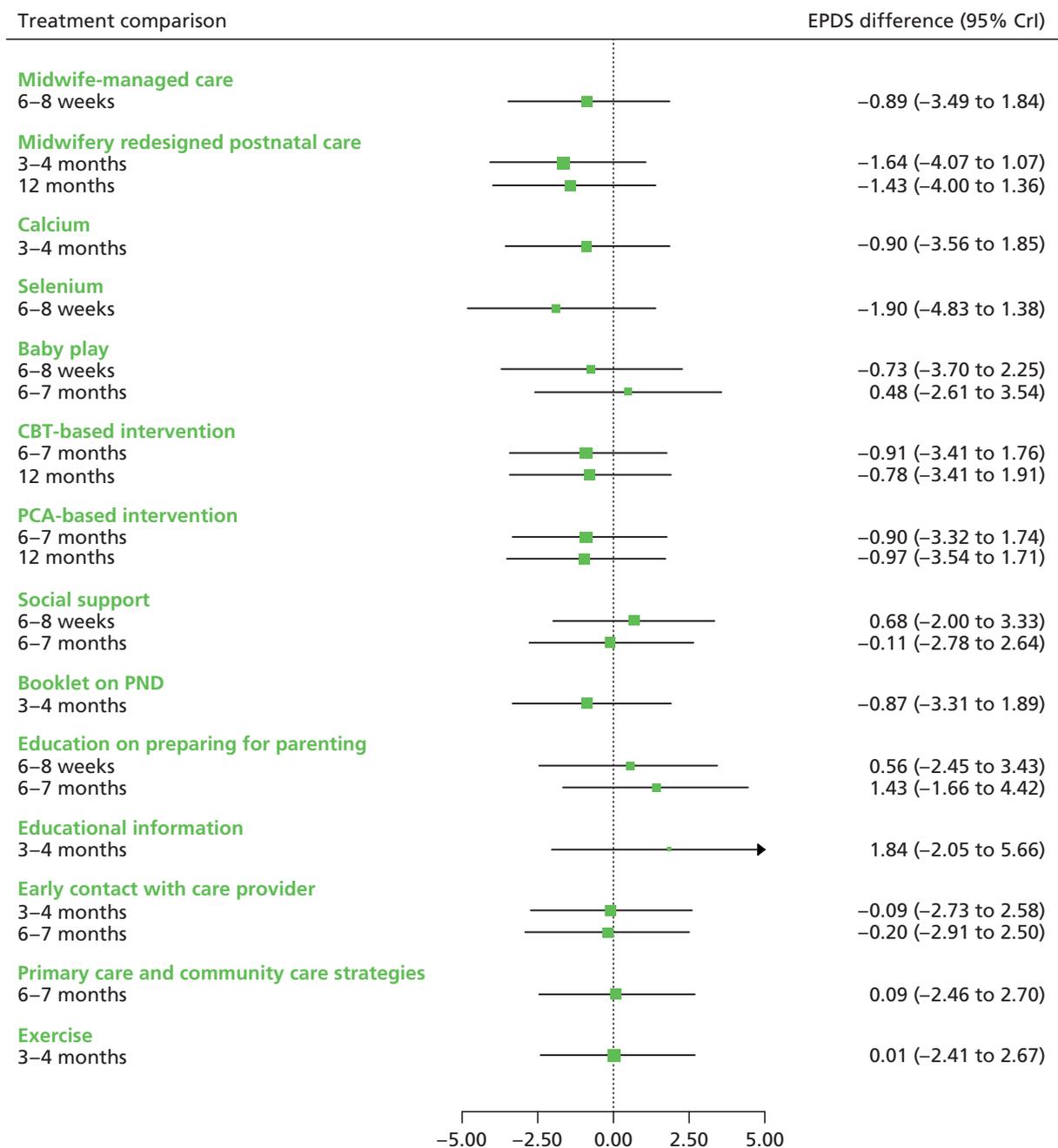
**FIGURE 17** Universal preventive interventions EPDS mean scores: network of evidence. Dashed lines represent three-arm trials.

Figure 18 presents the differences in EPDS mean scores of each intervention relative to usual care. The between-study SD was estimated to be 0.81 (95% CrI 0.04 to 2.61), which implies moderate heterogeneity of intervention effects between studies.

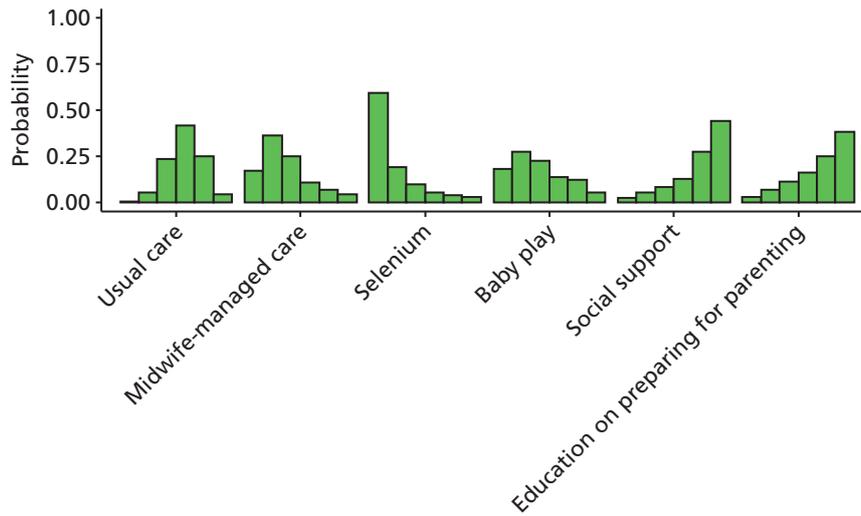
The interventions associated with the greatest reduction in EPDS mean score were selenium<sup>212</sup> (–1.90, 95% CrI –4.83 to 1.38 at 6–8 weeks) and midwifery redesigned postnatal care<sup>146</sup> (–1.64, 95% CrI –4.07 to 1.07 at 3–4 months; –1.43, 95% CrI –4.00 to 1.36 at 12 months). None of the comparisons against usual care were statistically significant at a conventional 5% level.

Figures 19–22 present the probabilities of treatment rankings at 6–8 weeks, 3–4 months, 6–7 months and 12 months, respectively.

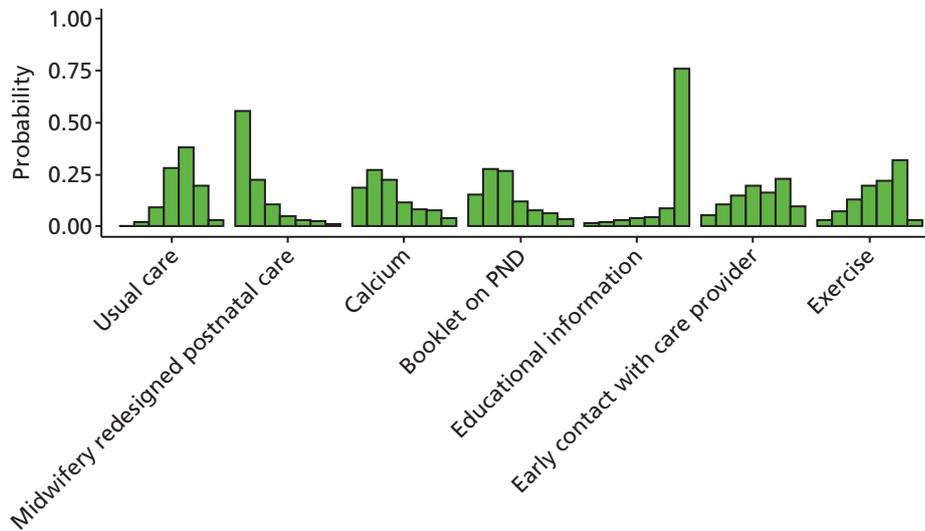
The intervention with the highest probability of being the best at 6–8 weeks postnatally was selenium<sup>212</sup> (probability 0.59); at 3–4 months postnatally the intervention with the highest probability of being the best was midwifery redesigned postnatal care (probability 0.55), while at 6–7 months postnatally CBT-based intervention and PCA-based intervention were equally likely to be the best (probability 0.30 in each case) and at 12 months postnatally the highest probabilities were associated with midwifery redesigned postnatal care<sup>146</sup> and PCA-based intervention (probability 0.58 and 0.25, respectively).



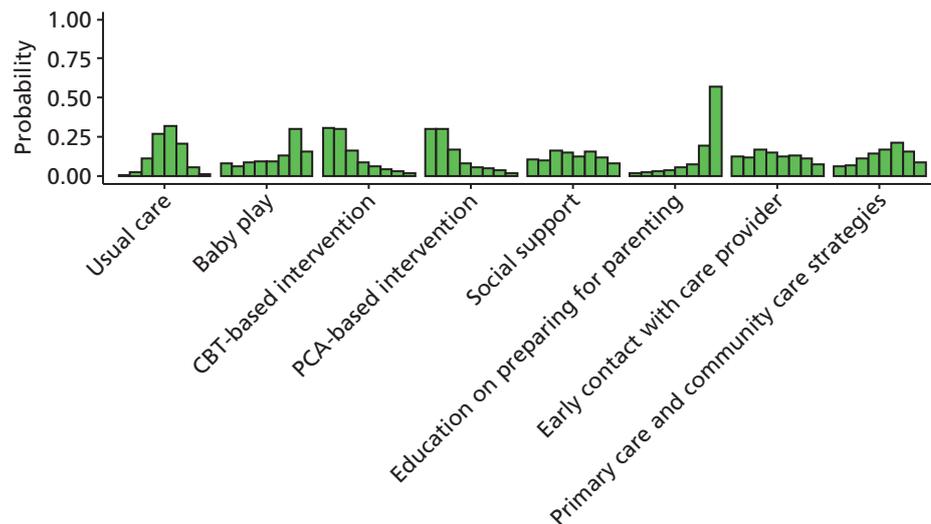
**FIGURE 18** Universal preventive interventions EPDS mean scores: mean differences of treatment comparisons vs. usual care across all time points.



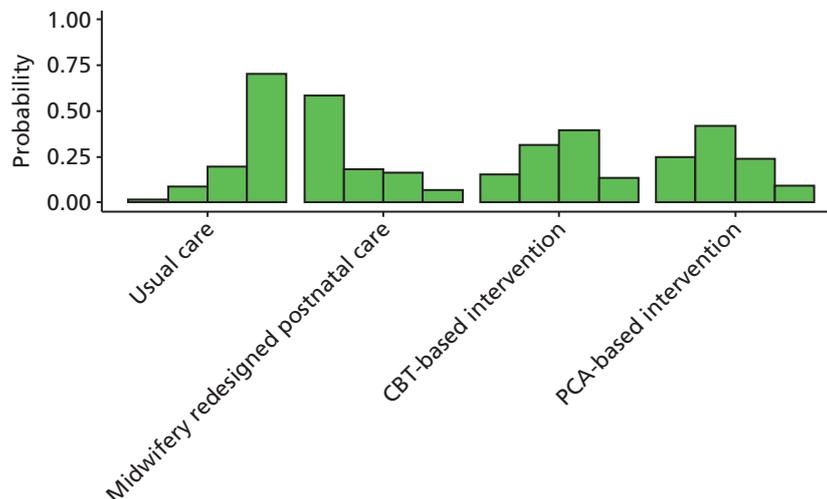
**FIGURE 19** Universal preventive interventions EPDS mean scores: probability of treatment rankings at 6–8 weeks postnatally (ranks 1–6).



**FIGURE 20** Universal preventive interventions EPDS mean scores: probability of treatment rankings at 3–4 months postnatally (ranks 1–7).



**FIGURE 21** Universal preventive interventions EPDS mean scores: probability of treatment rankings at 6–7 months postnatally (ranks 1–8).



**FIGURE 22** Universal preventive interventions EPDS mean scores: probability of treatment rankings at 12 months postnatally (ranks 1–4).

### **Summary of results from network meta-analysis for universal preventive intervention studies for Edinburgh Postnatal Depression Scale mean scores**

Not all studies provided information about intervention effects at each time, making it difficult to draw inferences across all interventions at each time. In general, the intervention effects were inconclusive and the CIs were wide. Intervention effects tended to vary over time. The interventions most likely to be the best among those evaluable at each assessment were:

- 6–8 weeks postnatally: selenium<sup>212</sup> (the risk of bias for this study was unclear so the benefit of selenium estimated in this NMA should be treated with some caution)
- 3 months postnatally: midwifery redesigned postnatal care<sup>146</sup>
- 6 months postnatally: CBT-based intervention<sup>61</sup> and PCA-based intervention<sup>61</sup>
- 12 months postnatally: midwifery redesigned postnatal care,<sup>146</sup> CBT-based intervention<sup>61</sup> and PCA-based intervention.<sup>61</sup>

## Summary of results for universal preventive interventions for Edinburgh Postnatal Depression Scale threshold and Edinburgh Postnatal Depression Scale mean scores

### Overall summary of results for universal preventive interventions for Edinburgh Postnatal Depression Scale threshold and Edinburgh Postnatal Depression Scale mean scores

Table 26 indicates the results of the NMAs for the EPDS threshold scores and EPDS mean scores at all assessment times. The results indicate that the universal preventive intervention with the best-quality evidence and the most enduring effect were midwifery redesigned postnatal care,<sup>146</sup> CBT-based intervention<sup>61</sup> and PCA-based intervention.<sup>61</sup>

The qualitative data indicated that women appreciated the benefits from IPT, the reassurance and normalisation of social support, and the support received from peers while taking part in midwifery-led interventions and group-based CAM interventions.

**TABLE 26** Universal preventive interventions NMAs: overall summary of main effects of interventions relative to usual care

Time postnatally	EPDS mean score		EPDS threshold score		Overall risk of bias
	Difference in mean (95% CrI)	Probability of being the best <sup>a</sup>	Odds ratio (95% CrI)	Probability of being the best <sup>a</sup>	
<b>6 weeks postnatally</b>					
Midwife-managed care <sup>219</sup>	-0.89 (-3.49 to 1.84)	0.17	0.66 (0.30 to 1.40)	0.43 <sup>b</sup>	Unclear
Calcium <sup>208</sup>	NE	NE	0.70 (0.29 to 1.64)	0.36 <sup>b</sup>	High
<b>3 months postnatally</b>					
Midwifery redesigned postnatal care <sup>146</sup>	-1.64 (-4.07 to 1.07)	0.55 <sup>c</sup>	NE	NE	Low
Calcium <sup>208</sup>	-0.90 (-3.56 to 1.85)	0.19	0.32 (0.09 to 0.94)	0.48 <sup>d</sup>	High
Booklet on PND <sup>186</sup>	-0.87 (-3.31 to 1.89)	0.15 <sup>c</sup>	0.34 (0.06 to 1.38)	0.45 <sup>d</sup>	High
<b>6 months postnatally</b>					
CBT-based intervention <sup>61</sup>	-0.91 (-3.41 to 1.76)	0.30 <sup>e</sup>	0.67 (0.30 to 1.46)	0.38 <sup>b</sup>	Low
PCA-based intervention <sup>61</sup>	-0.90 (-3.32 to 1.74)	0.30 <sup>e</sup>	0.69 (0.32 to 1.46)	0.29 <sup>b</sup>	Low
<b>12 months postnatally</b>					
Midwifery redesigned postnatal care <sup>146</sup>	-1.43 (-4.00 to 1.36)	0.58 <sup>f</sup>	0.57 (0.27 to 1.21)	0.43 <sup>f</sup>	Low
PCA-based intervention <sup>61</sup>	-0.97 (-3.54 to 1.71)	0.25 <sup>f</sup>	0.61 (0.29 to 1.36)	0.25 <sup>f</sup>	Low
CBT-based intervention <sup>61</sup>	-0.78 (-3.41 to 1.91)	0.15 <sup>f</sup>	0.58 (0.27 to 1.30)	0.32 <sup>f</sup>	Low

Key: high, high risk of bias; low, low risk of bias; NE, not evaluable; unclear, unclear risk of bias.

a Probability of being the best among interventions with evaluable data at each assessment.

b Best among six interventions.

c Best among seven interventions.

d Best among five interventions.

e Best among eight interventions.

f Best among four interventions.

#### Notes

For difference in mean < -0.75 or odds ratio < 0.70.

Not evaluable data were data not available on this outcome measure for this intervention.

## Chapter 6 Results for selective preventive intervention studies

### Characteristics of randomised controlled trials of selective preventive interventions

There were 20 RCTs in the selective preventive interventions group, in five of the seven intervention classes defined as:

- psychological ( $n = 6$ )<sup>158–163</sup>
- educational ( $n = 5$ )<sup>188–190,192,271</sup>
- social support ( $n = 5$ )<sup>149,201–204</sup>
- pharmacological agents or supplements ( $n = 1$ )<sup>213</sup>
- midwifery-led interventions ( $n = 3$ )<sup>221–223</sup>
- organisation of maternity care ( $n = 0$ )
- CAM or other ( $n = 0$ ).

Results are presented in this order for the RCTs of selective preventive interventions. There was limited replication of interventions across the trials. The 20 selective preventive intervention trials are described by their intervention context, mechanisms and measured outcomes within the seven classes. The results of the NMAs are presented for the EPDS threshold score and EPDS mean scores, followed by the findings of the qualitative data.

**Description of qualitative studies of selective preventive interventions**

The qualitative synthesis identified four studies in the selected preventive interventions group, within three of the seven intervention classes:

1. psychological ( $n = 1$ )<sup>296–298</sup>
2. educational ( $n = 1$ )<sup>253,254</sup>
3. midwifery-led interventions ( $n = 2$ ).<sup>292–294</sup>

For ease of reference the selective preventive interventions have been given short-version descriptive labels (Table 27).

**TABLE 27** Selective preventive interventions: short-version descriptive labels

First author, year, reference number	Short-version descriptive labels	Fuller description
Barnes, 2009 <sup>149</sup>	Peer support	Home-Start UK volunteer visits
Brugha, 2000 <sup>188</sup>	Education on preparing for parenting	Preparing for Parenthood is a series of six structured 2-hour long antenatal classes. These are preceded by an initial introductory meeting with the woman and her partner. The classes are designed to increase social support and problem-solving skills
Buist, 1999 <sup>189</sup>	Education on preparing for parenting	Ten classes in pregnancy and postpartum, focusing on parenting and coping strategies. Sessions covered physical preparing for parenting, but focused on emotional issues and highlighted the reality of parenting. Didactic teaching was combined with interactive group work, films and experiential exercises
Chabrol, 2002 <sup>158</sup>	CBT-based intervention	One cognitive-behavioural prevention session during hospitalisation
Gamble, 2005 <sup>221</sup>	Midwife-led debriefing or counselling after childbirth	Face-to-face counselling within 72 hours of birth and again via telephone at 4–6 weeks postpartum for women who report a distressing birth experience
Harris, 2002 <sup>213</sup>	Thyroxine	100 µg of thyroxine tablets daily in thyroid antibody-positive women
Sen, 2006 <sup>191</sup>	Education on preparing for parenting	A twin midwife advisor, invitation to attend a series of education sessions, additional home visits and attendance at an antenatal twin clinic for women with twins
Small, 2000 <sup>223</sup>	Midwife-led debriefing or counselling after childbirth	Midwife-led debriefing after operative childbirth, before discharge from hospital
Zlotnick, 2011 <sup>163</sup>	IPT-based intervention	An interpersonally based intervention for low-income pregnant women with intimate partner violence

## Selective preventive interventions: psychological interventions

### *Characteristics and main outcomes of randomised controlled trials of selective preventive interventions of psychological interventions*

Of the six included selective preventive intervention trials evaluating a psychological intervention,<sup>158–163</sup> none were conducted in the UK. Three types of psychological interventions were evaluated: psychoeducational therapy,<sup>162</sup> IPT<sup>160,163</sup> and CBT.<sup>158,159,161</sup> Comparisons were made with usual care in specific countries<sup>158,159,161–163</sup> and educational information.<sup>160</sup> One trial provided the intervention in a group format<sup>159</sup> and five trials incorporated individual sessions.<sup>158,160–163</sup> None of the interventions were provided in the home setting. One trial provided the intervention in the antenatal period only,<sup>160</sup> whereas three trials initiated the intervention postnatally<sup>159,161,162</sup> and two trials provided the intervention across the perinatal period from pregnancy to after childbirth.<sup>158,163</sup> Interventions were provided by a variety of service providers. The number of contacts ranged from one to six (mean 4.3) and contact duration ranged from 25 minutes to 2 hours.

A summary of the characteristics and main outcomes is provided in *Table 28*.

### *Description and findings from qualitative studies of selective preventive interventions of psychological interventions*

There was one US-based study reporting qualitative data on selective preventive interventions for PND.<sup>296–298</sup> The IPT intervention for teenagers promoted support from peers and clinicians, and participants were able to gain practical skills and felt empowered (*Table 29*).

### **Findings from qualitative studies of selective preventive interventions of psychological interventions: support, learning practical strategies and empowerment**

Participants reported that the intervention promoted the development of relationships and connection with other group members, and that it was a normalising experience.<sup>296–298</sup> Service providers said gaining practical skills was an important aspect of the intervention and that the intervention was beneficial when the group was supportive, and when the group members could share experiences and give advice.<sup>296–298</sup> Clinicians raised the importance of supporting the women and the validation of the pregnancy as part of an IPT intervention for teenagers:<sup>296–298</sup>

*That we honored the arrival of motherhood, supported it as valid and no less valid even though they were young and poor.*

*Participant*<sup>296–298</sup>

*Helping them to think about what's next, how to get the child care, how to find a school for the child, how to negotiate with the difficult people in their lives to get what they need.*

*Participant*<sup>296–298</sup>

Being able to self-advocate and establish personal boundaries was interpreted by the authors as two benefits of IPT.<sup>296–298</sup>

**TABLE 28** Selective preventive interventions: characteristics and outcomes of RCTs of psychological interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
CBT-based intervention	Chabrol, 2002 <sup>158,255,256</sup>	France	258	Antenatal setting	Antenatal and postnatal	Individually	Psychologist
CBT-based intervention	Hagan, 2004 <sup>159</sup>	Australia	199	Postnatal setting	Postnatal	Group	Midwife
CBT-based intervention	Silverstein, 2011 <sup>161</sup>	USA	50	Postnatal setting	Postnatal	Individually	Social worker

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in France	1	60	BDI, EPDS score 11 or more, HDRS, MINI, SIGH-D	–	<p><i>Compared with the control group, women in the prevention group had significant reductions in the frequency of probable depression (30 ± 2% vs. 48 ± 2%). Recovery rates based on HDRS scores of &lt; 7 and BDI scores of &lt; 4 were also significantly greater in the treated group than in the control group<sup>158</sup></i></p> <p><i>The study suggests that this programme for prevention and treatment of post-partum depression is reasonably well-accepted and efficacious<sup>158</sup></i></p>	High
Usual care in Australia	6	120	BDI, DSM-IV, EPDS median (interquartile range), GHQ, SADs	–	<p><i>Fifty-four mothers (27%) in the trial were diagnosed with minor or major depression in the 12 months following very preterm delivery, 29 (29%) in the intervention group and 25 (26%) in the control group [relative risk 1.1 (95% CI 0.80–1.5)]<sup>159</sup></i></p> <p><i>There were no differences in the time of onset or the duration of the episodes of depression between the groups<sup>159</sup></i></p> <p><i>Our intervention program did not alter the prevalence of depression in these mothers<sup>159</sup></i></p>	Low
Usual care in the USA	4	25–60	QIDS	–	<p><i>Forty-four per cent of control group mothers experienced an episode of moderately severe depression symptoms over the follow-up period, compared to 24% of PSE mothers. Control mothers experienced an average 1.19 symptomatic episodes over the 6 months of follow-up, compared to 0.52 among PSE mothers<sup>161</sup></i></p> <p><i>PSE appears feasible and may be a promising strategy to prevent depression among mothers of preterm infants<sup>161</sup></i></p>	Low

continued

**TABLE 28** Selective preventive interventions: characteristics and outcomes of RCTs of psychological interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
IPT-based intervention	Phipps, 2013 <sup>160</sup>	USA	106	Antenatal setting	Antenatal	Individually	Psychologist
IPT-based intervention	Zlotnick, 2011 <sup>163</sup>	USA	54	Antenatal setting	Antenatal and postnatal	Individually	Interventionist
Psychoeducational intervention	Tam, 2003 <sup>162</sup>	China	516	Postnatal setting	Postnatal	Individually	Nurse

Key: CGI, Clinical Global Impressions; CI, confidence interval; CTS, Conflict Tactics Scale; DTS, Davidson Trauma Scale; GHQ, General Health Questionnaire; HDRS, Hamilton Depression Rating Scale; high, high risk of bias; IPV, Intimate Partner Violence; KID-SCID, childhood version of the Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders*; LIFE, Longitudinal Interval Follow-up Examination; low, low risk of bias; MINI, Mini International Neuropsychiatric Interview; PSE, Problem Solving Education; PTSD, post-traumatic stress disorder; QIDS, Quick Inventory of Depressive Symptoms; SADs, Schedule for Affective Disorders; SCID/NP, Structured Clinical Interview for *Diagnostic and Statistical Manual of Mental Disorders*– non-patient edition; SIGH-D, Structured Interview Guide for the 17-item version of the Hamilton Depression Rating Scale; unclear, unclear risk of bias; WHO-QOL, World Health Organization Quality of Life scale.

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Educational information	6	60	KID-SCID	–	<p><i>The overall rate of depression in the intervention group (12.5%) was lower than the control group (25%) with a hazard rate ratio of 0.44 (95% confidence interval, 0.17–1.15) at 6 months after delivery<sup>160</sup></i></p> <p><i>An intervention that is delivered during the prenatal period has the potential to reduce the risk for postpartum depression in primiparous adolescent mothers<sup>160</sup></i></p>	Low
Usual care in the USA	5	60	EPDS mean, LIFE, SCID/NP	DTS, Criterion A of PTSD module of SCID-NP, CTS2	<p>The intervention was not associated with a reduction in major depressive episodes, PTSD, or IPV in pregnant or postnatal women. There was some effect in lowering symptoms of PTSD and depression among pregnant women. For women up to 3 months postnatally, there was a larger effect for PTSD symptoms</p> <p><i>This study suggests some initial support for our intervention. Larger randomized trials are needed to further examine the intervention both during and after pregnancy<sup>163</sup></i></p>	Low
Usual care in China	4	–	CGI, GHQ, HADS	WHO-QOL (Chinese version)	<p><i>There was no significant difference in psychological morbidity, quality of life or client satisfaction between the counselling group and the control group<sup>162</sup></i></p>	Unclear

TABLE 29 Qualitative study of selective preventive interventions: characteristics of studies evaluating psychological interventions

First author, year, reference number	Intervention details								
	Country	Name	Setting	Delivered antenatal/postnatal	Group/individual	Number of women in group	Number of sessions	Duration of session	Facilitator/service providers
Shanok, 2007 <sup>296-298</sup> Moderate CASP quality	USA	IPT (n = 14 current depressive disorder); n = 28; no inclusion/exclusion criteria	Secondary care: school for pregnant/parenting teenagers	Majority antenatal	Group	7	12 weekly	75 minutes	Clinical psychologist and co-therapist with training in IPT

## Selective preventive interventions: educational interventions

### *Characteristics and main outcomes of randomised controlled trials of selective preventive intervention of educational interventions*

Of five included trials of a selective preventive intervention evaluating an educational intervention,<sup>188–190,192,271</sup> two were conducted in the UK.<sup>188,191</sup> Two main types of interventions were identified: education on preparing for parenting<sup>188,189,192,271</sup> and a booklet on PND and social worker telephone call.<sup>190</sup> Comparisons were made with usual care in specific countries.<sup>188,189,192,271</sup> One study evaluated the effect of group sessions,<sup>188</sup> two studies evaluated the effect of individual sessions only<sup>190,192</sup> and two studies evaluated a combination of individual and group sessions.<sup>189,191</sup> One trial provided the intervention in a home setting.<sup>192</sup> Three trials provided the intervention in the antenatal period only,<sup>188,189,191</sup> whereas one trial initiated the intervention in the postnatal period<sup>190</sup> and one trial provided the intervention across the antenatal and postnatal periods.<sup>192</sup> The interventions were provided by a variety of service providers, with the number of contacts ranging from 1 to 25 (mean 9.6 contacts) and the duration varying between 1 and 2 hours. A summary of the characteristics and main outcomes is provided in *Table 30*.

### *Description and findings from qualitative studies of selective preventive interventions of educational interventions*

One qualitative study of an educational intervention was included in the indicated preventive interventions category.<sup>253,254</sup> This study was linked to the trial of education on preparing for parenting.<sup>188</sup> Further details are provided in *Table 31*.

## Findings from the qualitative review

### *Support*

Data from participants of the group intervention demonstrated that the intervention promoted the development of relationships and connection with other group members and that it was a normalising experience.<sup>253,256</sup> One participant refused to take part in the intervention and said the idea of being in room full of people who did not know each other was 'strange'.<sup>253,254</sup>

Recipients reported that the intervention helped them to harness support from family members.<sup>253,254</sup> Authors' interpretations indicated that participants valued the provision for their partner to join the group and that they were most interested in the session that included partner involvement. Participants found it helpful having another person with them to hear information that was provided.<sup>253,254</sup>

### *Learning practical strategies*

Participants reported that they had learned useful practical strategies as part of the intervention.<sup>253,254</sup> Specifically, participants learned, and were then able to apply, the SODAS (situation, options, disadvantages, advantages, solution) problem-solving system.<sup>253,254</sup>

### *Education/active participation in own health care*

The intervention promoted the gaining of knowledge and active participation in their own health care.<sup>253,254</sup> Specifically, the recipients reported that they were able to gain information about sensitive subjects such as PND.<sup>253,254</sup>

### *Service delivery and barriers to participation*

Although the majority of service user perspectives on psychological interventions were positive, a number of suggestions for improvement were provided. Authors of one study<sup>253,254</sup> reported participants wanted more time for sharing of experiences. The women reported that they wanted to keep groups intimate:

*And then when there were four of us there was more trust, you could be honest, it became like a little family.*

*Participant*<sup>253,254</sup>

**TABLE 30** Selective preventive interventions: characteristics and outcomes of RCTs of educational interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Booklet on PND and social worker call	Howell, 2012 <sup>190</sup>	USA	540	Postnatal setting	Postnatal	Individually	Social worker
Education on preparing for parenting	Brugha, 2000 <sup>188,254,331</sup>	UK	209	Antenatal setting	Antenatal	Group	Nurse and occupational therapist
Education on preparing for parenting	Buist, 1999 <sup>189</sup>	Australia	44	Antenatal setting	Antenatal	Individually and group	Midwife, psychologist, nurse
Education on preparing for parenting	Sen, 2006 <sup>191,271</sup>	UK	162	Antenatal setting	Antenatal	Individually and group	Midwife

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Educational information	1	–	EPDS score 10 or more, PHQ-9		<p><i>An intention-to-treat repeated measures analysis for up to 6 months of follow-up demonstrated that mothers in the intervention group were less likely to screen positive for depression versus enhanced usual care (odds ratio of 0.67; 95% CI 0.47–0.97 number needed to treat, 16; 95% CI: 9–112)<sup>190</sup></i></p> <p>For black and Latina postnatal women, the action oriented behavioural educational intervention was associated with fewer depressive symptoms</p>	Low
Usual care in the UK	6	120	EPDS score 11 or more, GHQ-D, SCAN		<p><i>Assignment to the IG did not significantly impact on PND [odds ratio for GHQ-Depression 1.22 (95% CI 0.63 to 2.39), p = 0.55] or on risk factors for depression<sup>188</sup></i></p> <p><i>Attendees benefited no more than non-attendees<sup>188</sup></i></p>	Unclear
Usual care in Australia	10	–	BDI, EPDS score 13 or more	STAI, DAS, SSS	<p><i>Postpartum . . . no differences in depression scores, however, anxiety less at 6 weeks in IG<sup>189</sup></i></p>	Unclear
Usual care in the UK	6	90	EPDS score 13 or more, HADS	HADS subscale for anxiety, PSI, marital relationship, mother–infant attachment, social support	<p><i>Non significant differences were noted at 6 weeks (8% vs. 20%; p = 0.52); 12 weeks (11 vs. 22; p = 0.20) and 26 weeks postnatal (9% vs. 19%; p = 0.08) but not at 52 weeks postnatal (18% vs. 20%; p = 0.68)<sup>191</sup></i></p> <p><i>Future provision of care for twin pregnancy, birth and parenting requires careful consideration. The intervention resulted in improved psychological benefit other than depression<sup>191</sup></i></p>	Low

continued

**TABLE 30** Selective preventive interventions: characteristics and outcomes of RCTs of educational interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Education on preparing for parenting	Walkup, 2009 <sup>192</sup>	USA	167	Home visits	Antenatal and postnatal	Individually	Community women

Key: CI, confidence interval; DAS, Dyadic Adjustment Scale; GHQ, General Health Questionnaire; high, high risk of bias; HOME, Home Observation for Measurement of the Environment; ITSEA, Infant Toddler Social Emotional Assessment; low, low risk of bias; SCAN, Schedule for Clinical Assessment in Neuropsychiatry; SSS, Sarason Social Support Scale; unclear, unclear risk of bias.

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Educational information	25	60	CES-D	PSI, Parenting knowledge test, HOME, Parent involvement, ITSEA, Social Support self-report measure, substance use	<p><i>No between-group differences found for maternal involvement, home environment, or mothers' stress, social support, depression, or substance use<sup>192</sup></i></p> <p><i>Supports efficacy of paraprofessional-delivered Family Spirit home-visiting intervention for young American Indian mothers on maternal knowledge and infant behavior outcomes<sup>192</sup></i></p>	Unclear

TABLE 31 Qualitative studies: characteristics of studies evaluating educational interventions

First author, year, reference number	Intervention details								
	Country	Name	Setting	Delivered antenatal/postnatal	Group/individual	Numbers in group	Number of sessions	Duration of session	Facilitator/service providers
Wheatley, 1999, <sup>253</sup> 2003 <sup>256</sup>	UK	Preparing for parenthood	Secondary care – antenatal clinic	Antenatal	Group	10–15	One introductory meeting, six group sessions and one postnatal reunion	2 hours	NR
NR, not reported.									

Participants also reported that they would have liked written information such as handouts to be able to re-read them at a later point.<sup>253,254</sup>

The authors<sup>253,254</sup> also raised the point that when women were provided with information about the intervention they were told that only some women would be invited to take part. At the same time they were told the primary aim of the intervention was to reduce the likelihood of PND. The authors concluded that the selected women may have made the assumption that they were considered as of increased vulnerability for PND, but as it was never confirmed it may have left them with unresolved questions and anxieties. This may have implications for how information about interventions is presented to women.

A participant in one study<sup>253,254</sup> reported difficulties in accessing the service:

*I mean I wish I hadn't missed the others, you know what I mean, to carry on really but just, what with getting there as well and my bleeding – so like you know I was upset that I missed quite a few sessions.*

*Participant*<sup>253,254</sup>

Other barriers were less visible and concerned how women approached the taboo subject of PND. The authors of one study<sup>253,254</sup> reported that women appeared to want information about PND but were resistant to ask for this information in fear that they would be thought of as 'going mad'. Other women appeared to actively avoid information about PND; when one woman was asked if she had found out about PND from health professionals she replied:

*Well no, not really. I just didn't want to know. I think I thought if I didn't know about it, it wouldn't happen!*

*Participant*<sup>253,254</sup>

The authors concluded that some participants avoided information about PND, as they believed a lack of knowledge could operate as a protective factor. When this information about PND was provided to them in the context of the intervention it appeared most were receptive to it.

## Selective preventive interventions: social support interventions

### *Characteristics and main outcomes of randomised controlled trials of selective preventive interventions of social support*

Of the five included trials<sup>149,201–204</sup> evaluating social support interventions for the selective prevention of PND, only two were conducted in the UK.<sup>149,201</sup> Peer support was the main type of social support intervention identified: booklet on PND,<sup>149,201,203</sup> as well as support in labour<sup>204</sup> and a booklet plus video.<sup>202</sup> One trial provided the intervention using a group format,<sup>203</sup> whereas the remaining four trials provided individual sessions.<sup>149,201,202,204</sup> Two trials provided the intervention in a home setting.<sup>149,201</sup> One trial provided the intervention in the antenatal period only,<sup>202</sup> and no trial initiated the intervention postnatally. Three trials provided the intervention in both the antenatal and postnatal time periods.<sup>149,201,203</sup> One trial provided the intervention during labour.<sup>204</sup> As in the other included trials, the interventions were provided by a variety of lay and professional service providers. The number of contacts varied greatly with duration of contact (300 minutes) reported in only one trial.<sup>204</sup>

A summary of the characteristics and main outcomes is provided in *Table 32*.

No qualitative studies provided data on social support interventions.

**TABLE 32** Selective preventive interventions: characteristics and outcomes of RCTs of social support interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Booklet plus video	Logsdon, 2005 <sup>202</sup>	USA	128	Antenatal setting	Antenatal	Individually	Nurse
Peer mentors living with HIV	Richter, 2014; <sup>203</sup> Rotheram, 2014 <sup>269</sup>	South Africa	262	Primary care	Antenatal and postnatal	Group	Peer mentors
Peer support	Barnes, 2009 <sup>149</sup>	UK	527	Home visits	Antenatal and postnatal	Individually	Home-Start volunteers
Peer support	Cupples, 2011 <sup>201</sup>	UK	343	Home visits	Antenatal and postnatal	Individually	Peer mentors

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Usual care in the USA	1	–	CES-D	PSQ, RSE	<i>No significant differences found in Center for Epidemiological Trials of Depression instrument scores among groups at 6 weeks postpartum</i> <sup>202</sup>  No significant difference	Unclear
Usual care in South Africa for women with HIV	8	–	EPDS score 13 or more, GHQ	Infant health, weight-for-age z-score, health-care utilisation, social support, HIV transmission-related behaviours	Compared to standard care women living with HIV, Enhanced Intervention women were less likely to report depressed mood (OR = 2.55; $p = 0.003$ )  <i>Adherence to clinic intervention groups was low, yet, there were benefits for maternal and infant health at 1.5 months post birth</i> <sup>203</sup>  Significant difference	High
Usual care in the UK	2 or more	–	EPDS score 13 or more, SCID	PSI, ICQ, MSSSI	<i>Volunteer support had no identifiable impact on the emergence of maternal depression from 2 to 12 months or on depression symptoms when infants were 12 months</i> <sup>149</sup>  <i>Informal support initiated following screening for disadvantage in pregnancy did not reduce the likelihood of depression for mothers with infants</i> <sup>149</sup>  No significant difference	Unclear
Usual care in the UK	2 or more	–	SF-36	BSID-II	<i>IG and CG did not differ in BSID-II psychomotor (mean difference 1.64, 95% CI -0.94 to 4.21) or mental (-0.81, -2.78 to 1.16) scores, nor SF-36 physical functioning (-5.4, -11.6 to 0.7) or mental health (-1.8, -6.1 to 2.6)</i> <sup>201</sup> scores  <i>No benefit for infant development or maternal health at 1 year</i> <sup>201</sup>  No significant difference	Low

continued

**TABLE 32** Selective preventive interventions: characteristics and outcomes of RCTs of social support interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Support in labour	Wolman, 1993; <sup>204</sup> Trotter, 1992; <sup>276</sup> Nikodem, 1998 <sup>275</sup>	South Africa	189	Labour ward	Labour	Individually	Supportive labour companion doula

Key: BSID, Bayley Scales of Infant Development; CG, control group; CI, confidence interval; CSEI, Coopersmith's Self-Esteem Inventory; GHQ, General Health Questionnaire; HDRS, Hamilton Depression Rating Scale; high, high risk of bias; ICQ, Infant Characteristics Questionnaire; IG, intervention group; low, low risk of bias; MSSl, Maternal Social Support Index; PDI, Pitt Depression Inventory; PSQ, Postpartum Support Questionnaire; RSE, Rosenberg Self-Esteem scale; SEM, standard error of the mean; unclear, unclear risk of bias.

Comparison group	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Usual care in South Africa	1	300	EPDS mean score, HDRS, PDI	STAI, CSEI	<p><i>The mean depression score of control group mothers was 23.27 (SEM 1.28) and of supported mothers 10.4 (SEM 0.77) (<math>p &lt; 0.001</math>)<sup>204</sup></i></p> <p><i>The group receiving support attained higher self-esteem scores and lower postpartum depression and anxiety ratings 6 weeks after delivery<sup>204</sup></i></p> <p><i>According to the data analysis the presence of a supportive labour companion resulted in a significant decrease in depression 3 months after birth: <math>t(61) = 2.18</math>; <math>p &lt; 0.05</math><sup>276</sup></i></p> <p><i>There were no differences in postpartum depression scores between two groups at 1 year<sup>275</sup></i></p>	Unclear
Mixed results						

## Selective preventive interventions: pharmacological agents or supplements

### *Characteristics and main outcomes of randomised controlled trials of selective preventive interventions of pharmacological agents or supplements*

Only one trial was identified that evaluated a pharmacological agent or supplement intervention for the prevention of PND.<sup>213</sup> This trial was conducted in the UK and evaluated the administration of thyroxine during the postnatal period. The number of contacts involved was two or more but duration length of contact was not reported. A summary of the characteristics and main outcomes is provided in *Table 33*.

No qualitative studies provided data on studies of pharmacological agents or supplement interventions.

## Selective preventive interventions: midwifery-led interventions

### *Characteristics and main outcomes of randomised controlled trials of selective preventive interventions of midwifery-led interventions*

Of the three trials<sup>221–223</sup> included in the selective preventive interventions evaluating midwifery-led interventions, none were conducted in the UK. The types of midwifery-led interventions that were identified included midwife-led debriefing after childbirth<sup>221,223</sup> and CenteringPregnancy Plus.<sup>222</sup> Comparisons were made with usual care in Australia<sup>221,223</sup> and the USA.<sup>222</sup> Two studies evaluated individual sessions<sup>221,223</sup> and one study was undertaken in the antenatal period only.<sup>222</sup> Midwives provided the interventions. The number of contacts varied and duration of contact ranged from 1 to 2 hours. A summary of the characteristics and main outcomes is provided in *Table 34*.

### *Description and findings from qualitative studies of selective preventive interventions of midwifery-led interventions*

Two US-based studies<sup>292–295</sup> included in the selective preventive interventions reported on midwifery-led interventions. Details of these CenteringPregnancy interventions are presented in *Table 35*.

## Findings from the qualitative review

### *Support*

Women reported gaining support of various kinds, such as peer support, as a particularly helpful aspect of the CenteringPregnancy intervention.<sup>292–295</sup> Women talked about building relationships with peers,<sup>293–295</sup> receiving reassurance and normalising their experiences of pregnancy, birth and the postpartum period.<sup>293–295</sup> Women reported how they valued the emotional support, informational support and practical advice they gained from peers.<sup>293–295</sup>

Service providers were positive about their experience in delivering CenteringPregnancy. They echoed service user views suggesting that the intervention facilitated peer support.<sup>293–295</sup>

Women in two studies felt the intervention encouraged family and partner support, and increased family awareness of difficulties in pregnancy.<sup>292–295</sup> Participants in one study felt health professionals' support was helpful.<sup>292</sup> Service providers reported the intervention facilitated improved communication between health providers, such as between community mental health teams and obstetric providers.<sup>293–295</sup>

**TABLE 33** Selective preventive interventions: characteristics and outcomes of RCTs of pharmacological agents or supplements

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider	Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Thyroxine	Harris, 2002 <sup>2,13</sup>	UK	341	Postnatal setting	Postnatal	Individually	Prescriber	Usual care in the UK	2 or more	–	EPDS score 13 or more, GHQ, MADRS, RDC	–	No evidence that thyroxine had any effect on occurrence of depression <sup>7,13</sup>	Unclear

Key: GHQ, General Health Questionnaire; high, high risk of bias; low, low risk of bias; MADRS, Montgomery–Åsberg Depression Rating Scale; unclear, unclear risk of bias.

**TABLE 34** Selective preventive interventions: characteristics and outcomes of RCTs of midwifery-led interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
CenteringPregnancy Plus	Ickovics, 2011, <sup>222</sup> Ickovics 2007 <sup>262</sup>	USA	1047	Antenatal setting	Antenatal	Group	Midwife
Midwife-led debriefing after childbirth	Gamble, 2005 <sup>221,259,260</sup>	Australia	103	Postnatal setting	Postnatal	Individually	Midwife
Midwife-led debriefing after childbirth	Small, 2000 <sup>223</sup>	Australia	1041	Postnatal setting	Postnatal	Individually	Midwife

Key: CI, confidence interval; DAS, Dyadic Adjustment Scale; high, high risk of bias; low, low risk of bias; MINI, Mini International Neuropsychiatric Interview; MSSS, Maternity Social Support Scale; PTSD, post-traumatic stress disorder; RR, relative risk; SRS, Social Relationship Scale; unclear, unclear risk of bias.

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Risk of bias
Usual care in the USA	10	120	CES-D	PSS, SRS social support subscale items, seven SRS social conflict subscale items	<p><i>Using intention-to-treat models, there were no significant differences in psychosocial function; yet, women in the top tertile of psychosocial stress at study entry did benefit from integrated group care</i><sup>222</sup></p> <p>Scores for high-stress women in the CenteringPregnancy Plus arm were higher for self-esteem and lower for stress and social conflict in the third trimester, and depression was lower at 1 year postnatally</p> <p>No significant difference</p>	Low
Usual care in Australia	2 or more	–	EPDS score 13 or more, DASS-21	MINI-PTSD, MSSS	<p><i>At 3-month follow-up, intervention group women reported decreased trauma symptoms, low relative risk of depression, low relative risk of stress, and low feelings of self-blame</i><sup>221</sup></p> <p>The midwifery-led intervention for women following a distressing birth experience was associated with a reduction in symptoms of stress, trauma, depression, and self-blame</p> <p>Four women in the intervention group and 17 women in the control group had an EPDS score 12 or more at 3 months postnatally (RR 0.25, 95% CI 0.09 to 0.69)</p> <p>Significant difference</p>	Low
Usual care in Australia	1	60	EPDS score 13 or more	SF-36 subscales	<p>More women allocated to IG scored as depressed 6 months after birth than women allocated to usual postpartum care [81 (17%) vs. 65 (14%)], although this difference was not significant (odds ratio 1.24, 95% CI 0.87 to 1.77)</p> <p>No significant difference</p>	Low

TABLE 35 Qualitative studies of selective preventive interventions: description of studies of midwifery-led intervention

First author, year, reference number	CASP Quality Grading	Intervention details								
		Country	Name	Setting	Delivered antenatal/postnatal	Group/individual	Number of in group	Number of sessions	Duration of session	Facilitator/service providers
Lehman, 2012 <sup>292</sup>	Moderate	USA	CenteringPregnancy	Secondary care – faith-based community health centre	Antenatal and postnatal	Group and individual	NR	10 (the first four monthly, and then the last six fortnightly)	2 hours	NR
Novick, 2012, <sup>293</sup> 2013 <sup>294,295</sup>	High	USA	CenteringPregnancy	Secondary care – antenatal clinic	Antenatal and postnatal	Group and individual	8–12	One individual, then 8–10 group	2 hours	Certified nurse-midwife and a medical assistant

Key: NR, not reported.

### **Active participation/education**

One study highlighted how participants might actively participate in their own health care including the provision of education, and gaining information and knowledge.<sup>293-295</sup> Several respondents in one study reported that they valued receiving education and information about pregnancy and the postnatal period.<sup>293-295</sup> Providers across several studies felt that the intervention encouraged women to be active participants in their own health care.<sup>293-295</sup>

### **Service delivery and barriers to participation**

Service providers said that the group intervention was a more efficient use of their time.<sup>293-295</sup>

The review showed that peer support was an important aspect of the intervention. The intervention also appeared to promote and facilitate support from the woman's family and partner. Women found the support received from health professionals helpful. Service providers felt that the intervention facilitated improved communication between health providers. Women valued receiving education and information about pregnancy and the postnatal period. Providers felt that the intervention encouraged active participation by the women. Service providers also felt that the intervention was an efficient use of time compared with other models.

## **Selective preventive interventions: organisation of maternity care**

No selective preventive intervention for PND was identified concerning the organisation of maternity care. No qualitative studies provided data on selective preventive interventions of organisation of maternity care.

## **Selective preventive interventions: complementary and alternative medicine or other interventions**

No selective preventive intervention for PND was identified concerning CAMs or other interventions. No qualitative studies provided data on selective preventive interventions of CAMs or other interventions.

## **Results from network meta-analysis for selective preventive interventions for Edinburgh Postnatal Depression Scale threshold score**

Of the 20 selective preventive intervention trials, nine were included in the NMA.<sup>150,160,188,190,213,215,221,223,225</sup> Among the 11 trials excluded because they could not be connected to the main network (see *Appendix 10, Table of selective preventive intervention studies omitted from network meta-analysis*), two were conducted in South Africa<sup>203,204,269,270,275,276</sup> and one in China.<sup>162</sup> Three trials were excluded because they could not be connected to the main network of evidence.<sup>160,190,192</sup>

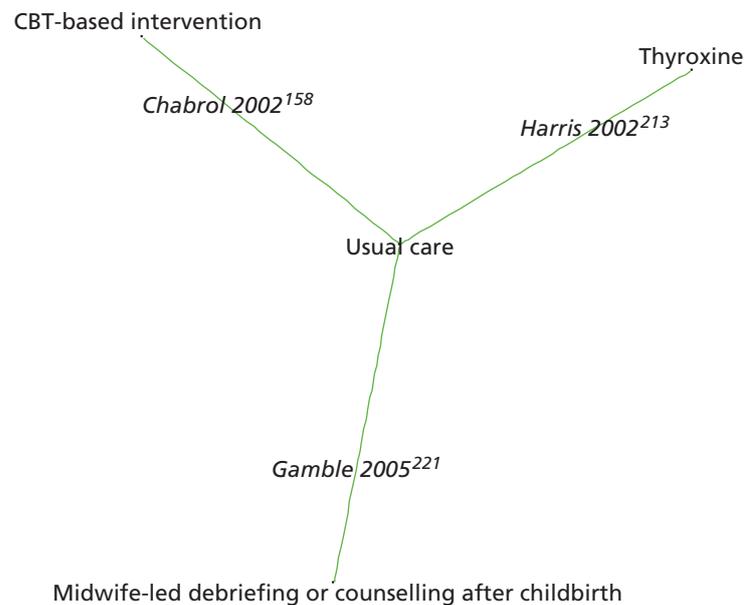
Five trials were excluded because of a lack of EPDS data,<sup>159,161,201,202,222,262</sup> and three trials because there was no usual-care comparator.<sup>160,190,192</sup>

Three of the trials at low risk of bias found no benefit of CenteringPregnancy Plus for young, ethnic minority women of low socioeconomic status,<sup>222,262</sup> of CBT-based intervention for mothers following very preterm delivery,<sup>159</sup> or of peer mentors for first-time mothers in socioeconomically deprived communities.

Of the other three trials at low risk of bias, one found that a CBT-based intervention was associated with a reduction in depressive symptoms for women living in financial hardship,<sup>161</sup> one found that an IPT-based intervention was associated with an overall lower rate of depression among primiparous adolescent mothers<sup>160</sup> and one found that a booklet on PND and social worker call was associated with a reduced likelihood of screening positive for depression among black and Latina mothers postpartum.<sup>190</sup>

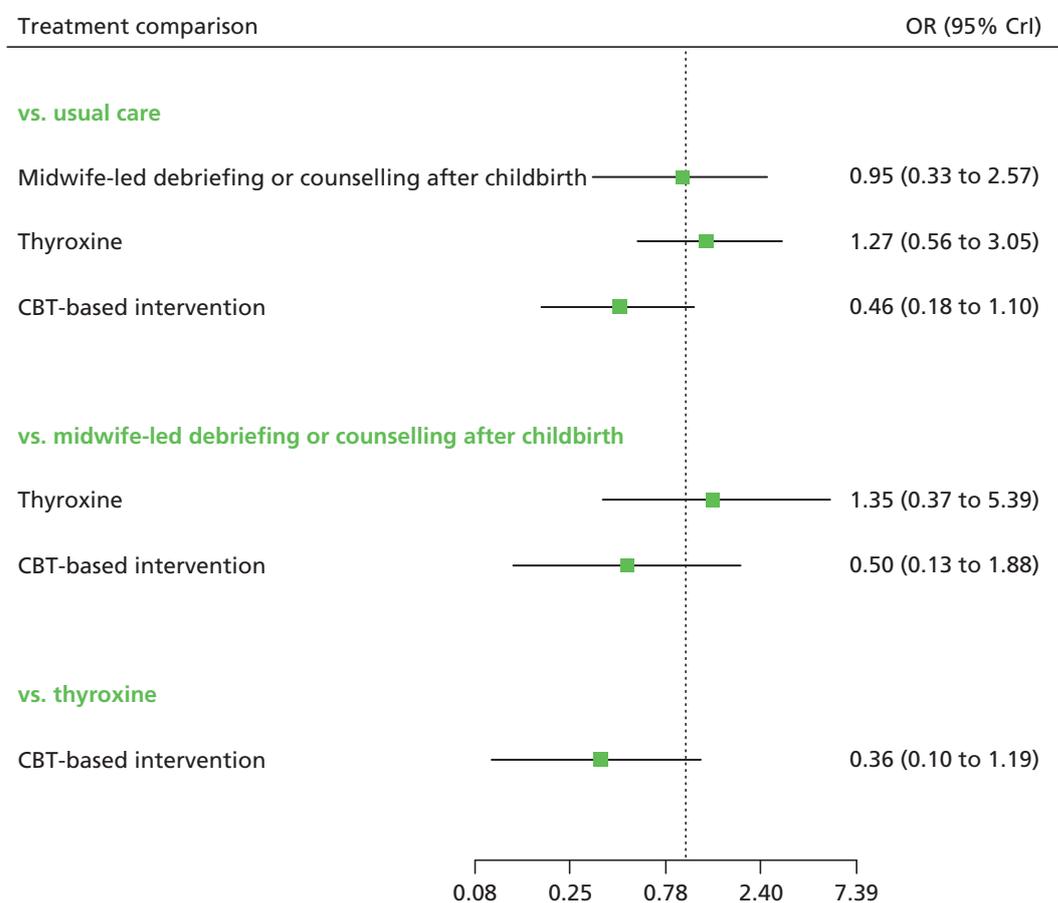
### **Results from network meta-analysis for selective preventive intervention for Edinburgh Postnatal Depression Scale threshold score at 6 weeks postnatally**

A NMA was used to compare the effects of thyroxine,<sup>213</sup> a CBT-based intervention<sup>158</sup> and midwife-led debriefing following childbirth<sup>221</sup> relative to usual care on EPDS threshold data. Data were available from three trials comparing three interventions.<sup>158,213,221</sup> Figure 23 presents the network of evidence.<sup>158,213,221</sup>



**FIGURE 23** Selective preventive interventions EPDS threshold score at 6 weeks postnatally: network of evidence.

Figure 24 presents the odds ratios of each intervention relative to usual care and Figure 25 presents the probabilities of treatment rankings. The total residual deviance was 6.00, compared with the total number of data points, six, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.21 (95% CrI 0.01 to 0.72), which implies mild heterogeneity of intervention effects between trials.



**FIGURE 24** Selective preventive interventions EPDS threshold score at 6 weeks postnatally: odds ratios all treatment comparisons. Key: OR, odds ratio.

Cognitive-behavioural therapy-based intervention had the biggest effect relative to usual care (odds ratio 0.46, 95% CrI 0.18 to 1.10), although this was not statistically significant at a conventional 5% level (see Figure 24). CBT-based intervention had the highest probability of being the best (probability 0.84) (see Figure 25).

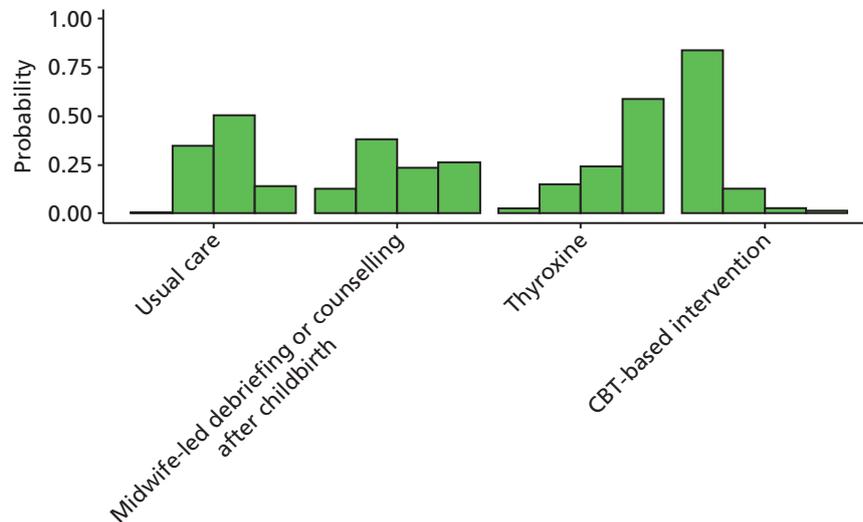


FIGURE 25 Selective preventive interventions EPDS threshold score at 6 weeks postnatally: probability of treatment rankings (ranks 1–4).

**Results from network meta-analysis for selective preventive intervention for Edinburgh Postnatal Depression Scale threshold score at 3 months postnatally**

A NMA was used to compare the effects of midwife-led debriefing after childbirth,<sup>221</sup> education on preparing for parenting<sup>188</sup> and thyroxine<sup>213</sup> relative to usual care on EPDS threshold. Data were available from three trials comparing four interventions.<sup>188,213,221</sup> Figure 26 presents the network of evidence. Three treatment effects were estimated from three trials.<sup>188,213,221</sup>

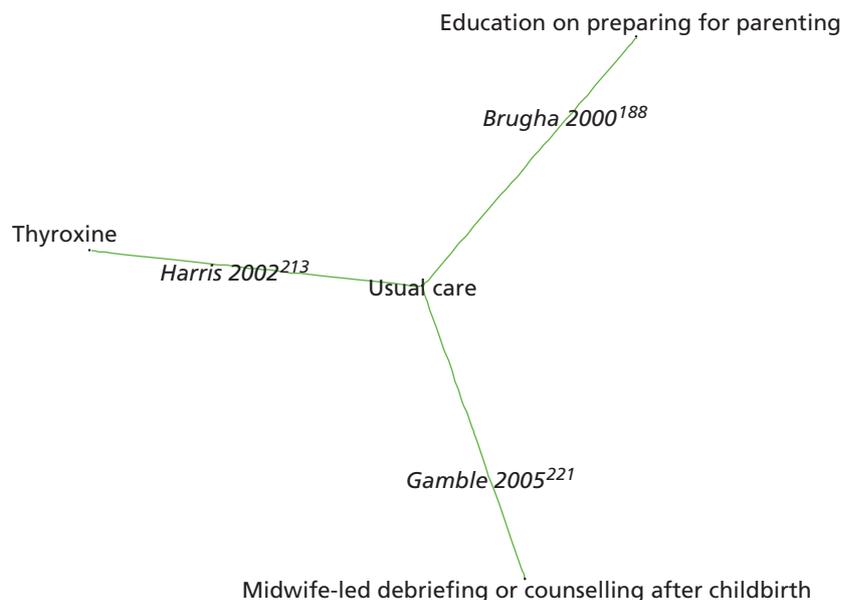
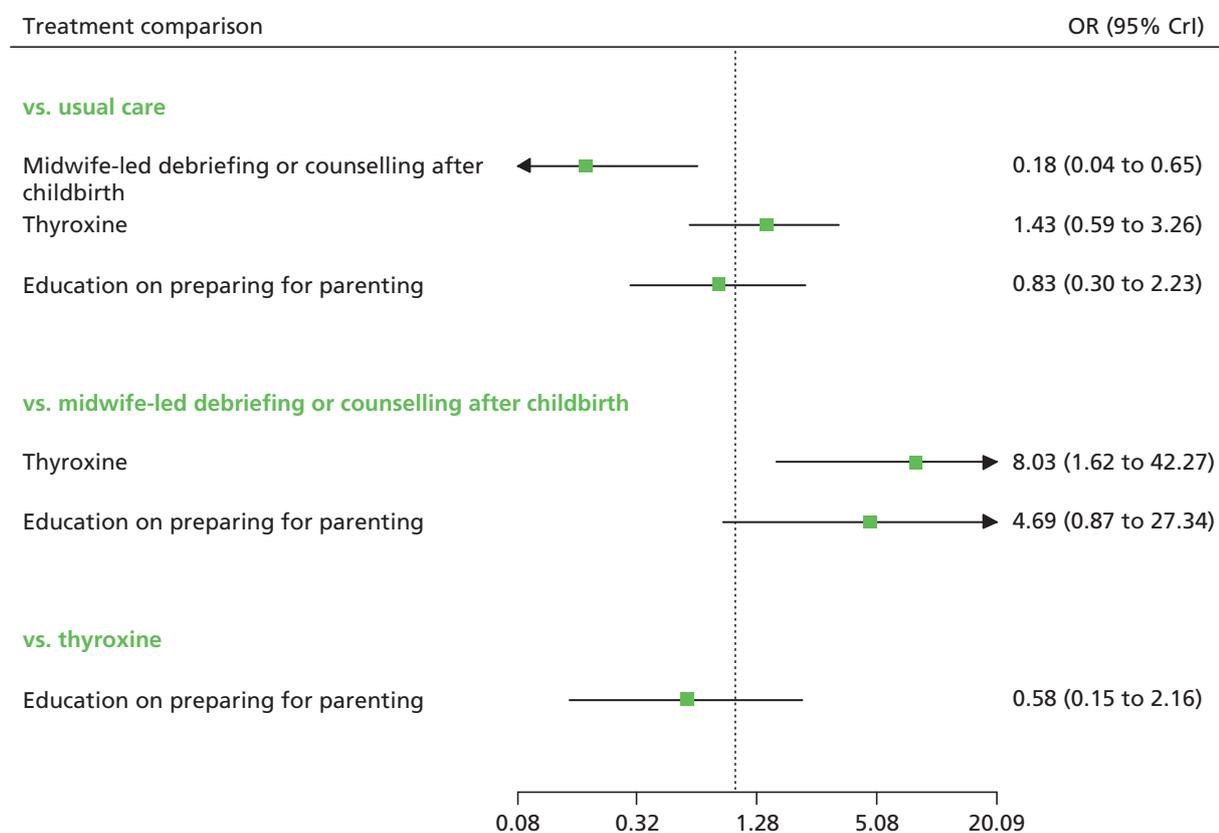
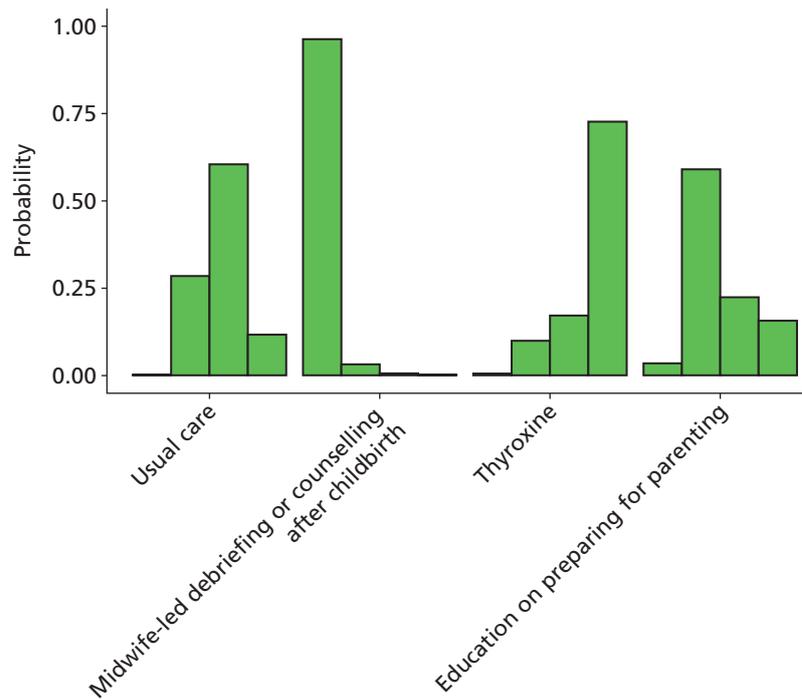


FIGURE 26 Selective preventive interventions EPDS threshold score at 3 months postnatally: network of evidence.

Figure 27 presents the odds ratios of each intervention relative to usual care and Figure 28 presents the probabilities of treatment rankings. The total residual deviance was 6.16, compared with the total number of data points, six, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.22 (95% CrI 0.01 to 0.73), which implies mild heterogeneity of intervention effects between trials.



**FIGURE 27** Selective preventive interventions EPDS threshold score at 3 months postnatally: odds ratios all treatment comparisons. Key: OR, odds ratio.



**FIGURE 28** Selective preventive interventions EPDS threshold score at 3 months postnatally: probability of treatment rankings (ranks 1–4).

For the selective preventive interventions at 3 months postnatally, midwife-led debriefing or counselling after childbirth had the biggest effect relative to usual care (odds ratio 0.18, 95% CrI 0.04 to 0.65) (see *Figure 27*). Midwife-led debriefing or counselling after childbirth had the highest probability of being the best (probability 0.96) (see *Figure 28*).

### **Results from network meta-analysis for selective preventive intervention for Edinburgh Postnatal Depression Scale threshold score at 6 months postnatally**

A NMA was used to compare the effects of thyroxine<sup>213</sup> and midwife-led debriefing after childbirth<sup>223</sup> relative to usual care on EPDS threshold. Data were available from two trials comparing three interventions.<sup>213,223</sup> *Figure 29* presents the network of evidence. There were two treatment effects to estimate from two trials.<sup>213,223</sup>

*Figure 30* presents the odds ratios of each intervention relative to usual care and *Figure 31* presents the probabilities of treatment rankings. The total residual deviance was 3.99, compared with the total number of data points, four, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.22 (95% CrI 0.02 to 0.74), which implies mild heterogeneity of intervention effects between trials.

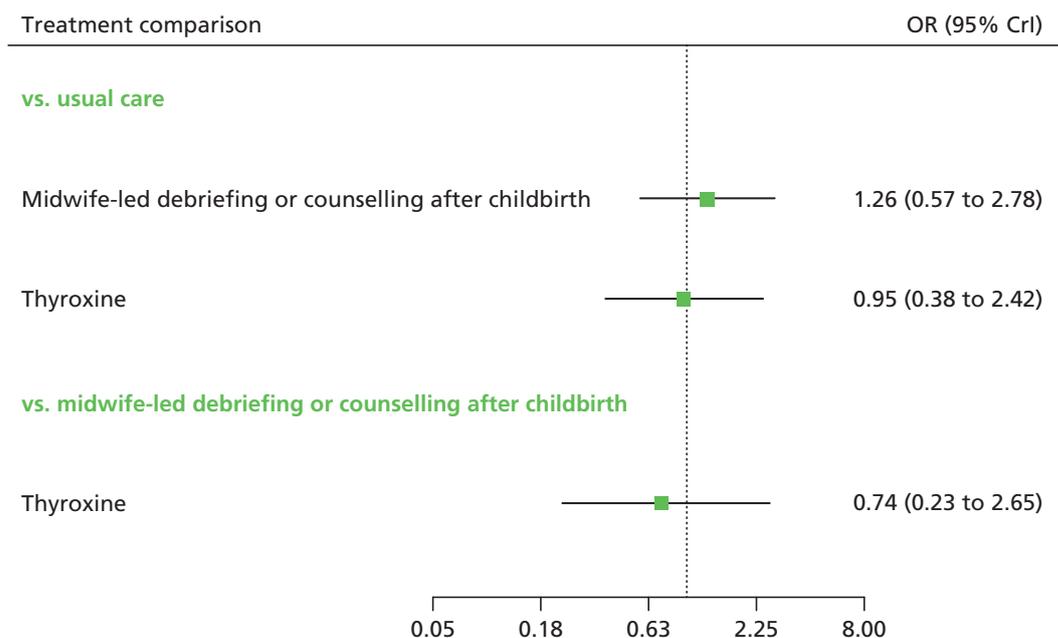
There was insufficient evidence of a difference in effect between interventions (see *Figures 30* and *31*).

### **Summary of results from network meta-analysis for selective preventive interventions Edinburgh Postnatal Depression Scale threshold score**

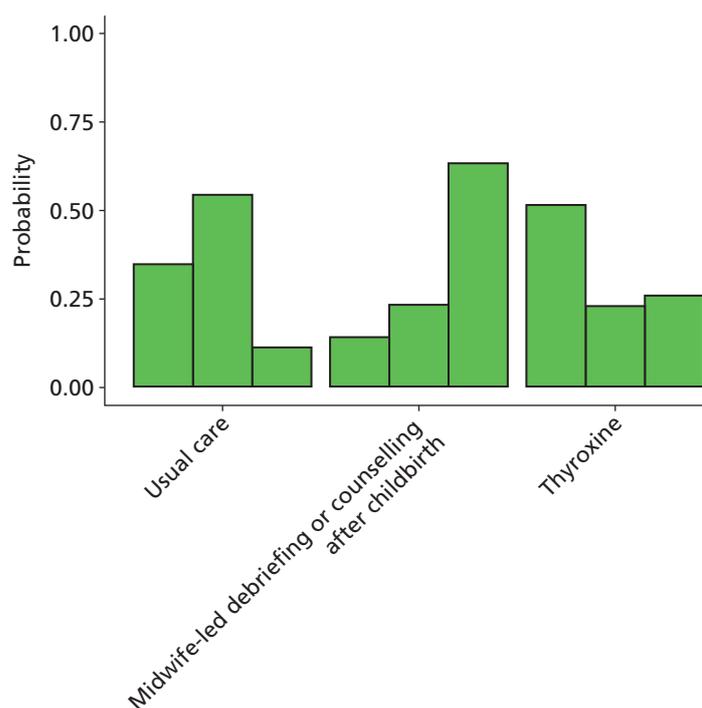
*Table 36* indicates the results of the NMAs for the EPDS threshold scores and mean scores at all assessment times. In general, the intervention effects were inconclusive, although midwife-led debriefing after childbirth was associated with a statistically significant benefit at 3 months. When interventions were evaluated at more than one assessment, the effects tended to vary over time.



**FIGURE 29** Selective preventive interventions EPDS threshold score at 6 months postnatally: network of evidence.



**FIGURE 30** Selective preventive interventions EPDS threshold score at 6 months postnatally: odds ratios all treatment comparisons. Key: OR, odds ratio.



**FIGURE 31** Selective preventive interventions EPDS threshold score at 6 months postnatally: probability of treatment rankings (ranks 1–3).

**TABLE 36** Selective preventive interventions NMAs: overall summary of main effects of interventions relative to usual care

Time postnatally	EPDS mean score		EPDS threshold score		Overall risk of bias
	Difference in mean (95% CrI)	Probability of being the best <sup>a</sup>	Odds ratio (95% CrI)	Probability of being the best <sup>a</sup>	
<b>6 weeks postnatally</b>					
CBT-based intervention: Chabrol, 2002 <sup>158</sup>	-1.75 (-4.25 to 0.71)	0.75 <sup>b</sup>	0.46 (0.18 to 1.10)	0.84 <sup>c</sup>	High
Education on preparing for parenting: Sen, 2006, <sup>191</sup> Buist, 1999 <sup>189</sup>	-0.81 (-3.10 to 1.34)	0.23 <sup>3</sup>	NE	NE	Low; unclear <sup>d</sup>
<b>3 months postnatally</b>					
Education on preparing for parenting: Sen, 2006, <sup>191</sup> Buist, 1999 <sup>189</sup>	-1.08 (-3.83 to 1.65)	0.35 <sup>b</sup>	0.83 (0.30 to 2.23)	0.03 <sup>c</sup>	Low; unclear <sup>d</sup>
IPT-based intervention: Zlotnick, 2011 <sup>163</sup>	-1.85 (-5.60 to 2.14)	0.62 <sup>b</sup>	NE	NE	Unclear
<b>6 months postnatally</b>					
Education on preparing for parenting: Sen, 2006, <sup>191</sup> Buist, 1999 <sup>189</sup>	-1.32 (-3.54 to 1.10)	0.83 <sup>b</sup>	NE	NE	Low; unclear <sup>d</sup>

Key: high, high risk of bias; low, low risk of bias; NE, not evaluable; unclear, unclear risk of bias.  
<sup>a</sup> Probability of being the best among interventions with evaluable data at each assessment.  
<sup>b</sup> Best among three interventions.  
<sup>c</sup> Best among four interventions.  
<sup>d</sup> When there were two studies, the risk of bias is indicated in the order in which the studies are cited.

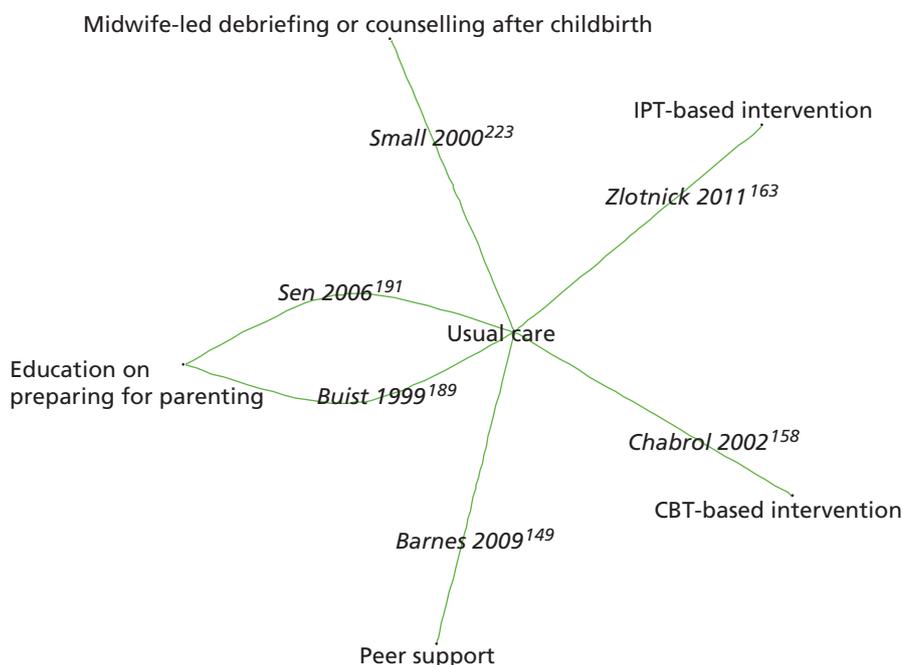
**Notes**  
 For difference in mean < -0.75 or odds ratio < 0.70.  
 Not evaluable data were data not available on this outcome measure for this intervention.

## Results from network meta-analysis for selective preventive interventions for Edinburgh Postnatal Depression Scale mean scores

A NMA was used to compare the effects of CBT-based intervention,<sup>158</sup> education on preparing for parenting,<sup>189,191</sup> IPT-based intervention,<sup>163</sup> midwife-led debriefing after childbirth<sup>223</sup> and peer support<sup>149</sup> relative to usual care on EPDS mean scores. Data were available from six trials comparing five interventions. *Figure 32* presents the network of evidence. There were five intervention effects to estimate (relative to usual care) from six trials.<sup>149,158,163,189,191,223</sup>

*Figure 33* presents the difference in EPDS mean scores of each intervention relative to usual care and *Figures 34–37* present the probabilities of treatment rankings at 6–8 weeks, 3–4 months, 6–7 months and 12 months, respectively. The between-study SD was estimated to be 0.68 (95% CrI 0.03 to 2.46), which implies moderate heterogeneity of intervention effects between trials. The interventions associated with the greatest reduction in EPDS mean score were the IPT-based intervention (–1.85, 95% CrI –5.60 to 2.144 at 3–4 months) and CBT-based intervention (–1.75, 95% CrI –4.25 to 0.71 at 6–8 weeks). None of the comparisons against usual care were statistically significant at a conventional 5% level.

The intervention with the highest probabilities of being the best at 6–8 weeks was the CBT-based intervention (probability 0.75). The intervention with the highest probability of being the best at 3–4 months was the IPT-based intervention (probability 0.62). The intervention with the highest probability of being the best at 6–7 months was education on preparing for parenting (probability 0.83). The intervention with the highest probability of being the best at 12 months was education on preparing for parenting (probability 0.57).



**FIGURE 32** Selective preventive interventions EPDS mean scores: network of evidence.

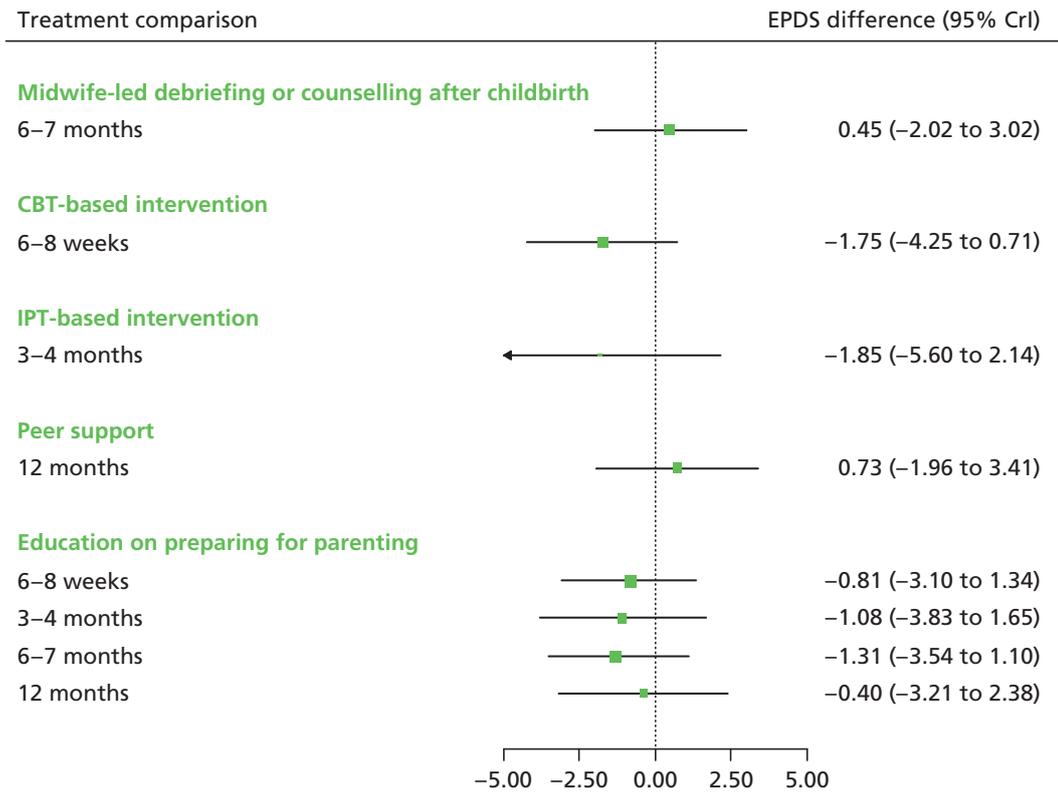


FIGURE 33 Selective preventive interventions EPDS mean scores: mean differences of treatment comparisons vs. usual care across all time points.

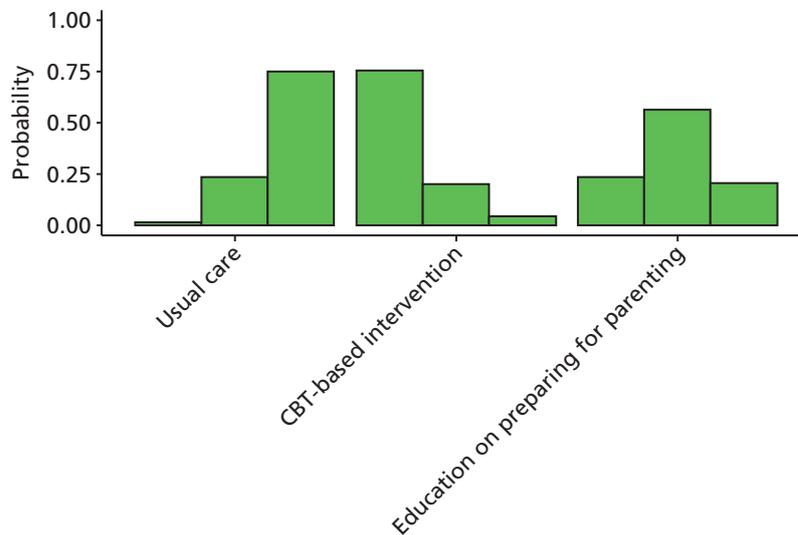
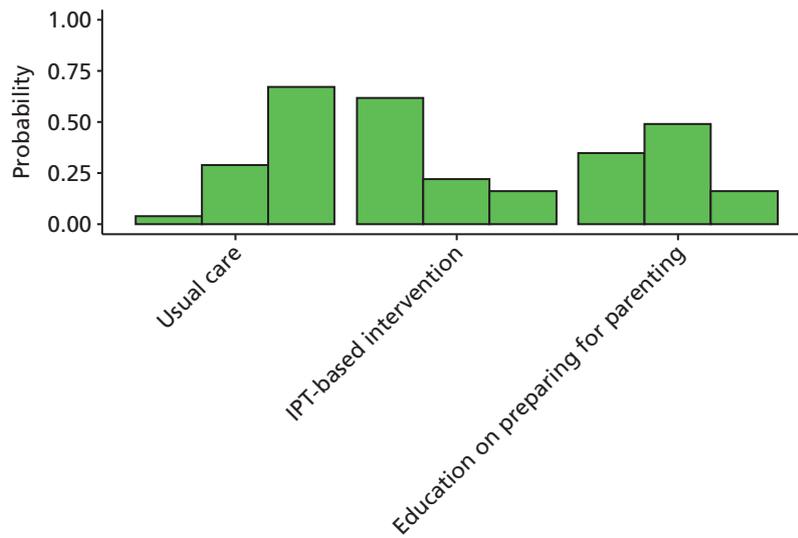
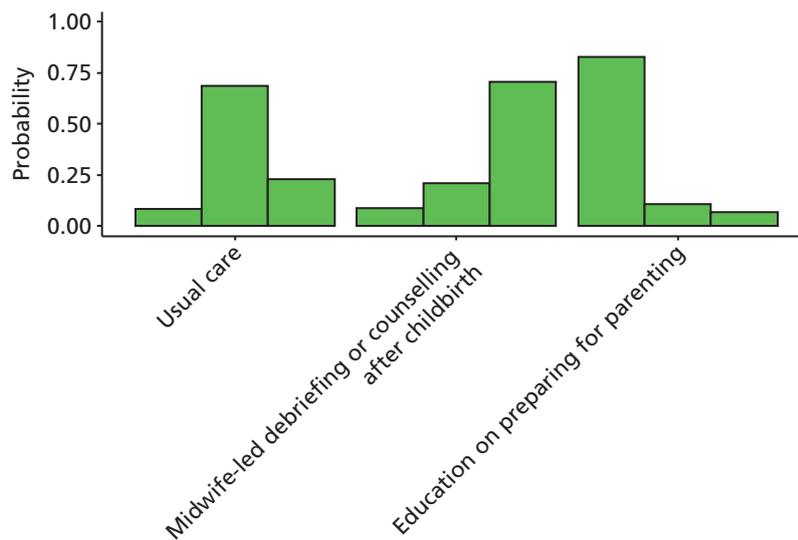


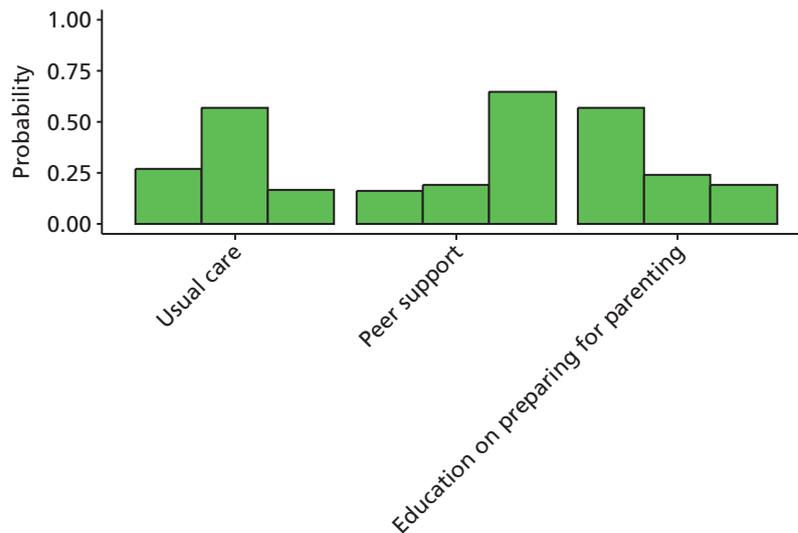
FIGURE 34 Selective preventive interventions EPDS mean scores: probability of treatment rankings at 6–8 weeks postnatally (ranks 1–3).



**FIGURE 35** Selective preventive interventions EPDS mean scores: probability of treatment rankings at 3–4 months postnatally (ranks 1–3).



**FIGURE 36** Selective preventive interventions EPDS mean scores: probability of treatment rankings at 6–7 months postnatally (ranks 1–3).



**FIGURE 37** Selective preventive interventions EPDS mean scores: probability of treatment rankings at 12 months (ranks 1–4).

### **Summary of results from network meta-analysis for selective preventive interventions for Edinburgh Postnatal Depression Scale mean scores**

Not all interventions provided information about intervention effects at each time, making it difficult to draw inferences across all interventions at each time. In general, the intervention effects were inconclusive and the CIs were wide. The most beneficial interventions appeared to be the CBT-based interventions, IPT-based interventions and education on preparing for parenting. However, the evidence for the effect of CBT-based intervention came from the study by Chabrol *et al.*,<sup>158</sup> which was judged to be at high risk of bias. As such, the benefit of that CBT-based intervention estimated in this NMA should be treated with some caution. In addition, the evidence for the effect of IPT-based interventions at 3–4 months came from a trial which was a small pilot study by Zlotnick *et al.*<sup>163</sup> and, as such, the results should be treated with caution.

The evidence from the qualitative review demonstrated that the IPT, as a selective intervention, was acceptable to women and they reported benefiting from gaining realistic information about motherhood and from being empowered to ask for help. The educational intervention 'Preparing for parenthood' provided participants with an additional opportunity to learn about PND while avoiding the stigma of asking for this information. Benefits of the CenteringPregnancy intervention included facilitation of support, particularly peer support for selective groups.

# Chapter 7 Results for indicated preventive intervention studies

## Characteristics of randomised controlled trials of indicated preventive interventions

There were 30 RCTs in the indicated preventive interventions group, in six of the seven intervention classes defined as:

1. psychological ( $n = 19$ )<sup>61,121,148,164-179</sup>
2. educational ( $n = 4$ )<sup>193-196</sup>
3. social support ( $n = 2$ )<sup>205,206</sup>
4. pharmacological agents or supplements ( $n = 3$ )<sup>214-216</sup>
5. midwifery-led interventions ( $n = 1$ )<sup>224</sup>
6. organisation of maternity care ( $n = 0$ )
7. CAM or other interventions ( $n = 1$ )<sup>229</sup>

Results are presented in this order for the RCTs of indicated preventive interventions. There was limited replication of interventions across the studies. The 30 indicated preventive intervention studies are described by their intervention context, mechanisms and measured outcomes within the seven classes.

## Description and findings from qualitative studies of indicated preventive interventions

There were three qualitative studies in the indicated preventive interventions group, in two of the seven intervention classes:

- social support ( $n = 2$ )<sup>299,301</sup>
- organisation of maternity care ( $n = 1$ )<sup>300</sup>

One study reported on the perspectives and attitudes of service providers to indicated preventive interventions.<sup>298</sup> For ease of reference, indicated preventive interventions were given short-version indicative labels (*Table 37*).

TABLE 37 Indicated preventive interventions: short-version descriptive labels

First author, year, reference number	Short-version indicative label	Fuller description
Armstrong, 1999 <sup>164</sup>	Promoting parent–infant interaction	A structured home-visiting programme of weekly nurse home visiting supported by a social worker and paediatrician when the child was at great risk of poor health and developmental outcomes
Austin, 2008 <sup>165</sup>	CBT-based intervention	An antenatal cognitive–behavioural group intervention in a primary care setting for pregnant women identified with mild to moderate symptoms in pregnancy and/or at risk of developing depression or anxiety in the perinatal period
Austin, 2008 <sup>165</sup>	Educational information	Information booklet for pregnant women identified with mild to moderate symptoms in pregnancy and/or at risk of developing depression or anxiety in the perinatal period
Dennis, 2009 <sup>205</sup>	Peer support	Telephone-based volunteer peer support for women at high risk of PND
Ginsburg, 2012 <sup>168</sup>	CBT-based intervention	An eight-lesson cognitive–behavioural-based programme, Living in Harmony, for reservation-based American Indians
Ginsburg, 2012 <sup>168</sup>	Educational information	An eight-lesson education programme, Education-Support programme, for reservation-based American Indians
Gorman, 1997 <sup>169</sup>	IPT-based intervention	A preventive intervention adapted from IPT for depression, for women at high risk of PND and adjustment problems
Grote, 2009 <sup>170</sup>	Educational information	Written educational materials about depression, and strong encouragement to seek treatment at the behavioural health centre for low-income, pregnant women scoring 13 or more on the EPDS
Grote, 2009 <sup>170</sup>	IPT-based intervention	Culturally relevant, enhanced brief IPT-B consisting of an engagement session, followed by eight acute IPT-B sessions before birth and maintenance IPT up to 6 months postpartum for low-income, pregnant women scoring 13 or more on the EPDS
Marks, 2003 <sup>224</sup>	Midwifery continuous care	Continuous midwifery care of a named midwife who, as far as possible, followed the women through the pregnancy, delivery and postnatally, for women with a history of major depressive disorder
Morrell, 2009 <sup>61</sup>	CBT-based intervention	HV training in the assessment of postnatal women combined with cognitive–behavioural approach sessions for eligible women who scored 12 or more on the EPDS
Morrell, 2009 <sup>61</sup>	PCA-based intervention	HV training in the assessment of postnatal women combined with Person-Centred Approach sessions for eligible women who scored 12 or more on the EPDS
Munoz, 2007 <sup>173</sup>	CBT-based intervention	Mamás y Bebés/Mothers and Babies Course developed in Spanish and English that uses a cognitive–behavioural mood management framework and incorporates social learning concepts, attachment theory and sociocultural issues, for low-income predominantly Latina women who screened positive for a major depressive episode and/or who scored 16 or more on CES-D
Petrou, 2006 <sup>174</sup>	Promoting parent–infant interaction	Home visits from research health visitors to enhance maternal sensitivity to infant communicative signals and infant responsiveness and to encourage women to express their feelings; for women at raised risk for PND
Stamp, 1995 <sup>195</sup>	Education on preparing for parenting	Two antenatal groups and one postnatal group with a practical and emotional emphasis on planning for and expectations of life changes precipitated by the arrival of a new baby for women vulnerable to developing PND. A non-directive, practical and supportive programme was developed, underpinned by a philosophy that acknowledged the abilities and resourcefulness of the women themselves. Its focus was on access to information, preparation and support, the extension and development of women’s existing networks and goal setting
Webster, 2003 <sup>196</sup>	Booklet on PND	Providing women in the intervention group with a booklet about PND and a list of the phone contacts of PND resources; for pregnant women with risk factors for PND

IPT-B, Interpersonal Psychotherapy – brief; HV, health visitor.

## Indicated preventive interventions: psychological interventions

### *Characteristics and main outcomes of randomised controlled trials of indicated preventive interventions of psychological interventions*

Of the 19 included studies reporting psychological interventions for the indicated prevention of PND,<sup>61,121,148,164–179</sup> only three<sup>61,174,177</sup> were conducted in the UK. Six types of psychological interventions were identified: CBT-based interventions,<sup>61,148,165,167,168,171–173</sup> empowerment training,<sup>175</sup> IPT-based interventions,<sup>166,169,170,178,179</sup> mindfulness-based intervention,<sup>121</sup> promoting parent–infant interaction<sup>164,174,177</sup> and psychoeducational interventions.<sup>176</sup> Comparisons were made with usual care in specific countries<sup>61,121,148,164,166,167,169–179</sup> and educational information.<sup>165,168</sup> Seven studies evaluated group sessions,<sup>121,165,171,173,177–179</sup> 11 evaluated individual sessions<sup>61,148,164,167–170,172,174–176</sup> and one evaluated both group and individual sessions.<sup>166</sup> Five studies took place in the home setting.<sup>61,164,168,172,174</sup> Six studies were undertaken in the antenatal period only,<sup>121,168,173,175–177</sup> two in the postnatal period only<sup>61,164</sup> and 11 in a combination of both antenatal and postnatal periods.<sup>148,165–167,169–172,174,178,179</sup> The interventions were provided by different health-care providers (nurse, social worker, paediatrician, psychologist, counsellor, health visitor, community health workers) and group facilitators.<sup>171,177</sup> The number of contacts varied and length of contact ranged from 30 minutes<sup>168</sup> to 2 hours<sup>121,165,171,177</sup> A summary of the characteristics and main outcomes is provided in *Table 38*.

There were no qualitative studies of indicated preventive interventions of psychological interventions.

## Indicated preventive interventions: educational intervention

### *Characteristics and main outcomes of randomised controlled trials of indicated preventive interventions of educational interventions*

None of the four included studies<sup>193–196</sup> reporting educational interventions for the indicated prevention of PND were conducted in the UK. Two main types of educational interventions were identified: a booklet on PND<sup>193,194,196</sup> and education on preparing for parenting.<sup>195</sup> Comparisons were made with usual care in specific countries and educational information. Two studies evaluated group sessions,<sup>194,195</sup> and two evaluated individual sessions only.<sup>193,196</sup> No study took place in the home setting. Two studies were undertaken in the antenatal period only,<sup>194,196</sup> one in the postnatal period only<sup>193</sup> and one in a combination of both antenatal and postnatal periods.<sup>195</sup> The interventions were provided by different health-care providers (nurse, midwife) with the number of contacts ranging from one to eight (mean 3.25) and duration of contact ranging from 1 to 2 hours (mean 1.5 hours). A summary of the characteristics and main outcomes is provided in *Table 39*.

There were no qualitative studies of indicated preventive interventions of educational interventions.

## Indicated preventive interventions: social support

### *Characteristics and main outcomes of randomised controlled trials of indicated preventive interventions of social support*

Only one of the included studies<sup>206</sup> evaluating social support for the indicated prevention of PND was conducted in the UK. Peer support was the main type of social support intervention identified: a booklet on PND.<sup>205,206</sup> Comparisons were made with usual care in specific countries (i.e. Canada<sup>205</sup> and the UK<sup>206</sup>) Both included studies evaluated individual sessions only.<sup>205,206</sup> One study took place in the home setting<sup>206</sup> and one intervention was by telephone.<sup>205</sup> One study was undertaken in the postnatal period only,<sup>205</sup> and one in a combination of both antenatal and postnatal periods.<sup>206</sup> Both interventions were provided by different peer volunteers, the number of contacts varied and the length of contact was not specified. A summary of the characteristics and main outcomes is provided in *Table 40*.

**TABLE 38** Indicated preventive interventions: characteristics and outcomes of RCTs of psychological interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
CBT-based intervention	Austin, 2008 <sup>165</sup>	Australia	277	Antenatal setting	Antenatal and postnatal	Group	Psychologist
CBT-based intervention	El-Mohandes, 2008 <sup>167</sup>	USA	1070	Antenatal setting	Antenatal and postnatal	Individually	Counsellor
CBT-based intervention	Ginsburg, 2012 <sup>168</sup>	USA	47	Home visits	Antenatal	Individually	Paraprofessionals

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Educational information	6	120	EPDS mean score (data extracted using digitising software), MINI	STAI (not reported)	<p>Intention-to-treat analyses revealed relatively low mean baseline EPDS scores [range 6.88 (SD 4.43) 8.16 (SD 4.47)], with no reduction in EPDS scores in either group. MINI depression criteria were fulfilled by 19% of all participants at time 1, but there was no reduction in depression in either group; in contrast those with MINI anxiety diagnoses reduced from 28% in late pregnancy to 16% at 4 months postpartum in the CBT group, with similar reductions in the control group</p> <p>No significant difference</p>	Unclear
Usual care in the USA	2 or more	36	BDI-II, Hopkins symptom checklist	CTS, ETSE	<p>Depression at postpartum interview was 25.5% in the intervention group and 29.0% in the control group; <math>p = 0.303</math></p> <p><i>An integrated multiple risk factor intervention addressing psychosocial and behavioral risks delivered mainly during pregnancy can have beneficial effects in risk reduction postpartum<sup>167</sup></i></p> <p>No significant difference</p>	Low
Educational information	8	30–60	CES-D, CGAS, DISC, EPDS mean score	SSI	<p><i>At all post intervention assessments, mothers in both groups showed similar reductions in depressive symptoms and similar rates of MDD. Both groups of participants also showed similar improvements in global functioning. No changes in either group were found on the measure of social support<sup>168</sup></i></p> <p>No significant difference</p>	Unclear

continued

**TABLE 38** Indicated preventive interventions: characteristics and outcomes of RCTs of psychological interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
CBT-based intervention	Le, 2011 <sup>171</sup>	USA	217	Antenatal setting	Antenatal and postnatal	Group	Group Facilitators
CBT-based intervention	McKee, 2006 <sup>172</sup>	USA	90	Home visits	Antenatal and postnatal	Individually	Psychologist
CBT-based intervention and PCA-based intervention	Morrell, 2009 <sup>61</sup>	UK	595	Home visits	Postnatal	Individually	Health visitors
CBT-based intervention	Munoz, 2007 <sup>173</sup>	USA	41	Antenatal setting	Antenatal	Group	Psychologist

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in the USA	11	120	BDI-II score 21 or more, Mood Screener	Mood Screener	<p><i>The cumulative incidence of major depressive episodes was not significantly different between the intervention (7.8%) and UC (9.6%) groups<sup>171</sup></i></p> <p><i>A CBT intervention for low-income, high-risk Latinas reduced depressive symptoms during pregnancy but not during the postpartum period<sup>171</sup></i></p> <p>No significant difference</p>	Unclear
Usual care in the USA	8	–	BDI-II	IRS, NSSQ	<p><i>The two intervention conditions were equally effective in reducing depression<sup>172</sup></i></p> <p>No significant difference</p>	High
Usual care in the UK	up to 8	60	CORE-OM, EPDS score 12 or more and mean, SF-36 MCS	PSI, DAS, SF-6D, SF-36 PCS	<p>At 6 months postnatally, 93 of the 271 (34%) women in the IG and 67 of the 147 women in the CG (46%) had an EPDS score 12 or more. The OR for a score 12 or more at 6 months postnatally was 0.62 (95% CI 0.40 to 0.97; <math>p=0.036</math>) for women in the IG vs. CG</p> <p><i>Training health visitors to assess women, identify symptoms of PND, and deliver psychologically informed sessions was clinically effective at 6 and 12 months postnatally compared with usual care<sup>61</sup></i></p> <p>Significant difference</p>	Low
Usual care in the USA	12	–	CES-D, EPDS mean score; MMS for MDE	–	<p><i>Differences in terms of depression symptom levels or incidence of MDEs between the two groups did not reach statistical significance in this pilot trial. However, the MDE incidence rates of 14% for the intervention condition versus 25% for the comparison condition represent a small effect size (<math>h = 0.28</math>)<sup>173</sup></i></p> <p>No significant difference</p>	Unclear

continued

**TABLE 38** Indicated preventive interventions: characteristics and outcomes of RCTs of psychological interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
CBT-based intervention	Rahman, 2008 <sup>148</sup>	Pakistan	903	Antenatal setting	Antenatal and postnatal	Individually	Community health workers
Empowerment training	Tiwari, 2005 <sup>175</sup>	Hong Kong	110	Antenatal setting	Antenatal	Individually	Midwife
IPT-based intervention	Crockett, 2008 <sup>166</sup>	USA	36	Antenatal setting	Antenatal and postnatal	Individually and group	Counsellor

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in Pakistan	16	–	HDRS	Weight-for-age Z scores, height-for-age Z scores, MSPSS, BDQ, GAFS	At 6 months, 97 of the 418 (23%) women in the IG and 211 of the 400 women in the CG (53%) had major depression. The OR was 0.22 (95% CI 0.14 to 0.36; $p < 0.0001$ ). At 12 months, 27% in the IG (111 out of 412) vs. 59% in the CG (226 out of 386) had major depression. The OR was 0.23 (95% CI 0.15 to 0.36; $p < 0.0001$ )  <i>This psychological intervention delivered by community-based primary health workers has the potential to be integrated into health systems in resource-poor settings<sup>148</sup></i>  Significant difference	Low
Usual care in Hong Kong	1	30	EPDS score 10 or more	CTS, SF-36	<i>Twenty-five women from the control group had EPDS scores of 10 or more compared with 9 from the experimental group (relative risk 0.36, 0.15–0.88)<sup>175</sup></i>  The experimental group reported less psychological abuse and minor physical violence and their depression symptom scores were lower than the those for the CG  Significant difference	Low
Usual care in the USA	4	90	DSM-IV, EPDS score 10 or more, SCID	PPAQ, PSI, SAS self-report questionnaire	At 3 months postpartum, the study found no significant differences between the two conditions in degree of depressive symptoms or level of parental stress  No significant difference	Unclear

continued

**TABLE 38** Indicated preventive interventions: characteristics and outcomes of RCTs of psychological interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
IPT-based intervention	Gorman, 1997 <sup>169</sup>	USA	45	Antenatal setting	Antenatal and postnatal	Individually	Psychologist
IPT-based intervention	Grote, 2009 <sup>170</sup>	USA	53	Antenatal setting	Antenatal and postnatal	Individually	Psychologist
IPT-based intervention	Zlotnick, 2001 <sup>178</sup>	USA	35	Antenatal setting	Antenatal and postnatal	Group	Psychologist

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in the USA	5	–	BDI, EPDS score 13 or more, PANAS, SCID, SCL-90-R	DAS, PPAQ	<i>No significant differences between the two groups were found on self-report measures of depressive symptomatology, general psychiatric symptomatology, marital satisfaction or general postpartum adjustment at either 1 or 6 months postpartum</i> <sup>169</sup>	Unclear
Educational information	8	–	BDI, DIS, EPDS score 13 or more, SCID (DSM-IV)	BAI, PPAQ new baby subscale (not reported), SAS (Social and Leisure Domain)	No significant difference  At 6 months postnatally, no women in the IPT-B groups had major depression, compared with 16 of 23 (70%) in the UC group. At 6 months postnatally, the EPDS scores indicated a response to treatment in 22 of 25 women in the IPT-B group (88%) vs. 7 of 28 (25%) in the CG with a large effect size ( $\chi^2 = 21.16$ , $df = 1$ , $p < .001$ ; Cohen's $h = 1.17$ ) <sup>170</sup>  <i>Findings suggest that enhanced IPT-B ameliorates depression during pregnancy and prevents depressive relapse and improves social functioning up to 6 months postpartum</i> <sup>170</sup>	Unclear
Usual care in the USA	4	60	BDI, SCID		Significant difference  At 3 months postnatally, none of the 17 women in the intervention group, compared with 6 of 18 women in the control group (33%) had major depression. There was a greater reduction in BDI scores in the 17 IG women than in the 18 CG women ( $t = 3.50$ , $df = 33$ ; $p = 0.001$ ). Four antenatal sessions of IPT for financially disadvantaged women appeared to prevent major PND  Significant difference	Unclear

continued

**TABLE 38** Indicated preventive interventions: characteristics and outcomes of RCTs of psychological interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
IPT-based intervention	Zlotnick, 2006 <sup>179</sup>	USA	99	Antenatal setting	Antenatal and postnatal	Group	Nurse
Mindfulness-based intervention	Vieten, 2008 <sup>121</sup>	USA	34	Antenatal setting	Antenatal	Group	Clinical psychologist, yoga instructor
Promoting parent–infant interaction	Armstrong, 1999 <sup>164</sup>	Australia	181	Home visits	Postnatal	Individually	Nurse, social worker, paediatrician
Promoting parent–infant interaction	Petrou, 2006, <sup>174</sup> Cooper, 2014 <sup>267</sup>	UK	151	Home visits	Antenatal and postnatal	Individually	Health visitor

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in the USA	5	60	BDI	RIFT	At 3 months postnatally, 2 of the 50 women in the intervention group (4%), compared with 8 of 40 women in the control group (20%), had major PND. A brief antenatal IPT-based intervention for financially disadvantaged women appeared to prevent major PND  Significant difference	Unclear
Usual care in the USA	8	120	CES-D, PANAS-X	STAI, PSS, ARM, MAAS	<i>Differences observed between treatment and wait-list controls at 3-month follow-up were not statistically significant</i> <sup>121</sup>  No significant difference	High
Usual care in Australia	6	–	EPDS score 13 or more	PSI, breastfeeding, accidental injury, Child Abuse Potential Inventory, HOME, newly-developed measure of preventive infant health care, PSQ-18, use of health services	At 6 weeks, women receiving the home-based programme had significant reduction in PND screening scores as well as improvements in their experience of the parental role and improvement in the ability to maintain their own identity. EPDS in intervention group was 5.67 (SD 4.14) vs. 7.90 (SD 5.89) comparison group; $p = 0.004$  Significant difference	Low
Usual care in the UK	2 or more	–	EPDS mean score, SCID for DSM-IV diagnoses	ASSA, BSID II MDI, BSQ	<i>The index intervention had no discernible impact on maternal mood or the quality of maternal parenting behaviours, neither did it benefit the infant outcomes assessed</i> <sup>174,267</sup>  No significant difference	Low

continued

**TABLE 38** Indicated preventive interventions: characteristics and outcomes of RCTs of psychological interventions (*continued*)

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Promoting parent–infant interaction	Wilson, 2013 <sup>177</sup>	UK	31	Antenatal setting	Antenatal	Group	Group facilitators
Psychoeducational intervention	Weidner, 2010 <sup>176</sup>	Germany	238	Antenatal setting	Antenatal	Individually	Psychologist

Key: ARM, Affect Regulation Measure; ASSA, Ainsworth Strange Situation Assessment of Infant Attachment; AWS, Adult Wellbeing Scale; BAI, Beck Anxiety Inventory; BDQ, Brief Disability Questionnaire; BSID, Bayley Scales of Infant Development; BSQ, Behaviour Screening Questionnaire; CG, control group; CGAS, Children's Global Assessment Scale; CI, confidence interval; CTS, Conflict Tactics Scale; DAS, Dyadic Adjustment Scale; df, degrees of freedom; DIS, Diagnostic Interview Schedule; DISC, Diagnostic Interview Schedule for Children-Computer Version; DSM-IV, *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition*; ETSE, Environmental Tobacco Smoke Exposure; GAFS, Global Assessment of Functioning Scale; high, high risk of bias; HOME, Home Observation for Measurement of the Environment; HDRS, Hamilton Depression Rating Scale; IG, intervention group; IRS, Interaction Rating Scale; ITP-B, Interpersonal Psychotherapy – brief; low, low risk of bias; MAAS, Mindful Attention Awareness Scale; MDD, major depressive disorder; MDE, Major Depressive Episodes; MDI, Mental Development Index; MINI, Mini International Neuropsychiatric Interview; MMS, Maternal Mood Screener; MSPSS, Multidimensional Scale for Perceived Social Support; NSSQ, Norbeck Social Support Questionnaire; OR, odds ratio; PANAS, Positive and Negative Affect Schedule; PPAQ, postpartum adjustment questionnaire; PSQ, Postpartum Support Questionnaire; RIFT, Range of Impaired Functioning Tool; SAS, Social Adjustment Scale; SCL-90-R, Symptom Checklist-90-Revised; SSI, Social Support Index; UC, usual care; unclear, unclear risk of bias.

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in the UK	6	120	EPDS mean score	AWS Salivary cortisol	For a small number of women vulnerable in pregnancy, representing a hard-to-reach population, the Mellow Bumps Group and the Chill-out in Pregnancy group both appeared to have positive effects on the women's mental health and well-being overall at 8–12 weeks postnatally  No significant difference	High
Usual care in Germany	22	–	HADS	Giessen Subjective Complaints list (physical symptoms)	<i>The psychosomatic intervention had a significant effect on anxiety scores (p=0.006), but not on depression scores, physical complaints and characteristics of labour and delivery</i> <sup>176</sup>  No significant difference	High

**TABLE 39** Indicated preventive interventions: characteristics and outcomes of RCTs of educational interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Booklet on PND	Heh, 2003 <sup>193</sup>	Taiwan	70	Postnatal setting	Postnatal	Individually	Nurse
Booklet on PND	Lara, 2010 <sup>194</sup>	Mexico	377	Antenatal setting	Antenatal	Group	Group facilitators
Booklet on PND and contact numbers	Webster, 2003 <sup>196</sup>	Australia	600	Antenatal setting	Antenatal	Individually	Leaflet (unclear)
Education on preparing for parenting	Stamp, 1995 <sup>195</sup>	Australia	144	Antenatal setting	Antenatal and postnatal	Group	Midwife

Key: CI, confidence interval; high, high risk of bias; low, low risk of bias; SCL-90, Symptom Checklist-90; unclear, unclear risk of bias.

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in Taiwan	1	60	EPDS score 10 or more (Chinese version)		At 3 months postnatally, Taiwanese women who received information at around 6 weeks postnatally, had lower EPDS scores, (mean 10.8, SD 4.4) than a control group (mean 12.1, SD 3.00) ( $p = 0.02$ )  Significant difference	High
Usual care in Mexico	8	120	BDI-II, SCID	SCL-90 anxiety subscale	At 6 months postnatally, 6 of 56 women in the intervention group (10.7%) had major depression vs. 15 of 60 women in the control group (25%), but there was no significant effect  <i>Available data are consistent with the possibility that the incidence of depression may have been reduced by the intervention, but differential attrition makes interpretation of the findings difficult<sup>194</sup></i>	High
Usual care in Australia	1	–	EPDS score 13 or more		Mixed results  <i>The proportion of women who reported an EPDS score of 13 or more was 26%. There were no significant differences between intervention (46/192, 24%) and control groups (50/177, 28.2%) on this primary outcome measure (OR 0.80; 95% CI 0.50–1.28)<sup>196</sup></i>	Unclear
Usual care in Australia	3	–	EPDS score 13 or more		No significant difference  At 6 weeks postnatally, 8 out of 64 women in the intervention group (13%) scored 13 or more on the EPDS compared with 11 out of 64 women in the control group (17%)  At 12 weeks postnatally, 7 out of 63 women in the intervention group (11%) scored 13 or more, compared with 10 out of 65 women in the control group (15%)  At 6 months postnatally, 9 out of 60 women in the intervention group (15%) scored 13 or more, compared with 6 out of 61 women in the control group (10%)  No significant difference	Low

**TABLE 40** Indicated preventive interventions: characteristics and outcomes of RCTs evaluating social support

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Peer support	Dennis, 2009 <sup>205</sup>	Canada	701	Telephone	Postnatal	Individually	Peer volunteers
Peer support	Harris, 2006 <sup>206</sup>	UK	65	Home visits	Antenatal and postnatal	Individually	Newpin volunteer

Key: high, high risk of bias; low, low risk of bias; SCAN PSE, Schedule for Clinical Assessment in Neuropsychiatry Present State Examination; UCLA, University of California, Los Angeles; unclear, unclear risk of bias. Statistically significant difference is assumed at the conventional value of < 0.05.

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in Canada	8	–	EPDS score 13 or more, SCID	STAI, UCLA loneliness scale	At 12 weeks postnatally, 40 out of 297 women in the intervention group (14%) scored 13 or more on the EPDS compared with 78 out of 315 women in the control group (25%) ( $\chi^2 = 12.5$ ; $p < 0.001$ ). The number needed to treat was 8.8 (95% CI 5.9 to 19.6). The relative risk reduction was 0.46 (95% CI 0.24 to 0.62)  Significant difference	Low
Usual care in the UK	2 or more	–	SCAN, PSE	–	The onset of perinatal major depression was 27% (8/30) for the Newpin befriender group and 54% (19/35) for the control group ( $\chi^2 = 4.00$ , $p = 0.045$ , two-tailed test) <sup>206</sup>  Significant difference	Unclear

### **Description and findings from qualitative studies of indicated preventive interventions of social support**

Two qualitative studies of social support interventions were included in the indicated preventive interventions category,<sup>299,301</sup> one relating to women's perceptions and one relating to service provider perceptions of the same intervention. Further details are provided in *Table 41*.

#### **Findings from the qualitative review**

##### **Support**

Emotional support, informational support and the development of relationships with peers were reported by participants as beneficial aspects of the telephone support intervention.<sup>299</sup>

##### **Service delivery**

Service providers<sup>301</sup> were concerned that the intervention represented an invasion of the recipients' privacy and also that they would not be able to deal with unpredictable situations for which they were not qualified. One peer volunteer<sup>301</sup> reported that providing the service had resulted in the recurrence of her own past emotions and anxieties. Peer volunteers felt uncomfortable discussing emotional issues with the recipients. Some felt they would have benefited from further training, supervision and information to share with the service users. The peer volunteers reported that they would have liked more time to devote to the role.<sup>301</sup>

### **Indicated preventive interventions: pharmacological agents or supplements**

#### **Characteristics and main outcomes of randomised controlled trials of indicated preventive interventions of pharmacological agents or supplements**

All three included studies<sup>214-216</sup> evaluating pharmacological agents or supplements for the indicated prevention of PND were conducted in the USA. Four types of pharmacological agents or supplements were identified: eicosapentaenoic acid (EPA) plus DHA,<sup>214</sup> nortriptyline<sup>273</sup> and sertraline.<sup>216</sup> One study was undertaken in the antenatal period only<sup>214</sup> and two studies were undertaken in the postnatal period only.<sup>215,216</sup> A summary of the characteristics and main outcomes is provided in *Table 42*.

There were no qualitative studies of indicated preventive interventions of pharmacological agents or supplements.

### **Indicated preventive interventions: midwifery-led interventions**

#### **Characteristics and main outcomes of randomised controlled trials of indicated preventive interventions of midwifery-led interventions**

There was one indicated preventive intervention evaluating midwifery-led interventions, conducted in the UK.<sup>224</sup> A summary of the characteristics and main outcomes is provided in *Table 43*.

There were no qualitative studies of indicated preventive interventions of midwifery-led interventions.

**TABLE 41** Qualitative studies of indicated preventive interventions: characteristics of studies evaluating social support

First author, year, reference number	Intervention details			Delivered Antenatal/postnatal	Group/individual	Number of sessions	Duration of session	Facilitator/service providers
	Country	Name	Setting					
Dennis, 2009 <sup>205</sup>	Canada	Telephone-based peer support	Telephone support	Postnatal	Individual	Mean contacts 8.8 (SD 6 contacts)	Mean length of contact 14.1 minutes (SD 18.5 minutes), range 1–180 minutes	Peer volunteers – mothers from the community with resolved history of PND who participated in a 4-hour training session

Key: NA, not applicable.

**TABLE 42** Indicated preventive interventions: characteristics and outcomes of RCTs evaluating pharmacological interventions or supplements

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
EPA and DHA	Mozurkewich, 2013 <sup>214</sup>	USA	126	Antenatal setting	Antenatal	Individually	Prescriber
Nortriptyline	Wisner, 2001 <sup>215</sup>	USA	51	Postnatal setting	Postnatal	Individually	Prescriber
Sertraline	Wisner, 2004 <sup>216</sup>	USA	25	Postnatal setting	Postnatal	Individually	Prescriber

Key: BRMS, Bech–Rafaelsen Mania Scale; HAM-D, Hamilton Rating Scale for Depression; HDRS, Hamilton Depression Rating Scale; high, high risk of bias; low, low risk of bias; MINI, Mini International Neuropsychiatric Interview; unclear, unclear risk of bias.

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Usual care in the USA	2 or more	–	BDI, MINI	–	<p><i>No differences between groups in BDI scores or other depression endpoints at any of the three time points after supplementation<sup>214</sup></i></p> <p><i>EPA-rich fish oil and DHA-rich fish oil supplementation did not prevent depressive symptoms during pregnancy or postpartum<sup>214</sup></i></p> <p>No significant difference</p>	Low
Usual care in the USA	2 or more	–	HDRS (HAM-D)	BRMS	<p>6 out of the 26 women in the nortriptyline intervention group (23%) compared with 6 out of the 25 women in the control group (24%) had a postnatal recurrence of depression</p> <p>No significant difference</p>	Low
Usual care in the USA	2 or more	–	HDRS, SCID	Asberg Side Effects rating	<p><i>Recurrences in the 17-week preventive treatment period occurred in four of the eight women taking placebo (proportion, 0.50; 95% CI, 0.16–0.84) and in one of the 14 women taking sertraline (proportion, 0.07, 95% CI, 0.00–0.34) (<math>p = 0.04</math>, Fisher's exact test)<sup>216</sup></i></p> <p>Significant difference</p>	Low

**TABLE 43** Indicated preventive interventions: characteristics and outcomes of RCTs evaluating midwifery-led interventions

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider	Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Midwifery continuous care	Marks, 2003 <sup>24</sup>	UK	98	Antenatal setting	Antenatal and postnatal	Individually	Midwife	Usual care in the UK	22	NR	EPDS mean score, SCID	CAME, MSQ	At 3 months postnatally, the EPDS mean score for the 43 women in the control group was 7.49 (SD 5.33) and for the 42 women in the intervention group was 7.48 (SD 6.54)	Unclear

Key: CAME, Contextual Assessment of Maternity Experience; MSQ, Maternity Service Questionnaire; NR, not reported; unclear, unclear risk of bias.

## Indicated preventive interventions: organisation of maternity care

### *Characteristics and main outcomes of randomised controlled trials of indicated preventive interventions of organisation of maternity care*

No indicated preventive intervention for preventing PND was identified concerning the organisation of maternity care.

### *Description and findings of qualitative studies of selective preventive interventions of the organisation of maternity care*

One qualitative study of an intervention evaluating the organisation of maternity care was included in the indicated preventive intervention category.<sup>300</sup> Further details are provided in *Table 44*.

### Support

Recipients of the intervention<sup>300</sup> reported the support they received from the health professionals delivering the service as helpful and the relationship with the service provider appeared to be of great importance. Women reported that they were able to rely on the service and that if they needed the service urgently it was available to them:

*... the service was closing and I just rang up and was like 'I really need some help', and they called me straight back the next day ... (M)y clinical nurse ... immediately started seeing me within a week because they ... could see how desperate I was for some help ...*

*Participant*<sup>300</sup>

They also valued a close relationship they were able to form with their clinician and reported on their kind approach which enabled a feeling of safety.<sup>300</sup>

### Empowerment (self-esteem)

The authors reported that the women learned to cope without the service, and that it allowed them to gain confidence in themselves.<sup>300</sup>

### Service delivery and barriers to participation

Women reported feeling intimidated by the thought of referral to the specialist perinatal and infant mental health service.<sup>300</sup> The authors reported that those who did feel able to access the service fully said that they would have liked the service to be extended beyond the infant's first birthday and felt that they were not ready to be discharged, which caused them stress and anxiety.<sup>300</sup>

TABLE 44 Qualitative studies of indicated preventive interventions: characteristics of studies evaluating organisation of maternity care

First author, year, reference number	Intervention details								
	Country	Name	Setting	Delivered antenatal/postnatal	Group/individual	Numbers in group	Number of sessions	Duration of session	Facilitator/service providers
Myors, 2014 <sup>300</sup>	Australia	Specialist perinatal and infant mental health service	Secondary care – location not reported	Antenatal and postnatal	Individual	NA	Multiple contact	NA	Nurse, psychiatrist, psychologist, social workers

Key: NA, not applicable.

## Indicated preventive interventions: complementary and alternative medicine or other interventions

### *Characteristics and main outcomes of randomised controlled trials of indicated preventive interventions of complementary and alternative medicine or other interventions*

The only included study evaluating CAMs or other interventions for the indicated prevention of PND was conducted in the USA.<sup>229</sup> A summary of the characteristics and main outcomes is provided in *Table 45*.

There were no qualitative studies of indicated preventive interventions of CAM or other interventions.

## Results from network meta-analysis for indicated preventive interventions for Edinburgh Postnatal Depression Scale threshold score

Of the indicated preventive intervention trials, 12 were included in the NMA (see *Appendix 10, Table of indicated preventive intervention studies omitted from network meta-analysis*). Four trials were excluded because they could not be connected to the main network of evidence<sup>148,177,229</sup> and 12 were excluded as a result of lack of available EPDS data.<sup>121,166,167,171,172,176,178,179,206,214–216</sup>

The four trials excluded because they could not be connected to the main network were undertaken in China (Hong Kong),<sup>175</sup> Mexico,<sup>194</sup> Pakistan<sup>148</sup> and Taiwan.<sup>193</sup>

Of the 14 trials excluded as a result of lack of available EPDS data, four were at high risk of bias and none of these were associated with significant differences in depression.<sup>121,172,176,177</sup> The UK-based trial was small ( $n = 31$ ) and the results suggested that psychoeducational interventions in pregnancy may benefit women with major psychosocial needs.<sup>177</sup>

Of the 14 trials excluded as a result of lack of available EPDS data, six were at unclear risk of bias.<sup>166,171,178,179,206,229</sup> Five of these trials were small, with fewer than 100 participants.<sup>166,178,179,206,229</sup> The largest of these trials, with 217 participants, concluded 'A CBT intervention for low-income, high-risk Latinas reduced depressive symptoms during pregnancy but not during the postpartum period'.<sup>171</sup> Two of the three trials examining IPT-based intervention found a significant effect using the BDI or DSM-IV [*Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM-IV)*] criteria,<sup>178,179</sup> but the other did not.<sup>166</sup> In the active acupuncture study there were only 20 participants in each group<sup>229</sup> and the UK-based Newpin trial found a significant reduction in the onset of perinatal major depression using the Schedule for Clinical Assessment in Neuropsychiatry (SCAN).<sup>206</sup>

One of the four trials at low risk of bias found that EPA- and DHA-rich fish oil supplementation did not prevent depressive symptoms.<sup>214</sup> No difference was found in the rate of recurrence in women treated with nortriptyline compared with those treated with placebo.<sup>215</sup> There were significantly fewer recurrences of depression in women taking sertraline preventive treatment compared with women taking placebo.<sup>216</sup> A CBT-based intervention that integrated multiple risk interventions, delivered mainly during pregnancy, had a non-significant effect in reducing risks for smoking, depression and intimate partner violence, but there was a difference in favour of the intervention group.<sup>167</sup>

**TABLE 45** Indicated preventive interventions: characteristics and outcomes of RCTs evaluating CAM or other

Intervention summary	First author, year, reference number	Country	Total number of women randomised	Place	Timing	Type of session	Provider
Acupuncture for depression	Manber, 2004 <sup>229</sup>	USA	61	Antenatal setting	Antenatal and postnatal	Individually	Acupuncture specialist

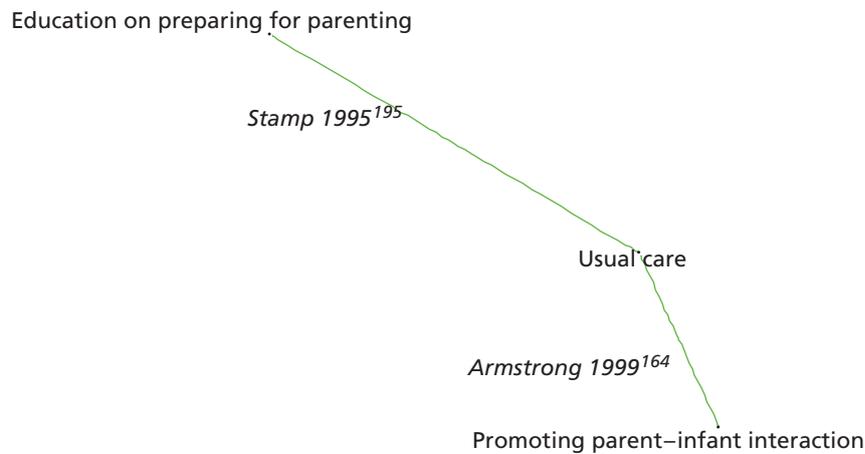
Key: BDI, Beck Depression Inventory; HDRS, Hamilton Depression Rating Scale; high, high risk of bias; low, low risk of bias; unclear, unclear risk of bias.

Comparison group(s)	Number of contacts	Duration of contact (minutes)	Depression outcomes	Other outcomes	Main findings	Overall risk of bias
Acupuncture non-specific	12	30	BDI, HDRS	–	At 10 weeks postnatally, the mean BDI score in the 16 women in the acupuncture group was 6.9 (SD 7.7). In the 19 women in the active control it was 10.8 (SD 9.8) and in the 19 women in the massage group it was 10.2 (SD 6.6). There was no pure control  Limited by small sample	Unclear

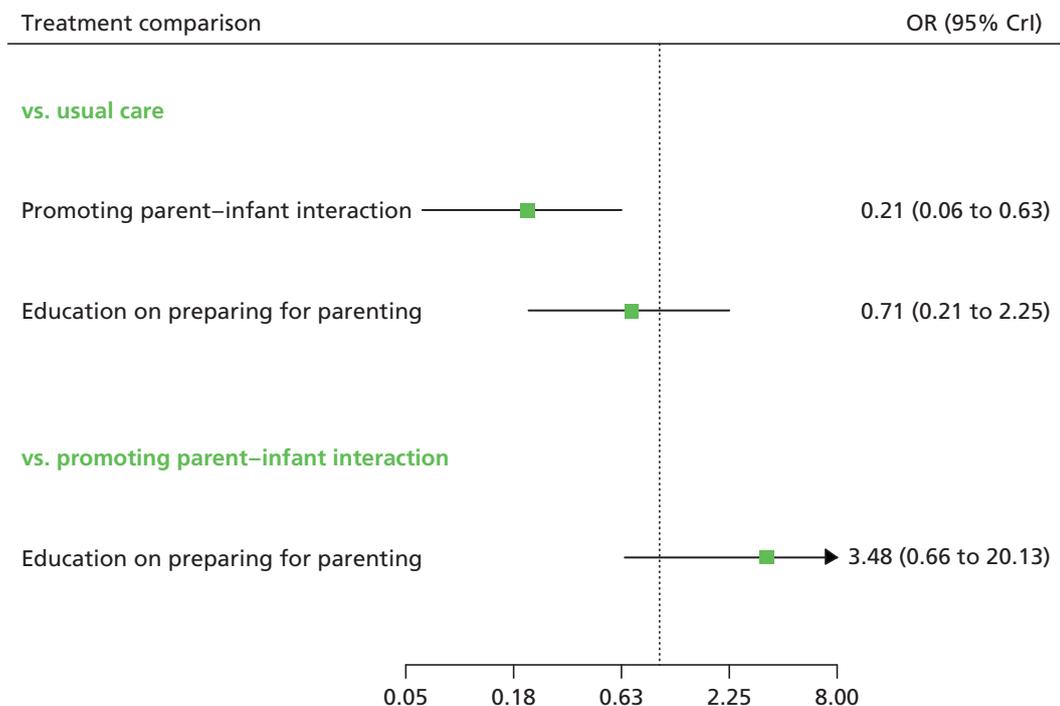
**Results from network meta-analysis for indicated preventive intervention for Edinburgh Postnatal Depression Scale threshold scores at 6 weeks postnatally**

A NMA was used to compare the effects of education on preparing for parenting and promoting parent–infant interaction relative to usual care on EPDS threshold. Data were available from two studies comparing three interventions.<sup>166,197</sup> Figure 38 presents the network of evidence. There were two intervention effects to estimate from two studies.

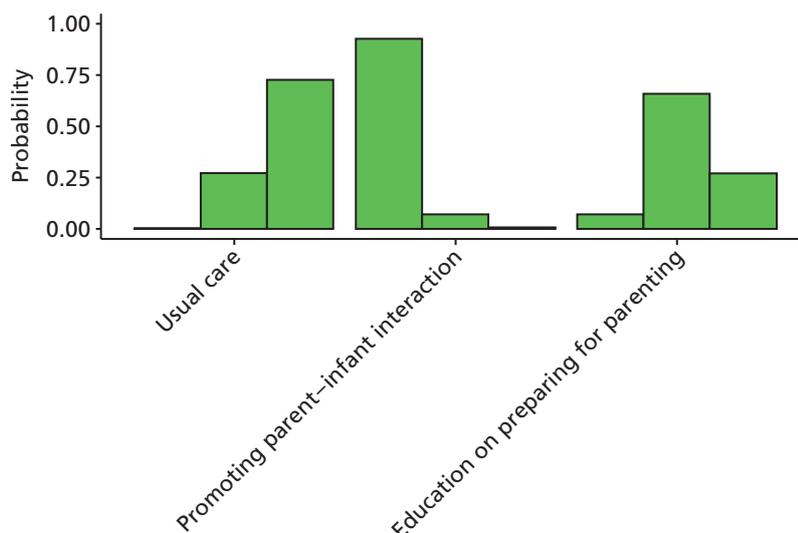
Figure 39 presents the odds ratios of each intervention relative to usual care and Figure 40 presents the probabilities of treatment rankings. The total residual deviance was 4.12, compared with the total number of data points, four, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.23 (95% CrI 0.01 to 0.74), which implies mild heterogeneity of intervention effects between studies.



**FIGURE 38** Indicated preventive interventions EPDS threshold score at 6 weeks postnatally: network of evidence.



**FIGURE 39** Indicated preventive interventions EPDS threshold score at 6 weeks postnatally: odds ratios all treatment comparisons.



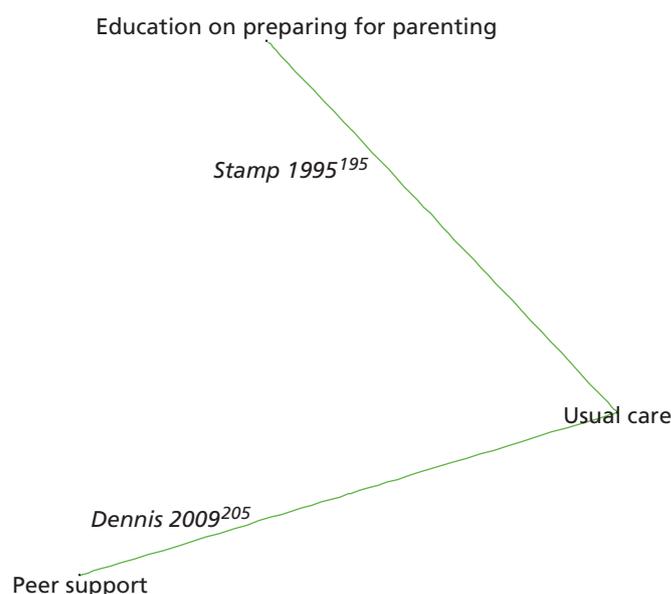
**FIGURE 40** Indicated preventive interventions EPDS threshold score at 6 weeks postnatally: probability of treatment rankings (ranks 1–5).

Promoting parent–infant interaction and education on preparing for parenting reduced the odds of high EPDS scores compared with usual care, although the effect was statistically significant only for promoting parent–infant interaction at a conventional 5% level (see *Figure 39*).

Promoting parent–infant interaction had the highest probability of being the best (probability 0.84) (see *Figure 40*).

### **Results from network meta-analysis for indicated preventive intervention for Edinburgh Postnatal Depression Scale threshold scores at 3 months postnatally**

A NMA was used to compare the effects of peer support and education on preparing for parenting relative to usual care on EPDS threshold. Data were available from two studies comparing three interventions.<sup>197,207</sup> *Figure 41* presents the network of evidence. There were two intervention effects to estimate from three studies.



**FIGURE 41** Indicated preventive interventions EPDS threshold score at 3 months postnatally: network of evidence.

Figure 42 presents the odds ratios of each intervention relative to usual care and Figure 43 presents the probabilities of treatment rankings. The total residual deviance was 4.05, compared with the total number of data points, four, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.21 (95% CrI 0.01 to 0.72), which implies mild heterogeneity of intervention effects between studies.

Both peer support and education on preparing for parenting have reduced odds of high EPDS scores compared with usual care. However, the effects were not statistically significant at a conventional 5% level (see Figure 42). Peer support has the highest probability of being the best (probability 0.69) (see Figure 43).

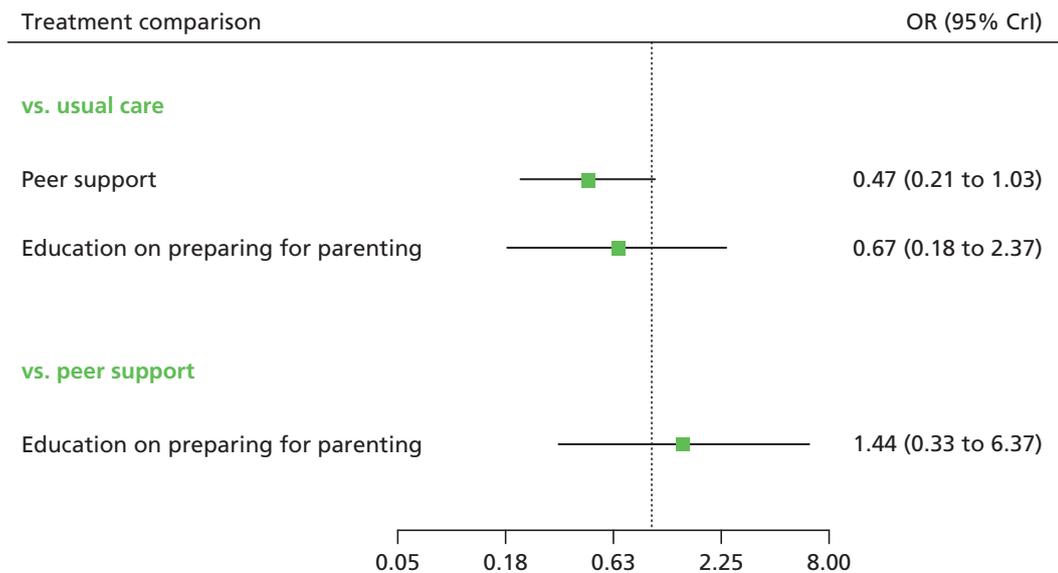


FIGURE 42 Indicated preventive interventions EPDS threshold score at 3 months postnatally: odds ratios all treatment comparisons.

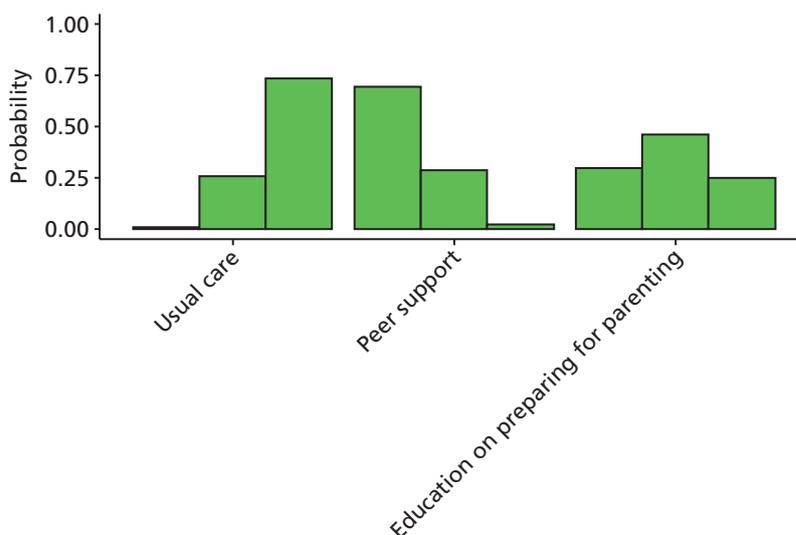
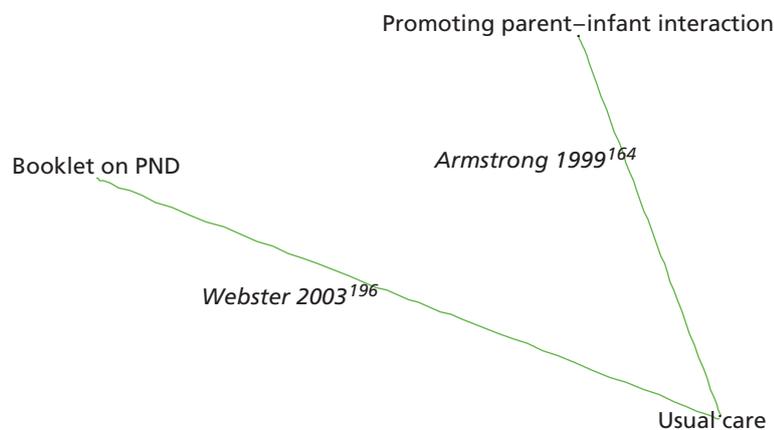


FIGURE 43 Indicated preventive interventions EPDS threshold score at 3 months postnatally: probability of treatment rankings.

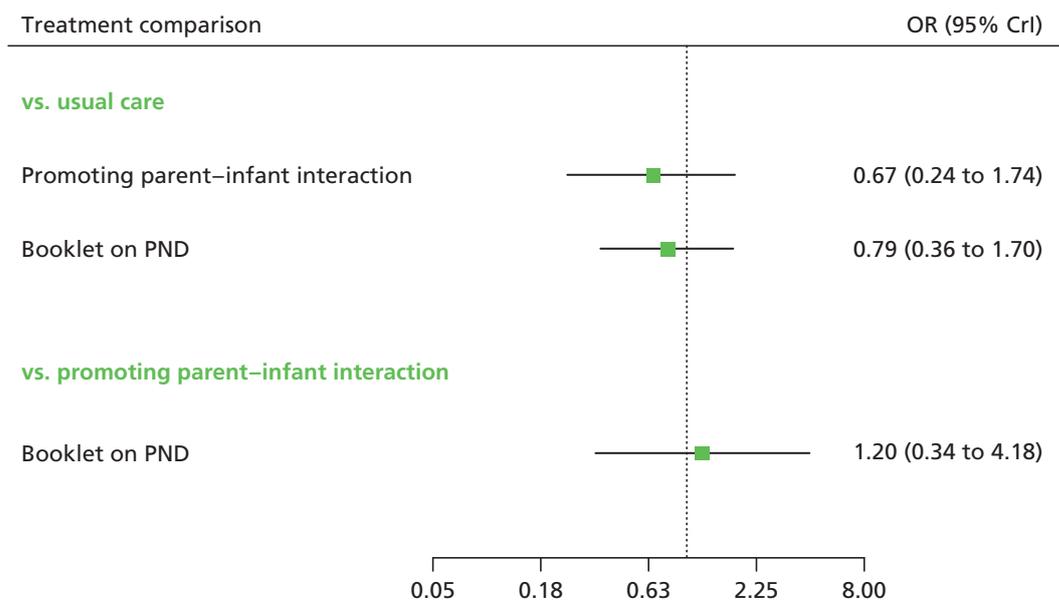
### Results from network meta-analysis for indicated preventive intervention for Edinburgh Postnatal Depression Scale threshold scores at 4 months postnatally

A NMA was used to compare the effects of booklets on PND and promoting parent–infant interaction relative to usual care on EPDS threshold. Data were available from two studies comparing three interventions.<sup>166,198</sup> *Figure 44* presents the network of evidence. There were two intervention effects to estimate from two studies.

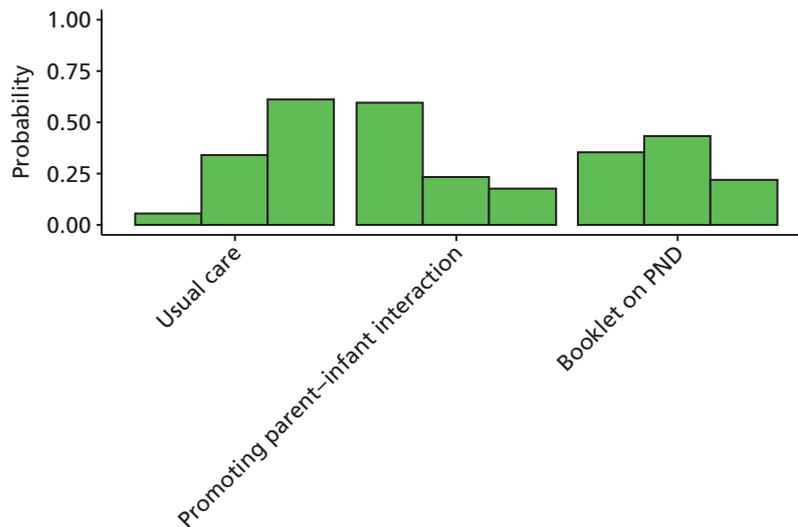
*Figure 45* presents the odds ratios of each intervention relative to usual care and *Figure 46* presents the probabilities of treatment rankings. The total residual deviance was 3.97, compared with the total number of data points, four, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.22 (95% CrI 0.01 to 0.70), which implies mild heterogeneity of intervention effects between studies.



**FIGURE 44** Indicated preventive interventions EPDS threshold score at 4 months postnatally: network of evidence.



**FIGURE 45** Indicated preventive interventions EPDS threshold score at 4 months postnatally: odds ratios all treatment comparisons.

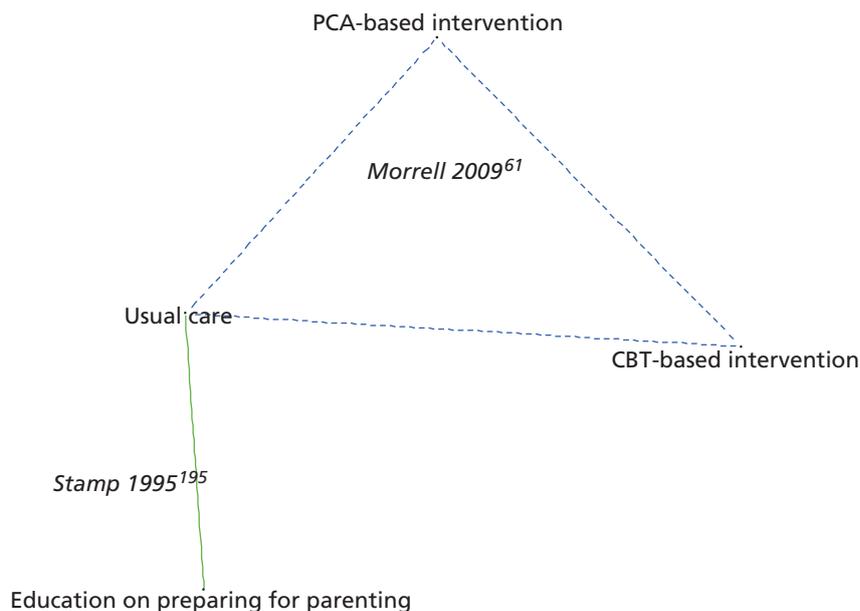


**FIGURE 46** Indicated preventive interventions EPDS threshold score at 4 months postnatally: probability of treatment rankings (ranks 1–3).

The odds ratio for both promoting parent–infant interaction and booklet on PND was less than 1, suggesting a beneficial effect compared with usual care, although the results were not statistically significant at a conventional 5% level (see *Figure 45*). Promoting parent–infant interaction has the highest probability of being the best (probability 0.60) (see *Figure 46*).

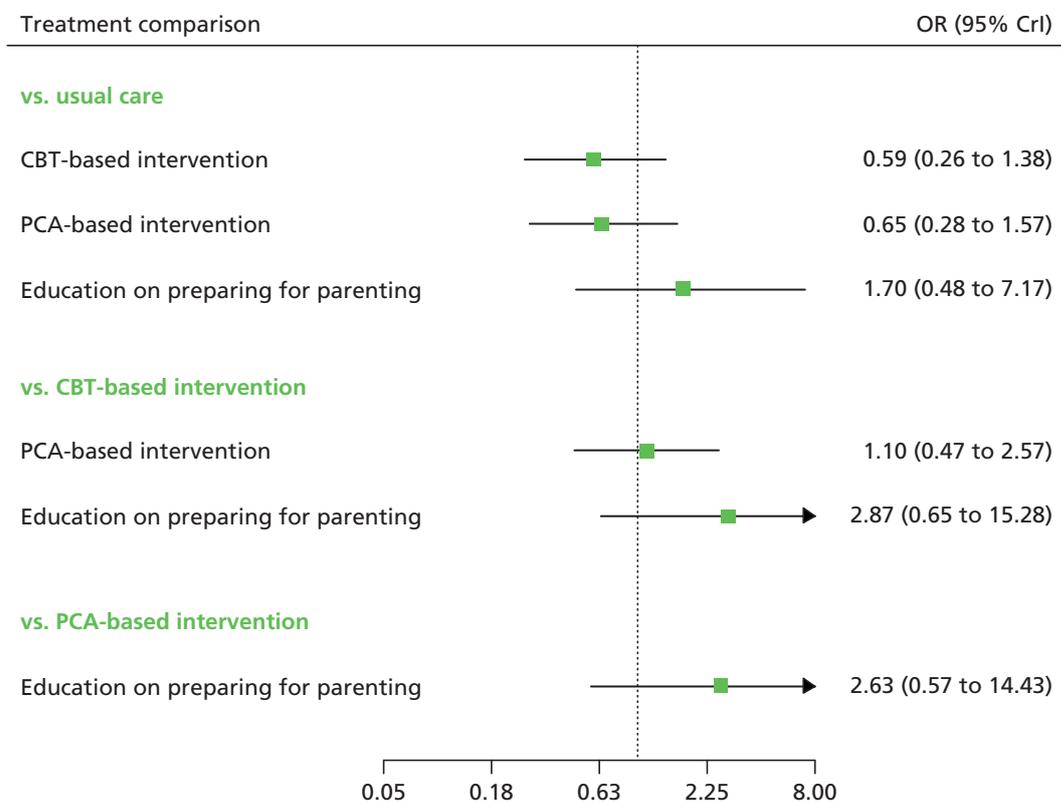
**Results from network meta-analysis for indicated preventive intervention for Edinburgh Postnatal Depression Scale threshold scores at 6 months postnatally**

A NMA was used to compare the effects of CBT-based intervention, PCA-based intervention and education on preparing for parenting relative to usual care on EPDS threshold. Data were available from two studies comparing four interventions.<sup>61,197</sup> *Figure 47* presents the network of evidence. There were three intervention effects to estimate from two studies.

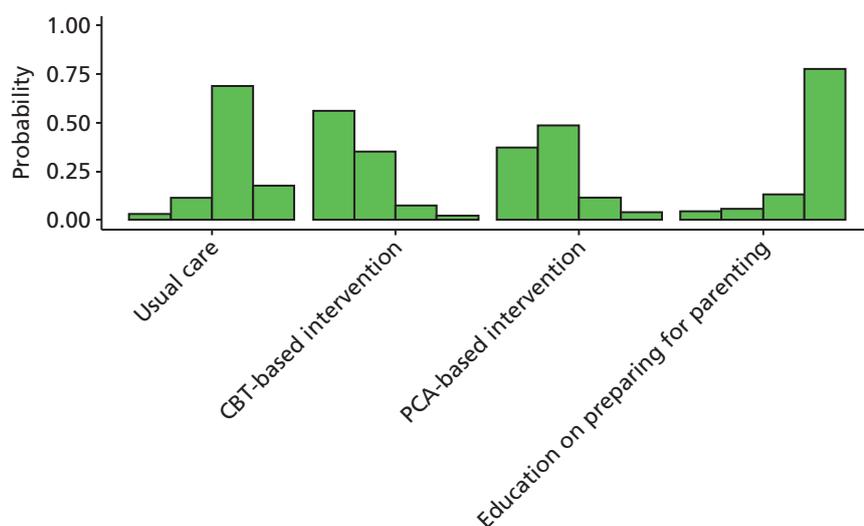


**FIGURE 47** Indicated preventive interventions EPDS threshold score at 6 months postnatally: network of evidence.

Figure 48 presents the odds ratios of each intervention relative to usual care and Figure 49 presents the probabilities of treatment rankings. The total residual deviance was 4.12, compared with four data points, included in the analysis. This implies a good fit of the model to the data. The between-study SD was estimated to be 0.22 (95% CrI 0.01 to 0.73), which implies mild heterogeneity of intervention effects between studies.



**FIGURE 48** Indicated preventive interventions EPDS threshold score at 6 months postnatally: odds ratios all treatment comparisons.



**FIGURE 49** Indicated preventive interventions EPDS threshold score at 6 months postnatally: probability of treatment rankings (ranks 1–4).

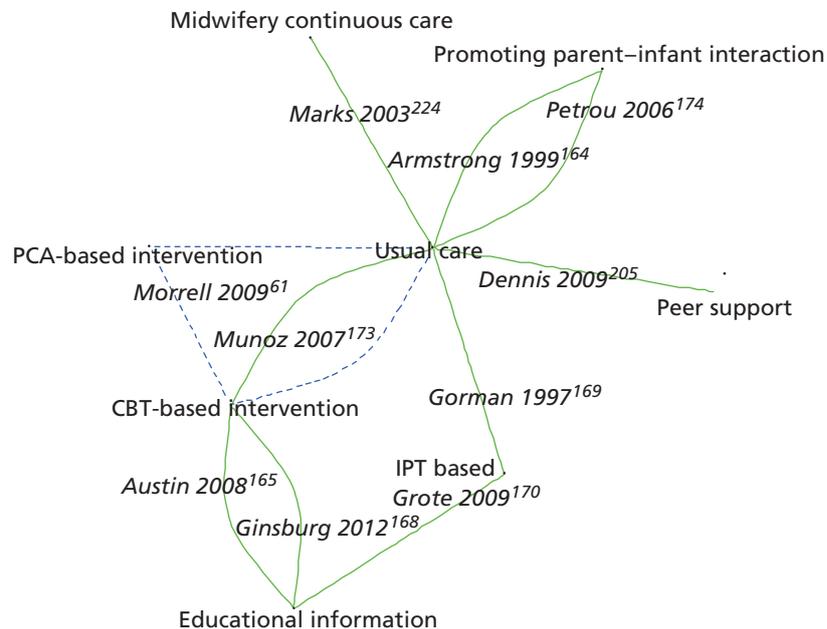
The CBT- and PCA-based interventions had reduced odds of high EPDS scores compared with usual care. Education on preparing for parenting had an increased odds of a high EPDS score at 6 months compared with usual care. However, none of the odds ratios were statistically significant at a conventional 5% level (see *Figure 48*). The CBT-based intervention has the highest probability of being the best (probability 0.56) (see *Figure 49*).

### Summary of results from network meta-analysis for indicated preventive intervention for Edinburgh Postnatal Depression Scale threshold scores

In general, the intervention effects were inconclusive, although promoting parent–infant interaction was associated with a statistically significant benefit at 6 weeks. Intervention effects tended to vary over time, with the most beneficial treatments being promoting parent–infant interaction at 6 weeks, peer support at 3 months, promoting parent–infant interaction at 4 months, and CBT- and PCA-based interventions at 6 months.

### Results from network meta-analysis for indicated preventive intervention for Edinburgh Postnatal Depression Scale mean scores

A NMA was used to compare the effects CBT-based intervention, educational information, IPT-based intervention, midwifery continuous care, peer support, PCA-based intervention and promoting parent–infant interaction relative to usual care on EPDS mean scores. Data were available from 10 studies comparing eight interventions.<sup>61,166,167,170–172,175,176,207,226</sup> There were seven intervention effects to estimate (relative to usual care) from 10 studies. *Figure 50* presents the network of evidence.



**FIGURE 50** Indicated preventive interventions for EPDS mean scores: network of evidence. Dashed lines represent three-arm trials.

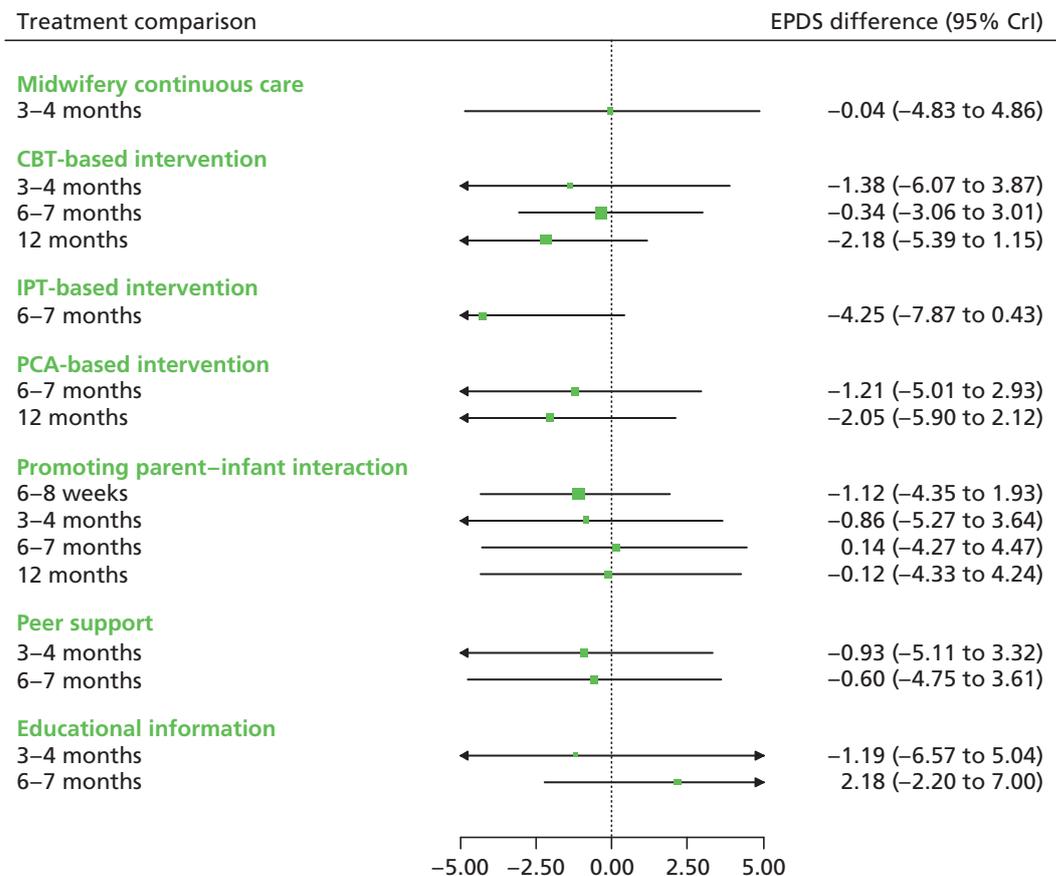
Figure 51 presents the differences in EPDS mean scores of each intervention relative to usual care. The between-study SD was estimated to be 1.95 (95% CrI 0.69 to 3.55), which implies moderate heterogeneity of intervention effects between studies. However, there is considerable uncertainty about the between-study SD because of the relatively small number of studies that provided data relative to the number of intervention effects being estimated. The interventions associated with the greatest reduction in EPDS mean score were IPT-based intervention (−4.25, 95% CrI −7.87 to 0.43 at 6–7 months), CBT-based intervention (−2.18, 95% CrI −5.39 to 1.15 at 12 months) and PCA-based intervention (−2.05, 95% CrI −5.90 to 2.12 at 12 months). None of the comparisons with usual care were statistically significant at a conventional 5% level. Figures 52–55 present the probabilities of treatment rankings at 6–8 weeks, 3–4 months, 6–7 months and 12 months, respectively.

The interventions with the highest probabilities of being the best at 6–8 weeks were the IPT-based intervention and promoting parent–infant interaction (probability 0.60 and 0.32, respectively).

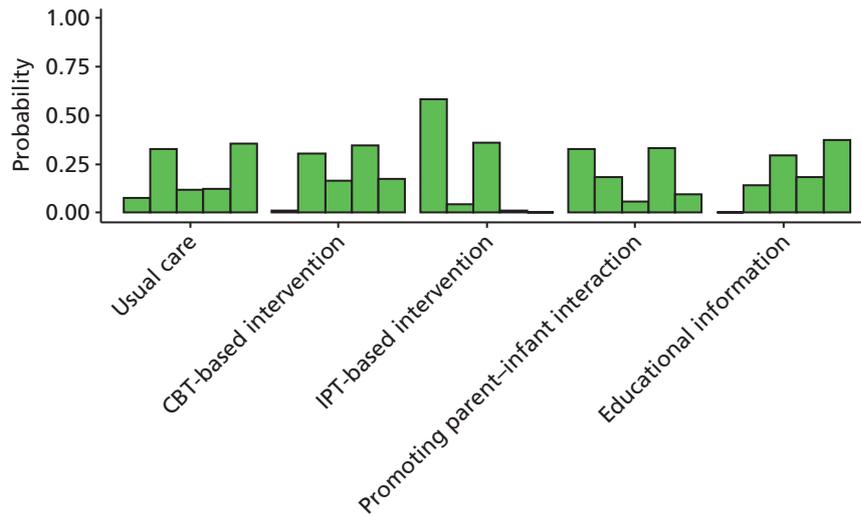
The interventions with the highest probabilities of being the best at 3–4 months were educational information (probability 0.24), CBT-based intervention (probability 0.21), promoting parent–infant interaction (probability 0.20) and peer support (probability 0.20).

The intervention with the highest probability of being the best at 6–7 months was IPT-based intervention (probability 0.77).

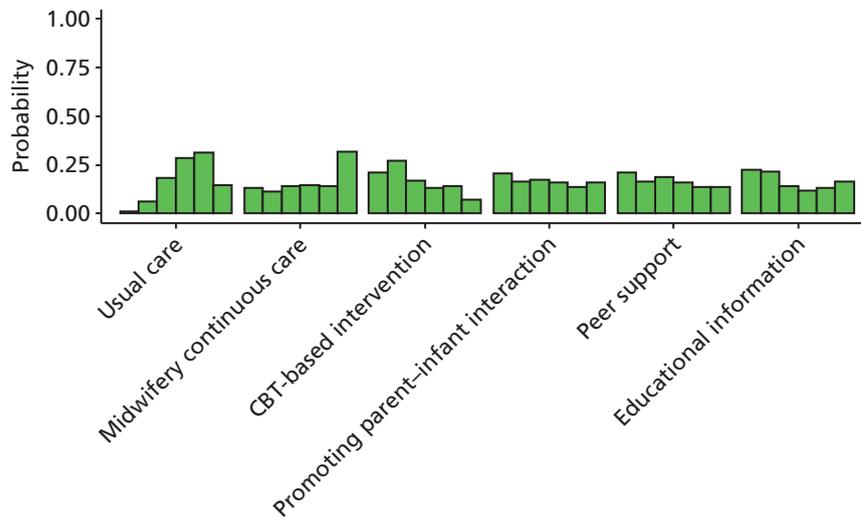
The interventions with the highest probabilities of being the best at 12 months were CBT- and PCA-based interventions (probability 0.43 and 0.41, respectively).



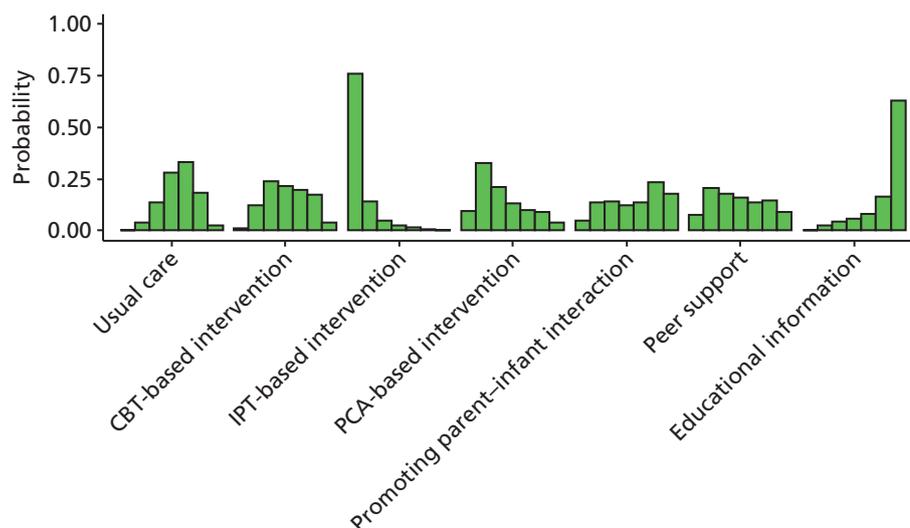
**FIGURE 51** Indicated preventive interventions EPDS mean scores: mean differences of treatment comparisons vs. usual care across all time points.



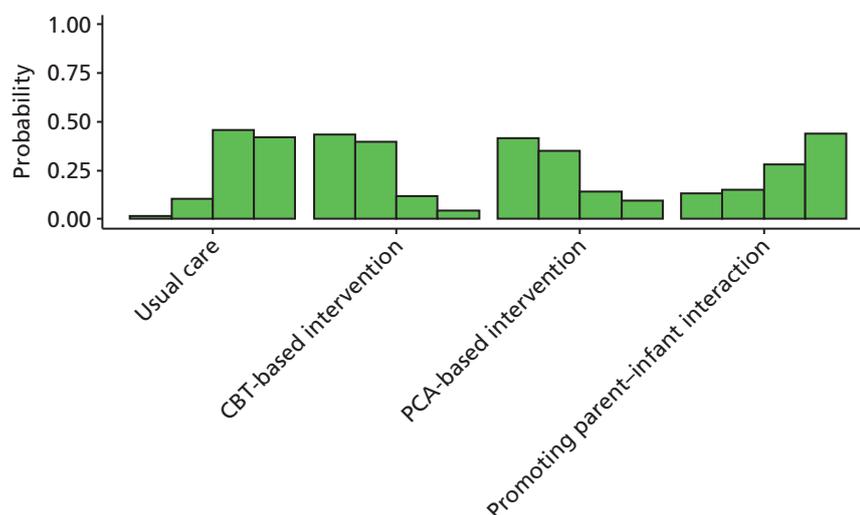
**FIGURE 52** Indicated preventive interventions EPDS mean scores: probability of treatment rankings at 6–8 weeks postnatally (ranks 1–5).



**FIGURE 53** Indicated preventive interventions EPDS mean scores: probability of treatment rankings at 3–4 months postnatally (ranks 1–6).



**FIGURE 54** Indicated preventive interventions EPDS mean scores: probability of treatment rankings at 6–7 months postnatally (ranks 1–7).



**FIGURE 55** Indicated preventive interventions EPDS mean scores: probability of treatment rankings at 12 months postnatally (ranks 1–4).

### Summary of results from network meta-analysis for indicated preventive intervention for Edinburgh Postnatal Depression Scale mean scores

Not all interventions provided information about intervention effects at each time, making inferences across all treatments at each time difficult. In general, the intervention effects were inconclusive and the CrIs were wide. The most beneficial treatments appeared to be IPT-based intervention, educational information, CBT-based intervention and PCA-based intervention. A summary of the results for the threshold and the EPDS mean scores is presented in *Table 46*.

The qualitative evidence suggested that the social support intervention adequately provided emotional and informational support to women. Women reported that they felt able to rely on a perinatal and infant mental health service if they needed to access them urgently and appreciated the support of the health professionals delivering the service. However, barriers to accessing the service included a feeling of intimidation around being referred to such a service, stigma and concerns about being discharged before they felt ready.

**TABLE 46** Indicated preventive interventions NMAs: overall summary of main effects of interventions relative to usual care

Time postnatally	EPDS mean score		EPDS threshold score		Overall risk of bias
	Difference in mean (95% CrI)	Probability of being the best <sup>a</sup>	Odds ratio (95% CrI)	Probability of being the best <sup>a</sup>	
<b>6 weeks postnatally</b>					
Promoting parent–infant interaction <sup>164</sup>	–1.12 (–4.35 to 1.93)	0.60 <sup>b</sup>	0.21 (0.06 to 0.63)	0.84 <sup>c</sup>	Low
<b>3 months postnatally</b>					
CBT-based intervention <sup>173</sup>	–1.38 (–6.07 to 3.87)	0.21 <sup>d</sup>	NE	NE	Unclear
Educational information <sup>168</sup>	–1.19 (–6.57 to 5.04)	0.24 <sup>d</sup>	NE	NE	Unclear
Peer support <sup>205</sup>	–0.93 (–5.11 to 3.32)	0.20 <sup>d</sup>	0.47 (0.21 to 1.03)	0.69 <sup>c</sup>	Low
Education on preparing for parenting <sup>195</sup>	NE	NE	0.67 (0.18 to 2.37)	0.30 <sup>c</sup>	Low
Promoting parent–infant interaction <sup>164</sup>	–0.86 (–5.27 to 3.64)	0.20 <sup>d</sup>	NE	NE	Low
<b>4 months postnatally</b>					
Promoting parent–infant interaction <sup>164</sup>	NE	NE	0.67 (0.24 to 1.74)	0.60 <sup>c</sup>	Low
<b>6 months postnatally</b>					
IPT-based intervention <sup>169,170</sup>	–4.25 (–7.87 to 0.43)	0.77 <sup>e</sup>	NE	NE	Unclear
PCA-based intervention <sup>61</sup>	–1.21 (–5.01 to 2.93)	0.10 <sup>e</sup>	0.65 (0.28 to 1.57)	0.37 <sup>f</sup>	Low
CBT-based intervention <sup>61</sup>	–0.34 (–3.06 to 3.01)	0.01 <sup>e</sup>	0.59 (0.26 to 1.38)	0.56 <sup>f</sup>	Low
<b>12 months postnatally</b>					
PCA-based intervention <sup>61</sup>	–2.05 (–5.90 to 2.12)	0.41 <sup>f</sup>	NE	NE	Low
CBT-based intervention <sup>61,173</sup>	–2.18 (–5.39 to 1.15)	0.43 <sup>f</sup>	NE	NE	Low; unclear <sup>g</sup>

Key: high, high risk of bias; low, low risk of bias; NE, not evaluable; unclear, unclear risk of bias.  
a Probability of being the best among interventions with evaluable data at each assessment.  
b Best among two interventions.  
c Best among three interventions.  
d Best among six interventions.  
e Best among seven interventions.  
f Best among four interventions.  
g Where there were two studies, the risk of bias is indicated in the order in which the studies are cited.  
For difference in mean < –0.75 or odds ratio < 0.70. Not evaluable data were data not available on this outcome measure for this intervention.

# Chapter 8 Results of realist synthesis: what works for whom?

## Introduction to Best Fit Realist Synthesis

Having characterised the principal seven classes of intervention and having identified focal interventions from among the group- and individual-based approaches, the team sought to examine the main service models for prevention of PND in relation to the underlying programme theory and mechanisms.

## Results of the review

The 'Best Fit Realist Review' engaged with 96 studies relating to 13 separate intervention programmes.<sup>7,8,42–44,61,146,148,151,152,154,160,163,164,166,170,178,179,184,190,205,206,208,219,221,222,224,236,251,252,262,264,277–340</sup> CenteringPregnancy was the most represented in the literature (with 22 studies).<sup>61,146,148,151,154,164,170,179,190,205,208,219,221,251,252,262,264,327,335–338</sup> Next came telephone peer support and IPT plus telephone (nine studies each), followed by midwifery redesigned postnatal care (eight). Then followed IPT-brief (seven), midwife-managed care (seven), midwife-led brief counselling (six), the Newpin Project (six), Health Visitor PoNDER Training (six), Thinking Healthy Programme (five) and the two-step behavioural educational intervention (five). Finally home-based intervention and IPT plus Reach Out, Stand strong, Essentials for new mothers (ROSE) were both covered by three studies.

Eleven trials were from the effectiveness review, 25 of the studies represented the views of women receiving an intervention and five represented the views of service providers. One study collected the views of both women and service providers. Two represented a cost study or economic evaluation. One study collected measures of women's satisfaction and costs.<sup>339</sup> Eleven studies were either reviews or evidence syntheses. The remaining 40 studies were study reports but were not RCTs, qualitative studies or economic evaluations. Eight of the qualitative studies were already included in the qualitative synthesis of intervention studies. (See *Appendix 9*.)

## Synthesis drawing upon realist approaches

The realist review began by engaging with the spreadsheet-based matrices of intervention classes and their relative effectiveness and with the qualitative synthesis of intervention study findings. The dearth of qualitative intervention studies further required that the realist synthesis engage with wider qualitative data from beyond the group of intervention studies. These studies are characterised from here onwards as PSSS studies. Such studies identify strategies, used by women who had not experienced PND, that they believe helped to prevent the condition. Although such data must be treated with caution, given that they reflect women's anticipation of a hypothetical situation, the team believed that this perspective would provide a counterpoint to interventions in which content and delivery had been primarily devised by health professionals. The PSSS studies allow comparison between what women feel is helpful and what is actually being delivered by the interventions themselves.

## Description of included personal and social support strategy studies

In total, 23 studies ( $n = 29$  citations) were identified reporting qualitative data on the perspectives and attitudes of women who had not experienced PND regarding PSSSs that they believe helped to prevent the condition (see *Appendix 9, Personal and social support strategy studies: population characteristics*).

### Study respondents in the personal and social support strategy studies

The number of participants contributing qualitative evidence across all studies, where reported, was summed and totalled 801 (one study<sup>7</sup> did not provide the number of participants who contributed to the qualitative findings). Fifteen studies provided data from participants from a general population in the country of study,<sup>7,286,302,303,305,312,313,316–325</sup> while the remaining studies examined evidence from minority groups within the country of study. The minority groups were either a culturally different group based within the country of study ( $n = 6$ )<sup>292,306–311,314,315,318</sup> or a selective group ( $n = 2$ ).<sup>296–298,304</sup> For details of participant characteristics see *Appendix 9*.

### Study setting of the personal and social support strategy studies

Ten studies were conducted in the UK,<sup>304,306–315,319,321,322,324</sup> seven studies were conducted in the USA,<sup>286,292,296–298,302,303,318,320</sup> one in Switzerland,<sup>316</sup> one in Canada,<sup>317</sup> one in Norway,<sup>323</sup> one in India,<sup>325</sup> one in China<sup>305</sup> and one in multiple centres.<sup>7</sup>

## Synthesis of findings across personal and social support strategy studies

Several themes relating to the PSSSs which helped women prevent PND were identified across the included studies. Included studies focused on either general population women, minority groups which were culturally different from the general population of the country of study or, in a small number of cases, selective groups (low-socioeconomic status or vulnerable groups). Two studies<sup>305,325</sup> focused on the general population of the country of study, but highlighted findings related to particular cultural practices.

Based on an actual or promising assessment of effectiveness, the review team specified thirteen interventions requiring further in-depth analysis. These 13 interventions became the focus for subsequent investigation of study clusters (*Table 47*).

**TABLE 47** Thirteen focal interventions for exploration by realist review principles

Intervention category	Initiative	Target population	Setting
Psychological	Health Visitor PoNDER Training	Universal and indicated	UK
Psychological	Home-based intervention	Indicated	Australia
Psychological	IPT plus telephone follow-up	Universal	China
Psychological	IPT standard antenatal care plus the ROSE programme	Indicated	USA
Psychological	IPT – Brief	Indicated	USA
Educational	Two-step behavioural educational intervention	Selective	USA
Social Support	Telephone peer support	Indicated	Canada
Social Support	The Newpin Project	Indicated	UK
Social Support	Thinking Healthy Programme	Indicated	Pakistan and developing world
Midwifery-led interventions	CenteringPregnancy	Selective	USA and Australia
Midwifery-led interventions	Midwife-led brief counselling	Selective	Australia
Midwifery-led interventions	Midwife-managed care <sup>332</sup>	Universal	UK
Midwifery-led interventions	Midwifery redesigned postnatal care	Universal	UK

Examination of the RCTs in conjunction with searches for qualitative research revealed 22 published trial reports associated with the 13 interventions (see *Table 48*). These reports became the 'index papers' for our study clusters.

## Searching for CLUSTER documents for realist synthesis

Google Scholar citation searches ('forward chaining') were conducted for each of the 22 published study reports.<sup>141</sup> A total of 1888 citations were identified (including duplicates). The mean number of citations was 86 (range 0–232). Lists of results for articles citing an index paper were examined carefully for shared authorship, a common study identifier or for other common study-level denominators (e.g. setting or institution). When a directly connected ('sibling') report was identified this was used to populate synthesis of the findings from PSSS studies *Appendix 7*.

In addition, when a similar intervention study (e.g. differing in setting, population, etc.) was identified, this was recorded as a kinship study. Finally, systematic reviews, narrative reviews and qualitative evidence syntheses on the topic were also identified. The reference lists of all 22 original published reports (*Table 48*), as well as the reference lists of all 'sibling' studies, were scrutinised ('backward chaining') for earlier sibling studies (e.g. protocols, pilot studies, feasibility studies, etc.) or related 'kinship studies' (e.g. studies sharing a common intervention or underpinning theory).

## Preliminary synthesis and construction of a theoretical model

A formative stage of the synthesis required becoming familiar with the focal interventions, to sensitise to the study data and to broadly characterise the different programmes against their defining dimensions. *Table 49* attempts to locate the included programmes against the following dimensions:

- whether the programme is delivered at an individual or group level or it has elements of both ('mixed approach'), or whether it is not directly targeting the women but reaching them indirectly through health professional training
- whether the programme is delivered face to face, whether it is delivered remotely or whether it uses both methods ('hybrid delivery')
- whether the programme is delivered by health professionals or by lay support, or it is delivered by both ('joint delivery').

This formative analysis helped in looking for similarities and differences across programmes, for example, in characterising the different mechanisms by which lay support might work compared with delivery by health professionals.

Although specific components of one-to-one or group types of approach are determined by the reviews of effectiveness and acceptability, these two types of approach are underpinned by discernibly different assumptions. Consequently, the mechanisms by which such approaches might operate also carry important differences. These are best illustrated by placing the two types of approach in juxtaposition. However, interventions may blend both approaches. For example, CenteringPregnancy, an essentially group-based approach, offers the opportunity for individual consultation with health professionals. IPT is initially conducted in a group environment, but is followed up by one-to-one telephone contact (*Table 50*).

Subsequent synthesis involved detailed itemisation of programme components from each cluster of related study reports; use of multiple reports was essential as not all study reports provided a full description of the intervention. The descriptions of the interventions often lacked sufficient detail to allow replication beyond the original programme.<sup>341</sup> The innovative template for intervention description and replication (TIDieR) framework was used as a template for elicitation of relevant programme components.<sup>342</sup> *Appendix 16* contains the TIDieR templates for all thirteen focal interventions, with as complete details as cluster reporting allowed.

**TABLE 48** Results for citation searches of index papers for realist synthesis

Study report (first author, year, reference number)	Number of Google Scholar citations
<b>Psychological</b>	
<i>Health Visitor PoNDER Training</i>	
1. Morrell, 2009 <sup>61</sup>	44
2. Morrell, 2009 <sup>151</sup>	105
<i>Home-based intervention</i>	
3. Armstrong, 1999 <sup>164</sup>	169
4. Armstrong, 2000 <sup>251</sup>	97
5. Fraser, 2000 <sup>252</sup>	93
<i>IPT standard antenatal care plus the ROSE programme</i>	
6. Zlotnick, 2006 <sup>179</sup>	117
<i>IPT plus telephone follow-up</i>	
7. Gao, 2010 <sup>154</sup>	15
8. Gao, 2012 <sup>327</sup>	10
<i>IPT-brief</i>	
9. Grote, 2009 <sup>170</sup>	75
<b>Educational</b>	
<i>Two-step behavioural educational intervention</i>	
10. Howell, 2012 <sup>190</sup>	9
11. Howell, 2014 <sup>335</sup>	1
12. Martin, 2013 <sup>336</sup>	0
<b>Social support</b>	
<i>Telephone peer support</i>	
13. Dennis, 2009 <sup>205</sup>	102
<i>The Newpin Project</i>	
14. Harris, 2008 <sup>206</sup>	0
<i>Thinking Healthy Programme</i>	
15. Rahman, 2008 <sup>148</sup>	209
<b>Midwifery-led interventions</b>	
<i>CenteringPregnancy</i>	
16. Ickovics, 2007 <sup>262</sup>	199
<i>Midwife-led brief counselling</i>	
17. Gamble, 2005 <sup>221</sup>	105
<i>Midwife-managed care</i>	
18. Shields, 1997 <sup>219</sup>	37
19. Shields, 1998 <sup>337</sup>	43
20. Turnbull, 1996 <sup>338</sup>	232
<i>Midwifery redesigned postnatal care</i>	
21. MacArthur, 2002 <sup>146</sup>	168
22. MacArthur, 2003 <sup>264</sup>	58
<b>Total references</b>	<b>1888</b>

**TABLE 49** Dimensions of the featured interventions: how it is delivered

Dimension	Individual	Mixed approach	Group	Training
Face to face	Midwife-managed care, midwifery redesigned postnatal care	IPT standard antenatal care plus ROSE programme	CenteringPregnancy, Thinking Healthy Programme	Health Visitor PoNDER Training
Hybrid delivery	Midwife-led brief counselling plus telephone postpartum, the Newpin Project, two-step behavioural educational intervention	–	IPT plus telephone follow-up	–
Remote	Telephone peer support	–	–	–

**TABLE 50** Dimensions of the featured interventions: who is involved

Dimension	Individual	Mixed approach	Group	Training
Health/care professional	Midwife-managed care, midwifery redesigned postnatal care, midwife-led brief counselling plus telephone postpartum, two-step behavioural educational intervention	IPT standard antenatal care plus the ROSE programme	IPT plus telephone follow-up	Health Visitor PoNDER Training
Joint delivery	–	–	CenteringPregnancy	–
Lay support	The Newpin Project, telephone peer support	–	Thinking Healthy Programme	–

### Identification of provisional 'best fit' conceptual framework for realist synthesis

Searches of Google Scholar identified two outputs from a single Veteran Affairs project on group-based approaches.<sup>343,344</sup> In line with the 'best fit framework',<sup>345,346</sup> these study reports were sufficiently generic to be used as a source of an 'analytical framework' (Figure 56) for examining group care approaches during the perinatal period.

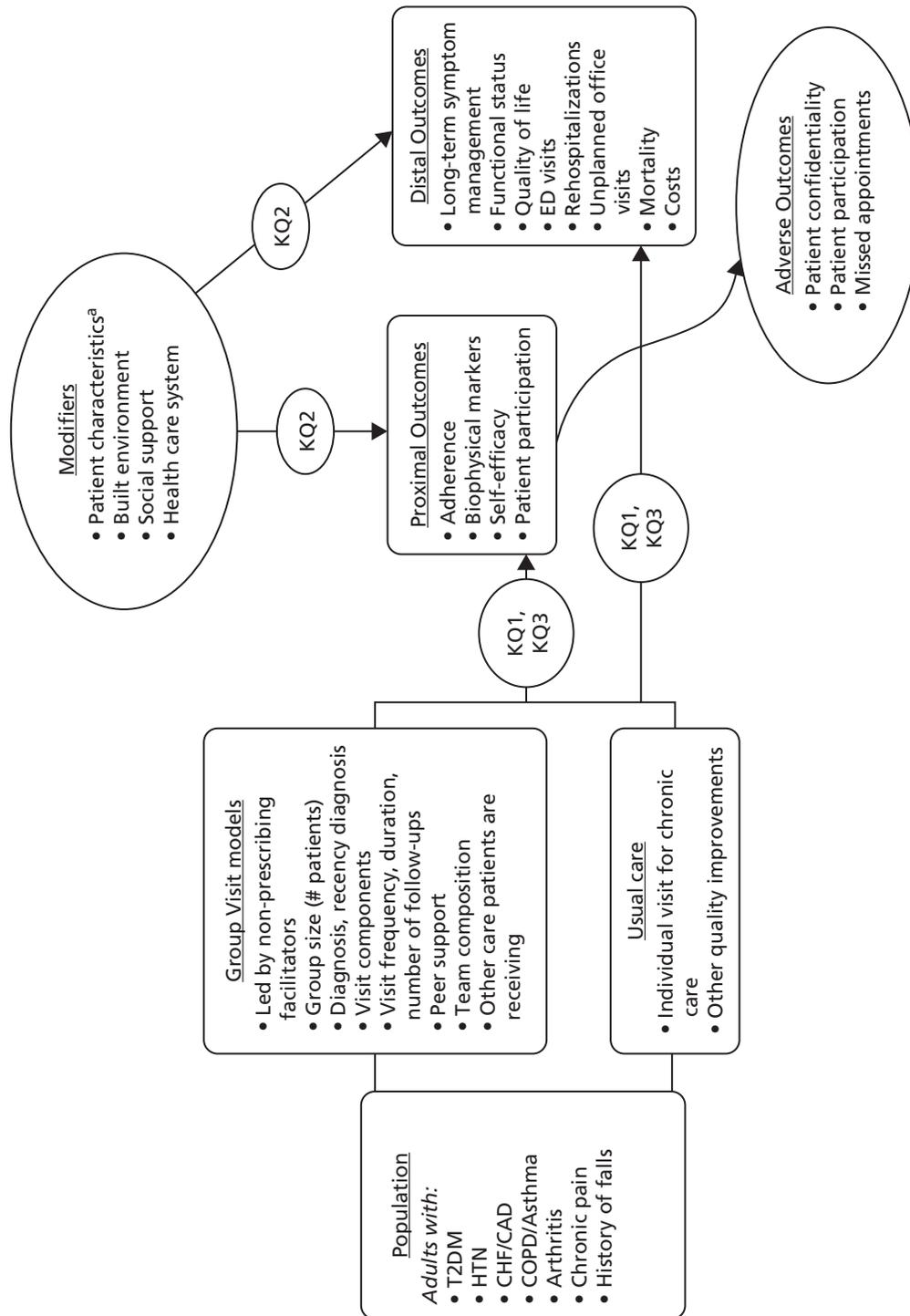
### Population of the conceptual framework

Elements of the analytical conceptual framework (see Figure 56) were deconstituted into fields on a data extraction form. Two fields were modified a priori in recognition of the topic: mortality (re-interpreted as suicide ideation) and biophysical markers (re-interpreted as physical signs and symptoms). The Best Fit Framework approach provides for inclusion of additional inductive elements once the deductive stage of the synthesis is completed.

### Identification of existing theory underpinning specific mechanisms

Five main bodies of theory seemed to underpin the specific mechanisms of featured interventions:

- social cognitive/learning theory and self-efficacy
- social support/social exchange theory (e.g. Brugha *et al.*<sup>152</sup>)
- locus of control (e.g. Brugha *et al.*<sup>152</sup>)
- empowerment (e.g. CenteringPregnancy)
- attachment theory (e.g. home-based intervention and IPT interventions).



**FIGURE 56** Analytical framework to evaluate group visits. Reproduced with permission from Quinones et al.<sup>343</sup> Note: a. Includes gender, race/ethnicity, age, education/health literacy, rurality/geography, chronic conditions/morbidity and other patient demographics. Note: socioeconomic influences such as financial strain (e.g. price of gas) directly affect patient population. Key: CHF/CAD, congestive heart failure/coronary artery disease; COPD, chronic obstructive pulmonary disease; HTN, hypertension; KQ, key question; ED, emergency department; T2DM, type 2 diabetes mellitus.

The theories underpinning the mechanisms for each study are provided in *Table 51*. *Table 52* indicates the theories relevant for the prevention of PND. *Table 53* indicates the mechanism of application of the theories according to the approach used, for example one-to-one or group approach.

**TABLE 51** Specific theories underpinning mechanisms

Initiative	Implicit/explicit presence of theory
CenteringPregnancy	CenteringPregnancy was developed and piloted by a certified nurse-midwife after experience with successful family-centred approaches to prenatal care and in recognition of repetitiousness [sic] of one-on-one prenatal care for providers. Uses a model of empowerment
Health Visitor PoNDER training	Health visitors were trained to deliver psychologically informed sessions based on distinct psychological theories, either cognitive-behavioural principles <sup>347</sup> or person-centred principles <sup>348</sup>
Home-based intervention	Attachment theory <sup>349</sup> states that parents' bonding with their own children and treatment of them is affected by their own earlier attachment history and internal working models. Attachment theory emphasises the importance of consistency in relationships and sensitive understanding of reactions to separation, loss and rejection. The theory of resilience <sup>350</sup> recognises personal resilience factors (e.g. positive orientation to problem-solving), and environmental factors (e.g. the help of a supportive adult). <sup>351,352</sup> Although some factors are relatively fixed, others can be modified, such as access to support. By exploring individual and family strengths, positive experiences and resources are built upon and enhanced
IPT standard antenatal care plus ROSE programme; IPT plus telephone follow-up; IPT-brief	<p>IPT<sup>353</sup> is grounded in interpersonal theories<sup>354</sup> and attachment theories.<sup>355</sup> It is based on the hypothesis that clients who experience social disruption are at increased risk of depression. IPT specifically targets interpersonal relationships and is designed to assist clients in modifying either their relationships or their expectations about relationships. IPT could help new mothers in:</p> <ul style="list-style-type: none"> <li>• role transitions: in which clients have to adapt to a change in life circumstances. IPT aims to help to re-appraise the old and new role, to identify sources of difficulty in the new role and fashion solutions for these roles</li> <li>• interpersonal disputes: these occur in marital, family, social or work settings. Clients may have diverging expectations of a situation and this conflict is excessive enough to lead to significant distress. IPT aims to identify sources of dispute, faulty communication or unreasonable expectations. It intervenes by communication training, problem-solving or other techniques that aim to facilitate change in the situation</li> <li>• interpersonal deficits: in which clients report impoverished interpersonal relationships in terms of both number and quality of the relationships. IPT aims to identify problematic processes such as dependency or hostility and aims to modify these processes</li> </ul>
Midwife-led brief counselling	The intervention was based on two theoretical perspectives relating to violence and maternal distress, <sup>356,357</sup> focus group discussions with childbearing women and midwives and reviews of the literature
Midwife-managed care	The predominant model of shared care – divided among midwives, hospital doctors and GPs (family physicians) – has been called into question. This initiative was designed to address the hypothesis that midwife-managed care would result in fewer interventions, similar (or more favourable) outcomes, similar complications, plus greater satisfaction with care and enhanced continuity of care and carer

continued

TABLE 51 Specific theories underpinning mechanisms (*continued*)

Initiative	Implicit/explicit presence of theory
The Newpin Project <sup>340</sup>	A lifespan model of psychosocial origins of depression in women <sup>358</sup> pinpoints the role of stressful life events/difficulties (often involving humiliating losses) in bringing on depression/fresh-start events (promising hope of a new beginning) in promoting remission
Midwifery redesigned postnatal care	No explicit theory. The intervention was based on UK government reports stating that there was a need for wide-ranging changes to maternity services, emphasising poor assessment and frequently inappropriate delivery of postnatal care. A service led by midwives, with continuity of care and involvement of women, which is supportive and sensitive to individual needs, and preferences is at the centre of the maternity care recommendations
Telephone peer support	The intervention was based on research related to maternal dissatisfaction with peer support. Lazarus and Folkman (1984) <sup>359</sup> theorised that coping incorporates problem-resolution and emotion-regulation while employing affective, cognitive, and behavioural response systems. Bandura (1977) <sup>360</sup> and Bandura (1986) <sup>361</sup> social cognitive theory, peer support influences health outcomes by (1) decreasing isolation and feelings of loneliness; (2) swaying health practices and deterring maladaptive behaviours or responses; (3) promoting positive psychological states and individual motivation; (4) providing information regarding access to medical services or the benefits of behaviours that positively influence health and well-being; and (5) preventing risk for, progression of, and promoting recovery from physical illness
Thinking Healthy Programme	Holistic approach designed to counter 'defunct theory of "mind-body" dualism' <sup>362</sup>
Two-step behavioural educational intervention	Prior research suggests that postpartum physical symptoms, overload from daily demands and poor social support play a major role in generation of depressive symptoms

TABLE 52 Programme theories for preventing PND

Programme theory	Label	Programme theory – PND will be prevented if ...	Relevant theory	Elements
<b>By activity</b>				
PT1	Developing trust	Women develop meaningful relationships with other women in the group and with health-care providers <sup>285,363</sup>	Social cognitive theory	Group interaction
PT1	Asking for help	Women are made aware that it is legitimate to ask for help <sup>364</sup> and can identify whom to ask <sup>365</sup>	Social norms	Modelling within group
PT2	Learning by doing	Women acquire practical <sup>366</sup> and communication skills <sup>367</sup> that equip them for their new roles <sup>366</sup>	Social learning theory, locus of control, self-efficacy	Practical sessions, demonstrations, role play
PT3	Feeling supported	Women feel supported by their partner, health professionals, peer supporters or group members to help them feel comfortable, reduce their anxiety and help them cope with challenges <sup>283,285,364,368</sup>	Social support	Group sessions, telephone, individual sessions
PT4	Accessing information	Women are able to access information not before or after but when they need it <sup>369</sup>	Social learning theory, locus of control	Group or individual information sessions
PT5	Sharing information	Women are able to harvest resources to support coping <sup>184</sup> from their health-care provider <sup>370</sup> or from other group members	Social exchange theory	Group or information sessions
<b>Symbolic</b>				
PT6	Feeling normal	Women come to realise that their experience is not uncommon and that other women come through it <sup>364,369</sup>	Social norms	Group sessions or individual interaction with peer or professional
PT7	Dispelling the myth of the ideal mother/birth/baby	Women come to realise that the narratives of the ideal mother, <sup>316,371</sup> birth <sup>372</sup> and baby are social constructions	Social norms	Group sessions or individual interaction with peer or professional
PT8	Making time for self	Women discover that it is legitimate to make time for themselves <sup>320,371</sup> within a baby-centric situation <sup>373</sup>	Social norms	Group sessions or individual interaction with peer or professional
PT, programme theory.				

**TABLE 53** Mechanisms and underpinning theory for generic group and one-to-one approaches

Mechanism	Underpinning theory (when identified)	Group approaches	One-to-one approaches
Appraisal support (functional support)	Social exchange theory <sup>374,375</sup>	<p>Positive: even where facilitator appears unsupportive other group members may compensate</p> <p>Negative: individuals may feel inhibited within a group setting</p>	<p>Positive: individuals may develop rapport and trust with their nominated contact</p> <p>Negative: individuals may perceive nominated contact as judgemental or unsympathetic</p>
Emotional support (functional support)	Social exchange theory <sup>374,375</sup>	<p>Positive: even where facilitator appears unsupportive other group members may compensate</p> <p>Negative: individuals may feel inhibited within a group setting</p>	<p>Positive: individuals may develop rapport, and trust with, and feel able to confide in their nominated contact</p> <p>Negative: individuals may not be appropriately matched with nominated contact</p>
Informational support (functional support)	Social exchange theory <sup>374,375</sup>	<p>Positive: facilitator may validate information quality on behalf of the group</p> <p>Positive: other group members may ask a question of relevance to a more reticent member</p> <p>Positive: reticent individuals may grow in confidence to ask questions</p> <p>Negative: group members may provide unfiltered information leading to incorrect decision or incomplete picture</p> <p>Negative: individuals/partners may feel uncomfortable in asking sensitive questions</p>	<p>Positive: health professional/peer supporter may validate information quality and provide tailored information</p> <p>Positive: individuals may feel comfortable in asking sensitive questions</p> <p>Negative: health professional/peer supporter may provide inappropriate, unhelpful or factually incorrect information</p> <p>Negative: individuals may leave personalised concerns unexpressed</p>
Instrumental support (functional support)	Social exchange theory <sup>374,375</sup>	<p>Positive: women may share ideas for sources of practical aid</p> <p>Negative: individual women may experience increased frustration if sources are not forthcoming</p>	<p>Positive: facilitator may share ideas for sources of practical aid</p> <p>Negative: facilitator may not have full understanding of practical realities</p>
Support-seeking strategies	Attachment theory <sup>355</sup>	<p>Positive: group members access widest range of suggested strategies</p> <p>Negative: others in group may have a limited repertoire of strategies to share</p>	<p>Positive: health professional/peer supporter may be able to tailor suggested strategies</p> <p>Negative: health professional/peer supporter may have limited repertoire of strategies to share</p>
Interpersonal relationships	Interpersonal theory <sup>354</sup>	<p>Positive: other group members may act as buffer or sounding board for relationship difficulties</p> <p>Negative: group may have limited time to address specific individual relationship difficulties</p> <p>Negative: individuals may feel inhibited from sharing relationship difficulties with others</p>	<p>Positive: health professional/peer supporter may become confidant for relationship difficulties</p> <p>Negative: individual may feel inhibited from sharing relationship difficulties with health professional/peer supporter</p>

**TABLE 53** Mechanisms and underpinning theory for generic group and one-to-one approaches (*continued*)

Mechanism	Underpinning theory (when identified)	Group approaches	One-to-one approaches
Normalisation	Normalising through connection theory <sup>376</sup>	Positive: other group members may affirm validity of individual's feeling or experience	Positive: health professional/peer supporter may validate individual's feeling or experience based on previous caseload or professional knowledge
		Positive: facilitator may validate individual's feeling or experience based on previous caseload or professional knowledge	Negative: health professional/peer supporter may communicate frequently experienced phenomenon as routine and appear to minimise individual's personalised experience
		Negative: others in group may not have experienced same feeling or event. Individual may feel strange or isolated	Negative: health professional/peer supporter may perpetuate unrealistic expectations
		Negative: others in group may perpetuate or amplify unrealistic expectations	
Coping	Coping theory <sup>359</sup>	Positive: individual is exposed to different models of coping and can select resources appropriately	Positive: health professional/peer supporter may identify most appropriate coping resources to match to individual
		Negative: individual may compare themselves unfavourably to other group members	Negative: health professional/peer supporter may privilege their own preferred strategies
Self-efficacy	Self-efficacy theory <sup>377</sup>	Positive: group members may help to normalise rationalisations for their symptoms	Positive: care provider may help to normalise rationalisations for their symptoms
		Negative: group members may affirm belief that PND is unpreventable/untreatable	Negative: care provider may affirm belief that PND is unpreventable/untreatable
Continuity of care	Not identified	Positive: group facilitation and membership may be relatively stable	Positive: individual receives coherent and cohesive care from a sole provider
		Negative: group facilitation and membership may be inconsistent	Negative: individual may become overly dependent upon sole provider
Modelling behaviours	Social learning theory <sup>360</sup>	Positive: other group members may be appropriate and realistic role models	Positive: individuals may rehearse appropriate behaviours in a safe environment
		Negative: group may promote unhelpful norms that counterbalance positive behaviours	Negative: individual may not perceive health professional/peer supporter as appropriate or realistic role model
Preparing for parenting	Not identified	Positive: facilitator and other group members may contribute to realistic expectations	Positive: health professional/peer supporter may help to actively manage expectations

continued

**TABLE 53** Mechanisms and underpinning theory for generic group and one-to-one approaches (*continued*)

Mechanism	Underpinning theory (when identified)	Group approaches	One-to-one approaches
		Negative: facilitator and other group members may focus on labour rather than parenthood	Negative: health professional/peer supporter may base advice solely on their own experience  Negative: health professional/peer supporter may focus on labour rather than parenthood
Targeting depressive symptoms	Vulnerability-stress theory <sup>358</sup>	Positive: even though not every individual experiences every symptom, there is an increased likelihood that at least one member experiences a symptom	Positive: health professional/peer supporter may be able to tailor support/advice to specific needs of individual
Targeting anxiety symptoms	Vulnerability-stress theory <sup>358</sup>	Positive: not every individual experiences every symptom but there is an increased likelihood that at least one member experiences a symptom	Positive: health professional/peer supporter may be able to tailor support/advice to specific needs of individual

The social cognitive theory of depression proposes that ‘women for whom motherhood is a highly valued role may be particularly vulnerable to depression if events or difficulties threaten this role’.<sup>378</sup> Interventions that address this theory therefore seek to equip the woman with self-efficacy so that she is better able to manage such events or difficulties or has multiple strategies by which she might attempt to address them. Increased self-efficacy may be seen in the management of her own symptoms or, more generally, in being able to cope with the practical aspects of motherhood that might otherwise be viewed as difficult or problematic. A further aspect to this theory is the modification of the woman’s understanding of the motherhood role so that she is less likely to fall victim to unrealistic expectations of either herself or of others.

The social support theory of depression is underpinned by social exchange theory. Social support has been found to facilitate the adaptation to, and transition to, motherhood and facilitates the flow of emotional concern, instrumental aid, information and appraisal between people, including partners and mothers. Interventions that address this theory therefore seek to reduce the psychological stress of the transition to motherhood.<sup>379</sup> Strategies include the building up of social support networks prior to the birth and being better able to mobilise such support when needed. Group-based interventions may serve to extend social support again in preparation for the birth or as a resource to be accessed after childbirth. Social exchange theory requires a structure through which an interactive process might occur and preventive strategies may help in both the identification of and mobilisation of such structures for interaction.<sup>378</sup>

The idea of the locus of control, that is ‘whether a person perceives what happens to her as being within her own control or in the hands of external forces’,<sup>380</sup> is believed to be an important aspect of psychological functioning. Clearly this is closely linked with self-efficacy, as discussed above. However, some commentators caution<sup>380</sup> that in a childbirth context this may not necessarily translate into greater involvement in decision-making as, for some women, such involvement may actually increase feelings of anxiety. Interventions that engage with the idea of locus of control provide a woman with an opportunity to discuss all aspects of the motherhood experience fully with staff. The woman receives the right amount of information that they personally require. Receiving the right amount of information, both ‘preloaded’ (i.e. prior to the birth) and subsequently ‘on demand’, reduces their anxiety about aspects of the motherhood experience and increases their satisfaction with aspects of the birth experience. Again the mechanism of modifying expectations, to make them more realistic, is present in such interventions.

The empowerment model of prevention of depression is based on the assumption that women are likely to experience negative partner support and therefore need information and coping resources by which to handle this. Interventions that address this theory therefore seek to provide information to help women to identify particular strategies that may be helpful to them. Community resources are identified from which women may draw as appropriate. Empowerment approaches often allow an individualised focus for an intervention so that support can focus on areas of particular need for each woman.

The attachment theory of depression proposes that postpartum depression develops when a mother's attachment needs are not being satisfied by her partner, whom she feels is irresponsive or inaccessible to her.<sup>381</sup> Although attachment theory originally focused on the importance developing a strong emotional bond between an infant and their mother, more recently this has been extended to include adult relationships, such as the partner and the mother or mother-in-law. Attachment provides a useful resource during times of uncertainty, such as characterise the anxiety-filled birth and postnatal periods. Attachment theory attempts to explain why some women seek to be close to their partner, or significant others, but fear being rejected by them and why others seek to avoid closeness. Interventions that address the attachment theory seek to develop attachment, typically with the partner, so that social support may be readily accessed as and when required. They seek to develop mechanisms by which need for support may be communicated and recognised.

This discussion demonstrates that these theories are not distinct but frequently operate in close proximity. Collectively they explain many intervention components for individual-based and group-centred approaches. Other interventions derive their imperative not from an explicit theoretical basis but from political or social drivers such as the agendas of the UK government<sup>264</sup> or of the World Health Organization.<sup>148</sup> For a fuller discussion of principal theories underpinning strategies for treatment and by implication, prevention see the useful summary by Beck.<sup>381</sup>

## Development of a programme theory

A key issue in developing a programme theory with regard to two different modes of delivery, that is group-based (one-to-many) and individual-based (one-to-one) approaches, relates to whether they offer competing alternatives to meet the same needs or they seek to address different sets of needs. The tables of components (see *Appendix 7*) assist in identification of important mechanisms that are common to both approaches, those that can substitute for each other, or those that are unique to one of the two approaches.

### Group-based interventions

In the case of the group, under a 'resource-based model' (i.e. the idea that a group is identifying, sharing and subsequently using its collective emotional and experiential resources) members of a group may provide aspects of information, experience or support beyond the resources of a single facilitator.<sup>302,312,313,321</sup> However, this relies on the existence of mechanisms for releasing the resources for use by the whole group. There is evidence of facilitators being aware of resources or experience within a group that the individuals themselves felt unable or unwilling to share.<sup>293</sup> Consequently, the facilitators felt powerless to offer such experiences without the approval of the individual themselves. Use of group-based mechanisms places additional requirements for group coherence,<sup>382</sup> the development of trust with a larger number of individuals and the existence of ground rules that minimise the chance of harmful group behaviours.

### Continuity of care

Continuity of care may be present through the ongoing participation of one or more group co-ordinators. The CenteringPregnancy programme identifies 'stability of group leadership' as an 'essential element' of the approach.<sup>383</sup> Continuity is also sought within team midwifery-based support approaches,<sup>224</sup> but that does not necessarily translate into the personalised and tailored care required for the building of confidence, trust and satisfaction with care. If a facilitator does not function well with, or relate well

personally to, several or, indeed, all of the group, then this may potentially cause more harm than a problematic one-to-one approach. However, this may be partially compensated for through a form of substitution by good relationships within the group.

### **Individual-centred interventions**

With regard to individual interventions it is perhaps unhelpful to focus on the 'individual' part as the intervention (in contrast to the acknowledged effect of the 'group'). The individual approach offers potential benefits that may or may not be realised. For example, under a resource-based model, a particular supporter, whether professional or lay, may not have experience to draw upon and mobilise for the benefit of the individual. Continuity of care, a claimed advantage of individual-based interventions, may not be realised if staff changes or team processes interfere with this. This may explain why Dennis *et al.*<sup>384</sup> found a non-significant effect for continuity of care in their systematic review. There may not be a rapport between supporter and woman. If an individual relationship is not built up, then trust and relationships are impaired. Other benefits, such as sharing of confidential, personalised information, are not realised. Dennis *et al.*<sup>384</sup> refer to this in the specific context of revealing PND to a health professional. However, this may be equally important in prevention when seeking to broach the subject of potential symptoms or causative factors.<sup>385</sup> It is helpful to highlight the personalised, targeted nature of the individual-based approaches, not the fact of the individual relationship per se.

### **Considerations shared by group-based and individual-centred interventions**

The analysis has revealed the shared importance of three preparatory stages in the intervention. Principally, these concern (1) recruitment, whether of health professionals or of lay supporters, (2) training, again irrespective of whether professionals or lay supporters, and (3) the process of targeting or matching the needs of those requiring support to those delivering support. In addition, mechanisms for sustainability within a programme also surface as being important considerations.

#### **Recruitment**

Recruitment is a key intervention in relation to lay support. Lay supporters are typically volunteers and are often motivated by a desire to help or to give something back.<sup>301</sup>

#### **Training**

Clinical staff must make a considerable investment of time to supplement their clinical expertise with facilitation, counselling or support skills. Midwives, to create a favourable impression within a CenteringPregnancy intervention have to be sufficiently skilled, knowledgeable and warm, to provide suggestions for group discussion and to allow unstructured discussion, all of which were appreciated by group members.<sup>277</sup> The intervention by Morrell<sup>287</sup> compared training for health visitors in assessment and two different methods of psychological support. Deficiencies in delivery of care sometimes imply a need for further training.

For lay supporters, the potential training burden is substantial. For example, it may include experiential training, such as role-playing and supervision, information on peer support strategies and topic-specific information about PND and medications as well as organisations or further sources to which they could refer.<sup>386</sup> Dennis<sup>386</sup> describes the use of a 121-page training manual.

#### **Matching**

Behavioural interventions require creation of a rapport between service provider and recipients of care. Those delivering group interventions must be viewed as accessible and welcoming by members of the group. Indeed, effective facilitation requires that the facilitator progressively suppresses his or her own role so that the group becomes functional with minimum and judicious input. In the individual telephone counselling intervention, participants were matched with peer volunteers 'if the mother desired'.<sup>205</sup> However, this so-called matching was based on residency and ethnicity and was performed by the co-ordinator. The Newpin Intervention saw young befrienders being matched with younger parents.<sup>206,387</sup> However, demographic 'matching' may not be sufficient and numerous other variables could be considered when seeking to establish compatibility.

### Support to providers

A further ongoing requirement for both approaches is supervision of, or at least support to, those delivering support (whether professionals or lay supporters). This is particularly the case for formal psychological approaches, such as IPT, which often require supervision as a component of intervention delivery. The availability of such support may have a subsequent effect on retention of the facilitators/supporters, the sustainability of the overall programme and, indeed, on further recruitment.

Another consideration for both group and individual approaches that is not determined exclusively by type of intervention delivery relates to the convenience of the intervention sessions. Delivery of sessions at home or over the telephone and integration with routine health-care visits may help to increase the acceptability and feasibility of intervention delivery as well as adherence.<sup>327,388</sup> Hybrid models may seek to optimise the pattern of home visits and regular visits to a health-care provider. Opportunities for improved co-ordination are offered by using such visits to give advice on nutrition, child health, child development programmes, positive parenting programmes, vaccination programmes, routine childbirth education sessions and community health programmes.<sup>389</sup> Group interventions can seek to achieve improved acceptability and feasibility by being offered in conjunction with individual health-care appointments, as in the CenteringPregnancy model.

### Components of the interventions

Several features recurred frequently in the qualitative syntheses of interventions and of personal and social strategies, as either actual or suggested components for the intervention, irrespective of the chosen method of delivery. In some cases the feature is implicit within suggestions of what might have helped. For example, the value of family support or of instrumental support translates into a requirement for intervention content that both affirms the validity of help-seeking and provides practical strategies for eliciting such support. A useful intervention, when time and resources permit, includes the following:

- make provision for continuity of care
- legitimise help-seeking without framing this as an inability to cope
- offer strategies for identifying support
- equip women to delegate tasks without surrendering mother role
- offer strategies for eliciting emotional, spiritual and instrumental support
- identify coping strategies to allow self-help
- help women to access information as and when required
- feel able to share feelings and experiences without experiencing premature closure
- facilitate normalisation of feelings
- create realistic expectations about the birth
- create realistic expectations about motherhood roles
- create realistic expectations about health professional support and roles and health services
- challenge social norms of the ideal birth, the ideal baby or the ideal mother
- anticipate baby-centric focus of family and health professionals
- identify strategies for acknowledging and meeting mother's own needs
- prepare women for emotional lability
- anticipate fatigue, pain and slow recovery from labour
- help women adjust their routines to motherhood
- widen focus beyond delivery and birth
- gain strength/joy from baby
- develop attachment with infant
- acquire practical skills (breastfeeding, changing nappies, bottle feeding, bathing)
- understand appropriate use of medication, alternative medicine and counselling services
- acknowledge and build upon cultural variation
- adjust to cultural barriers regarding communication or provision of support.

### Sustainability

A further key consideration relates to the sustainability of the intervention or programme. Unlike other self-management or peer support programmes, primarily within the domain of chronic diseases, pregnancy is a time-limited condition with definable antenatal and postnatal periods. Sustainability cannot be offered by continuity of group membership. Sustainability may be offered by structural components, for example, a common venue or ongoing facilitators, or by process elements such as training manuals and programmes or a standard curriculum. There is some evidence within the reviewed studies of a cohort approach which seeks to engage a group of mothers to be at a common point and then take them together through the antenatal, birth and postnatal period. Certainly group membership seems less of an issue under a cohort model than with an escalator model, in which mothers can enter or exit at any point in the programme. However, the cohort model is, in turn, predicated upon having sufficient critical mass of women at approximately the same point in their pregnancy for the group to be viable. Here considerations of optimal group size need to be considered against what is feasible and practicable.

Recruitment of the next generation of peer supporters could, in theory, be achieved from within each cohort although timing is an issue as a recent mother, adjusting to such a significant life event, does not correspond to the typical model of one likely to volunteer. Therefore, some mechanism for medium-term follow-up may be needed to keep in touch with potential future peer supporters.

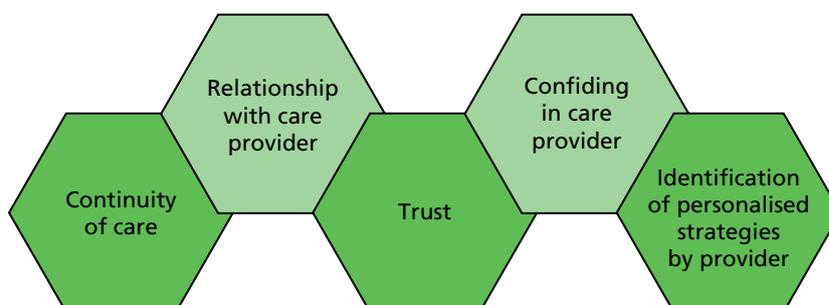
### Construction of pathways or chains from 'if-then' statements

The subsequent stage to production of 'if-then' statements is to seek to integrate these into causal pathways or chains.

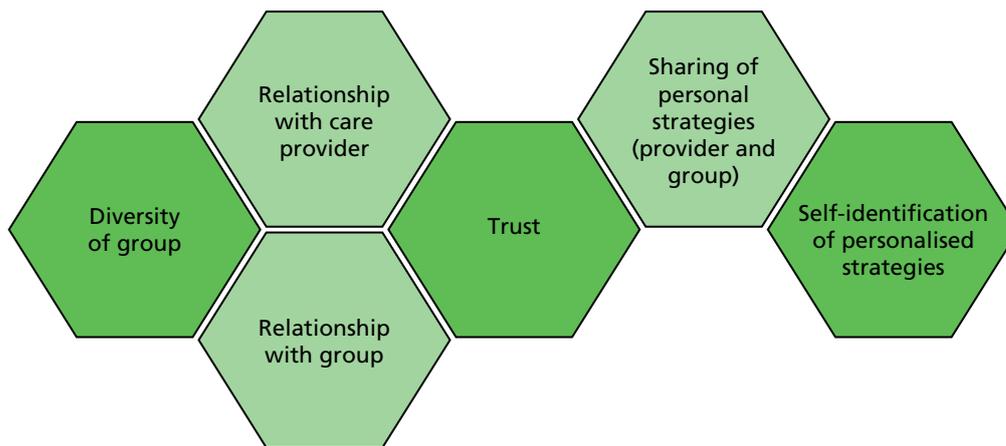
#### Mechanisms for improving appropriateness of strategies

Figures 57 and 58 present schema demonstrating the way in which 'if-then' statements might illuminate particular paths or dependencies.<sup>290</sup>

These representations illustrate that a key point in the delivery of interventions, whether group or individual based, is the establishment of a relationship with a care provider, whether professional or a lay helper. Matching of care provider to women, whether individually or collectively, becomes a key factor in the success of such interventions. Building up such a relationship allows the establishment of trust, which then allows open and frank information exchange.<sup>285</sup> When such communication is present it leads, in turn, to a better understanding of the needs of the expectant mother. The establishing of relationships explains, at least in part, why continuity of care<sup>283</sup> figures prominently in discussions of the requirements for good-quality antenatal care.



**FIGURE 57** The ways in which 'if-then' statements might illuminate pathways for individual approaches. Data source: McNeil *et al.*, 2013.<sup>290</sup>



**FIGURE 58** The ways in which 'if-then' statements might illuminate pathways for group approaches.

In group-based interventions, the requirement for a successful relationship is further compounded. Relationships need to be built up between mother and care provider *and* between mother and others in the group.<sup>283,289</sup> However, this element of 'risk' to the functioning of the group may potentially be compensated for by the likelihood that support for the group may compensate for inadequacies in the facilitation and also that the group has more resources, in terms of experience to share and a 'like mind',<sup>390</sup> to offer in support of each individual mother. When support is being provided by care provider and/or by women in a group this may take away some of the pressure on the relationship with fathers or significant others (such as in-laws).

That women need to build up relationships in order for the intervention to work is seen in the experience that groups may initially struggle.<sup>285</sup> Subsequently, they typically weather initial periods of individual anxiety.

### **On adverse effects**

Some women do not welcome the group approach and so, in quantitative terms, are lost to trials prior to randomisation. Similarly, most of the qualitative studies recruited women who had agreed to participate in a group-based approach. This represents an important area of potential methodological bias. Likewise, participation tends to be described in very forgiving terms, for example in the number of women attending one or more sessions. Theoretically, this means that the women are likely to be being delivered a suboptimal 'dose' of care. In practical terms, there is the possibility that health provider resources are not used effectively or women may be unable to access groups because available slots are occupied by non-attenders. In addition, there was some evidence that discomfort experienced by partners over the nature of discussions may have caused them to disengage with a subsequent perception of lack of support from the viewpoint of the women themselves.<sup>283</sup> A further complication relates to the potential inclusion of fathers. Fathers may experience difficulty in contributing to the group<sup>277</sup> either because of their own shyness or because women felt that men were uncomfortable with intimate discussions.<sup>283</sup> Alternatively, women may feel reticent in bringing up topics when in a mixed group that includes fathers. If women themselves fail to maintain an adequate attendance level, and thus experience a consequent lack of group support, they may perceive an inability to implement strategies that they have learned.<sup>286</sup>

Communication with a care provider, and/or with a group, should not be viewed simply in positive terms. Groups or care providers may, albeit unwittingly, create expectations that become difficult or impossible for an individual mother to fulfil.<sup>371</sup> A failure to meet either perceived or actual norms may contribute to a feeling of inadequacy. Social comparison may also be unfavourable if others in the group are handling challenging situations with more ease, even if this reflects individual proficiency rather than the benchmark level for the group as a whole. There was some evidence that established group members would take significant steps to avoid upsetting other group members by creating expectations (e.g. in their support relationships, material circumstances or the pregnancy experience) that they might be unable subsequently to fulfil.<sup>293</sup>

Although much is made of the benefits of bringing together women who are facing the common challenges associated with pregnancy, labour and childbirth, it should be recognised that this is not without risk. Given the recognised susceptibility of these women to emotional feelings, it can be seen to be potentially volatile to bring together women when the response of another might well attenuate the emotional effect. A further consideration within a group context is that a lack of privacy during the intervention may result in a mother feeling that her individual care has been sacrificed to the requirements of the group. The very structured CenteringPregnancy protocol also poses specific logistic problems if women perceive that the format of the sessions is not ideal, with a 2-hour session being too long<sup>289</sup> or there being too long a period of time between first and second group meetings.<sup>277</sup>

A shared concern for both individual- and group-based approaches relates to the fact that any type of service provision raises expectations from the service. If these expectations are subsequently unrealised then this can be an additional source of frustration to women who already feel unsupported. Improved access to a caregiver through a targeted intervention may subsequently raise expectations that might not be met either in individual follow-up care from the provider or by front-desk support staff in their interactions with mothers.<sup>283</sup> Qualitative research revealed specific logistic concerns related to the fact that the choreographed and structured nature of group sessions may induce a feeling of being rushed by a health professional during the intervention. Specifically, within a military setting, CenteringPregnancy was seen to neglect consideration of the associated workload and resource constraints. So, although the CenteringPregnancy Intervention appears to be generally well received, constraint of available resources could have a disproportionate, that is non-symmetrical, effect, if service providers are seen to be scrimping and saving on costs of care. Women may therefore feel that their care is not perceived as a priority.

Other considerations relate to specific facilitation difficulties in which a health professional is perceived as being too controlling or not suitably facilitative in engaging with the wishes of the group. A tension between encouraging women to bring their family, in some cases, when this facilitates their access and attendance but acknowledging the disruption this may pose, in other instances, can lead to the perception that the service is not family centred and that older children are not welcome.

## Testing of the programme theory and integrating quantitative and qualitative findings

Having identified hypothesised components for successful inclusion in an intervention or programme enabled us to re-examine their presence or absence in the featured interventions. Although this approach is necessarily limited by the quality of reporting of each intervention this effect was minimised by using all available published reports of each intervention, not solely the primary trial report. It was assumed that the emphasis of the reporting would largely reflect the corresponding emphasis of particular features within an intervention. That is, if a feature is mentioned it is more likely to be considered important to an intervention's mechanisms of action whereas if a feature is unclear or omitted, particularly given word limit constraints, it is correspondingly unlikely to be considered a key feature, although not necessarily absent. A further limitation relates to the limited ability of an approach based on reporting to establish whether a feature was deliberately planned in the conception of an intervention or was implemented fortuitously or opportunistically. Nevertheless, its presence would indicate that it is feasible both as a feature of the existing intervention and as part of any planned enhancement.

Finally, consideration of desired qualitative features alone is not sufficient for exploration of the candidate interventions. At some point these features must be correlated with data on the effectiveness of each intervention. *Table 54* makes an initial link between the presence or absence of reported features and an overall assessment of effectiveness. However, it is important to recognise that this simply represents a correlation and cannot be considered evidence of a cause and effect relationship.

### Response from the service user group to optimal characteristics identified from the qualitative/realist reviews

Consultation with the PPI group revealed that many characteristics listed resonated with group members' own experience and feelings. One informant commented that they felt that 'the list was meaningful and shows good insight into the pregnancy experience and early motherhood', while another stated that 'it captures the main concerns' and a third agreed that it was meaningful. They did identify that the wording of the list would need careful attention if it is to be translated into use with women themselves, as opposed to health professionals.

#### Modifications to the list

One informant endorsed the need to equip woman to delegate tasks without surrendering the mother role. She made an implicit connection with challenging the concept of the 'ideal mother' in stressing to women that 'help with mothering could be necessary and to avoid making this shameful or neglectful'. Members of the PPI group offered specific observations on the timing of some of the suggested strategies. Practical skills (such as breastfeeding, changing nappies, bottle feeding, bathing) were considered 'very important skills that need to be acknowledged before the birth'. It was felt that these should be emphasised because, as also revealed by the literature reviews, 'too much focus is on the birth'. It was also important that women's own needs be acknowledged before the birth:

*I would add also to tell mothers to look after themselves before and after the birth by doing one thing a day they enjoy; five minutes of filing nails, eating something they really enjoy and simple everyday pleasures, which are achievable.*

*PPI group member*

Finally, information on PND needs to be available from the start, for example at antenatal classes.

#### Additions to the list

In addition, members of the PPI group volunteered observations that triangulated with findings identified elsewhere in the review processes. In particular, the involvement of, and role of, partners was essential with a need to educate partners regarding symptoms and a requirement to 'keep them involved and to help them understand what is going on'. Comments resonated with the strategies offered by IPT, namely 'to avoid potential possible relationship difficulties/breakdown which obviously wouldn't be helpful to the women with PND'. The importance of attachment extends beyond the mother and baby, requiring that partners enjoy 'some level of involvement to encourage the later bonding process with baby – or it could become very much just the woman's experience'.

Other findings from the review, reflected by participant responses, included the importance of the need to legitimise help-seeking without framing this as an inability to cope given that women may 'fear their children may be taken away from them if they open up as to how they are feeling'. The key role of continuity of care was affirmed, particularly in the context of the caregiver being able to identify changes in the woman and therefore offer personalised strategies for eliciting emotional, spiritual and instrumental (i.e. practical) support.

**TABLE 54** Matrix indicating presence or absence of reported features with overall assessment of effectiveness

Element from qualitative findings	Two-step	CenteringPregnancy	Midwife-led brief counselling	Midwife-managed care	Mid-routine primary care
Continuity of care	–	✓	–	✓	✓
Legitimise help-seeking	✓	–	–	–	–
Identify support	✓	✓	–	–	–
Delegate without surrender	–	–	–	–	–
Strategies for eliciting support	✓	✓	–	✓	–
Coping strategies	–	–	–	–	–
Access information as required	✓	–	–	✓	–
Able to share feelings without experiencing premature closure	–	–	–	–	–
Normalisation of feelings	✓	–	–	–	–
Realistic expectations about birth	–	–	–	–	–
Realistic expectations about motherhood roles	–	–	–	–	–
Realistic expectations of professionals and health services	✓	–	✓	–	–
Challenge 'ideal'	–	–	–	–	–
Anticipate baby-centric focus	–	–	–	–	–
Acknowledge mother's own needs	–	–	–	–	✓
Acknowledge emotional lability	–	–	–	–	–
Anticipate fatigue, pain, and recovery from labour	✓	–	–	–	–
Adjust routines	✓	–	–	–	–
Focus beyond delivery and birth	–	–	–	–	–
Gain strength/joy from baby	–	–	–	–	–
Develop attachment with infant	–	–	–	–	–
Acquire practical skills	–	✓	–	–	–
Use of medication, alternative medicine and counselling	–	–	–	–	–
Cultural variation	–	–	–	–	–
Cultural barriers regarding communication or support	–	–	–	–	–

PoNDER	Home based	IPT phone	IPT Rose	IPT-brief	Telephone support	Newpin	Thinking Healthy
-	-	-	-	✓	✓	-	-
-	✓	✓	-	-	✓	✓	-
-	✓	✓	-	✓	✓	✓	-
-	-	-	-	-	-	-	-
-	-	✓	✓	-	✓	✓	-
✓	-	✓	✓	✓	-	-	-
-	✓	✓	-	✓	✓	✓	✓
✓	-	-	-	✓	✓	✓	-
✓	-	✓	✓	✓	-	-	-
-	-	-	-	-	-	-	✓
✓	✓	✓	✓	✓	-	-	✓
-	-	-	-	-	✓	-	✓
-	-	-	-	-	-	✓	✓
-	-	-	-	-	-	-	✓
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
✓	-	-	-	-	-	-	-
-	✓	-	-	-	-	-	✓
-	-	-	-	-	-	-	-
-	✓	✓	✓	✓	-	-	✓
-	-	✓	-	-	-	-	✓
-	-	-	-	-	-	-	-
-	-	-	-	✓	✓	-	-
-	-	-	-	✓	-	-	-

Other important features felt to help avoid PND included:

- being informed about and prepared for the risks of recurrence with subsequent pregnancies
- having a supportive GP
- not being put under pressure to breast feed if a woman feels uncomfortable doing so
- providing access to other new mums for example, groups.

An observation, not identified in the literature, related to 'help with identifying baby's cries'. A woman described how she 'felt anxious and found it hard to trust and to connect with [her] baby'. She suggested that help in interpreting baby's cries might be based on the work of an Australian musician who has 'observed babies' cries and discovered how we can interpret them before they become fully fledged; it is called Dunstan's baby language.<sup>391</sup>

### **Additional nuances emerging from the consultation**

One informant, while recognising that the strategies listed were important, highlighted practical difficulties, in implementing the strategies. For example, triggering asking for help may prove problematic because 'what a woman experiences is "normal" for her and therefore she might not know that she is depressed and therefore not ask for help'. Similarly, equipping a woman with strategies for identifying support is also dependent on a woman herself recognising that she needs support.

Delegation of tasks will not always be possible if a woman has no one to help her or if a partner is of no help and only increases her anxiety. Individual ability to 'manage everything themselves' varies from woman to woman and this needs to be recognised by health-care providers. Other comments also highlighted the individualised nature of response to help, advice and support:

*Anything that is said to an anxious or depressed woman can have a negative effect but also a positive effect. Her ability to cope must not be doubted. I think professionals need to be very aware.*

## **Summary of findings from realist synthesis review**

When planning a group-based intervention, an intervention is:

- more likely to succeed if a facilitator has been trained in group leadership and facilitation
- more likely to succeed if a facilitator has personal resources that they can bring to the group
- more likely to succeed if a facilitator creates a rapport with the group
- more likely to succeed if the group creates a favourable group dynamic
- less likely to succeed if the facilitator is seen as controlling or not responding to the wishes of the group.

When planning a one-to-one peer-based intervention, an intervention is more likely to succeed:

- if a peer has been matched on other than simple demographic variables
- when peers are recruited based on extroversion and good communication skills.

When planning a one-to-one professional mediated intervention, an intervention is more likely to succeed if:

- a relationship of trust is built up between the woman and the care provider
- the health-care provider has significant personal resources on which to draw.

A face-to-face intervention is more likely to be successful if a health-care provider responds to visual, verbal and non-verbal cues that reflect how a woman is feeling.

An intervention delivered at a distance is more likely to be successful if a supporter makes more contacts, has more conversations and leaves messages.

Training interventions for health professionals or peer supporters are more likely to be successful if they:

- include problem-solving strategies such as role play
- include demonstrations of practical skills that can subsequently be modelled with individuals and groups of women
- are relevant to the community as they equip health professionals or peer supporters with appropriate skills to deal with the range of people who receive services within a multicultural society.

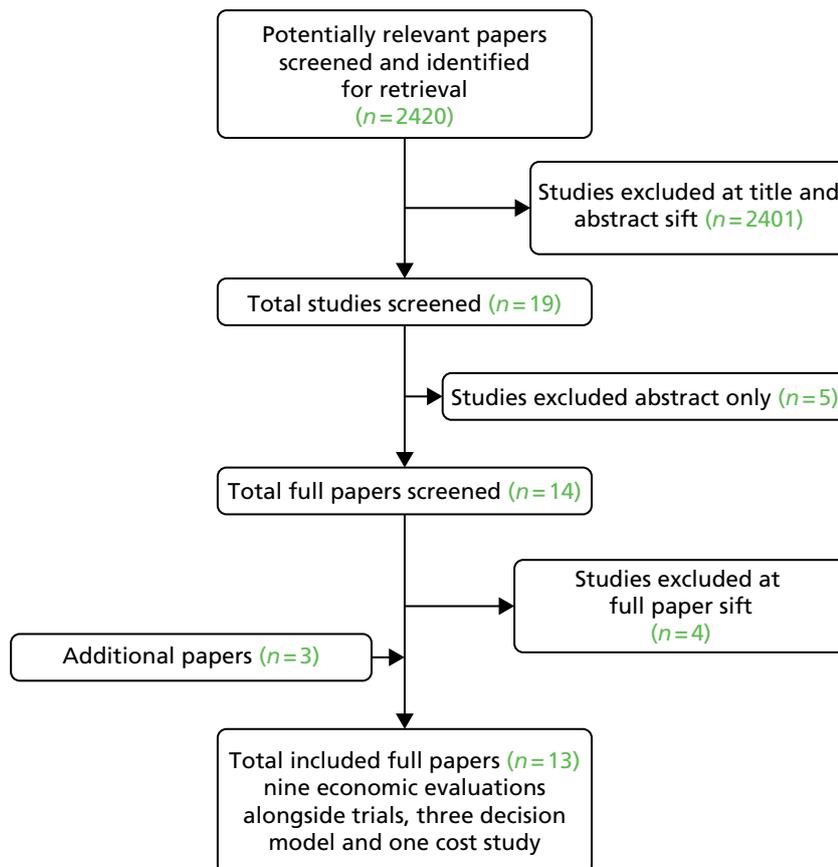


## Chapter 9 Assessment of cost-effectiveness

### Systematic review of existing cost-effectiveness models

#### Identification of cost-effectiveness studies

A comprehensive search was undertaken to identify systematically cost-effectiveness literature comparing the costs of different interventions to prevent PND. The search used a combination of thesaurus and free-text terms. The search comprised four facets combined together. Facet 1 comprised terms for the population (pregnant and postnatal women). Facet 2 comprised terms for prevention. Facet 3 comprised terms for known risk factors of PND. Facet 4 was generic terms for interventions. To retrieve cost-effectiveness literature, the four facets of the searches were combined with an economic evaluations search filters. The searches were performed by an information specialist (AC) in November and December 2012. The search strategy is reported in *Appendix 1*. The economic evaluations filter for MEDLINE is provided in *Appendix 1, Search strategy used for cost-effectiveness studies with economic evaluations filter for MEDLINE*. The list of electronic bibliographic databases searched for cost-effectiveness literature is presented in *Appendix 1, Electronic databases searched for the cost-effectiveness literature*. All citations were imported into Reference Manager version 12 and duplicates deleted. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart for the studies included in the health economics review is presented in *Figure 59*.



**FIGURE 59** The PRISMA flow chart of studies included in the health economics review.

### Study selection criteria and procedures for the health economics review

Papers were eligible for inclusion if they included costs or health-related quality-of-life measurements of PND that could be used in an economic decision model. As only a limited number of studies addressing prevention only were found, the inclusion criteria were kept broad to include papers evaluating screening for and treatment of PND, as well as prevention of PND in order to minimise the risk of potentially useful data being excluded. When multiple papers of the same studies were published, the most detailed or most recent (as appropriate) were selected, as recorded in *Table 55*.

There were 2420 papers were identified in the search. The reasons for exclusion at the full paper stage are shown in *Table 55*. There were two studies for which multiple papers for the same study were found<sup>45,57,392,393</sup> and in both cases the more detailed paper was selected.<sup>45,392</sup> An additional paper that was published after the search was completed was identified by a member of the project team who was an author on the paper and the paper was included.<sup>396</sup> It was not identified in a systematic way and other papers that were published after the search was conducted will have been missed. A second paper was identified by a member of the project team during the search for quantitative studies and was included in this health economic review.<sup>56</sup> This paper had been excluded at the title and abstract stage on the basis of the paper title. A further paper was identified during the economic modelling process.<sup>397</sup> It had been excluded at the title and abstract stage as PND or associated terms were not included in the title or abstract. Of the 13 papers identified,<sup>61,174,199,264,392-394,398-400</sup> nine described an economic evaluation that was conducted alongside a trial,<sup>53,61,174,199,264,299,392,393,400</sup> three papers described an economic decision model<sup>45,56,394</sup> and one paper described a cost study.<sup>398</sup>

### Overview of papers included in the health economics review

Although all included papers described an economic evaluation of a PND intervention, they were heterogeneous in many aspects, including the population, intervention, comparator and outcomes evaluated. The nine economic evaluations<sup>53,61,174,199,264,299,392,393,400</sup> and the one cost study<sup>398</sup> are described in *Table 56* and the three economic decision models<sup>45,56,392</sup> are described in *Table 57*.

### Population considered in the health economics review

The population under consideration differed between studies. Two of the studies evaluating treatment interventions included only women diagnosed with PND.<sup>392,399</sup> The other two studies that evaluated the incremental cost of PND included women regarded as having PND<sup>400</sup> and women at risk of PND.<sup>51</sup> In the Dagher *et al.*<sup>400</sup> study, women were regarded as having PND if they scored 13 or more on the EPDS at 5 weeks postpartum. The Petrou *et al.*<sup>174</sup> study included high-risk women identified antenatally at 26–28 weeks' gestation using the Cooper predictive index,<sup>401</sup> including both psychological and social risk factors. Women were diagnosed with PND using the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders-Third Edition Revised* diagnoses at 8 weeks, 18 weeks, 12 months and 18 months postpartum. The population in the screening papers<sup>45,56</sup> was all postnatal women. For the papers broadly evaluating the prevention of PND, the population differed with some studies including all postnatal women<sup>61,199,264,397</sup> and three studies evaluating women who had been identified as at increased risk of developing PND.<sup>61,174,396</sup>

**TABLE 55** Reasons for exclusion of full papers in the health economics review

First author, year, reference number	Reason for exclusion
Stevenson, 2010 <sup>392</sup>	Two papers on same study, <sup>392,393</sup> the more detailed paper was selected <sup>392</sup>
Paulden, 2009 <sup>57</sup>	Two papers on same study, <sup>45,57</sup> the more detailed paper was selected <sup>45</sup>
Buist, 2002 <sup>394</sup>	Non-economic evaluation, neither costs nor health-related quality of life reported
Darcy, 2011 <sup>395</sup>	Non-economic evaluation, neither costs nor relevant health-related quality of life reported

TABLE 56 Economic evaluations and the cost study included in the health economics review

Study (first author, year, reference number)	Country	Intervention	Population	Sample size	Outcomes measured	Main economic outcome reported	Quality-of-life measure	Time horizon	Result
Appleby, 2003 <sup>398</sup>	England	Health visitors giving cognitive-behavioural counselling	All postnatal women	97 health visitors	Number of health visitor contacts per depressed woman pre and post training; cost of health visitor time pre and post training	Change in health visitor costs	–	6 months	A non-significant decrease in mean costs occurred overall
Boath, 2003 <sup>399</sup>	England	PND treatment in a specialised PBDU compared with routine primary care	Women with PND	60 women (30 in the intervention and 30 in the control group)	Mean costs for women using PBDU and routine primary care; number of women depressed at 6 months	Incremental cost per successfully treated woman	–	6 months	A move from routine primary care to PBDU would incur an additional cost of £1945 per successfully treated women
Dagher, 2012 <sup>400</sup>	USA	–	Employed postnatal women	31 depressed, 607 non-depressed	Total health-care resources used at 11 weeks	Difference in health-care resources used	SF-12	11 weeks	The mean total cost for health-care resources used was US\$681 higher in the depressed group than in the non-depressed group
Dukhovny, 2013 <sup>396</sup>	Canada	Volunteer telephone-based peer support compared with usual care for the prevention of PND	High-risk women (screened postnatally)	610 women (296 in the intervention and 314 in the control group)	Cases of PND averted at 12 weeks (EPDS), health-service use, cost of intervention, volunteer opportunity cost, hired housework/child care and partner time of work	ICER (per case of PND averted)	–	12 weeks	An ICER of CA\$10,009 per case of PND avoided

continued

TABLE 56 Economic evaluations and the cost study included in the health economics review (continued)

Study (first author, year, reference number)	Country	Intervention	Population	Sample size	Outcomes measured	Main economic outcome reported	Quality-of-life measure	Time horizon	Result
Gold, 2007 <sup>397</sup>	Australia	Primary care and community-based interventions to promote the health of new mothers	All postnatal women in study areas	16 intervention areas: eight in the intervention and eight in the control group	Cost of the intervention and health-care resource use	Cost per woman of the intervention and cost per area	SF-36 (but value not reported in paper)	24 months	Average cost per woman of AU\$129 in rural areas and AU\$172 in urban areas. No significant differences in health-care resource use when intervention areas compared with control areas
MacArthur, 2003 <sup>264</sup>	England	Designed to enable midwifery care in community settings to be tailored to women's individual needs with a focus on the identification and management of physical and psychological health rather than on routine observations	All postnatal women in the selected GP clusters	1042 (485 in the control group and 557 in the intervention group)	Number and duration of health-service use; EPDS scores	Total health-care resources used. Cost per case of probable depression avoided	–	12 months	An incremental cost of £700 per case of probable depression prevented
Morrell, 2000 <sup>199</sup>	England	Additional postnatal care by trained community postnatal support workers	Postnatal women	623 (311 in the intervention group and 312 in the control group)	Number of contacts with health services, SF-36, Duke functional social support scale scores, EPDS scores, other measures of health outcomes	Change in health service costs	SF-36	6 week and 6 months	No significant differences in NHS resource use (except for the support worker service)

Study (first author, year, reference number)	Country	Intervention	Population	Sample size	Outcomes measured	Main economic outcome reported	Quality-of-life measure	Time horizon	Result
Morrell, 2009 <sup>61</sup>	England	Health visitor psychologically informed training intervention	At-risk women (screened postnatally) and all postnatal women	At-risk women 418; all women 2659	Cost of health visitor training, health service contacts for interventions and control, EPDS scores	Incremental costs and QALYs	SF-6D	6 and 12 months	Psychological approaches dominated control group – lower mean cost and higher mean QALY gain
Petrou, 2006 <sup>174</sup>	England	Additional health visitor visits	At-risk women (screened antenatally)	151 (74 in intervention group and 77 in control group)	Number of contacts with health services, length of PND	Incremental cost per month of PND avoided	–	18 months	Incremental cost per month of PND avoided of £43.10
Petrou, 2002 <sup>53</sup>	England	–	High-risk women	206	Number of contacts with health services	Incremental cost of treating PND	–	18 months	Mean cost per women with PND £2419; mean cost per women without PND £2027

Key: ICER, incremental cost-effectiveness ratio; PBDU, psychiatric parent and baby day unit; QALY, quality-adjusted life-year.

TABLE 57 Economic decision models included in the health economics review

Study (first author, year, reference number)	Country	Intervention	Population	Costs used	Quality-of-life measure	Outcome measure	Model time horizon	Results
Hewitt, 2009 <sup>45</sup>	England	Screening for PND (EPDS and BDI)	All postnatal women	Cost of screening; cost of treating PND	Moderate PND	ICER, incremental costs and incremental QALYs	1 year	EPDS (cut-off score of 6) ICER £41,103 per QALY. The ICER for other strategies ranged from £23,195 to £814,623
Stevenson, 2010 <sup>392</sup>	England	Group CBT for women with PND	Women with PND	Cost of group CBT	SF-6D (mapped from EPDS)	Mean cost per QALY	1 year	Mean cost per QALY of £46,462 (£36,062 PSA)
Campbell, 2008 <sup>56</sup>	New Zealand	Screening for PND (three-questionnaire)	All postnatal women	Cost of screening; cost of treating PND	Revicki and Wood general depression values	ICER, incremental costs, incremental QALYs, incremental PND cases detected, incremental PND cases resolved	1 year	ICER NZ\$3461 per QALY, NZ\$287 per additional case of PND detected, NZ\$400 per additional case of PND resolved

Key: ICER, incremental cost-effectiveness ratio; PSA, probabilistic sensitivity analysis; QALY, quality-adjusted life-year.

The methods used to identify higher-risk women also varied between studies. The Dukhovny *et al.*<sup>396</sup> and Morrell *et al.*<sup>61</sup> studies both used the EPDS but at different cut-off points (score greater than 9 and score greater than 11, respectively) and at different time points (24–48 hours after hospital discharge and at 6 weeks postnatally, respectively). Both the 2002 and the 2006 Petrou *et al.* papers<sup>53,174</sup> identified women antenatally at 26–28 weeks' gestation using the Cooper predictive index.<sup>401</sup>

### Interventions in the health economics review

Of the 13 included papers:

- Six were broadly concerned with the prevention of PND.<sup>61,174,199,264,396,397</sup>
- Four evaluated different strategies for treating PND<sup>53,392,399,400</sup> and, of these four, two were concerned with the additional cost of treating PND.<sup>53,400</sup>
- Two evaluated screening for PND.<sup>45,56</sup>
- One focused on the impact on health visitors' time before and after they were given training in cognitive-behavioural counselling.<sup>398</sup>

The health impact of the intervention on PND was measured in 10 of the studies;<sup>45,56,61,174,199,264,392–394,399</sup> the measure used differed between studies and included the number of cases of, or duration of PND and the EPDS scores. The Appleby *et al.*<sup>398</sup> study did not report the impact of the intervention on PND, as it was focused on the impact on health visitors and their time spent per depressed woman. The Petrou *et al.*<sup>53</sup> study and the Dagher *et al.*<sup>400</sup> study did not contain an intervention, as they were focused on the incremental cost of treating PND in a high-risk population and among employed women, respectively.

### Health-related quality-of-life data in the health economics review

Seven of the papers used a measure of health-related quality of life.<sup>45,56,61,199,392,397,400</sup> Five of these papers used a generic measure,<sup>61,199,392,397,400</sup> whereas the other two used a patient-generated utility value.<sup>45,56</sup> Of those that used a generic measure, two used the SF-6D,<sup>61,392</sup> two used the SF-36<sup>199,397</sup> and one used the SF-12.<sup>400</sup> The SF-36 and SF-12 cannot be used in their basic form to estimate quality-adjusted life-year (QALY) values but can be converted into the SF-6D, which provides values that can be used to estimate QALY values for use in an economic decision model. Only the mean and SD were reported for the SF-12 PCS and MCS at 5 postnatal weeks.<sup>400</sup>

The remaining two papers<sup>45,401</sup> used patient-generated utility values from a study by Revicki and Wood,<sup>402</sup> in which patients diagnosed with depression valued hypothetical depression-related states using a standard gamble approach. From this study,<sup>402</sup> Hewitt *et al.*<sup>45</sup> used the value given for moderate depression and applied this to women suffering with PND in their decision model. In contrast, Campbell *et al.*<sup>56</sup> used values for severe symptoms, mild or moderate symptoms, subthreshold symptoms, drug and psychological treatment response, and response without drug-associated disutility for different health states within their model. There are several issues with using the utility values from the Campbell *et al.*<sup>56</sup> study. First, the health state valued was a general depression health state and not a specific PND health state. Second, the sample size reported of 70 patients was relatively small and made up of patients suffering with depression and not specifically PND. Third, the health-state values were estimated using a patient population, although the preferred approach is to use a general population sample to value health states.<sup>403</sup>

The PoNDER trial<sup>61</sup> collected SF-6D data, using the UK tariff, at a baseline of 6 weeks and then at 6, 12 and 18 months postnatally, and these scores were used in the economic evaluation to calculate QALYs. The PoNDER trial<sup>61</sup> also collected data on the EPDS at the same time points. The paired data on the change in SF-6D and EPDS scores were used by Stevenson *et al.*<sup>392</sup> to map change in EPDS to change in SF-6D which was then used in the decision model.<sup>392</sup>

Comparison between the QALY estimates used in the three papers is not possible because of the way they were calculated and presented. Hewitt *et al.*<sup>45</sup> and Campbell *et al.*<sup>56</sup> used utility values from the Revicki and Wood study.<sup>402</sup> Hewitt *et al.*<sup>45</sup> used values of 0.63 for women with PND and 0.86 for women without PND

and Campbell *et al.*<sup>56</sup> used values of 0.30 for severe symptoms, 0.63 for mild or moderate symptoms, 0.80 for subthreshold symptoms and response with drug and psychological treatment and 0.86 for response without drug-associated disutility. Whereas Morrell *et al.*<sup>61</sup> presented the mean difference in QALY values at 6 months for women in the control and intervention groups, Stevenson *et al.*<sup>392</sup> presented the mean QALY gain.

### **Costs and health-care resources reported in the health economics review**

All included studies reported health-service use for interventions evaluating the prevention or treatment of PND. The nine economic evaluations alongside trials and the one cost study all reported costs associated with the resource use reported during the trials or study, whereas the decision models used estimates from the literature and expert opinion. Costs were inflated using the hospital and community health services index for studies based in England.<sup>404</sup> Canadian costs were inflated using the Canadian Consumer Price Index, health and personal care index,<sup>405</sup> US costs were inflated using the medical care Consumer Price Index,<sup>406</sup> Australian costs were inflated using the Australian Total Health Price Index<sup>407</sup> and the New Zealand costs were inflated using the average of the US and English indexes. The costs used in the economic evaluations identified in the literature review are presented in *Table 58*.

In their economic decision model, Hewitt *et al.*<sup>45</sup> included costs for screening using the EPDS and BDI based on 5 minutes of health visitors' time plus the licence fee for the BDI screening tool. The costs of treatment of PND were based on NICE clinical guidelines for the treatment of PND and were costed using relevant NHS reference costs. The cost for an undiagnosed woman with depression was estimated as one additional GP visit. Stevenson *et al.*<sup>392</sup> included costs for an intervention group CBT, which were based on resource use reported in a RCT and from expert opinion.<sup>408</sup> Campbell *et al.*<sup>56</sup> included the cost of screening and the cost of treatment based on unit costs of health staff and prescriptions. Screening was assumed to take 5 minutes using the EPDS and 3 minutes using the brief three PHQ questions.<sup>49</sup> A further 30-minute appointment with a GP was assumed for all women who screened positive. Half of the women who were severely depressed and did not respond to treatment were assumed to have 1 day of inpatient care in hospital and a further GP appointment. Treatment costs were adjusted for non-compliance, with 10% of the total treatment costs applied to these women.

For their economic evaluations alongside trials, Petrou *et al.*<sup>53</sup> estimated the health-care resources used from delivery to 18 months by the population of high-risk women and differentiated between those who developed PND and those who did not. Women diagnosed with PND had higher overall resource use, a reported difference of £392, which inflated at 2012/3 prices increased to £601.<sup>404</sup> Part of the Petrou *et al.*<sup>53</sup> 2002 sample included women who were taking part in the Petrou *et al.*<sup>174</sup> 2006 RCT. The report of 2006 trial<sup>174</sup> described resource use for the intervention group, additional health visitor visits, and the control group, routine primary care, and not for women who developed PND and those that did not. Mother and infant costs were included in both studies.

A broader perspective was taken in the Dukhovny *et al.*<sup>396</sup> study, which included both health-care and non-health-care costs. For the intervention, the public health cost and the opportunity cost of the volunteers' time was included. Costs for the intervention group and the usual-care group were reported at 12 weeks. These included health-care costs as well as costs for hired housework, hired child care and family/friend and partner time off work. Mother and infant costs were included.

The 2009 Morrell *et al.*<sup>61</sup> paper collected health-care resource use for women in their trial. Total resource use estimates were split into control and intervention groups over periods of 6 and 12 months. The primary analysis was carried out using the 6-month data, which included the costs incurred by the mother. A further analysis on the 12-month data was also carried out, which included the costs incurred by the mother and also the baby. The total resource use was further split into an analysis of at-risk women and an analysis of all women and additionally split between the two intervention approaches of CBA and PCA. The study also collected data on the additional training that would be required for health visitors to be able to provide the psychologically informed intervention sessions and estimated that the additional training would increase the health visitors' cost per hour of client time by £2, from £77 to £79.

TABLE 58 Costs used in economic evaluations included in the health economics review

First author, year, reference number	Resource use recorded in study	Category of cost	Cost	Base year	Inflated cost (2012/13)	Perspective
Appleby, 2003 <sup>398</sup>	Health visitor time, pre-training	Per woman	£81	1998	£135	Health-care system (NHS) perspective – health visitor time
		Per depressed woman	£116		£193	
		Per treated woman	£107		£178	
	Health visitor time, post-training	Per woman	£79		£132	
		Per depressed woman	£108		£180	
		Per treated woman	£109		£182	
Boath, 2003 <sup>399</sup>	Mean cost PBDU patient	PBDU cost	£991	1992/3	£1905	Health-care system (NHS) and wider societal costs perspective – health-care resource use. Mother and infant costs included
		GP and health visitor	£203		£390	
		Secondary care	£0		£0	
		Cost to client	£302		£581	
		Medication	£44		£85	
		Total	£1540		£2960	
		Total excluding cost to client	£1238		£2380	
	Mean cost per routine primary care patient	PBDU cost	£0	1992/3	£0	
		GP and health visitor	£266		£511	
		Secondary care	£309		£594	
		Cost to client	£25		£48	
		Medication	£32		£62	
		Total	£632		£1215	
		Total excluding cost to client	£607		£1167	
Dagher, 2012 <sup>400</sup>	Mean cost per woman with PND	Emergency department visits	US\$84	2001	US\$131	Health-care system perspective (USA) – health-care resource use. Unclear if infant costs included
		Inpatient hospital stays	US\$607		US\$949	
		Outpatient surgeries	US\$93		US\$145	
		Physician's office/urgent care centre visits	US\$124		US\$194	
		Mental health counselling	US\$138		US\$216	
		Total	US\$1046		US\$1636	

continued

**TABLE 58** Costs used in economic evaluations included in the health economics review (*continued*)

First author, year, reference number	Resource use recorded in study	Category of cost	Cost	Base year	Inflated cost (2012/13)	Perspective
	Mean cost per woman without PND	Emergency department visits	US\$13	2001	US\$20	
		Inpatient hospital stays	US\$80		US\$125	
		Outpatient surgeries	US\$138		US\$216	
		MD office/urgent care centre visits	US\$12		US\$189	
		Mental health counselling	US\$13		US\$20	
		Total	US\$365		US\$571 £343 <sup>a</sup>	
Dukhovny, 2013 <sup>396</sup>	Telephone-based peer support group	Public health costs	CA\$667	2011	CA\$674	Health-care system and wider societal costs perspective (Canada) – health-care resource use and wider costs included. Mother and infant costs included
		Volunteer opportunity costs	CA\$126		CA\$127	
		Hired housework	CA\$234		CA\$236	
		Hired child care	CA\$194		CA\$196	
		Family/friend and partner time of work	CA\$2374		CA\$2398	
		Health-care utilisation total	CA\$901		CA\$910	
		Nursing visits	CA\$252		CA\$255	
		Provider visits	CA\$371		CA\$375	
		Mental health visits	CA\$43		CA\$43	
		Inpatient admissions total	CA\$227		CA\$229	
		Mother	CA\$42		CA\$42	
		Infant	CA\$185		CA\$187	
		Ambulance	CA\$8		CA\$8	
		Total	CA\$4497		CA\$4543 £2474 <sup>a</sup>	

TABLE 58 Costs used in economic evaluations included in the health economics review (continued)

First author, year, reference number	Resource use recorded in study	Category of cost	Cost	Base year	Inflated cost (2012/13)	Perspective
	Routine primary care	Public health costs	NA	2011	NA	
		Volunteer opportunity costs	NA		NA	
		Hired housework	CA\$180		CA\$182	
		Hired child care	CA\$137		CA\$138	
		Family/friend and partner time of work	CA\$1983		CA\$2003	
		Health-care utilisation total	CA\$1080		CA\$1091	
		Nursing visits	CA\$256		CA\$259	
		Provider visits	CA\$373		CA\$377	
		Mental health visits	CA\$57		CA\$58	
		Inpatient admissions total	CA\$389		CA\$393	
		Mother	CA\$73		CA\$74	
		Infant	CA\$316		CA\$319	
		Ambulance	CA\$6		CA\$6	
		Total	CA\$3380		CA\$3415	
					£1860 <sup>a</sup>	
Gold, 2007 <sup>397</sup>	Cost of the intervention	Rural, cost per woman	AU\$172	2002	£127 <sup>a</sup>	Cost of the intervention and health-care resource use (Australia)
		Urban, cost per woman	AU\$129		£95 <sup>a</sup>	
		Rural, cost per area	AU\$272,490		£200,959 <sup>a</sup>	
		Urban, cost per area	AU\$313,900		£231,499 <sup>a</sup>	
MacArthur, 2003 <sup>264</sup>	Control group	Total costs	£542	1998	£902	Health-care system (NHS) perspective – health-care resource use. Infant costs not included
		Postnatal care cost	£126		£209	
	Intervention group	Total costs	£470		£783	
		Postnatal care costs	£190		£317	

continued

**TABLE 58** Costs used in economic evaluations included in the health economics review (*continued*)

First author, year, reference number	Resource use recorded in study	Category of cost	Cost	Base year	Inflated cost (2012/13)	Perspective
Morrell, 2000 <sup>199</sup>	Cost of intervention, additional support worker visits	–	£160	1996	£279	Health-care system (NHS) perspective – cost of the intervention and health-care resource use. Mother and infant costs included
	Total resources, intervention (6 months)	–	£815		£1420	
	Total resources, control (6 months)	–	£639		£1113	
Morrell, 2009 <sup>61</sup>	Total resources used, all women (6 months)	Control	£272	2003/4	£350	Health-care system (NHS) perspective – health-care resource use. Mother and infant costs included
		CBA	£253		£326	
		PCA	£250		£322	
	Total resources used, at-risk women (12 months)	Control	£374		£481	
		CBA	£329		£423	
		PCA	£353		£454	
Petrou, 2006 <sup>174</sup>	Cost of additional health visitor visits	–	£121	2000	£185	Health-care system (NHS) perspective – health-care resource use. Mother and infant costs included
Petrou, 2002 <sup>53</sup>	Total resources used, women with PND	–	£2419	2000	£3710	Health-care system (NHS) perspective – health-care resource use. Mother and infant costs included
	Total resources used, women without PND	–	£2027		£3109	
Hewitt, 2009 <sup>45</sup>	Cost of intervention	EPDS (5 minutes health visitor time)	£8	2006/7	£9	Health-care system (NHS) perspective – cost of screening and treatment
		BDI (5 minutes health visitor time and license fee)	£9		£10	
	Cost of treatment of PND	Structured psychological therapy	£447		£517	
		Supportive care	£414		£479	
Stevenson, 2010 <sup>392</sup>	Group CBT: One session per week for 8 weeks, 2-hour long, groups of four to six women	–	£1500	2007/8	£1687	Health-care system (NHS) perspective – cost of intervention/treatment

**TABLE 58** Costs used in economic evaluations included in the health economics review (*continued*)

First author, year, reference number	Resource use recorded in study	Category of cost	Cost	Base year	Inflated cost (2012/13)	Perspective
Campbell, 2008 <sup>56</sup>	Psychological therapy (IPT- or CBT-based intervention): eight sessions (50 minutes each), provided by a clinical psychologist	–	NZ\$268	2006/7	NZ\$318 £166 <sup>a</sup>	Health-care system perspective (New Zealand) – cost of screening and treatment
	Social support: three group sessions (five women) and three telephone contacts by a qualified counsellor (30 minutes each)	–	NZ\$59		NZ\$70 £37 <sup>a</sup>	
	Combination therapy: 16 sessions (50 minutes each) of psychological therapy by a clinical psychologist and 12 weeks' antidepressant therapy	–	NZ\$561		NZ\$666 £347 <sup>a</sup>	

Key: GBP, Great British pounds; PBDU, psychiatric parent and baby day unit; NA, not applicable.

a Costs converted using XE Currency Converter ([www.xe.com](http://www.xe.com)) exchange rates correct as of 11 March 2014: 1 AU\$ = 0.55 GBP; 1 USD = 0.6 GBP; 1 CAD = 0.545 GBP; and 1 NZ\$ = 0.52 GBP.

The Morrell *et al.*<sup>199</sup> paper reported the cost of the intervention under study (additional care by trained community postnatal support workers) and the total health-care resources used by the intervention and control groups. Total health-care resource use was reported at 6 weeks and 6 months. Mother and infant costs were included.

MacArthur *et al.*<sup>264</sup> collected total health-care resources used for the intervention and control groups in three matrices (presented in *Table 59*). A subset of the total health-care resources, referred to as postnatal care costs, was also presented. These costs included the standard community services offered to postnatal women including midwife home visits, GP home visits and the postnatal check. For all matrices, total costs were lower in the intervention group than in the control group, while postnatal care costs were higher in the intervention group than in the control group for matrices A and B and lower for matrix C. Costs for matrix A were estimated based on crude data from midwives' diaries and GPs' records. A further analysis was conducted that included replacement data from women's health diaries when estimates from midwives were unavailable (matrix B). Using this approach the total costs for the control group decreased from £542 to £479, whereas the cost of postnatal care increased slightly from £126 to £134. A third analysis using the women's health diaries to estimate the frequency of midwives' and GP appointments was undertaken (matrix C). Using this approach the total costs decreased compared with matrix A to £509 and the costs of postnatal care also increased compared with both matrices A and B to £161. The total cost for the intervention group also fell, from £470 to £457, and the costs for postnatal care decreased from £190 to £152 (see *Table 66*). As the intervention was not intended to impact on health visitors, health visitor costs were not included in the total resource use. Costs incurred by the babies were also not included.

Boath *et al.*<sup>399</sup> reported the median and mean of total cost for women receiving treatment in a specialised psychiatric parent and baby day unit and for women receiving routine primary care. Costs to the mother and baby were included in the analysis.

**TABLE 59** Costs by matrices A, B and C derived from trial of midwifery redesigned postnatal care

Matrix	Category of cost	Mean of cluster means	
		Control (£)	Intervention (£)
Matrix A	Total costs	542	470
	Postnatal care costs	126	190
Matrix B	Total costs	479	469
	Postnatal care costs	134	190
Matrix C	Total costs	509	457
	Postnatal care costs	161	152

Data source: MacArthur *et al.*<sup>264</sup>

Appleby *et al.*<sup>398</sup> concentrated on what the impact of additional training would be in terms of the amount of time health visitors spent with the women under their care. The amount of time spent with each woman, depressed woman and treated woman before and after the training on cognitive-behavioural counselling, was recorded and costed using the 1998 *Unit Costs of Health and Social Care*.<sup>409</sup> Further details on the definition of depressed or treated women were not provided.

The Dagher *et al.*<sup>400</sup> study estimated the extra health-care resources used by women with PND compared with those used by women without PND. Health-care use was estimated using self-reported data from the women themselves. The data on health-care use were then costed using 2001 unit prices of services provided by the Blue Cross Shield of Minnesota. The incremental cost for women with PND compared with women without PND was US\$1065. Converted to British pounds using exchange rates correct as of March 2014, this is equivalent to a difference of £641. It is not clear whether or not this included the health-care costs of the infant as well as the mother.

Gold *et al.*<sup>397</sup> evaluated the economic side of the PRISM (Program of Resources, Information and Support for Mothers) trial. The PRISM trial evaluated primary care and community-based strategies to improve the physical and mental health of new mothers. Costs were collected in relation to the intervention and health-care resource use in the intervention and control areas. No significant differences were found in health-care resource use between the areas. The cost of the intervention was estimated in Australian dollars at AU\$272,490 in rural communities and AU\$313,900 in urban areas. Inflated from 2002 prices to 2012/13 prices using the Australian Total Health Price Index<sup>407</sup> and converted to British pounds using exchanges rates correct as of July 2014, which resulted in costs of £200,959 and £231,499, respectively. The average cost per woman was AU\$172.40 for rural areas and AU\$128.70 for urban areas which resulted in a cost of £127 and £95, respectively, when inflated and converted.

The differences in the population, intervention, and objective for each study make a comparison of the different costs across the papers difficult. However, as a number of papers report costs of treatment, a speculative comparison could be made. Boath *et al.*<sup>399</sup> at 6 months reported the highest cost for those undergoing treatment in the parent and baby day unit at £2380 and a lower cost for those undergoing routine primary care at £1167. Stevenson *et al.*<sup>392</sup> estimated the cost of treating PND with group CBT-based intervention as £1687, but did not include any additional GP appointments or secondary care that a woman with PND may have received. Hewitt *et al.*<sup>45</sup> estimated the total cost of standard care for women with PND as £996. This is lower than the best comparator for the cost of routine primary care reported by Boath *et al.*<sup>399</sup> Petrou *et al.*<sup>53</sup> found a difference of £601 in health-care resources used between high-risk women with PND and high-risk women without PND. This is the lowest of all the estimates of the PND treatment studies, possibly because the control group comprised high-risk women rather than a universal population of all women and, therefore, it estimated the additional cost of treating PND in a high-risk population. The difference between the resource use of women with PND and the resource use of non-high-risk women may have been greater. Based on these figures, £1000 would be a reasonable estimate for the cost of routine care for women with PND.

In the studies not based in England, with costs converted to British pounds, Dagher *et al.*<sup>400</sup> estimated the incremental cost as £641. This is similar to that found in the Petrou *et al.*<sup>53</sup> study, but lower than other England-based estimates. This could be because of differences in the health-care systems of the two countries. It could also be as a result of the way health-care resource use was recorded. Dagher *et al.*<sup>400</sup> relied on self-reported estimates of health-care use from the women in the study and used a recall period of up to 3 months, whereas Boath *et al.*<sup>399</sup> used women's case notes, Stevenson *et al.*<sup>392</sup> used cost estimates from a RCT and Hewitt *et al.*<sup>45</sup> costed out treatment guidelines.

### **Main results reported in the health economics review**

The outcomes and time horizons evaluated varied between the studies. For the economic evaluations alongside trials, outcomes were evaluated at various time points between 12 weeks and 24 months. Both decision models used a time horizon of 1 year. Four papers reported costs only.<sup>53,397,398,400</sup> Appleby *et al.*<sup>398</sup> found that giving health visitors training in cognitive-behavioural counselling was associated with a statistically non-significant decrease in mean costs incurred by health visitors. Petrou *et al.*<sup>53</sup> found a lower mean cost per high-risk woman without PND than per woman with PND in terms of total health-care resources used with a difference of £601 in 2012/3 prices. The Morrell *et al.*<sup>199</sup> paper found no significant difference between NHS resource used in the intervention and control groups apart from the cost of the intervention itself. The other economic evaluations<sup>264,396</sup> alongside trials used incremental costs against a variety of outcome measures including the number of cases of PND prevented, month of PND avoided<sup>174</sup> and incremental cost per successfully treated woman.<sup>399</sup> The Morrell *et al.*<sup>61</sup> paper reported incremental costs and QALYs and found that psychological interventions dominated the control group, with lower mean costs and a higher mean QALY gain. Dagher *et al.*<sup>400</sup> reported an incremental cost of US\$1065 for women with PND compared with women without PND.

All three decision models reported a cost per QALY and included univariate and multivariate sensitivity analyses. Hewitt *et al.*<sup>45</sup> found that the incremental cost-effectiveness ratio (ICER) for the screening intervention EPDS (cut-off score of 16) to be £41,103 per QALY. This ranged between £23,195 and £814,623 for different screening strategies compared in the sensitivity analyses. The highest ICER values were found when a low EPDS cut-off value was used. Campbell *et al.*<sup>56</sup> reported an ICER of NZ\$3461, a cost per additional case of PND detected of NZ\$287, and a cost per additional case of PND resolved of NZ\$400. In the sensitivity analyses the ICER ranged from NZ\$2959 to NZ\$9607 per QALY. Stevenson *et al.*<sup>392</sup> reported a mean cost per QALY of £46,462 for group cognitive therapy for women with PND. In the sensitivity analyses, this ranged between £19,230 and £61,948, with the lower value representing a set of values favourable to CBT-based intervention and still believed to be plausible. A probabilistic sensitivity analysis (PSA), an expected value of perfect information analysis (EVPI) and an expected value of partial perfect information (EVPPI) on four variables were also conducted. The results of the PSA reported a mean cost per QALY of £36,062, with the results suggesting that some runs had a cost per QALY of under £30,000. The results of the EVPI and EVPPI estimated a maximum value of £64M to remove all uncertainty with large values for removing uncertainty in the cost treatment variable and the relationship between the EPDS and SF-6D variable.

### **Summary of appropriateness of previously published models**

None of the reviewed models were entirely appropriate for answering the decision problem addressed within this review. Thus, a de novo model was constructed.

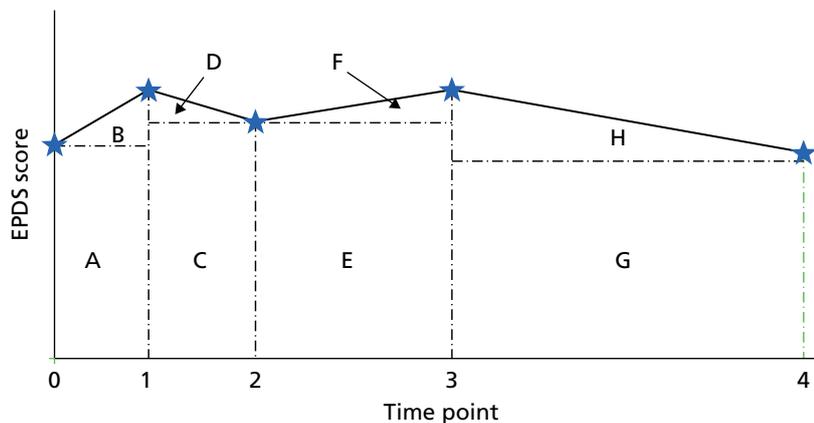
## **The de novo model**

### **The conceptual model**

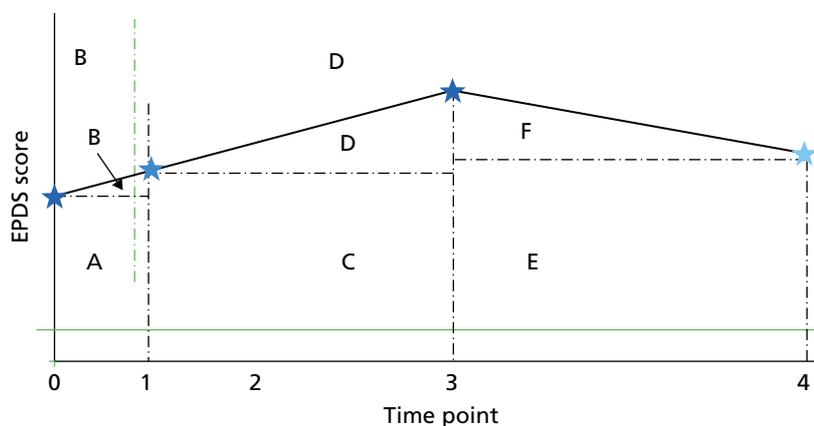
The purpose of the de novo model was to estimate the incremental QALYs and incremental costs of each intervention in the NMA of EPDS scores compared with usual care. From these data, fully incremental analyses could be conducted to establish the most cost-effective intervention and the robustness of these conclusions. The conceptual model used an area under the curve approach to calculate the summation of weekly EPDS scores over a year. Data from the NMA of EPDS values identified five time points: baseline (common to all treatments), 6–8 weeks, 3–4 months, 6–7 months and 1 year. For simplicity, the EPDS score between assessments was approximated by a linear relationship. A further simplification was that deaths were not included in the model; it was believed that this would have little impact on the results given the dearth of information on the effect (if any) of interventions on mortality.

A 1-year time horizon was chosen to align with previous modelling work<sup>392</sup> and to acknowledge the fact that PND is assumed to be 'standard' depression after 12 months postpartum and that different treatment options may become available to the woman. However, it is implausible that any change in utility would immediately be removed after 12 months and therefore a sensitivity analysis assessed the impact of altering the assumption that all effects were assumed to have dissipated at 12 months. This analysis has the limitation that the duration of residual benefit is uncertain and that other events, such as a subsequent pregnancy, could occur that would limit the generalisability of the results in all women. For the base-case discounting was not applied. For the sensitivity analysis a discount rate of 3.5% was applied to utility in the second year as recommended by NICE.<sup>403</sup>

Figure 60 illustrates the approach in which data exist for all time points (which is the case only for usual care), whereas Figure 61 provides an illustrative example when only one data point (in addition to the assumed baseline value) is reported. The summation of EPDS scores for other combinations of numbers and position of reported time points are calculated using the same method. Separate analyses were undertaken for the universal, the selective and the indicated preventive intervention groups and the results will be presented in this order.



**FIGURE 60** An illustrative example of calculating the area under the curve when data for an intervention are available for all time points.



**FIGURE 61** An illustrative example of calculating the area under the curve when data for an intervention are available only at time point 3.

For reasons that will be detailed later, the area under the curve is divided into two constituent parts: until time point 1 (0 to 6–8 week data) and from time point 1 to time point 4 (6–8 weeks to 1 year). In the initial time period, the area under the curve is calculated by the addition of rectangle A to triangle B. In the subsequent time period, the area under the curve is the summation of rectangles C, E and G and of triangles D, F and H.

In this example, in order to differentiate between the EPDS values before time points 0 and 1 and between time points 1 and 4, an estimation of the EPDS value at time point 1 must be made. This estimation assumes a linear progression between time points 0 and 3 (for which data were reported in this illustrative example), with the estimated point depicted by the blue star at time point 1 in *Figure 61*. In the base case it was assumed that at 1 year (time point 4) the EPDS values would be equal for the intervention and usual care. This is depicted as the light-blue star at time point 4 in *Figure 61*. In order to assess the impact, where it was assumed that any change in EPDS score would persist beyond 1 year, a sensitivity analysis was undertaken which assumes that the value at time point 4 would be the average between the last reported data point and the usual-care value at time point 4.

### Model parameters

The parameters required for the model have been divided into four broad categories:

1. the effectiveness data for each intervention
2. the incremental costs associated with each intervention
3. the relationship between utility and EPDS scores
4. the relationship between total health costs and EPDS scores.

### The effectiveness data for each intervention

The data used within the mathematical model were taken directly from the Convergence Diagnostic and Output Analysis (CODA) samples generated from the NMA of EPDS values. This approach has the advantage that correlation between parameters is preserved.

### The incremental costs associated with each intervention

The incremental cost was estimated for each intervention for each study included in the NMA of EPDS scores. The incremental cost was assumed to be the additional costs associated with the intervention above usual care costs. When more than one study was used to inform the effectiveness of an intervention, for example both Norman *et al.*<sup>123</sup> and Songøygard *et al.*<sup>129</sup> were used for the exercise intervention in the universal population, the average cost from the two studies was taken. This simplistic approach was deemed reasonable because of the assumed between-study heterogeneity values used in the NMAs which would provide similar weightings for each study in calculating intervention efficacy.

The size of groups for the group interventions was based on information provided in the studies when available and advice from clinical experts otherwise. The group size was assumed to be 12 for exercise-based intervention groups, eight for CBT group-based interventions and six for antenatal group interventions. The total cost for group interventions was based on the length and number of group sessions multiplied by the staff costs and then divided by the number in the group to give a cost per woman. When the length of appointment or session was not specified in the study, it was assumed to be 2 hours for antenatal group sessions and 1 hour for CBT-based interventions or IPT interventions. For both calcium and selenium, the intervention cost is assumed to be the drug cost only, with no additional tests assumed to be required because of the prescribing of these supplements. For educational information that is given out or posted to recipients, we assumed a cost of £1 per booklet or educational information to cover the costs of postage and printing and accompanying staff costs.

Some studies included an economic evaluation. Although these studies included a difference in total cost of health-care resource use for the intervention compared with the control, the absolute cost of the intervention was used. This was done for consistency with the costing approach applied to the other interventions in which an economic evaluation had not been carried out. In one case, the analysis by Morrell *et al.*<sup>61</sup> of all women, the only change in total resource use was presented for the costs of CBT and PCA. For this reason, change in total resource use has been used, which results in a negative cost for the intervention. In the case of at-risk women, Morrell *et al.*<sup>61</sup> presented change in health visitor costs and change in total resource used. As the intervention focused on health visitors, the change in health visitor costs was used to cost the intervention. In the CBT group the intervention resulted in fewer health visitor visits and, therefore, a negative cost for the intervention was applied.

A NHS and personal social services perspective was taken. This meant that only costs that would fall on the NHS or personal social services in full were included in the costing of the interventions. Other costs, such as volunteer opportunity costs and loss of earnings, were excluded.

Staff costs were taken from the 2013 *Unit Costs of Health and Social Care*<sup>404</sup> and are outlined in *Table 60*. The cost per hour of client contact with qualifications was used when available. A cost per hour was available for all staff roles, apart from GP costs (with or without qualifications). For some staff roles, for example clinical psychologist, health visitor, community nurse and social worker, both a unit cost per hour and a cost per hour of client contact were available. The average difference between the unit cost per hour and the rate per hour of client contact (+182%), was applied to those staff roles for which only a cost per hour was available. However, the rates for social workers were excluded from the calculation of average difference, as the difference value was deemed to be an outlier, being an increase of 383%. When both community and hospital costs were provided for a staff role, the average of the two was used. In addition to those costs presented in *Table 60*, a mean cost of face-to-face contact was used for health visitors at £47 and for a GP appointment lasting 11.7 minutes at £41.

**TABLE 60** Staff costs from the *Unit Costs of Health and Social Care*

Role	Unit cost per hour (£)	Per hour of client contact, including qualification, costs (£)
Physiotherapist (average community and hospital)	35.00	63.62 <sup>b</sup>
Occupational therapist (average community and hospital)	35.00	63.62 <sup>b</sup>
Community clinical psychologist	59.00	159.00 <sup>a</sup>
Health visitor	49.00	71.00
Midwife (community nurse)	48.00	70.00
Clinical support worker nursing (community) <sup>a</sup>	21.00	30.00 <sup>b</sup>
CBT-based intervention <sup>a</sup>	50.00	99.00
Hospital dietitian	35.00	63.62 <sup>b</sup>
Speech and language therapist (average community and hospital)	35.00	63.62 <sup>b</sup>
GP per patient contact lasting 11.7 minutes	–	–
GP out of office per hour	–	267.00
Social worker (children's services)	57.00	218.00

**Note**

a Qualification costs not included.

b Increased using an average of 182%.

Data source: Personal Social Services Research Unit.<sup>404</sup>

The 2013 *Unit Costs of Health and Social Care*<sup>404</sup> did not include costs for midwives. From the economic evaluations that had included the cost of midwives, two had used local costs<sup>61,174</sup> and one had used the cost of a district nurse.<sup>264</sup> The second approach was followed and the cost for a community nurse was used as a substitute for the cost of a midwife.

For CBT-based interventions and IPT-based interventions, when it was not specified in the study who delivered the content or when the content was delivered by psychology students, the reported cost of CBT-based interventions in the 2013 *Unit Costs of Health and Social Care*<sup>404</sup> was used. When it was specified that a clinical psychologist had given the intervention, the cost of a clinical psychologist was used.<sup>404</sup> Any additional costs of training have not been included in the staff costs unless the additional cost was specified in the study.<sup>61</sup>

The costs of each intervention are detailed separately for the three populations.

### The costs associated with interventions for the universal preventive interventions

For the universal preventive interventions, a number of assumptions were made for specific interventions. A general description of the interventions is given in *Table 61*.

Norman *et al.*<sup>123</sup> included an education session for the intervention group as well as the exercise sessions. The education sessions were given by physiotherapists, dietitians, speech pathologists, health psychologists and midwives. We have assumed that four out of the eight sessions were given by physiotherapists and the other professions gave one session each. For Matthey *et al.*,<sup>184</sup> the baby play intervention and the education on preparing for parenting were both delivered by a clinical psychologist and either a social worker or occupational therapist. For simplicity, the average cost of a social worker and occupational therapist was used in addition to the clinical psychologist cost. The Gunn *et al.*<sup>225</sup> study specified that the 6-week GP appointment was changed to a 1-week appointment. However, women could still have the 6-week appointment if required. In costing the intervention, a conservative approach was taken and it was assumed that all women would have an additional GP appointment.

In the case of the two studies looking at the effect of supplements,<sup>208,212</sup> the costs of the supplements were taken from the *British National Formulary*.<sup>410</sup> In the Mokhber *et al.*<sup>212</sup> study, women took 100 µg of selenium per day for 6 months. A 10-ml bottle contained 500 µg of selenium and, therefore, 37 full bottles were required for the 6-month period. Horison-Hohner *et al.*<sup>208</sup> specified that the 2000 mg of calcium per day was started at between 11 and 21 weeks' gestation. The assumption was made that the midpoint of 16 weeks would be used and therefore the calcium would be taken for 24 weeks assuming a normal pregnancy duration of 40 weeks. A 60-tablet pack of 1000 mg tablets would last 30 days and a woman would therefore require six whole 60-tablet packs over this period.

No incremental cost was applied to the Shields *et al.*<sup>219</sup> study for the universal preventive interventions which ensured that each woman saw a named midwife or member of the same team throughout the pregnancy and postnatal.

The following approaches were used for the studies that had an economic evaluation component to the trial. To cost the MacArthur *et al.*<sup>264</sup> study, postnatal care costs were calculated using the matrix A approach to costing, which uses data from midwives' diaries and GP records. For the Morrell *et al.*<sup>61</sup> study, the differences between total costs for PCA-based and CBT-based interventions and the cost of usual care were used because no figures related to the cost of the intervention were given for the all-women group. For the earlier Morrell *et al.*<sup>199</sup> economic evaluation, the additional cost of the support worker visits given in the paper were used as the cost of the intervention. Costs from all economic evaluations were uplifted to 2012/3 prices using the hospital and community health services.<sup>404</sup>

TABLE 61 Assumed intervention costs for the universal preventive interventions

Type of intervention	Study	Intervention	Cost (£)	Source reference
Educational information	Norman, 2010 <sup>123</sup>	Education group received written education material every week for 8 weeks through the post	8.00	–
Exercise	Norman, 2010 <sup>123</sup>	8-week programme of 1 hour of group physical therapy exercises given by a physical therapist and a 30-minute education session delivered by health-care professionals each week	67.86	PSSRU <sup>404</sup>
	Songøygard, 2012 <sup>129</sup>	12-week programme of 1-hour group sessions led by physiotherapists	63.62	PSSRU <sup>404</sup>
		Average cost	65.74	–
Selenium	Mokhber, 2011 <sup>212</sup>	100 µg of selenium per day until delivery taken for approximately 6 months	149.85	BNF <sup>410</sup>
Booklet on PND	Sealy, 2009 <sup>186</sup>	Posted an educational pamphlet at 4 weeks postnatal	1.00	–
Midwifery redesigned postnatal care <sup>a</sup>	MacArthur, 2003 <sup>264</sup>	Changes to postnatal care to systematic identification and management of women's health problems, led by midwives with GP contact only when required	107.64	MacArthur <i>et al.</i> <sup>264</sup>
Baby play	Matthey, 2004 <sup>184</sup>	One additional session 'baby play' and additional mail-outs (one antenatal and one postnatal); the extra session run by a clinical psychologist (author) and either a female social worker or occupational therapist	101.94	PSSRU <sup>404</sup>
Education on preparing for parenting	Matthey, 2004 <sup>184</sup>	One additional session which focused on postpartum psychosocial issues and additional mail-outs (one antenatal and one postnatal); the extra session run by a clinical psychologist (author) and either a female social worker or occupational therapist	101.94	PSSRU <sup>404</sup>
PCA-based <sup>b</sup> intervention	Morrell, 2009; <sup>61</sup> all women	Psychologically informed interventions by health visitors	–28.00	Morrell <i>et al.</i> <sup>61</sup>
CBT-based <sup>b</sup> intervention	Morrell, 2009; <sup>61</sup> all women	Psychologically informed interventions by health visitors	–24.00	Morrell <i>et al.</i> <sup>61</sup>
Early contact	Gunn, 1998 <sup>225</sup>	Changing the 6-week GP appointment to a 1-week appointment (assumes all women still have 6-week appointment in addition)	41.00	PSSRU <sup>404</sup>
Calcium	Harrison-Hohner, 2001 <sup>208</sup>	Women prescribed 1000 mg of calcium twice a day between 11 and 21 weeks' gestation until birth	78.96	BNF <sup>410</sup>
Midwife-managed care	Shields, 1997 <sup>219</sup>	Midwife-managed care – seen by same named midwife (or team) through pregnancy, birth and postnatal period	0.00	–
Primary care and community care strategies	Lumley, 2006 <sup>147</sup>	Education and training programmes for GPs and MCHNs. 10 hours of workshops, simulated patients, two clinical practice audits and evidence-based guidelines for GPs. A similar education programme provided for MCHNs with 12 hours training (year 1) and 3 hours (year 2). Information kit for mothers, appointment of full-time community development officer	94.79	Gold <i>et al.</i> <sup>397</sup>
Social support <sup>a</sup>	Morrell, 2000 <sup>199</sup>	Additional support worker visits	279.00	Morrell <i>et al.</i> <sup>199</sup>

Key: MCHN, maternal and child health nurse; PSSRU, Personal Social Services Research Unit.

a These studies included a change in total health-care costs which are discussed in the text.

b Only change in total resource use available for these studies.

Both MacArthur *et al.*<sup>264</sup> and Morrell *et al.*<sup>199</sup> included a change in total health-care costs. For MacArthur *et al.*,<sup>264</sup> the use of the change in total health-care cost would make the intervention of midwifery redesigned care cost saving. The intervention would go from costing £108 to saving £119 per woman compared with usual care. For Morrell *et al.*,<sup>199</sup> the use of change in total health care would increase the cost of the intervention of social support from £279 to £307 per woman.

The PRISM trial, evaluated by Lumley *et al.*,<sup>147</sup> also had an economic evaluation, reported in Gold *et al.*<sup>397</sup> The cost per woman in urban areas was used to cost the intervention, as it was felt that this would better represent the cost of applying the intervention in England (and Wales) than the rural cost. The cost was uplifted using the Australia Total Health Costs Index and converted to British pounds (£) using an exchange rate of AU\$0.55 to £1, which was applicable in July 2014.<sup>411</sup>

### The costs associated with interventions for the selective preventive interventions

For the selective preventive interventions an additional assumption was made for the Barnes *et al.*<sup>149</sup> study, which evaluated volunteer home visits. Volunteers were given 12 half days of training. The cost of the training was estimated to be £150 per day per six volunteers. This gave a cost of £150 per volunteer for training and it was assumed that the volunteers would see only one family; the impact of this assumption on the overall results will be discussed in the results section. A general description of the other interventions is given in *Table 62*.

**TABLE 62** Assumed intervention costs for the selective preventive interventions

Type of intervention	Study	Intervention	Cost (£)	Source of cost information
Midwife-led debriefing	Zlotnick, 2011 <sup>163</sup>	1-hour session with a trained midwife	70.00	Small <i>et al.</i> <sup>223</sup>
IPT-based intervention	Chabrol, 2002 <sup>158</sup>	Five individual 1-hour sessions – provided by study interventionists	495.00	PSSRU <sup>404</sup>
CBT-based intervention	Barnes, 2009 <sup>149</sup>	1-hour prevention session between 2 and 5 days postnatally given by master level psychology students	99.00	PSSRU <sup>404</sup>
Peer support	Buist, 1999 <sup>189</sup>	Volunteers 12 half-days of training	150.00	PSSRU <sup>404</sup>
Education on preparing for parenting	Sen, 2006 <sup>191</sup>	Four additional classes, run by midwives, nurse/psychologist, psychologist	275.67	PSSRU <sup>404</sup>
	Zlotnick, 2011 <sup>163</sup>	One individual visit prenatal and postnatal, five antenatal group sessions lasting 2 hours	256.67	PSSRU <sup>404</sup>
–		Average cost	266.17	–

Key: PSSRU, Personal Social Services Research Unit.

### The costs associated with interventions for the indicated preventive interventions

For indicated preventive interventions a number of assumptions were made for specific interventions. A general description of the interventions is given in *Table 63* and, when needed, more detail is provided.

For the three studies that had an economic evaluation component, we used the additional health visitor costs from Petrou *et al.*,<sup>174</sup> the public health costs from Dukhovny *et al.*<sup>396</sup> and the difference from the control arm in terms of the cost of health visitor contacts from Morrell *et al.*,<sup>61</sup> for both the CBT and PCA arms of the trial for at-risk women.

TABLE 63 Assumed intervention costs for the indicated preventive interventions

Type of intervention	Study	Intervention	Cost (£)	Source of cost information
Midwifery continuous care	Marks, 2003 <sup>224</sup>	Named midwife who as far as possible followed the woman through pregnancy, delivery and postnatally	0.00	–
Promoting parent–infant interaction	Armstrong, 1999; <sup>164</sup> Fraser, 2000 <sup>252</sup>	Average of 22 home nurse visits over 12 months. A weekly case conference held where child health nurses met with team’s social worker and community paediatrician	1849.47	PSSRU <sup>404</sup>
	<sup>a</sup> Petrou, 2006 <sup>174</sup>	Additional health visitor visits	185.00	Petrou <i>et al.</i> <sup>174</sup>
		Average cost	1017.23	–
Peer support	<sup>a</sup> Dukhovny, 2013 <sup>394</sup>	Telephone-based peer support	366.43	Dukhovny <i>et al.</i> <sup>392</sup>
IPT-based intervention	Gorman, 1997 <sup>169</sup>	Five individual sessions on IPT for depression	495.00	PSSRU <sup>404</sup>
	Grote, 2009 <sup>170</sup>	Engagement session followed by eight acute IPT-brief sessions before birth and maintenance IPT in either biweekly or monthly sessions up to 6 months postnatally	1831.50	PSSRU <sup>404</sup>
		Average cost	1163.25	–
Educational information	Grote, 2009 <sup>170</sup>	Written materials and encouragement to seek care if needed	1.00	–
	Ginsburg, 2012 <sup>168</sup>	Eight weekly 30–60 minutes in home (or in office) education sessions delivered by Apache paraprofessional family health educators and three booster sessions	816.75	PSSRU <sup>404</sup>
	Austin, 2008 <sup>165</sup>	Booklet	1.00	–
		Average cost	272.92	–
CBT-based intervention	Ginsburg, 2012 <sup>168</sup>	Eight weekly 30–60 minute in home (or in office sessions) of cognitive–behaviourally based programme delivered by Apache paraprofessional family health educators and three booster sessions	816.75	PSSRU <sup>404</sup>
	Austin, 2008 <sup>165</sup>	CBT-group-based intervention comprised six weekly 2-hour sessions (and a later follow-up session) of CBT delivered by a clinical psychologist and specially trained midwife	400.75	PSSRU <sup>404</sup>
	Munoz, 2007 <sup>173</sup>	CBT-based intervention: 12-week mood management course, and four booster sessions conducted at approximately 1, 3, 6 and 12 months postpartum. Groups of 3–8 pregnant women	874.50	PSSRU <sup>404</sup>
	<sup>a</sup> Morrell, 2009 <sup>61</sup> at-risk women	Psychologically informed interventions by health visitors	–35.00	Morrell <i>et al.</i> <sup>61</sup>
		Average cost	514.25	–
PCA-based intervention	<sup>a</sup> Morrell, 2009 <sup>61</sup> at-risk women	Psychologically informed interventions by health visitors	3.00	Morrell <i>et al.</i> <sup>61</sup>

Key: PSSRU, Personal Social Services Research Unit.

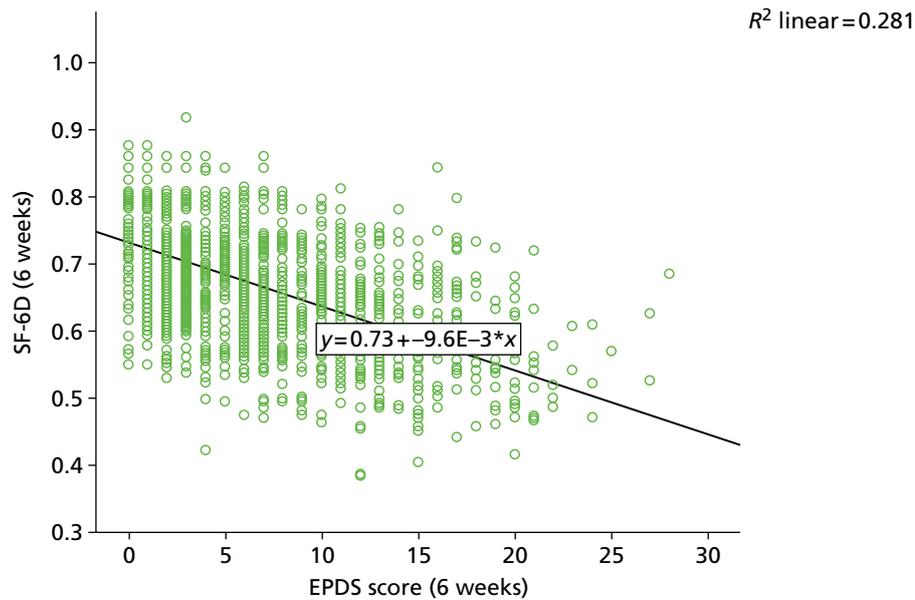
<sup>a</sup> These studies included a change in total health-care costs which are discussed in the text.

These three studies also included change in total health-care costs compared with usual care.<sup>61,174,396</sup> The use of total health-care costs would make PCA cost saving, with a reduction in the cost of the intervention from £3 to –£27 per woman compared with usual care.<sup>61</sup> Data from this trial would also increase the cost saving associated with a CBT-based intervention from £35 to £58. However, the effect on the overall cost of CBT-based interventions would be a reduction from £514 to £509 in the average cost for CBT-based interventions. Using change in total health-care costs would reduce the cost of peer support from £366 to £269.<sup>396</sup> The cost of the promoting parent–infant interactions would fall very slightly for the Petrou *et al.*<sup>174</sup> study, from £185 to £184, with a minimal impact on the overall cost of promoting parent–infant interaction, with this value remaining at £1017 to the nearest pound.

Marks *et al.*<sup>224</sup> specified that the intervention was to use existing midwifery resources; therefore, no cost was applied to this intervention. Fraser *et al.*<sup>252</sup> specified that a weekly case conference was held between the home visit nurse and the team social worker and community paediatrician, although the duration of the meeting was not reported. It was stated that 40% of families were referred to a social worker and that the mean number of visits from the nurse per woman was 22. The study did not specify how long each nurse home visit was; therefore, the mean cost of a face-to-face contact with a health visitor was used to cost this part of the intervention. For costing the case conferences, we assumed 22 meetings between the home visit nurse, social worker and the community paediatrician for each family referred to a social worker. We assumed that the costs of the person who would represent the paediatrician should this intervention be made available in England and Wales would equal that of a GP and assumed that a duration of 10 minutes per meeting per family. In the Ginsburg *et al.*<sup>168</sup> study, which compared a CBT-based intervention with an education-based intervention, Apache paraprofessional health educators were used to deliver both programmes. The cost of CBT-based intervention was used in the analysis for both interventions, as they were delivered by the same professionals in the study. Unlike the grouping of trials in the universal preventive interventions and selective preventive interventions, the trials grouped as certain types of intervention in the indicated group have a much wider range of individual costs. It is unclear what the effect on the results would be if the groupings were made differently.

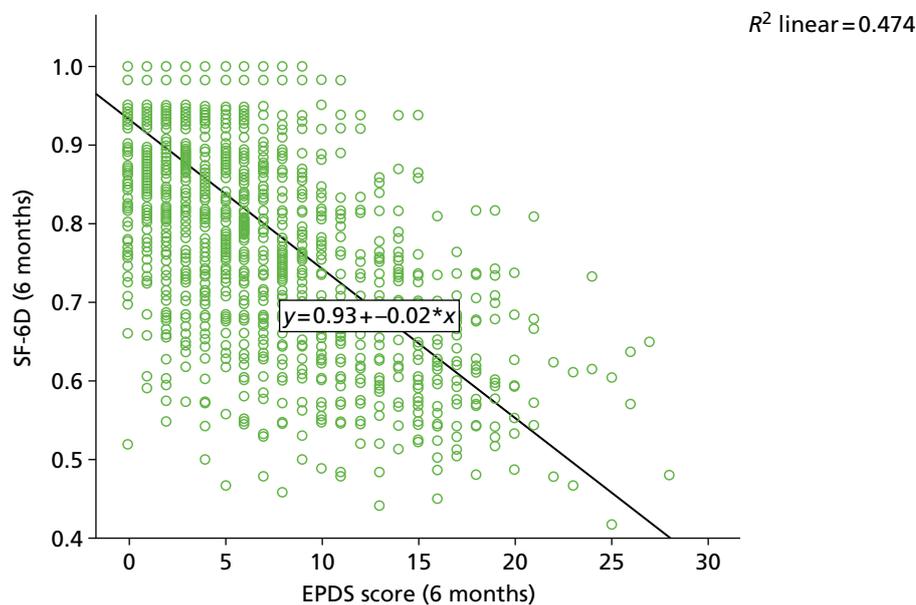
### **The relationship between utility and Edinburgh Postnatal Depression Scale scores**

In order to allow a meaningful comparison of the cost-effectiveness of interventions for the prevention of PND with other technologies competing for scarce resources it was necessary to transform the depression-specific measure (the EPDS) into a preference-based single index that can be applied to all diseases. Data were obtained from the PoNDER trial,<sup>61</sup> which provided absolute values of EPDS and SF-6D for individuals at three different time points: 6 weeks, 6 months and 1 year. These data are depicted as scatterplots in *Figures 62–64*.



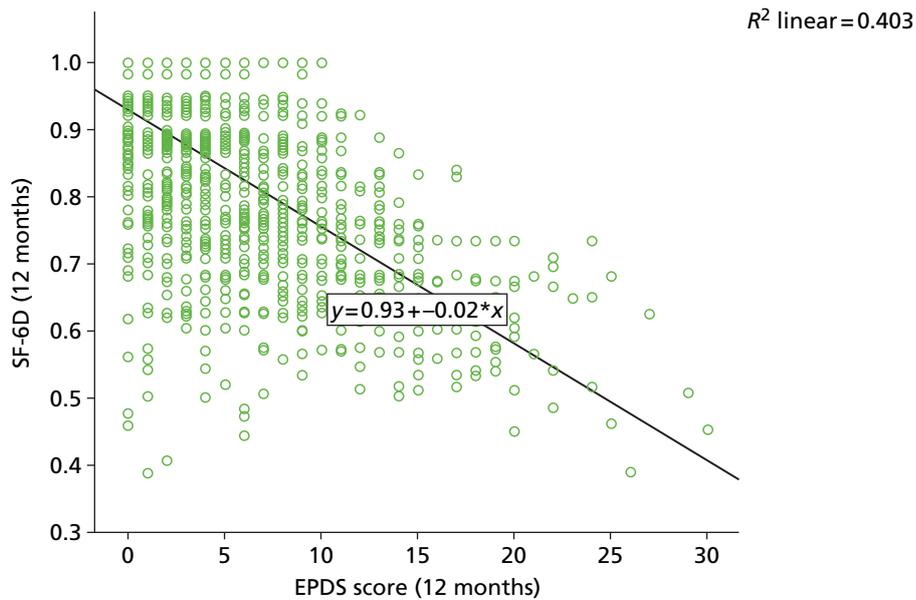
**FIGURE 62** The relationship between EPDS and SF-6D scores at 6 weeks.

It is seen that there is a moderate relationship between EPDS and SF-6D scores, with an  $R^2$  of 0.281, with a prediction that a unit improvement in EPDS score would be associated with a 0.01 improvement in utility.



**FIGURE 63** The relationship between EPDS and SF-6D scores at 6 months.

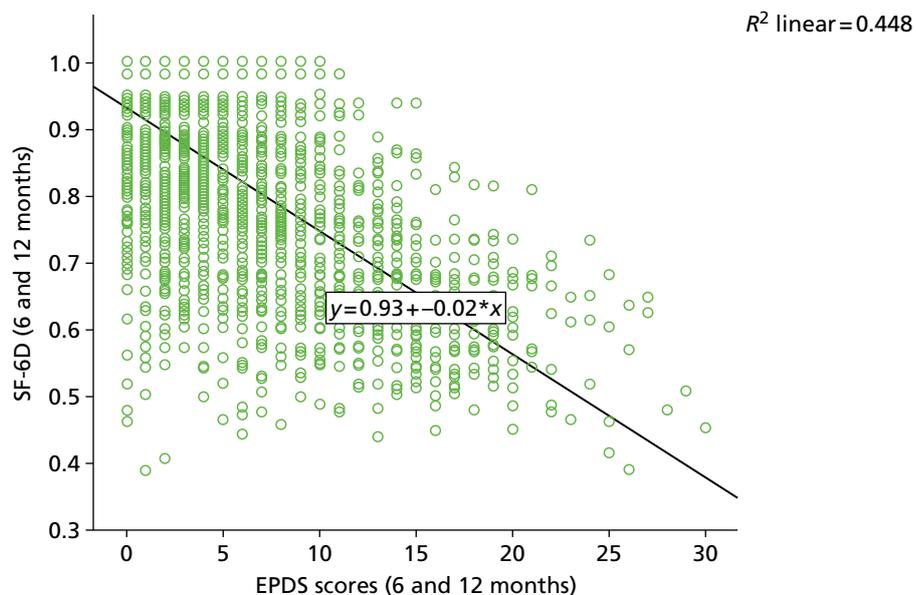
It is seen that there is a stronger relationship between EPDS and SF-6D scores at 6 months than 6 weeks, with an  $R^2$  of 0.474, with a prediction that a unit improvement in EPDS score would be associated with a 0.02 improvement in utility.



**FIGURE 64** The relationship between EPDS and SF-6D scores at 12 months.

It is seen that there is a moderate relationship between EPDS and SF-6D scores at 12 months, with an  $R^2$  value of 0.403, with a prediction that a unit improvement in EPDS score would be associated with a 0.02 improvement in utility.

The coefficient of the relationships between EPDS and SF-6D scores appeared to be different for the first 6-week period to that at 6 months and 12 months. Thus, the data for 6 months and 12 months were pooled, with the resulting relationship between EPDS and SF-6D in the combined data set shown in Figure 65.



**FIGURE 65** The relationship between EPDS and SF-6D scores using data at both 6 and 12 months.

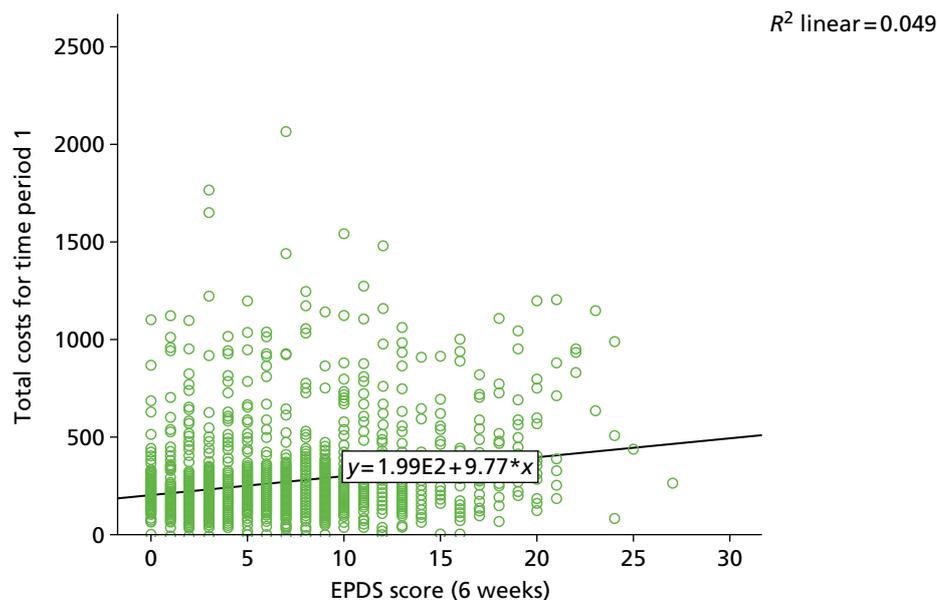
When using the combined data for 6 and 12 months, it is seen that there is a moderate relationship between EPDS and SF-6D scores, with an  $R^2$  value of 0.448, with a prediction that a 1-point improvement in EPDS scores would be associated with a 0.02-unit improvement in utility. An advantage of combining the data is to reduce the uncertainty in the relationship.

The assumed relationship between EPDS and SF-6D scores used within the model is shown in *Table 64*. The constant in the regression equation is not considered relevant as this will be applicable to all interventions.

The relationship in *Table 64* was used to calculate an area under the curve estimate for utility, which was then divided by the number of weeks in a year (52.178) to obtain a QALY value. Subtracting the value of usual care from that of an intervention gave the estimated incremental QALY gain associated with that intervention.

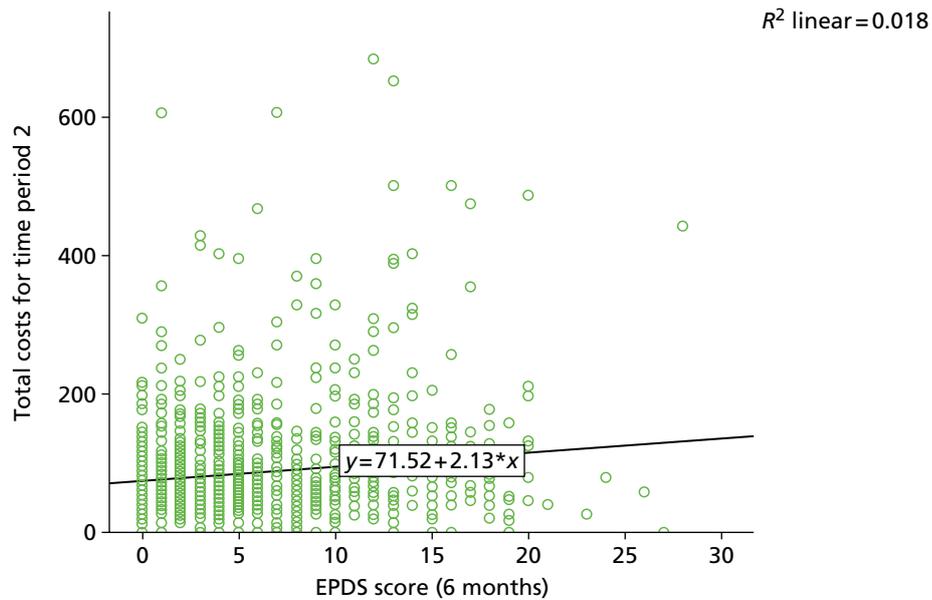
### **The relationship between total health costs and Edinburgh Postnatal Depression Scale scores**

Data were obtained from the PoNDER trial,<sup>61</sup> which provided absolute values of EPDS score and total health costs for individuals at three different time points: 6 weeks, 6 months and 1 year. These data are depicted as scatterplots in *Figures 66–68*.



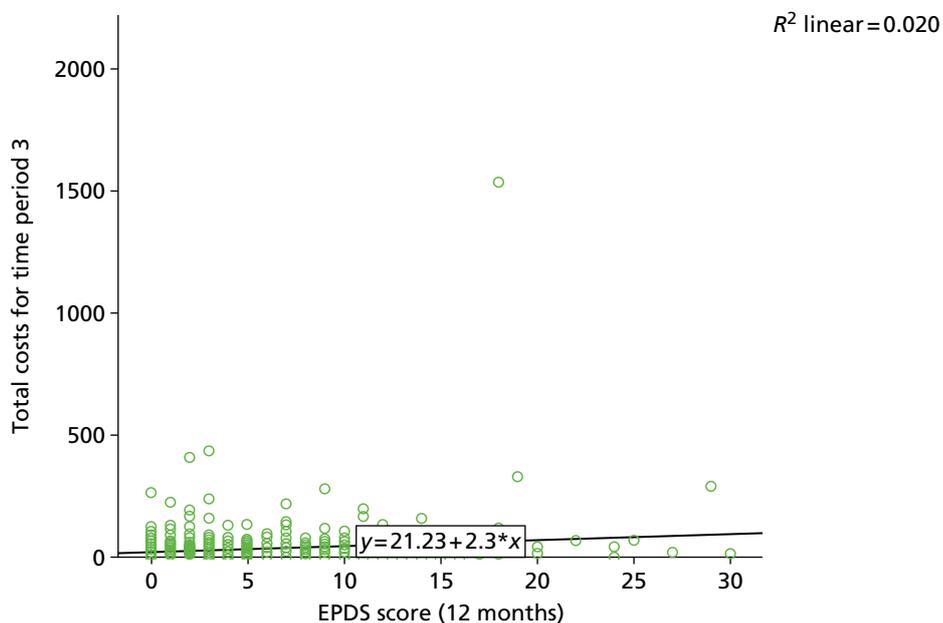
**FIGURE 66** The relationship between EPDS score and total health costs at 6 weeks.

It is seen that there is a very weak relationship between EPDS score and total health costs at 6 weeks, with an  $R^2$  value of 0.049, with a prediction that a 1-unit improvement in EPDS would be associated with a £10 decrease in costs across the 6-week period.



**FIGURE 67** The relationship between EPDS score and total health costs at 6 months.

It is seen that there is a very weak relationship between EPDS score and total health costs at 6 months, with an  $R^2$  value of 0.018, with a prediction that a 1-unit improvement in EPDS score would be associated with a £2 decrease in costs in the period from 6 weeks to 6 months.



**FIGURE 68** The relationship between EPDS score and total health costs at 12 months.

It is seen that there is a very weak relationship between EPDS score and total health costs at 12 months, with an  $R^2$  value of 0.020. The regression analysis predicts that a 1-unit improvement in EPDS score would be associated with a £2 decrease in costs across the period from 6 months to 12 months.

Owing to the weak relationship between the EPDS scores and total health-care costs across all time periods and the slight absolute cost impact it was decided not to model a relationship between EPDS scores and total health-care costs.

### The analyses undertaken

Probabilistic analyses were undertaken to examine the impact of uncertainty on the results using 1000 probabilistic draws. For effectiveness data, the measures of uncertainty came from the CODA samples provided by the NMA of EPDS values. For the relationship between EPDS and SF-6D, the initial and subsequent time periods coefficients were sampled assuming a normal distribution and using the mean and standard error provided in *Table 64*. The values between the initial and subsequent period were assumed to be independent.

**TABLE 64** Assumed relationship between EPDS and SF-6D scores used within the model

Time period	Coefficient <sup>a</sup>	Standard error on the coefficient
Between baseline and time point 1	0.018421	0.000312
Between time point 1 and 1 year	0.009602	0.000301

**Note**  
a A one-unit decrease in EPDS is associated with this gain in utility.

The probabilistic analyses allowed a graphical display of uncertainty in the form of a cost-effectiveness acceptability curve<sup>412</sup> (CEAC), which indicates the probability that an intervention was the most cost-effective. A fully incremental analysis was undertaken to determine the efficiency frontier and the intervention estimated the most cost-effective, assuming a cost per QALY threshold of £20,000, which is a value NICE considers to be appropriate in funding decisions.<sup>401</sup> A further analysis calculated the incremental costs associated with interventions in order that the cost per QALY compared with usual care was £20,000.

In addition, the EVPI<sup>413</sup> was estimated. The EVPI provides an indication of the maximum amount a funder would be prepared to pay to remove all uncertainty from the decision. Measures to reduce the uncertainty may take the form of a RCT or may come from other forms of research. The EVPI is calculated directly from the results of the probabilistic analyses by subtracting the net monetary benefit (NMB)<sup>414</sup> associated with the strategy perceived to be most cost-effective from the NMB associated with the optimal strategy in each of the PSA configurations, and dividing by the number of PSA runs. The EVPI estimate is then multiplied by the number of women assumed to be affected by the decision over forthcoming years.

The NMB is calculated as incremental QALYs multiplied by the willingness-to-pay threshold (assumed to be £20,000 per QALY in our calculations) minus the incremental costs, and is often compared with a chosen strategy, for example current care. NMB can be compared directly, with the largest value being for the strategy that is most cost-effective.

An example of calculating the EVPI is provided in *Table 65*, assuming only three PSA iterations and results presented per 100 people. In the example the intervention is more cost-effective, as it has an average NMB of £20,000  $[(£50,000 - £30,000 + £40,000)/3]$  compared with £0  $[(£0 + £0 + £0)/3]$  for current care. However, if the most cost-effective intervention was selected for each PSA run, the average NMB would be £30,000  $[(£50,000 + £0 + £40,000)/3]$  representing an EVPI of £10,000  $(£30,000 - £20,000)$  per 100 people. Should the decision affect 10,000 people the EVPI would be £1,000,000  $(10,000 \times £10,000/100)$ . If all uncertainty was removed from the model then this would be seen as cost-effective, assuming the £20,000 per QALY threshold, if the cost of removing the uncertainty was less than £1,000,000.

TABLE 65 Illustration of EVPI calculation

PSA run	Current care per 100 people (referent), NMB (£)	Intervention per 100 people, NMB (£)	Most cost-effective option per 100 people, NMB (£)
1	0	50,000	50,000
2	0	-30,000	0
3	0	40,000	40,000
Average from PSA runs	0	20,000	30,000

The EVPI can be extended to assess the value of perfect information not for all variables within the model, but for a selected subgroup. This is referred to as the EVPPi.<sup>415</sup>

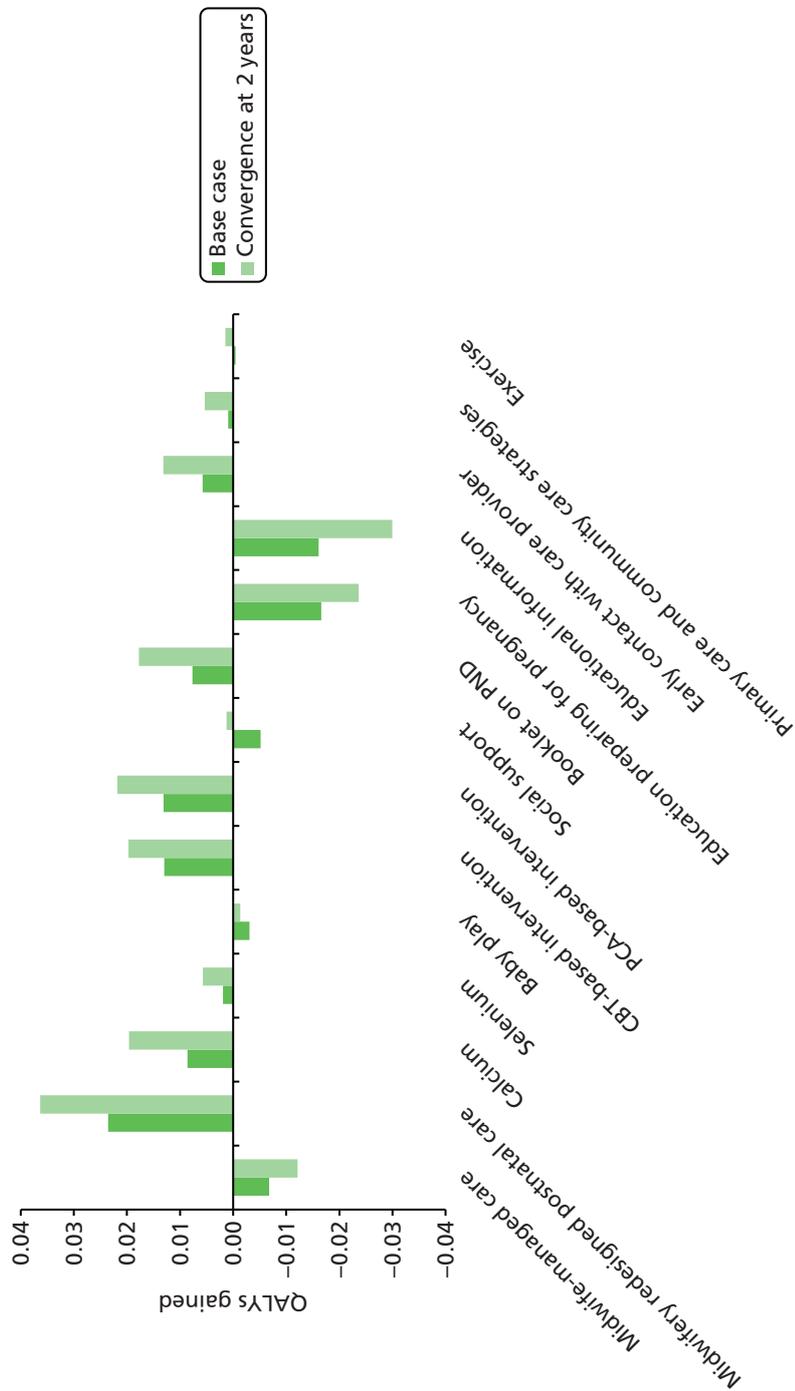
For the analyses conducted within this report two sets of parameters were defined, the first set being the effectiveness parameters (the CODA output from the NMA of EPDS values), and the second set being the relationship between EPDS scores and SF-6D scores. The first group evaluated in the EVPPi analyses assumed that a trial would be commissioned evaluating all interventions for the relevant population. The second group assumed that data were collected for a period of at least 12 months. The EVPPi analyses used the 1000 probabilistic draws for each group, setting each draw to a simulated set of known 'perfect' data while maintaining the random variability previously sampled for the remaining EVPPi group. These analyses were performed to assess the relative impact of removing uncertainty in the efficacy of the interventions compared with that of removing uncertainty in the utility mapping.

In order to translate value of information in terms of cost per woman into a societal value, it was assumed that a willingness to pay of £20,000 per QALY was applicable; that the information would be of benefit to women giving birth over a period of 10 years; and that in England and Wales the number of women per year who would benefit from the improved knowledge would be 720,000 in case of the universal preventive interventions, 108,000 in the case of the selective preventive interventions and 72,000 in the case of indicated preventive interventions. The number for the universal preventive interventions was estimated using the average numbers of maternities between 2010 and 2012 reported by the Office for National Statistics<sup>416</sup> and rounded to the nearest 10,000. Our clinical experts also estimated that 10% of women would fall in indicated preventive interventions and 15% in the selective preventive interventions. The duration for which the greater knowledge provides benefit to society is uncertain. Although it is arbitrary, 10 years seemed a reasonable period of time to assume that either there were no additional interventions for preventing PND or considerable service reconfiguration would occur. Note that this is different from the duration of benefit assumed for each woman, which remained for a 1-year period.

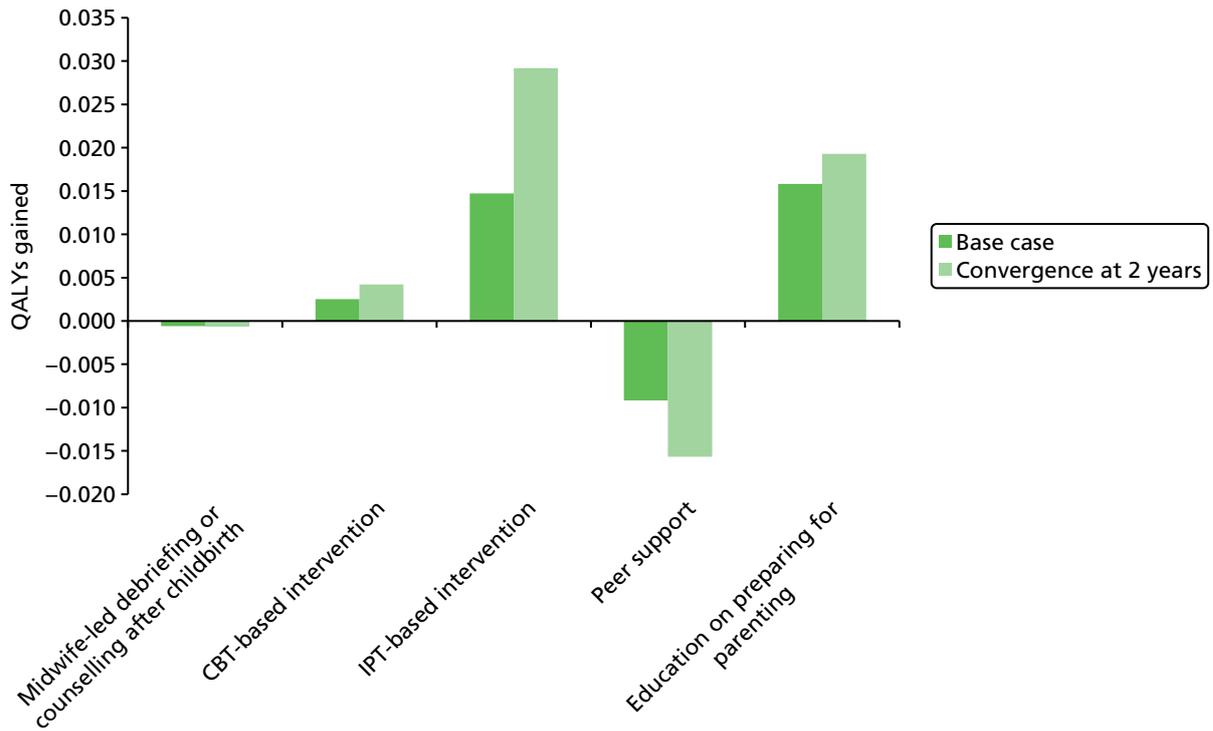
## Results

### *The estimated quality-adjusted life-year gain compared with usual care for each intervention*

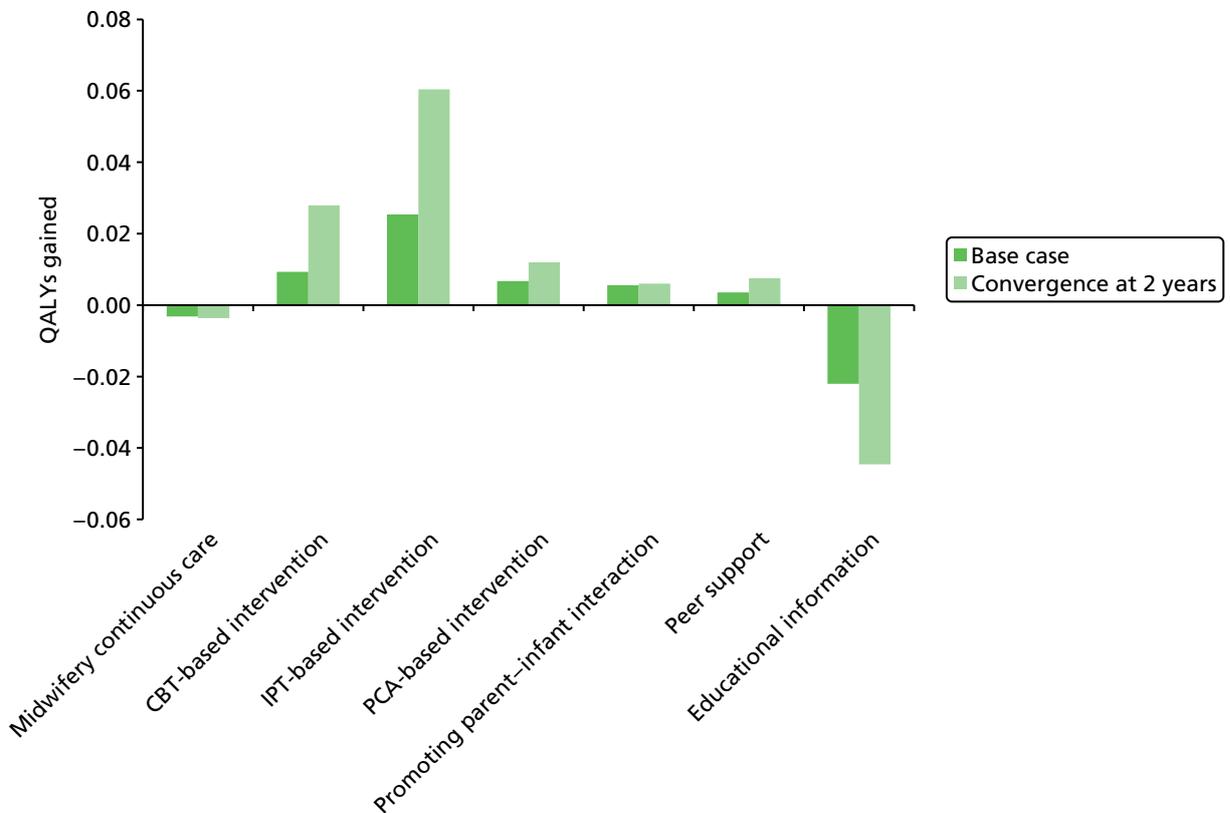
The estimated QALY gains per woman for each intervention in the universal preventive interventions, selective preventive interventions and indicated preventive interventions are provided in *Figures 69–71*. The trials included in each intervention group are fully detailed in *Chapter 4*. In all analyses the absolute estimated QALY gain in the base case was relatively low and never exceeded 0.026 (equivalent to 10 days of perfect health). In several instances the intervention was shown to be less effective than usual care. In the sensitivity analyses in which it was assumed that the EPDS score associated with an intervention became equal to that of usual care at 2 years, the effect of the intervention was typically larger, as would be expected. However, this was not true for all interventions, as in some time points in some interventions the intervention was estimated to be more effective than usual care, but at other time points usual care was estimated to be more effective.



**FIGURE 69** The estimated incremental QALYs per woman compared with usual care associated with each universal preventive intervention.



**FIGURE 70** The estimated incremental QALYs per woman compared with usual care associated with each selective preventive intervention.



**FIGURE 71** The estimated incremental QALYs per woman compared with usual care associated with each indicated preventive intervention.

### Calculating cost per quality-adjusted life-year values

The data presented in *Figures 69–71* were combined with the assumed costs of each intervention to estimate a cost per QALY value for each intervention compared with usual care and also to allow a fully incremental analysis to be undertaken. These data are provided in *Tables 66–71* for universal preventive interventions, indicated preventive interventions and selective preventive interventions and for the base-case and sensitivity analyses on time of EPDS score convergence. In all tables the intervention estimated to be most cost-effective at a willingness-to-pay threshold of £20,000 per QALY is shaded.

**TABLE 66** Cost per QALY values for the universal preventive interventions: base case

Intervention	Assumed incremental cost (£) <sup>a</sup>	Mean incremental QALYs <sup>a</sup>	Cost per QALY compared with usual care (£)	Percentage of times generating more QALYs than usual care (%)	Incremental cost which results in a cost per QALY of £20,000 (£) <sup>b</sup>	Fully incremental analyses, cost per QALY (£) <sup>c</sup>
PCA-based intervention	–28.00	0.0131	Dominating	84.8	262	–
CBT-based intervention	–24.00	0.0130	Dominating	83.2	259	Dominated
Usual care	–	–	–	–	–	Dominated
Midwife-managed care	0.00	–0.0068	Dominated	66.4	–136	Dominated
Booklet on PND	1.00	0.0076	131	68.3	153	Dominated
Educational information	8.00	–0.0161	Dominated	20.3	–322	Dominated
Early contact with care provider	41.00	0.0058	7116	69.4	115	Dominated
Exercise	65.74	–0.0004	Dominated	49.5	–9	Dominated
Calcium	78.96	0.0086	9189	69.7	172	Dominated
Primary care and community care strategies	94.79	0.0009	101,876	51.8	19	Dominated
Baby play	101.94	–0.0031	Dominated	40.2	–62	Dominated
Education on preparing for parenting	101.94	–0.0166	Dominated	13.4	–332	Dominated
Midwifery redesigned postnatal care	107.64	0.0236	4570	89.2	471	12,961
Selenium	149.85	0.0019	78,422	54.2	38	Dominated
Social support	279.00	–0.0052	Dominated	33.3	–103	Dominated

#### Note

a Compared with usual care.

b A negative number denotes that an intervention would need to be less costly than usual care.

c All incremental values are in terms of per woman. Dominating means costing less than an intervention producing the same or more QALYs or producing more QALYs at the same or lower cost. Dominated means costing more than an intervention producing the same or fewer QALYs or producing fewer QALYs at the same or higher cost.

**TABLE 67** Cost per QALY values for the selective preventive interventions: base case

Intervention	Assumed incremental cost (£) <sup>a</sup>	Mean incremental QALYs <sup>a</sup>	Cost per QALY compared with usual care (£)	Percentage of times generating more QALYs than usual care (%)	Incremental cost which results in a cost per QALY of £20,000 (£) <sup>b</sup>	Fully incremental analyses, cost per QALY (£) <sup>c</sup>
Usual care	–	–	–	–	–	–
Midwife-led debriefing or counselling after childbirth	70.00	–0.0006	Dominated	46.0	–12	Dominated
CBT-based intervention	99.00	0.0025	39,343	56.1	50	Extendedly dominated
Peer support	150.00	–0.0092	Dominated	26.8	–184	Dominated
Education on preparing for parenting	266.17	0.0158	16,811	93.3	317	16,811
IPT-based intervention	495.00	0.0147	33,640	79.6	294	Dominated

**Note**

a Compared with usual care.

b A negative number denotes that an intervention would need to be less costly than usual care.

c All incremental values are in terms of per woman. Dominating means costing less than an intervention producing the same or more QALYs or producing more QALYs at the same or lower cost. Dominated means costing more than an intervention producing the same or fewer QALYs or producing fewer QALYs at the same or higher cost. Extendedly dominated means that a combination of two other interventions can produce the same number of QALYs for a lower cost than the single intervention.

**TABLE 68** Cost per QALY values for the indicated preventive interventions: base case

Intervention	Assumed incremental cost (£) <sup>a</sup>	Mean incremental QALYs <sup>a</sup>	Cost per QALY compared with usual care (£)	Percentage of times generating more QALYs than usual care (%)	Incremental cost which results in a cost per QALY of £20,000 (£) <sup>b</sup>	Fully incremental analyses, cost per QALY (£) <sup>c</sup>
Usual care	–	–	–	–	–	–
Midwifery continuous care	0.00	–0.0032	Dominated	45.5	–63	Dominated
PCA-based intervention	3.00	0.0067	447	63.5	134	447
Educational information	272.92	–0.0221	Dominated	15.6	–441	Dominated
Peer support	366.43	0.0035	103,928	58.9	71	Dominated
CBT-based intervention	514.25	0.0093	55,157	73.3	186	Extendedly dominated
Promoting parent–infant interaction	1017.23	0.0055	183,696	61.8	111	Dominated
IPT-based intervention	1163.25	0.0254	45,884	88.9	507	62,251

**Note**

a Compared with usual care.

b A negative number denotes that an intervention would need to be less costly than usual care.

c All incremental values are in terms of per woman. Dominating means costing less than an intervention producing the same or more QALYs or producing more QALYs at the same or lower cost. Dominated means costing more than an intervention producing the same or fewer QALYs or producing fewer QALYs at the same or higher cost. Extendedly dominated means that a combination of two other interventions can produce the same number of QALYs for a lower cost than the single intervention.

**TABLE 69** Cost per QALY values for the universal preventive interventions: sensitivity analysis

Intervention	Assumed incremental cost (£) <sup>a</sup>	Mean incremental QALYs <sup>a</sup>	Cost per QALY compared with usual care (£)	Percentage of times generating more QALYs than usual care (%)	Incremental cost which results in a cost per QALY of £20,000 (£) <sup>b</sup>	Fully incremental analyses, cost per QALY (£) <sup>c</sup>
PCA-based intervention	-28.00	0.0218	Dominating	89.0	436	-
CBT-based intervention	-24.00	0.0197	Dominating	86.5	394	Dominated
Usual care	-	-	-	-	-	Dominated
Midwife-managed care	0.00	-0.0121	Dominated	36.6	-243	Dominated
Booklet on PND	1.00	0.0177	56	69.6	355	Dominated
Educational information	8.00	-0.0300	Dominated	24.0	-599	Dominated
Early contact with care provider	41.00	0.0131	3119	70.5	263	Dominated
Exercise	65.74	0.0015	44,486	52.9	30	Dominated
Calcium	78.96	0.0196	4022	71.0	393	Dominated
Primary care and community care strategies	94.79	0.0054	17,658	58.8	107	Dominated
Baby play	101.94	-0.0013	Dominated	46.3	-27	Dominated
Education on preparing for parenting	101.94	-0.0236	Dominated	20.7	-472	Dominated
Midwifery redesigned postnatal care	107.64	0.0363	2963	92.8	727	9340
Selenium	149.85	0.0057	26,267	55.2	114	Dominated
Social support	279.00	0.0013	221,579	52.4	25	Dominated

**Note**

a Compared with usual care.

b A negative number denotes that an intervention would need to be less costly than usual care.

c All incremental values are in terms of per woman. Dominating means costing less than an intervention producing the same or more QALYs or producing more QALYs at the same or lower cost. Dominated means costing more than an intervention producing the same or fewer QALYs or producing fewer QALYs at the same or higher cost.

**TABLE 70** Cost per QALY values for the selective preventive interventions: sensitivity analysis

Intervention	Assumed incremental cost (£) <sup>a</sup>	Mean incremental QALY <sup>a</sup>	Cost per QALY compared with usual care (£)	Percentage of times generating more QALYs than usual care (%)	Incremental cost which results in a cost per QALY of £20,000 (£) <sup>b</sup>	Fully incremental analyses, cost per QALY (£) <sup>c</sup>
Usual care	–	–	–	–	–	–
Midwife-led debriefing or counselling after childbirth	70.00	–0.0006	Dominated	48.8	–13	Dominated
CBT-based intervention	99.00	0.0042	23,429	55.4	85	Extendedly dominated
Peer support	150.00	–0.0157	Dominated	26.0	–313	Dominated
Education on preparing for parenting	266.17	0.0193	13,785	86.4	386	13,785
IPT-based intervention	495.00	0.0292	16,966	79.3	584	23,191

**Note**

a Compared with usual care.

b A negative number denotes that an intervention would need to be less costly than usual care.

c All incremental values are in terms of per woman. Dominating means costing less than an intervention producing the same or more QALYs or producing more QALYs at the same or lower cost. Dominated means costing more than an intervention producing the same or fewer QALYs or producing fewer QALYs at the same or higher cost. Extendedly dominated means that a combination of two other interventions can produce the same number of QALYs for a lower cost than the single intervention.

**TABLE 71** Cost per QALY values for the indicated preventive interventions: sensitivity analysis

Intervention	Assumed incremental cost <sup>a</sup>	Mean incremental QALYs <sup>a</sup>	Cost per QALY compared with usual care	Percentage of times generating more QALYs than usual care (%)	Incremental cost which results in a cost per QALY of £20,000 (£) <sup>b</sup>	Fully incremental analyses <sup>c</sup>
Usual care	–	–	–	–	–	–
Midwifery continuous care	0.00	–0.0036	Dominated	47.5	–72	Dominated
PCA-based intervention	3.00	0.0119	251	62.9	239	251
Educational information	272.92	–0.0446	Dominated	14.6	–891	Dominated
Peer support	366.43	0.0075	49,041	57.6	149	Dominated
CBT-based intervention	514.25	0.0279	18,423	84.3	558	Extendedly dominated
Promoting parent–infant interaction	1017.23	0.0060	168,468	56.3	121	Dominated
IPT-based intervention	1163.25	0.0604	19,259	91.5	1208	23,943

**Note**

a Compared with usual care.

b A negative number denotes that an intervention would need to be less costly than usual care.

c All incremental values are in terms of per woman. Dominating means costing less than an intervention producing the same or more QALYs or producing more QALYs at the same or lower cost. Dominated means costing more than an intervention producing the same or fewer QALYs or producing fewer QALYs at the same or higher cost. Extendedly dominated means that a combination of two other interventions can produce the same number of QALYs for a lower cost than the single intervention.

The values from each of the individual PSAs run were also used to generate an estimate of the probability that each intervention provided more QALYs than usual care.

**Producing cost-effectiveness acceptability curves**

Cost-effectiveness acceptability curves have been produced for the base case for each of the three populations. These are reproduced in *Figure 72–74*.

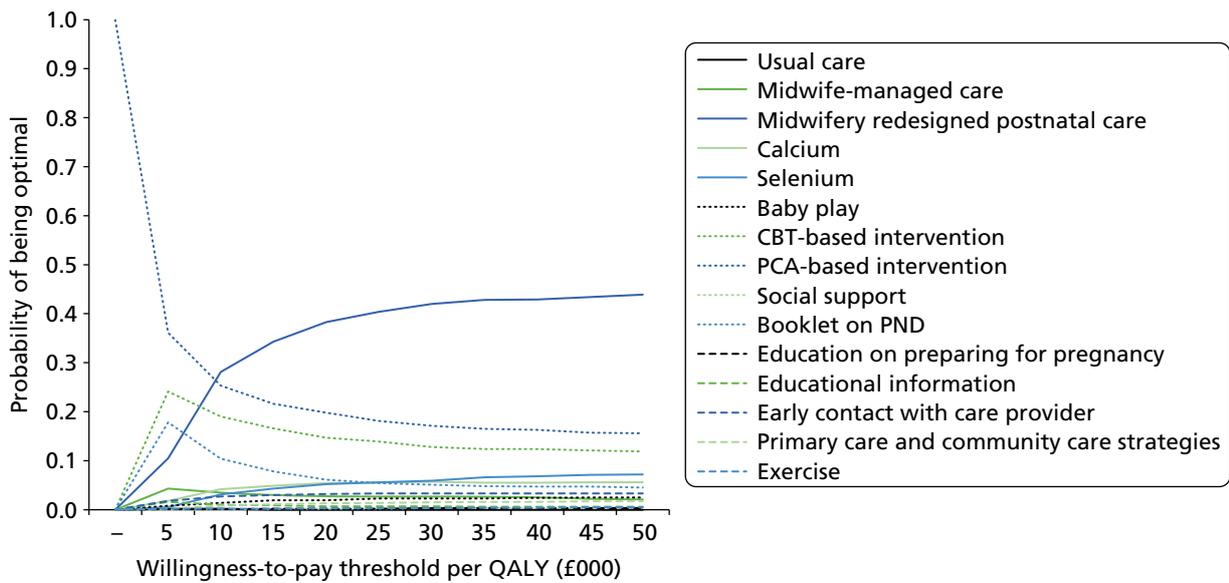


FIGURE 72 The CEAC for the universal preventive interventions.

The three universal preventive interventions with a relatively high probability of being optimal are usual care (for low willingness to pay per QALY levels), midwifery redesigned postnatal care and PCA-based intervention.

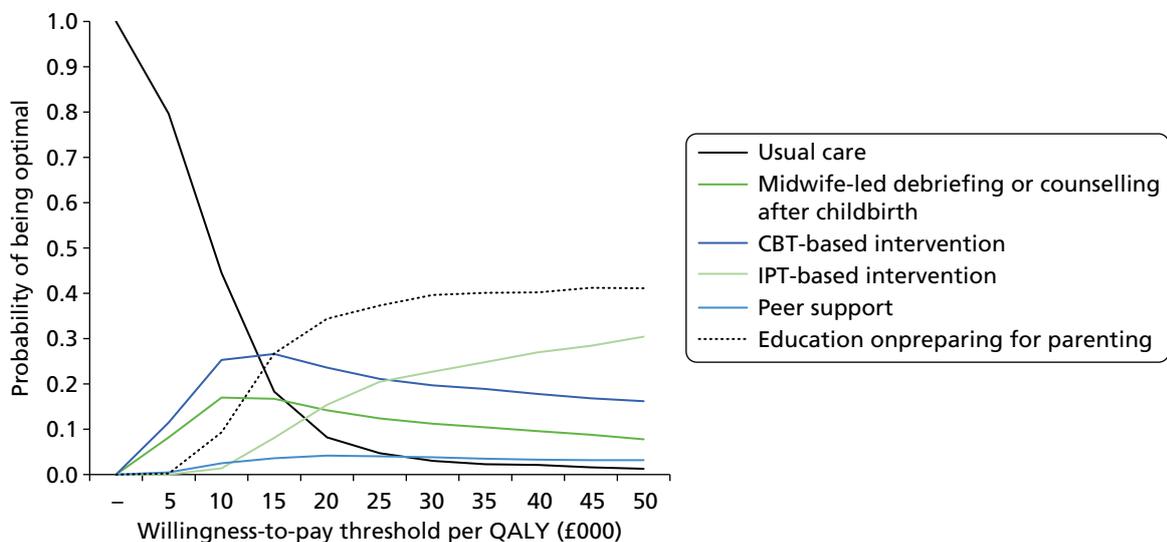
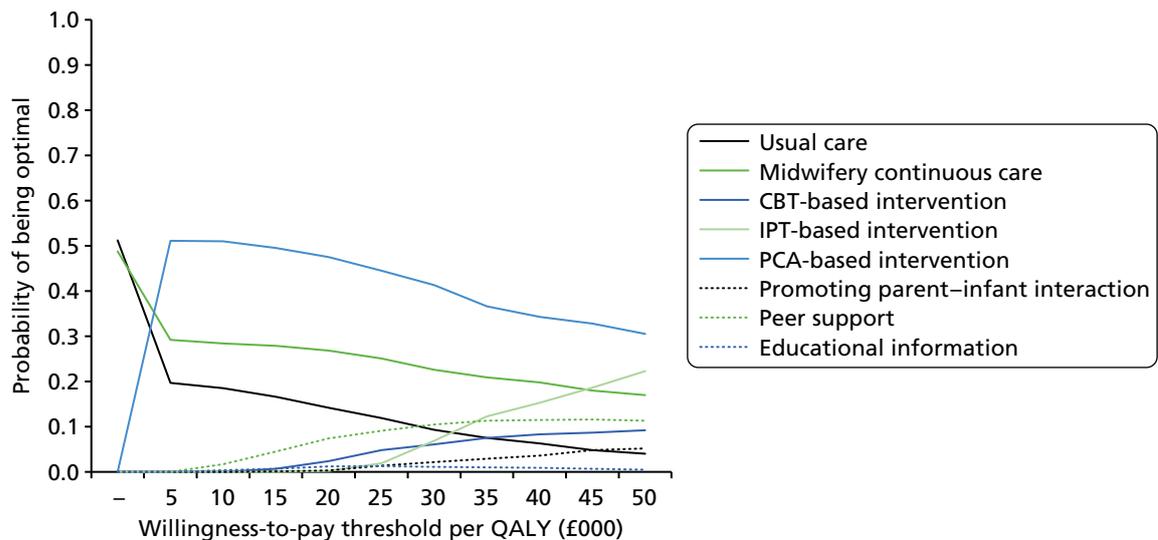


FIGURE 73 The CEAC for the selective preventive interventions.

All-strategies bar peer support have a reasonable probability (> 10%) of being the most cost-effective selective preventive intervention. As the willingness to pay per QALY value increases the probability that IPT-based intervention is optimal increases, indicating it is expected to produce the greatest mean number of QALYs.



**FIGURE 74** The CEAC for the indicated preventive interventions.

The three indicated preventive interventions strategies with a relatively high probability of being optimal are usual care (for low willingness to pay per QALY levels), midwifery continuous care and PCA-based intervention. As the willingness to pay per QALY value increases the probability that IPT-based intervention is optimal increases indicating it is expected to produce the greatest mean QALYs.

At a willingness to pay of £0 per QALY, both usual care and midwifery continuous care were deemed optimal as they shared the lowest cost per intervention. The CEAC has been modified to allocate the optimal strategy to the one with more QALYs in each probabilistic run (51% midwifery continuous care and 49% usual care).

### **Interpretation of the cost-effectiveness results produced**

A brief interpretation of the results for each population is provided. However, a number of factors apply to all populations; these are detailed in advance of the individual sections and serve to highlight the considerable uncertainty in the results.

The analyses undertaken are limited to those interventions that reported EPDS mean values. All other interventions are excluded, adding uncertainty to any conclusion. In all analyses the mean absolute QALY gain estimated was small (less than 0.061 in all analyses) and may not be seen as a worthwhile improvement should services needed to be reconfigured to achieve such benefits. The current results presented assume that capacity of staff is infinite and changes can be achieved without incurring costs, which is an oversimplification.

Uncertainty is large regarding the most cost-effective intervention in all populations. Once a willingness to pay of £20,000 per QALY is reached, no intervention had a probability of being the optimal strategy of greater than 50%.

Furthermore, the costings of each strategy have by necessity been relatively crude. Additional knowledge regarding the costs of any intervention deemed possibly cost-effective will improve the robustness of any decision.

### ***Interventions for the universal preventive interventions***

Midwifery redesigned postnatal care was estimated to be the most cost-effective intervention assuming a willingness to pay of £20,000 per QALY. However, in over 10% of simulations midwifery redesigned postnatal care was estimated to produce fewer QALYs than usual care in the base-case analysis. Both PCA-based intervention and CBT-based interventions dominated usual care and would also be candidates for introduction in the NHS. Midwifery redesigned postnatal care remained the intervention estimated to be most cost-effective when a duration of benefit to the woman of 2 years was assumed.

### ***Interventions for the selective preventive interventions***

Education on preparing for parenting was estimated to be the most cost-effective of the interventions evaluated with a cost per QALY of approximately £17,000. No other intervention appeared cost-effective compared with usual care alone unless a residual benefit lasting until year 2 was assumed. The mean QALYs produced by the peer support intervention were estimated to be lower than those produced by usual care, meaning that uncertainty in the intervention costs described previously would not affect the conclusions regarding the cost-effectiveness of this strategy. Education on preparing for parenting remained the intervention estimated to be most cost-effective when the duration of benefit to the woman of was assumed to be 2 years. However, the cost per QALY of an IPT-based intervention compared with education on preparing for parenting was reduced to approximately £23,000.

### ***Interventions for indicated preventive interventions***

A PCA-based intervention was estimated to be the most cost-effective intervention, although this was estimated to produce more QALYs than usual care on only 64% of simulations. No other intervention appeared cost-effective compared with usual care alone unless a residual benefit lasting until year 2 was assumed. A PCA-based intervention remained the intervention estimated to be most cost-effective when the duration of benefit to the woman was assumed to be 2 years. However, the cost per QALY of an IPT-based intervention compared with a PCT-based intervention was reduced to approximately £24,000 if a benefit of 2 years was assumed.

### ***Assessing the impact of using total health-care costs when these were available rather than intervention costs***

In the universal preventive interventions, the changes in assumed costs of the midwifery redesigned postnatal care intervention and the social support intervention did not alter the intervention estimated to be the most cost-effective assuming a willingness to pay of £20,000 per QALY. This remained as midwifery redesigned postnatal care, which now dominated all other interventions using mean values. Social support remained dominated by usual care using mean values.

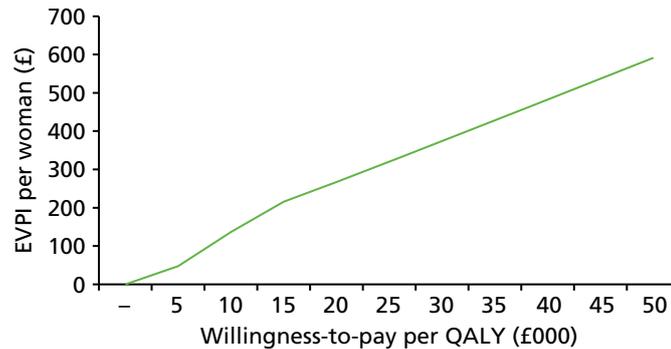
No studies reported total health-care costs in the selective preventive interventions.

In indicated preventive interventions changes to the assumed costs of a PCA-based intervention, a CBT-based intervention, peer support and promoting parent–infant interaction did not alter the intervention estimated to be the most cost-effective assuming a willingness to pay of £20,000 per QALY, which remained a PCA-based approach. The PCA-based intervention still dominated peer support and promoting parent–infant interaction using mean values, while a CBT-based intervention remained extendedly dominated by a PCA-based approach and an IPT-based approach using mean values.

## Value of information results

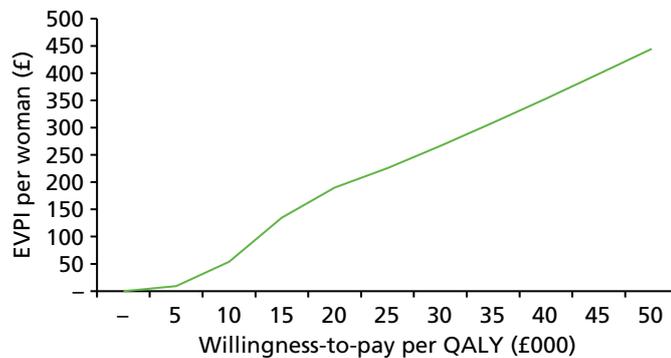
### Expected value of perfect information results

Figure 75–77 present the EVPI per woman for the three defined populations. In all of the figures the value increases as the willingness to pay increases, indicating that there is genuine uncertainty in the most effective intervention. Assuming a willingness to pay of £20,000 per QALY, the population EVPI values are very large, in excess of £150M for all analyses, which would more than cover the costs of studies aimed at reducing the uncertainty in model parameters.



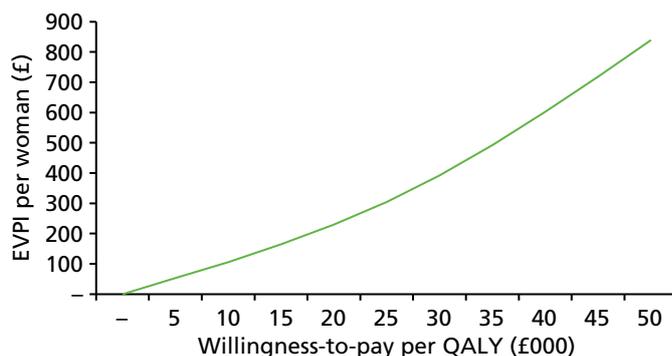
**FIGURE 75** The EVPI associated with the universal preventive interventions.

Assuming that 7.20 million women would benefit from improved knowledge in the universal preventive interventions and a willingness to pay of £20,000 per QALY, the population EVPI was estimated to be £1.93B (£267 × 7.20 million).



**FIGURE 76** The EVPI associated with the selective preventive interventions.

Assuming that 1.08 million women would benefit from improved knowledge in the selective preventive interventions and a willingness to pay of £20,000 per QALY, the population EVPI was estimated to be £205M (£190 × 1.08 million).



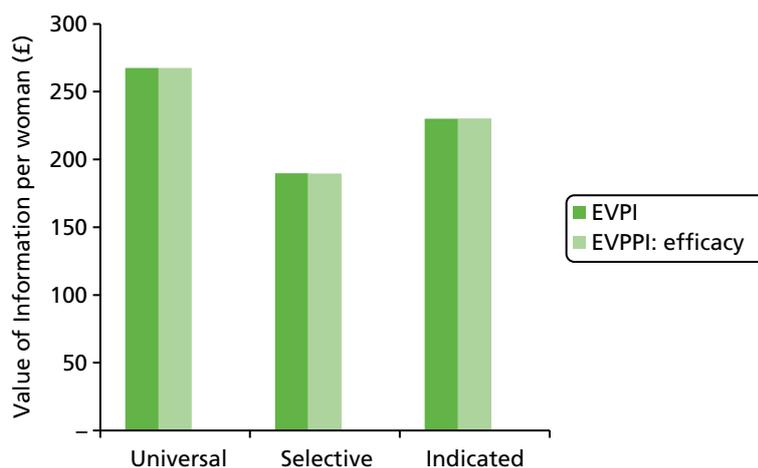
**FIGURE 77** The EVPI associated with the indicated preventive interventions.

Assuming that 720,000 women would benefit from improved knowledge in indicated preventive interventions and a willingness to pay of £20,000 per QALY, the population EVPI was estimated to be £166M (£230 × 720,000).

### Expected value of partial perfect information results

As previously stated the EVPPI analyses were undertaken assuming two broad groups: the efficacy data that represented the correlated CODA output from the NMA and the mapping of EPDS scores to utility values.

The EVPPI for the mapping group was zero, indicating that the value assigned to the relationship between EPDS and utility would not alter the conclusion regarding which intervention was most cost-effective. In stark contrast, having perfect data on the relative efficacies of the interventions could result in a different decision on the most cost-effective intervention and would be valuable. For all populations the EVPPI for the efficacy group equalled the EVPI value. It is seen in *Figure 78* that the impact of uncertainty in the efficacy data dwarfs that within the mapping.



**FIGURE 78** Results of the EVPI and EVPPI analyses. The value for the EVPPI for mapping is zero.

### *Discussion of the assessment of cost-effectiveness of interventions*

Although the cost-effectiveness analyses undertaken allow the most cost-effective intervention in each population to be estimated, these results are far from definitive. Limitations with the analyses include:

- Interventions that did not report EPDS values have been omitted from the analyses.
- The incremental costs for each strategy have, by necessity, been estimated in a simplistic manner. Costs of restructuring services, if required, have not been included.
- The possibility of erroneous grouping of trials as a single intervention within indicated preventive interventions.
- Simplistic assumptions have been made in estimating the area under the curve when data are not available for all time points.

Limitations with providing a definitive conclusion regarding the most cost-effective intervention include:

- that absolute QALY gains estimated are small for all interventions
- that there is considerable uncertainty in the direction of the estimates of QALY change compared with usual care for all interventions, thus usual care could conceivably be the most effective intervention in all three populations.

Value of information analyses were undertaken to estimate the monetary value of removing uncertainty in the efficacy data. These values were shown to be exceedingly high, in the order of hundreds of millions of pounds, which would be sufficient to cover the costs of future research. Although the relationship between EPDS and utility was not shown to influence the decision, given current information, should future research be undertaken it is recommended that utility data be collected. In addition, detailed costing data for each intervention should be recorded in any future research.

# Chapter 10 Discussion

## Introduction

The purpose of the current review was to evaluate the clinical effectiveness and cost-effectiveness, acceptability and safety of antenatal and postnatal interventions for pregnant and postnatal women to prevent PND. In this chapter, the principal findings of the NMAs and the economic evaluation are interpreted alongside an assessment of the strengths and limitations of the review and the overall strengths and limitations of the individual trials. Uncertainty about intervention effects, implications for further research and implications for practice are highlighted.

Up until 10–15 years ago management of depression in postpartum women was a neglected area<sup>59</sup> and even less attention was paid to the prevention of PND in research or practice.<sup>59</sup> However, with increasing knowledge about perinatal mental health<sup>59</sup> and particularly its potential long-term impact on the development of infants,<sup>33</sup> the need for preventive approaches has become more apparent.

The breadth of approaches aimed at preventing PND evaluated in clinical trials reflects the uncertainty around the aetiology of the condition and which of the many associated factors might be amenable to intervention. Some factors, such as a history of depression (before pregnancy, during pregnancy or postnatally) or a familial or genetic component, are unalterable but levels of risk may be reduced. Other factors, such as lack of social support, are potentially amenable to intervention.

## Description of the interventions

As far as we are aware, this is the most comprehensive review of interventions to evaluate the clinical effectiveness and cost-effectiveness, acceptability and safety of antenatal and postnatal interventions for pregnant and postnatal women to prevent PND. In total, 86 RCTs are included. Trials are categorised into one of three levels of preventive intervention (universal, selective and indicated) relevant for particular populations of women; the findings for each of these levels of preventive interventions is reported along with the limitations and implications.

The earlier Cochrane review of psychosocial and psychological interventions to prevent PND<sup>417</sup> searched to 30 November 2011 and the current review searched to July 2013. Our review included diverse interventions to prevent PND not just psychosocial and psychological, which is important given the diverse aetiology of PND.

The review includes trials from 16 countries. Trials were classified as psychological (including specific therapeutic approaches), educational, social, pharmacological, organisation of maternity care, midwifery-led interventions and CAM or other approaches to the prevention of PND. All of the universal preventive interventions were considered applicable to selective and indicated populations. Not all selective preventive interventions or indicated preventive interventions were applicable to a universal population. Evidence for some of the interventions was available neither for all populations nor for all follow-up times, meaning an evaluation of some interventions is necessarily incomplete.

The trials which followed up participants until 12 months postnatally provided information about enduring effects. Those trials which had a short-term follow-up of 6 weeks or 3 months did not provide information about whether or not any effect was sustained over the full postnatal year.

## Levels of preventive intervention

We defined selective preventive interventions as those provided for maternal populations identified on the basis of social risk (e.g. teenage parenting or poverty) and indicated preventive interventions as those provided for populations with individual risk (e.g. history of depression or a high score on a symptom checklist). Universal preventive interventions were provided for all pregnant and eligible postnatal women.

Categorising the trials into three levels of preventive intervention, relevant for particular populations of women, facilitates decisions on service provision from a service provider or commissioner perspective. The identification of populations of perinatal women for either selective or indicated preventive interventions can follow an assessment of risk of PND only among a population of perinatal women suitable for universal preventive interventions. Risk assessment requires specialised skills. The exceptions are for particular pregnant or postnatal women already known to health services because of a personal history, ongoing depression or anxiety or because of their social circumstances.

Within the trials, definitions of risk were inconsistent. Some trials used clinical criteria such as HIV-positive serostatus, or a screen for trauma symptoms. Other trials applied social criteria, such as being teenage, first-time pregnant, unmarried, from specific ethnic groups (such as Navajo or White Mountain Apache American Indian), or screened positive for domestic violence in the past year. Other trials used a depression diagnostic instrument or a measure of depressive symptoms. Even where a common instrument had been used to identify depressive symptoms, there was inconsistency in the threshold scores used to define level of risk. Some judgement was required for allocating trials to one of the three levels of preventive intervention.

## Conceptualisation of postnatal depression and the potential for prevention

Although depression can range on a continuum from mild symptoms to major depressive disorder, it is classified in psychiatry and for research purposes within a dichotomy of diagnosed depression or not depressed. The spectrum of symptoms in one person's state or mood can vary daily and weekly. We regarded depression in postnatal women as depression which may have begun before pregnancy, during pregnancy or after the baby was born. Trials for which the main focus was treatment of antenatal depression were included if they included a postnatal measure of depressive symptoms or a depression diagnosis, that is the antenatal treatment of depression was regarded as the prevention of PND. The implications of depression for a pregnant mother and her developing baby are different from the implications of depression for a new mother and her newborn and developing infant. There was inconsistency in the definition of antenatal depression as different self-completed measures of depressive symptoms (e.g. EPDS or BDI) or depression diagnostic instruments (e.g. DSM-IV or ICD-10) were used.

## Focus of the included interventions

Although all of the trials included a measure of PND, the primary aim of the trials varied from being primarily about PND prevention, antenatal well-being, birth outcomes, general health, general psychological well-being, infant outcomes and family outcomes. The deliberately broad inclusion criteria within our review enabled the capture of all potentially effective interventions whether PND was a primary or secondary outcome, notwithstanding selective reporting and publication bias.

## Network meta-analyses

A novel feature of this review was that inferences about intervention effects were made using a NMA. The NMA was used to determine the clinical effectiveness of individual antenatal and postnatal interventions for preventing PND, and to generate the joint distribution of individual antenatal and postnatal interventions which was used to characterise the uncertainty around inputs for the economic model.

A NMA requires trials to form a connected network of interventions, to enable intervention effects to be synthesised and compared. That is, trials included in the review could only be included in the NMA if they shared at least one intervention in common with at least one other study. In addition, trials must have provided information on the outcome measure of interest. The assumption made in the analysis was that any trials that were excluded because they did not provide information on the outcome of interest were missing at random.

Trials were excluded from the NMA if 'usual care' was considered to be sufficiently different from that in the UK or if the outcomes reported did not include the EPDS.

## Clinical effectiveness of universal preventive interventions

Of the trials included in the NMA, interventions most likely to be the best among those evaluable at each assessment were:

- at 3 months postnatally, midwifery redesigned postnatal care<sup>146</sup>
- at 6 months postnatally, CBT-based intervention<sup>61</sup> and PCA-based intervention<sup>61</sup>
- at 12 months postnatally, midwifery redesigned postnatal care,<sup>146</sup> CBT-based intervention<sup>61</sup> and PCA-based intervention.<sup>61</sup>

The most promising interventions were selected only from the set of interventions which formed a network.

### Psychological interventions

In the PCA-based intervention of health visitor training (the PoNDER trial) health visitors were trained in the assessment of postnatal women, combined with up to eight sessions for eligible women, in one arm a PCA and in the other arm a CBA.<sup>61</sup> The control group and the intervention group health visitors had an ongoing relationship with the women as part of their usual care. This trial had a low risk of bias and had the longest follow-up of 18 months. The trial had an accompanying economic evaluation, which indicated a high probability that the intervention was cost-effective but required what was considered a lengthy training for health visitors, including ongoing clinical supervision and reflective practice, equivalent in total to 8 days. The economic model indicated that, among the universal preventive interventions, the PCA-based intervention<sup>61</sup> was a candidate for introduction in the NHS. The trial findings were published in 2009 and were not included in the 2007 NICE guidance on antenatal and postnatal mental health.<sup>38</sup>

### Pharmacological or supplements

The calcium trial was included within a trial examining the prevention of pre-eclampsia. Outcomes were measured at only 3 months postnatally. The trial was assessed as having a high risk of bias overall. The authors were unable to explain the disparate outcomes in the two centres, Portland and Albuquerque.<sup>208</sup>

### **Midwifery-led interventions**

The intervention in the trial of redesigned midwifery-led community postnatal care was designed to enable midwifery care in community settings to be tailored flexibly according to the individual needs of the women. The focus was on the identification and management of women's physical and psychological health rather than on routine observations.<sup>146</sup> The trial had a low risk of bias. Women in the intervention group had a final check with their midwife at 10–12 weeks, which replaced the GP contact at 6–8-weeks, and overall GP consultation rates during the year were reduced in the intervention group. The economic evaluation indicated that among the universal preventive interventions, this intervention was the most cost-effective given current knowledge.

Despite some evidence of clinical benefit and cost savings, the findings did not substantially change practice or influence guidance. Following the 2004 revision to the GP contract, funding for maternity care was no longer allocated on an 'item of service' basis but was included in a global sum paid to GPs.<sup>418</sup> No recent studies have assessed the benefit of the GP role in postnatal care. The National Service Framework<sup>419</sup> recommended that all women should be provided with access to a midwife for up to 28 days post birth. NICE guidance<sup>420</sup> on routine postnatal care of women and their babies recommended that postnatal contacts should be based on an individual woman's need. However, many care providers in England continue to discharge some women from midwifery care at around 10–14 days postnatally, to health visitor care, with a routine GP contact offered at 6–8 weeks postnatally. Current NHS resource constraints mean that women are likely to be offered far fewer community contacts than were available in the trial of redesigned midwifery-led community postnatal care.<sup>146</sup> The historical definition of the postnatal period and fragmented organisation of maternity services across health-care sectors have hitherto been major barriers to revising practice in line with evidence, despite policy recognition of the importance of effective maternity care to promote life-long health and to reduce inequalities.<sup>66</sup>

In the trial of midwife-managed care within a Midwifery Development Unit (MDU),<sup>220</sup> 825 women were assessed at only 7 weeks postnatally using an unvalidated nine-item version of the EPDS rather than the usual 10-item EPDS. This model provided a high degree of continuity of care and carer with the aim that women should receive care from no more than four midwives during their hospital and community pregnancy, labour and postnatal care. MDU midwives therefore worked in both community and hospital settings. Birthing rooms used by MDU women were less clinical than those generally available and hospital postnatal care was provided in a dedicated postnatal ward that was designed to provide a more home-like environment. The authors advised at the time that further research should be carried out on the midwife's training in support, especially emotional support. The benefits of this approach merit consideration, but the various components would require significant changes in midwifery working to those utilised in most of the UK and would also require changes to facilities if the model was replicated.

### **Universal preventive interventions not included in the network meta-analysis**

Some interventions could not be compared in the NMA because trials did not provide the required data. For trials not included in the NMA, there should be caution about relying too heavily on whether or not a test of hypothesis was statistically significant in a particular trial, for example when the trial results showed a *p*-value less than 0.05 and the investigators concluded that the intervention was effective. One of the universal preventive intervention trials excluded from the NMA was conducted in the UK.<sup>150</sup> This trial, of unclear risk of bias, examining the frequency of health visitors' visits found no impact on most outcomes.

A US trial of education on preparing for parenting (a psychosocial prevention programme implemented through childbirth education programmes to enhance the co-parental relationship, parental mental health, the parent-child relationship and infant emotional and physiological regulation), with 169 participants, had an unclear risk of bias and found 'a [statistically] significant intervention effect on maternal depression and anxiety' using subset of seven items CES-D.<sup>163</sup>

An Australian trial of 'Towards Parenthood', with 143 women, in the education on preparing for parenting class of interventions was of unclear risk of bias found '[statistically] significantly lower levels of depression (BDI-II) post-treatment than participants in routine care'.<sup>185</sup> The different elements of the intervention could not be evaluated separately.

### Summary of qualitative findings for universal preventive interventions

Fourteen of the 21 qualitative studies of interventions examined a universal preventive intervention. Included studies provide at least moderate certainty with regard to their findings. Universal approaches must recognise that for a number of women the practical considerations regarding access to the intervention, convenience and challenges of integration with other responsibilities (such as other children or work commitments) may provide significant barriers to attendance at a substantive number of sessions or even attendance at all. Group-based approaches seemed to offer a wide range of resources and strategies, beyond those offered by the facilitator, and, provided that they do not prove too resource intensive or create unrealistic expectations of services, may be a useful supplement to provision. Group-based approaches may compensate for limitations in the formal care provision by providing additional social support, provided the group process is facilitated adequately. However, an important consideration relates to whether or not group approaches are able to offer sufficient individualised attention and continuity of care. Continuity of care was confirmed as an important operator across several interventions, and viewed as important by the EP committee, in that it enabled women to build up a relationship of trust with their health-care provider. This enabled both free communication of problems or concerns and then tailoring of support strategies to the needs of the individual woman. Midwifery redesigned care interventions seek to offer improved continuity. However, such continuity is not an automatic product of a single named provider or a stable team; it requires rapport and skills in facilitation if it is not to become an additional source of stress or anxiety.

The CenteringPregnancy approach is a highly structured, resource-intensive intervention that is being explored in the UK,<sup>421</sup> but has not yet been used widely in UK settings and may reveal its limitations within a resource-constrained environment. CenteringPregnancy provides group care to women at similar stages of pregnancy with a health assessment and provision of education and peer support. As a 'whole-system' approach it seems to merit wider evaluation, not simply against outcomes of relevance to PND but against a broad range of maternal and infant outcomes, both short and medium term. It may also offer support to partners, considered an important aspect of an intervention by the literature and the expert group of service users. However, such involvement is not unproblematic and may, in fact, exacerbate feelings of lack of support, particularly in comparison to others within the group. Although CenteringPregnancy has been evaluated in a universal context, its greater potential, given the extensive requirement for training and individual follow-up support, seems to lie in it being a more appropriate approach for an indicated population.

## Clinical effectiveness of selective preventive interventions

In general, the treatment effects for the selective preventive interventions were inconclusive. Of the studies included in the NMA, the most beneficial treatments appeared to be CBT-based interventions,<sup>158</sup> IPT-based interventions<sup>163</sup> and education on preparing for parenting. The most promising interventions for a selective population of women are presented within the categories in which the universal preventive interventions were presented.

### Psychological interventions

One of the most beneficial selective preventive interventions appeared to be CBT-based intervention<sup>158</sup> with IPT-based intervention estimated to provide the most QALYs. IPT is a relatively newly studied specific form of psychological intervention, which focuses on facilitating positive relationships. The studies examining IPT-based interventions were mainly undertaken in the USA, with two in China (one in Hong Kong). IPT has not been as well adopted in the UK as CBT-based approaches. Its use has been supported in a meta-analysis of psychological treatments for PND<sup>62,422</sup> and treatment for perinatal depression (including antenatal depression).<sup>250</sup> These studies could be replicated in a selective preventive intervention population.

### **Educational interventions**

Education on preparing for parenting appeared to be one of the more beneficial educational selective preventive interventions. It was estimated to be the most cost-effective of the trials of educational interventions evaluated with a cost of approximately £17,000 per QALY. The individual interventions were dissimilar. One, based in the UK examined the effectiveness of attendance at a twin clinic and provision of additional antenatal education, information, and support by a specialist midwife for women with twins.<sup>191</sup> The other, based in the USA offered 10 classes during pregnancy and postpartum, focusing on parenting and coping strategies, with 44 women, and was of unclear risk of bias.<sup>189</sup>

### **Social support**

The trial, conducted in the UK, of 343 young women having their first baby and living in a socioeconomically disadvantaged area examined peer mentor support in pregnancy and postnatally.<sup>201</sup> The failure to demonstrate a difference in the social support peer mentor group was similar to results from the trial of postnatal social support provided for a universal population<sup>199</sup> in which there appeared to be a trend for the intervention group scores to reflect poorer health than the scores for women in the control group. The authors recommended further rigorous evaluation of interventions to promote the health of children in socially disadvantaged communities.<sup>392</sup> More attention should be paid to exploring the nature of the support women say they would like, such as peer support, rather than examining the effectiveness of interventions without a particular theoretical basis.

### **Summary of qualitative findings for selective preventive interventions**

Four qualitative studies presented data from those who had received a selective preventive intervention. Included studies provide at least moderate certainty with regard to their findings. CenteringPregnancy was credited as offering support to partners, as well as facilitating support from the wider family and, most importantly, the peer support the intervention offered. IPT appears a well-received approach, although conclusions on the appropriateness of IPT as a selective prevention intervention are based on findings from a single study and constrained by the lack of qualitative evidence on the other types of intervention.

## **Clinical effectiveness of indicated preventive interventions**

The NMA showed that, in general, the treatment effects for the indicated preventive interventions were inconclusive and the CrIs were wide. The most beneficial interventions appeared to be those promoting parent–infant interaction at 6 weeks and 3 months postnatally,<sup>164</sup> those providing peer support at 3 months postnatally<sup>205</sup> or educational information at 3 months postnatally,<sup>168</sup> CBT-based intervention at 3–4 months postnatally,<sup>173</sup> IPT-based intervention at 7 months postnatally,<sup>169,170</sup> PCA-based intervention at 6 and 12 months postnatally<sup>61</sup> and CBT-based intervention at 6 and 12 months postnatally.<sup>61</sup>

The economic analysis showed that the indicated preventive interventions strategies with a relatively high probability of being optimal were midwifery continuous care; and PCA-<sup>61</sup> and IPT-based interventions.

### **Indicated preventive interventions not included in the network meta-analysis**

Some interventions could not be compared in the NMA because trials did not provide the required data. Apart from one large trial, conducted in Pakistan,<sup>148</sup> most of those excluded were small trials or trials without a comparable usual-care control group. Two small trials of women living in poverty<sup>178,179</sup> suggested a positive benefit of an IPT-based intervention. However, these results could be a consequence of small study effects and they should be confirmed in a RCT with up to 1 year of follow-up and adequately powered to detect clinically relevant treatment effects.

### **Social support**

Among the trials not included in the NMA, the UK-based trial examined Newpin volunteer peer support in 65 women.<sup>206</sup> The prevalence of perinatal major depression, measured by the SCAN, was 27% (8/30) in the Newpin befriender group and 54% (19/35) in the control group. This diagnostic instrument is more robust than the EPDS and the findings should be taken seriously by replicating the trial with an appropriately large sample size.

### **Pharmacological or supplements**

The findings demonstrating the effectiveness of sertraline<sup>216</sup> have been incorporated into clinical practice.

### **Complementary and alternative medicine or other interventions**

The small study of acupuncture, control acupuncture and massage in 61 women at different points in pregnancy (11–28 weeks)<sup>229</sup> was of unclear risk of bias and used the BDI at 10 weeks postnatally.

All of the trials within CAM or other were at unclear or high risk of bias.

### **Summary of qualitative findings for indicated preventive interventions**

Three qualitative studies presented data from those who had received an indicated preventive intervention and provided at least moderate certainty with regard to their findings. For an indicated population, the specific attention to developing strategies for better management of interpersonal relationships, as offered by IPT approaches, was important. Although the experience of individual women is unique, as affirmed by the expert group of service users, the facility for normalisation and creation of realistic expectations of what to expect and of which strategies might help is key to intervention approaches. However, once again it must be recognised that conclusions on the appropriateness of IPT as an intervention are constrained by the lack of qualitative evidence on the other types of intervention. The good availability of a specialist perinatal and infant mental health service appeared to be an essential part of an indicated preventive intervention although it should be noted that referral and discharge processes could cause anxiety, and how these are dealt with is of key importance.

## **Economic analysis**

This is the most up-to-date review of trials about the prevention or management of PND and provides the first estimate of the cost-effectiveness of preventing PND. The review included economic evaluations alongside trials, decision models and a cost study. In addition to the clinical outcomes, the review was able to combine the effectiveness data with the incremental costs for each intervention. Data from the PoNDER trial<sup>61</sup> were used to estimate a relationship between EPDS scores and SF-6D, allowing the QALYs produced by each intervention in the NMA of EPDS scores to be estimated. The incremental costs and QALYs for each intervention compared with standard care were used to estimate the cost-effectiveness of the intervention against standard care. In addition, fully incremental analyses were conducted, as were value of information analyses.

These estimates do not take into account any effects on the infant and the potential for them to benefit from QALY gain throughout their life course.

The universal preventive interventions with a relatively high probability of being optimal, and hence candidates for introduction within the NHS, were redesigned midwifery-led community postnatal care,<sup>264</sup> PCA-based interventions<sup>61</sup> and CBT-based interventions.<sup>61,173</sup>

Education on preparing for parenting was estimated to be the most cost-effective of the selective preventive interventions.<sup>189,191</sup>

Of the indicated preventive interventions, a PCA-based intervention was estimated to be the most cost-effective intervention, with the probability of the IPT-based intervention being optimal increasing as the willingness to pay per QALY increased.

There is genuine uncertainty as to the most effective intervention within the three levels of preventive intervention. In addition, the economic analysis has provided an analysis of the value of further research in the area. Assuming a willingness to pay of £20,000 per QALY, the population analysis (EVPI) values are very large, in excess of £150M for all analyses. For the universal preventive interventions, selective preventive interventions and indicated preventive interventions, the EVPI was estimated to be £1930M, £205M and £166M, respectively. These results were limited to those interventions for which an EPDS mean score was available. Overall, there was considerable uncertainty about the most cost-effective intervention in all populations as the cost estimations and estimations of the area under the curve were simple and the absolute QALY gains were small for all interventions. Expected value of information analyses quantify the expected gain from obtaining further information to inform decisions. For further research to be worthwhile, the EVPI must exceed the planned research costs. No definitive answer can be provided regarding the most cost-effective intervention because of the large uncertainty regarding the relative efficacies of the interventions. Given the high EVPI values which exceed the cost of trials, future trials assessing the relative efficacies of promising interventions appear value for money.

## Limitations of the quantitative evidence base

### *Replication of interventions*

One limitation of the evidence base, and therefore the evidence synthesis, was the lack of replication of interventions, other than of usual care as a control intervention. The exceptions were 'education on preparing for parenting',<sup>189,191</sup> 'promoting parent–infant interaction',<sup>164,174</sup> 'CBT-based intervention'<sup>61,165,168,173</sup> and 'IPT-based intervention'.<sup>169,170</sup> Within the interventions there was variation in skills of the care provider and the format, timing and duration of the intervention provided.

It was not possible for the review team to verify any potential benefits suggested by investigators who reported statistically significant effects on small trials of unclear risk of bias. Similarly, when investigators reported statistically non-significant results in trials that were not adequately powered to detect clinically meaningful effects, the results remain uncertain.

Despite the number of interventions assessed for the prevention of PND and the large number of trials conducted, there was generally a lack of replication of trials to confirm intervention effects. The lack of replication meant that there were insufficient sample data (i.e. trials) to estimate the between-trial SD from the data alone. The reasons for the lack of replication concern the complexity of the aetiology of PND and the additional skills required for interventions to be tested in addition to the novelty of the research overall in this generally neglected area of research.

### *Moderators and mediators*

The random (treatment)-effect models assumed that there was heterogeneity of treatment effects between trials. The mean of the random-effects distribution represents the pooled mean across the population and does not relate to women with any specific characteristics. Data were available from trials describing the study-level characteristics of the participants and the intervention provider as continuous or dichotomous outcomes. When there is heterogeneity between trials, it is sometimes possible to use meta-regression to explore whether or not study-level characteristics are treatment effect modifiers. However, it was not possible to perform a meta-regression in this instance because there was insufficient replication of each treatment effect across trials.

## Limitations of the included trials

### Quality of the trials

The Cochrane risk-of-bias assessment allowed a robust assessment of the risk of bias by two reviewers for the 86 RCTs. The highest level of assessed risk was for allocation concealment, followed by incomplete outcome data, then random sequence generation. Rather than excluding trials on the basis of an assessment of high risk of bias, all of the included trials were incorporated into the NMA irrespective of the assessment of risk of bias. The trials for which there appeared to be the most beneficial treatments were nearly all assessed as being at low risk of bias. Knowledge of the methodological weaknesses of the trials that were assessed as high risk of bias allows recommendations to be made about how to improve the general standard of research in the field.

### Heterogeneity of trial participants

The participants' characteristics reflected the heterogeneity of the individual trials: country, care system, severity of depression, risk factors, age, HIV serostatus, thyroid status, traumatic birth experience and intimate partner violence. The mean age of participants ranged from 16 to 33 years. The trials with young participants were mainly the selective preventive intervention trials.

### Intervention provider

More than 30 different health-care professionals (doctors, nurses and midwives), community volunteers and peer workers, and specialists (acupuncture, physiotherapy, counselling, massage, psychology, social work yoga) were involved in providing the interventions. The training ranged from 4 hours for peer support workers to master- and doctoral-level clinicians with supervision and the use of training manuals. It was not possible to determine whether or not a longer length of training was associated with greater effectiveness, although it is likely that the longer the length of training was associated with a greater cost.

Variations in health-care practice are important and may be attributable to components related to practitioners as individuals and women as individuals and the interaction between them. A highly skilled practitioner may be able to develop a trusting relationship with many people; a very much less skilled practitioner with only some people. The skills are trainable but only to some extent. In individual trials with access to individual-level data, with many women and many practitioners it should be possible to carry out multilevel modelling that would enable an estimate of the practitioner effect. When there are few participants and only one or two practitioners providing the intervention, it is not possible to disentangle the practitioner effect.

### Usual care in the UK

The reference treatment was usual care but we acknowledge that this varies between countries and within countries. We consulted a number of experts around the world to gain their views on the comparability of usual care in the UK with usual care in the other countries where trials were conducted. Usual perinatal care was defined as routine antenatal or postnatal care for healthy women with uncomplicated pregnancies. The consultation allowed us to conclude that care in Australia, Canada, Europe (France and Norway) and the USA was comparable for the network with usual care in the UK, but that it would not be possible to form a network with usual care provided in China (Hong Kong), Japan, Mexico, Pakistan, South Africa and Taiwan.

### Measures of depression

Over 100 different instruments had been used in the included trials, reflecting the lack of focus on particular outcomes or the lack of validated instruments used. Trials using the EPDS were selected as the focus for this review because this was the instrument most frequently used in the trials and because, being a continuous measure, results were presented as mean (SD) values. EPDS data are not normally distributed and methods of analysis should acknowledge the skewness of the data. The EPDS can also be used as a dichotomous measure for use in clinical practice, but a score of below a certain threshold does not confirm the absence of depression.<sup>2</sup> Further research might examine the outcomes of trials which used other primary outcome measures or diagnostic instruments when measuring depression.

### Treatment end points

The reason for the measuring outcomes at 6 weeks, 10 weeks, 12 weeks, 16 weeks, 4–5 months, 6 months, 7 months, 9 months and 12 months postnatally is not clear. A reduction in some of the time points to 6 weeks, 12 weeks, 6 months and 12 months postnatally would allow monitoring of any enduring effect to 12 months postnatally and allow a better comparison with the outcomes in other trials.

### Infant outcomes

One of the potential effects of PND is the impact on infant development. An infant can be exposed to a 'cumulative dose of depression' by either severity or duration and infants may vary in their susceptibility to the effects of PND. Impact of interventions on infants is difficult to determine before the age of 12 months and is often assessed by parental reports or more objective researcher assessments in controlled situations. Few of the trials reported outcomes to 12 months or reported infant outcomes at all. It would be important to use repeated measures analysis to 12 months postnatally or longer, and explore if any effect on infant development varied over time and if infant development scores correlated with maternal depression scores over time. Infants of women who were depressed in pregnancy or postnatally have been followed up to school age and beyond and there is evidence of lifelong effects on infants' mental health. However, within the context of a RCT, we are only aware of the PoNDER trial which followed up infants to 18 months postnatally. In the included studies which measured infant outcomes,<sup>61,149,153,168,174,201,211</sup> using the Ainsworth Strange Situation Assessment of Infant Attachment, Bayley Scales of Infant Development, Behaviour Screening Questionnaire, Children's Global Assessment Scale, Infant Characteristics Questionnaire and the Infant Toddler Social Emotional Assessment there was no clear benefit for infants in the measures used. It was not possible to perform a NMA. The sample size for trials examining infant outcomes should be appropriately large to determine differences where they exist. The main reason for the expansion of interest in PND in recent years is the recognition of the impact this usually self-limiting maternal condition has on the mental health of the infant across the life course. It is therefore a serious limitation of the review that the effects of intervention on this outcome could not be assessed.

### Strengths of the review

We undertook a rigorous systematic review and we believe that we identified all relevant trials evaluating the clinical effectiveness of interventions to prevent PND. Although we appraised and summarised a very large number of trials, much of the evidence was inconclusive because of inconsistency in determining an at-risk population for identifying the level of preventive intervention; outcomes measured; thresholds used in the same outcome measure; follow-up time points; and timing, duration and intensity of individual intervention provided.

The analysis approach differs from that used in previous Cochrane reviews<sup>233,417</sup> and other reviews<sup>423</sup> which did not distinguish between interventions within trials in terms of the control or comparator interventions. The 2013 Cochrane review<sup>417</sup> did not consider specific interventions separately but combined different psychosocial and psychological interventions. In contrast, our objective was to assess the clinical effectiveness and cost-effectiveness of individual interventions and the value of collecting additional information. These reviews were unable to make inferences about the relative effects of specific interventions, beyond class effects for psychological, educational, social and pharmacological interventions. The assumptions that they made were that intervention effects within a class were identical rather than treating them as related and exchangeable.

Previous reviews used standardised effect sizes rather than EPDS scores. Standardised effect sizes have been criticised on the basis that trials with identical results may spuriously appear to give different results. This can lead to estimates that were smaller in magnitude than other trials but appear greater, and vice versa. Working with standardised mean scores would also require a mapping to utility. Previous reviews also tended to ignore the time at which assessments were made, often taking the latest assessment time;

this would be reasonable if the treatment effect was constant over time, although little attempt has been made to test this assumption.

A further strength was the development of a de novo model which allowed the cost-effectiveness of each intervention compared with usual care to be estimated. Furthermore, fully incremental analyses and value of information calculations were undertaken.

## Limitations of the review

The NMA offers an advance on previous reviews. Nevertheless, there are some limitations with the current analysis:

- Some trials were omitted because they did not provide EPDS scores and this may have introduced reporting or selection bias. In principle, a multivariate meta-analysis would allow correlation between outcomes to be estimated in trials that provide multiple outcomes. However, this would involve a multivariate NMA of multiarm trials, which is beyond the scope of this review.
- No adjustment was made for the lack of quality associated with some trials. Evidence was taken at face value and treatment effects may thus be overstated.
- The analysis of EPDS scores assumes independence of outcomes within trials and independence of population intervention effects between trials. The EPDS scores are longitudinal within trials (i.e. repeated measures) and EPDS mean scores are expected to be more similar within trials than between trials. We would also expect population mean intervention effects to be correlated between trials at different times and for the between study SD to be different at different times. However, the lack of replication of pairs of interventions means that these parameters would be difficult to estimate without external information, which is beyond the scope of this review.
- A limitation of the economic evaluation was that estimations of incremental costs and the methodology used in the area under the curve model were by necessity, simplistic which may have introduced inaccuracy.
- Infant outcomes were not examined in detail because of inconsistent published infant outcome data.
- Family outcomes were not examined in detail because of insufficient outcome data.

## Discussion of all qualitative findings

In addition to the 21 qualitative studies of interventions, a further 23 studies reported qualitative data on perspectives and attitudes of women who had not experienced PND, regarding PSSSs that they believe helped them to prevent the condition. Included studies were generally of moderate to high quality and, therefore, taken individually or collectively provide at least moderate certainty with regard to their findings. Although the hypothetical nature of suggested strategies must be acknowledged, this body of evidence clearly provides a useful counterpoint to interventions that are largely hypothesised by service providers. Generally, this wider evidence base confirmed the presence of many features considered important by women within existing interventions. However, the team's ability to identify these components was constrained by the limited detail of reporting of each intervention. Nevertheless, we believe that each intervention, current or planned, should be evaluated against the list of strategies considered helpful by women who avoided PND. The findings of the qualitative review may therefore make a major contribution to design of future interventions.

## The implications of the main findings of this review

### *Findings associated with the evidence base: methodological implications*

Previous reviews have found no evidence to recommend any intervention for preventing PND because of methodological limitations.

Many trials reviewed were pilot studies or had small or non-generalisable samples. Overall, the universal preventive intervention trials were rated to have greater risks of bias than the selective and indicated preventive interventions; this was most notable for selection bias and attrition bias. This may be an inevitable consequence of research with women in this population. Fundamental reporting of quality criteria applicable to all trials, random sequence generation and allocation concealment would, however, improve (when it occurred) the quality assessment of up to 25% of trials.

### Implications for future research in the prevention of postnatal depression

The implications of the findings are that a variety of different approaches may be valuable in the prevention of PND. Identifying the single best approach for each level of preventive intervention may be what service commissioners require. Future trials could investigate individual women's preferences for approaches and the impact on effectiveness of offering women choice. Rather than establish a new practitioner role future trials could examine the effectiveness of the development of additional skills in practitioners who already work with pregnant and postnatal women. Examining the effectiveness of training in a PCA-based intervention, a CBT-based intervention or an IPT-based intervention would require a large enough sample to undertake practitioner-level analysis, to explore practitioner variability.

In future trials, the data generation process for the EPDS should be better considered. EPDS data are ordered categorical data and calculating a sample mean and sample SD for the purpose of statistical inference means appealing to the central limit theorem. In general, the sample sizes were not large enough for the central limit theorem to apply. Future estimates of treatment effect should be based on methods of analysis using ordered categorical techniques. It would still be possible to estimate population EPDS mean scores, rather than sample mean scores, but based on the population proportion of women. Using the current approach of using the sample mean can lead to negative estimates of absolute mean EPDS mean scores when it is assumed that the distribution of EPDS scores is normal.

Edinburgh Postnatal Depression Scale scores may be dichotomised in clinical practice as an assessment of risk and therefore operate as a decision aid for individual women to have further intervention. Within clinical trials, dichotomising EPDS scores according to a threshold for the purpose of making inferences about interventions is less appropriate. It has been recommended that dichotomies should be abandoned so that people are not arbitrarily divided into groups, by using thresholds on an underlying continuous scale. Calculating sample sizes based on dichotomous measures is regarded as inefficient in unnecessarily increasing the size of clinical trials, as well as contributing to overestimates of the extent to which different women respond differently to the same treatment.

Variation in the implementation of these interventions will manifest itself as heterogeneity between trials in treatment effect (i.e. in the estimate of the between-trial SD). When the evidence suggests that interventions are beneficial and cost-effective relative to usual care then it would be necessary to do further research to identify under what circumstances the treatment is beneficial (and not beneficial).

The value of information analyses undertaken produced EVPPI values for the relative efficacy of treatment in excess of £150M for each population. This is more than sufficient to fund research assessing the most effective intervention in each population. Comparing interventions in such a way that feedback loops could be created would create indirect as well as direct evidence (thereby strengthening inference) and would allow an assessment of inconsistency and adjustment for bias.

### ***Implications for individual interventions***

There are a number of hypothesised components for successful inclusion in an intervention, presented in full in *Chapter 8* and *Table 55* specifically. At a minimum, an intervention should allow women to develop trusting relationships with the care provider, feel supported, access information, have continuity of care, have individual-centred care and to have their partner involved. For health-care providers, there should be support with appropriate training, skills and resources, for them to respond to cues about how a woman is feeling.

Different psychological approaches (CBT-based, PCA-based and IPT-based) all were possibly cost-effective within the three levels of preventive interventions. The role of non-specific factors, such as congruence, positive regard and empathy, in psychotherapeutic interventions has been recognised. Skilled therapists may have multiple trainings and select the different approaches to suit clients at particular stages in their intervention. Skills to help women feel that they can trust their care provider and develop a continuing, supportive relationship, for example with a midwife or health visitor, would help address the needs of pregnant and postnatal women.



# Chapter 11 Conclusion

## Implications from this review for further research

The following recommendations are made for RCTs of preventive interventions for PND:

- Trials should be designed appropriately powered to address important hypotheses of interest: maternal and infant related.
- Sample sizes should be based on clear statistical criteria and an understanding of a clinically important difference.
- Trials should collect and report a battery of a few, consistent outcome measures.
- Outcomes should be measured at consistent time points – 6 weeks, 12 weeks, 6 months, 12 months postnatally.
- Outcomes should include anxiety.
- Trials should be in targeted populations.
- There should be a clear justification for the interventions being trialled.
- Women's perspectives on what they might find helpful should precede a RCT.
- Attention should be paid to the needs of women for a trusting, supportive, ongoing relationship with a care provider in the intervention development phase.
- Utility data should be collected for each intervention.
- Detailed costing data should be collected for each intervention.
- Women's and service providers' perspectives should be gathered alongside an ongoing trial in properly planned qualitative studies.
- Trials should include multiple interventions.
- Large data sets resulting from properly populated studies can be combined to allow multilevel modelling to disentangle moderators and mediators and specifically practitioner- and service-level effects.

## Implications from this review for service provision

The activity represented by this volume of trials which aimed to prevent PND rather than treat PND emphasises the importance of the condition and the potential benefit for perinatal women, infants and partners. Of the trials included in the NMA, the most beneficial treatments appeared to be midwifery redesigned postnatal care,<sup>146</sup> PCA-based intervention<sup>61</sup> and CBT-based intervention.<sup>61</sup> The effect of the interventions appeared to be small. Trials of parent–infant interaction including infant outcomes explicitly and replication would be important to confirm these findings. Although one intervention may not prevent the onset of depression, it may reduce the severity of symptoms and extrapolated to a population level that would represent a large benefit.

## Suggestions for research priorities

Preventive interventions should be relatively simple and inexpensive, particularly when they are to be applied to a universal population. Small trials are useful in assessing feasibility or generating hypotheses but potential treatment effects need to be confirmed in properly designed and conducted RCTs. Similarly, treatment effects based on small sample sizes from a limited number of trials should also be confirmed in properly designed and conducted RCTs. Specific interventions that are worthy of further evaluation include:

- As a universal preventive intervention: midwifery redesigned postnatal care, PCA-based interventions, CBT-based interventions and preparing for parenting.
- As a selective preventive intervention: CenteringPregnancy, IPT-based interventions and education on preparing for parenting.
- As an indicated preventive intervention: PCA-based interventions, CBT-based interventions, IPT-based interventions, promoting parent–infant interaction, telephone-based peer support and Newpin volunteer peer support.

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## Contributions of authors

All authors were involved in writing draft and final versions of the report.

**C Jane Morrell** (Associate Professor in Health Research) co-ordinated the review, wrote the background section of the report, and conducted the clinical effectiveness systematic review (screening and retrieving papers, assessing against the inclusion criteria and appraising the quality of papers and abstracting information from papers for synthesis), wrote sections of the results and discussion and assembled the final report.

**Paul Sutcliffe** (Associate Professor, Deputy Director for Warwick Evidence) co-ordinated the review, wrote the abstract and scientific summary, conducted the clinical effectiveness systematic review (screening and retrieving papers, assessing against the inclusion criteria and appraising the quality of papers and abstracting information from papers for synthesis), and wrote sections of the results and discussion.

**Andrew Booth** (Reader in Evidence-Based Information Practice) conducted the realist synthesis; and contributed to methodology, data extraction and interpretation of the qualitative synthesis.

**John Stevens** (Reader in Decision Science, Director, Centre for Bayesian Statistics in Health Economics, Health Economics and Decision Science) led on the quantitative synthesis, co-ordinated the NMA and wrote sections of the results and discussion.

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**Rebecca Harvey** (Research Associate in Medical Statistics, Health Economics and Decision Science) carried out the evidence synthesis, assisted with drafting the statistical results and data extraction of the trials included in the NMA.

**Alice Bessey** (Research Associate Health Economics and Decision Science) undertook the economic evaluation literature review, did the costing of interventions for economic evaluation and contributed to the health economic chapter.

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**Sarah Stewart-Brown** (Professor of Public Health Statistics and Epidemiology) advised on design of searches and the selection of trials for inclusion with regard to complementary and alternative approaches; advised on classification of preventive interventions and interpretation of findings; and contributed to the final report.

## Data sharing statement

Data can be obtained from the corresponding author.

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# Appendix 1 Literature search strategies

## Electronic bibliographic databases searched for clinical effectiveness evidence

- The Cochrane Library including the Cochrane Systematic Reviews Database, Cochrane Controlled Trials Register, DARE, HTA and NHS EED databases 1991 (searched on 28 November 2012).
- MEDLINE (via Ovid) 1946 – November week 3 2012 (searched on 30 November 2012).
- PreMEDLINE (via Ovid) 4 December 2012 (searched on 5 December 2012).
- EMBASE (via Ovid) 1974 – 4 December 2012 (searched on 5 December 2012).
- CINAHL (via EBSCOhost) 1982 (searched on 11 December 2012).
- PsycINFO (via Ovid) 1806 – November week 4 2012 (searched on 5 December 2012).
- Science Citation Index (via ISI Web of Science) 1899 – date (searched on 5 December 2012).
- Social Science Citation Index (via ISI Web of Science) 1956 (searched on 5 December 2012).
- ASSIA (via ProQuest) 1987 (searched on 19 December 2012).
- AMED (via Ovid) 1985 – 4 December 2012 (searched on 5 December 2012).
- CPCI-S (via ISI Web of Science) 1990 (searched on 5 December 2012).
- MIDIRS reference database 1991 (searched 24 July 2013).

## Additional resources used for clinical effectiveness evidence

1. UK Clinical Research Network (searched on 30 January 2013).
2. Current Controlled Trials (searched on 30 January 2013).
3. ClinicalTrials.gov (searched on 30 January 2013).
4. PROSPERO (searched on 19 February 2013).
5. Social Care online (searched on 19 February 2013).
6. ProQuest Dissertation and Theses (searched on 26 March 2013).
7. HSRProj (Health Services Research Projects in Progress) (searched on 19 February 2013).
8. Index to Theses (searched on 19 February 2013).
9. OpenGrey (searched on 19 February 2013).
10. relevant websites (searched on 26 March 2013).
11. general internet search using the search engine Google (searched on 19 February 2013).

## Search strategy for randomised controlled trials

1. MeSH descriptor: [Depression, Postpartum] explode all trees
2. pnd:ti,ab,kw (Word variations have been searched)
3. MeSH descriptor: [Depression] explode all trees
4. depress\*:ti,ab,kw (Word variations have been searched)
5. stress\*:ti,ab,kw (Word variations have been searched)
6. anx\*:ti,ab,kw (Word variations have been searched)
7. MeSH descriptor: [Anxiety Disorders] explode all trees
8. MeSH descriptor: [Anxiety] explode all trees
9. MeSH descriptor: [Affective Disorders, Psychotic] explode all trees
10. affective:ti,ab,kw (Word variations have been searched)
11. #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10

12. postpartum or post partum or postpartum:ti,ab,kw (Word variations have been searched)
13. MeSH descriptor: [Postpartum Period] explode all trees
14. postnatal\* or post natal\* or postnatal\*:ti,ab,kw (Word variations have been searched)
15. post-pregnan\* or post pregnan\* or postpregnan\*:ti,ab,kw (Word variations have been searched)
16. ante-natal\* or ante natal\* or antenatal\*:ti,ab,kw (Word variations have been searched)
17. pre-natal\* or pre natal\* or prenatal\*:ti,ab,kw (Word variations have been searched)
18. peri-natal\* or peri natal\* or perinatal\*:ti,ab,kw (Word variations have been searched)
19. #12 or #13 or #14 or #15 or #16 or #17 or #18
20. #11 and #19
21. #1 or #2 or #20
22. MeSH descriptor: [Primary Prevention] explode all trees
23. prevent\*:ti,ab,kw (Word variations have been searched)
24. Any MeSH descriptor with qualifier(s): [Prevention & control - PC]
25. prophyla\*:ti,ab,kw (Word variations have been searched)
26. decreas\* or reduc\* or lower\* or overcom\* or improv\* or avoid\*:ti,ab,kw (Word variations have been searched)
27. wellbeing or well-being or well being:ti,ab,kw (Word variations have been searched)
28. enhanc\* or improv\* or increas\*:ti,ab,kw (Word variations have been searched)
29. #27 and #28
30. #22 or #23 or #24 or #25 or #26 or #29
31. #21 and #30
32. MeSH descriptor: [Risk Factors] explode all trees
33. MeSH descriptor: [Risk] explode all trees
34. risk\* or indicat\* or predict\* or predispos\*:ti,ab,kw (Word variations have been searched)
35. MeSH descriptor: [Social Support] explode all trees
36. social support\*:ti,ab,kw (Word variations have been searched)
37. MeSH descriptor: [Socioeconomic Factors] explode all trees
38. MeSH descriptor: [Social Class] explode all trees
39. MeSH descriptor: [Life Change Events] explode all trees
40. history of depression\*:ti,ab,kw (Word variations have been searched)
41. MeSH descriptor: [Marriage] explode all trees
42. dyadic adjustment\* or parental adjustment\*:ti,ab,kw (Word variations have been searched)
43. MeSH descriptor: [Pregnancy Complications] explode all trees
44. MeSH descriptor: [Obstetric Labor Complications] explode all trees
45. complication\*:ti,ab,kw (Word variations have been searched)
46. MeSH descriptor: [Parturition] explode all trees
47. #32 or #33 or #34 or #35 or #36 or #37 or #38 or #39 or #40 or #41 or #42 or #43 or #44 or #45 or #46
48. #21 and #47
49. interven\* or program\* or target\* or educat\* or strat\*:ti,ab,kw (Word variations have been searched)
50. #21 and #49
51. #31 or #48 or #50

## Search strategy used on The Cochrane Library

The Cochrane Library including the Cochrane Systematic Reviews Database, Cochrane Controlled Trials Register, DARE, HTA and NHS EED databases, 1991– date (searched on 28 November 2012).

1. MeSH descriptor: [Depression, Postpartum] explode all trees
2. pnd:ti,ab,kw (Word variations have been searched)
3. MeSH descriptor: [Depression] explode all trees
4. depress\*:ti,ab,kw (Word variations have been searched)
5. stress\*:ti,ab,kw (Word variations have been searched)
6. ansi\*:ti,ab,kw (Word variations have been searched)
7. MeSH descriptor: [Anxiety Disorders] explode all trees
8. MeSH descriptor: [Anxiety] explode all trees
9. MeSH descriptor: [Affective Disorders, Psychotic] explode all trees
10. affective:ti,ab,kw (Word variations have been searched)
11. #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10
12. postpartum or post partum or postpartum:ti,ab,kw (Word variations have been searched)
13. postnatal\* or post natal\* or postnatal\*:ti,ab,kw (Word variations have been searched)
14. post-pregnan\* or post pregnan\* or postpregnan\*:ti,ab,kw (Word variations have been searched)
15. ante-natal\* or ante natal\* or antenatal\*:ti,ab,kw (Word variations have been searched)
16. pre-natal\* or pre natal\* or prenatal\*:ti,ab,kw (Word variations have been searched)
17. peri-natal\* or peri natal\* or perinatal\*:ti,ab,kw (Word variations have been searched)
18. #12 or #13 or #14 or #15 or #16 or #17
19. #11 and #18
20. #1 or #2 or #19

Search steps 1–20 are for the population PND.

21. MeSH descriptor: [Primary Prevention] explode all trees
22. prevent\*:ti,ab,kw (Word variations have been searched)
23. Any MeSH descriptor with qualifier(s): [Prevention & control - PC]
24. prophyla\*:ti,ab,kw (Word variations have been searched)
25. decreas\* or reduc\* or lower\* or overcome\* or improve\*:ti,ab,kw (Word variations have been searched)
26. #21 or #22 or #23 or #24 or #25

Search steps 21–26 are terms for prevention.

27. #20 and #26

Search step 27 combines the population and prevention terms to find literature on prevention of PND.

28. MeSH descriptor: [Risk Factors] explode all trees
29. MeSH descriptor: [Risk] explode all trees
30. risk\* or indicat\* or predict\* or predispos\*:ti,ab,kw (Word variations have been searched)
31. MeSH descriptor: [Social Support] explode all trees
32. social support\*:ti,ab,kw (Word variations have been searched)
33. MeSH descriptor: [Socioeconomic Factors] explode all trees
34. MeSH descriptor: [Social Class] explode all trees
35. MeSH descriptor: [Life Change Events] explode all trees
36. history of depression\*:ti,ab,kw (Word variations have been searched)

37. MeSH descriptor: [Marriage] explode all trees
38. dyadic adjustment\* or parental adjustment\*:ti,ab,kw (Word variations have been searched)
39. MeSH descriptor: [Pregnancy Complications] explode all trees
40. MeSH descriptor: [Obstetric Labor Complications] explode all trees
41. #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36 or #37 or #38 or #39 or #40

Search steps 28–30 are terms for risk and 31–40 are terms for known risk factors for PND.

42. #20 and #41

Search step 20 and 41 combines the population and risk terms to find papers about risk factors and PND to find trials that are focused at risk factors.

43. interven\* or program\* or target\* or educat\* or strat\*:ti,ab,kw (Word variations have been searched)

Search step 43 are different terms around interventions.

44. #20 and #43

Search step 44 combines PND and intervention terms to find trials of PND interventions.

45. #27 or #42 or #44

Search step 45 uses OR to combine the different subsets and try to find all PND trials.

The search retrieved 883 records, 60 systematic reviews, 38 other reviews from DARE, 759 trials, eight technology assessments and nine economic evaluations.

### Search strategy used on PreMEDLINE (via Ovid)

MEDLINE (Ovid) 1946 – week 3 November 2012 (searched on 30 November 2012) and PreMEDLINE (Ovid) 4 December 2012 (searched on 5 December 2012).

1. exp Depression, Postpartum /
2. pnd.tw.
3. exp Depression /
4. depress\$.tw.
5. stress\$.tw.
6. anx\$.tw.
7. exp Anxiety Disorders /
8. exp Anxiety /
9. exp Affective Disorders, Psychotic /
10. affective.tw.
11. 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
12. 12.(postpartum or post partum or postpartum).tw.
13. exp Postpartum Period /
14. (postnatal\$ or post natal\$ or postnatal\$).tw.
15. (post-pregnan\$ or post pregnan\$ or postpregnan\$).tw.
16. (ante-natal\$ or ante natal\$ or antenatal\$).tw.
17. (pre-natal\$ or pre natal\$ or prenatal\$).tw.

18. (peri-natal\$ or peri natal\$ or perinatal\$).tw.
19. 12 or 13 or 14 or 15 or 16 or 17 or 18
20. 11 and 19
21. 1 or 2 or 20

Search steps 1–21 are terms for the population PND.

22. exp Primary Prevention /
23. prevent\$.tw.
24. pc.fs.
25. prophyla\$.tw.
26. (decreas\$ or reduc\$ or lower\$ or overcom\$ or improv\$ or avoid\$).tw.
27. (wellbeing or well-being or well being).tw.
28. (enhanc\$ or improv\$ or increas\$).tw.
29. 27 and 28
30. or / 22-26,29

Search steps 22–30 are terms for prevention.

31. 21 and 30

Search step 31 combines the population and prevention terms to find literature on prevention of PND.

32. exp Risk Factors /
33. Risk /
34. (risk\$ or indicat\$ or predict\$ or predispos\$).tw.
35. exp Social Support /
36. social support\$.tw.
37. exp Socioeconomic Factors /
38. exp Social Class /
39. exp Life Change Events /
40. history of depression\$.tw.
41. exp Marriage /
42. (dyadic adjustment\$ or parental adjustment\$).tw.
43. exp Pregnancy Complications /
44. Obstetric Labor Complications /
45. complication\$.tw.
46. exp Parturition /
47. or / 32-46

Search steps 32–34 are terms for risk and 35–47 are terms for known risk factors for PND.

48. 31 and 47

Search step 48 combines 31 and 47 combining the population and risk terms to find papers about risk factors and PND to find trials that are focused at risk factors.

49. (interven\$ or program\$ or target\$ or educat\$ or strat\$).tw.

Search step 49 are different terms around interventions.

50. 21 and 49

Search step 50 combines PND and intervention terms to find trials of PND interventions.

51. 31 or 48 or 50

Search step 51 uses OR to combine the different subsets and try to find all PND trials.

52. Meta-Analysis as Topic /

53. meta analy\$.tw.

54. metaanaly\$.tw.

55. Meta-Analysis /

56. (systematic adj (review\$1 or overview\$1)).tw.

57. exp Review Literature as Topic /

58. 52 or 53 or 54 or 55 or 56 or 57

59. cochrane.ab.

60. embase.ab.

61. (psychlit or psychlit).ab.

62. (cinahl or cinhal).ab.

63. science citation index.ab.

64. bids.ab.

65. cancerlit.ab.

66. 59 or 60 or 61 or 62 or 63 or 64 or 65

67. reference list\$.ab.

68. bibliograph\$.ab.

69. hand-search\$.ab.

70. relevant journals.ab.

71. manual search\$.ab.

72. 67 or 68 or 69 or 70 or 71

73. selection criteria.ab.

74. data extraction.ab.

75. 73 or 74

76. Review /

77. 75 and 76

78. Comment /

79. Letter /

80. Editorial /

81. animal /

82. human /

83. 81 not (81 and 82)

84. 78 or 79 or 80 or 83

85. 58 or 66 or 72 or 77

86. 85 not 84

Search steps 52–86 are the systematic reviews filter for MEDLINE.

87. 51 and 86

Search step 87 combines the search with the systematic reviews filter to retrieve systematic reviews.

88. limit 87 to (English language and humans)
89. exp "costs and cost analysis" /
90. economics /
91. exp economics hospital /
92. exp economics medical /
93. exp economics nursing /
94. economics pharmaceutical /
95. exp "fees and charges" /
96. exp budgets /
97. budget\$.tw.
98. cost\$.ti.
99. (cost\$ adj2 (effective\$ or utilit\$ or benefit\$ or minim\$)).ab.
100. (economic\$ or pharmaco-economic\$ or pharmaco-economic\$).ti.
101. (price or pricing\$).tw.
102. (financial or finance or finances or financed).tw.
103. (fee or fees).tw.
104. or / 89-103

Search steps 89–104 is the economic evaluations filter for MEDLINE.

105. 51 and 104

Search step 105 combines the search with the economic evaluations filter to retrieve economic evaluations.

106. limit 105 to (english language and humans)
107. from 106 keep 1-266
108. mixed method.tw.
109. mixed methods.tw.
110. mixed study.tw.
111. multi method.tw.
112. multiple sources of data.tw.
113. triangulation design.tw.
114. (qualitative adj99 quantitative).tw.
115. 108 or 109 or 110 or 111 or 112 or 113 or 114

Search steps 108–115 are terms for mixed-methods research.

116. 51 and 115

Search step 116 combines the search with the mixed-methods filter to mixed-methods papers

117. limit 116 to (english language and humans)
118. findings.tw.
119. interview.tw.
120. qualitative.tw.
121. 118 or 119 or 120

Search steps 108–115 are the qualitative filter for MEDLINE.

122. 51 and 121

Search step 122 combines the search with the qualitative filter to retrieve qualitative studies

- 123. limit 122 to (english language and humans)
- 124. \*Depression, Postpartum /
- 125. 123 and 124

Search step 125 further refines the search to retrieve qualitative research with \*Depression, Postpartum / as a major subject heading.

## Search strategy used on EMBASE

EMBASE (Ovid) 1974 – 4 December 2012 (searched on 5 December 2012).

- 1. puerperal depression /
- 2. pnd.tw.
- 3. exp depression /
- 4. depress\$.tw.
- 5. stress\$.tw.
- 6. anxi\$.tw.
- 7. exp anxiety disorder /
- 8. exp anxiety /
- 9. mood disorder /
- 10. affective.tw.
- 11. or / 3-10
- 12. (postpartum or post partum or postpartum).tw.
- 13. exp puerperium /
- 14. (postnatal\$ or post natal\$ or postnatal\$).tw.
- 15. (post-pregnan\$ or post pregnan\$ or postpregnan\$).tw.
- 16. (ante-natal\$ or ante natal\$ or antenatal\$).tw.
- 17. (pre-natal\$ or pre natal\$ or prenatal\$).tw.
- 18. (peri-natal\$ or peri natal\$ or perinatal\$).tw.
- 19. or / 12-18
- 20. 11 and 19
- 21. 1 or 2 or 20

Search steps 1–21 are terms for the population PND.

- 22. exp primary prevention /
- 23. prevent\$.tw.
- 24. pc.fs.
- 25. prophyla\$.tw.
- 26. (decreas\$ or reduc\$ or lower\$ or overcom\$ or improv\$ or avoid\$).tw.
- 27. (wellbeing or well-being or well being).tw.
- 28. (enhanc\$ or improv\$ or increas\$).tw.
- 29. 27 and 28
- 30. or / 22-26,29

Search steps 22–30 are terms for prevention.

- 31. 21 and 30

Search step 31 combines the population and prevention terms to find literature on prevention of PND.

32. exp risk factor /
33. risk /
34. (risk\$ or indicat\$ or predict\$ or predispos\$).tw.
35. exp social support /
36. social support\$.tw.
37. exp socioeconomics /
38. exp social class /
39. exp life event /
40. history of depression\$.tw.
41. marriage /
42. (dyadic adjustment\$ or parental adjustment\$).tw.
43. exp pregnancy complication /
44. exp labor complication /
45. complication\$.tw.
46. exp birth /
47. or / 32-46

Search steps 32–34 are terms for risk and 35–47 are terms for known risk factors for PND.

48. 21 and 47

Search step 48 combines 21 and 47 combining the population and risk terms to find papers about risk factors and PND to find trials that are focused at risk factors.

49. (interven\$ or program\$ or target\$ or educat\$ or strat\$).tw.

Search step 49 are different terms around interventions.

50. 21 and 49

Search step 50 combines PND and intervention terms to find trials of PND interventions.

51. 21 or 48 or 50

Search step 51 uses OR to combine the different subsets and try to find all PND trials.

52. Meta Analysis /
53. ((meta adj analy\$) or metaanalys\$).tw.
54. (systematic adj (review\$1 or overview\$1)).tw.
55. or / 51-53
56. cancerlit.ab.
57. cochrane.ab.
58. embase.ab.
59. (psychlit or psyclit).ab.
60. (psychinfo or psycinfo).ab.
61. (cinal or cinahl).ab.
62. science citation index.ab.
63. bids.ab.
64. or / 55-62
65. reference lists.ab.

- 66. bibliograph\$.ab.
- 67. hand-search\$.ab.
- 68. manual search\$.ab.
- 69. relevant journals.ab.
- 70. or / 64-68
- 71. data extraction.ab.
- 72. selection criteria.ab.
- 73. 70 or 71
- 74. review.pt.
- 75. 72 and 73
- 76. letter.pt.
- 77. editorial.pt.
- 78. animal /
- 79. human /
- 80. 77 not (77 and 78)
- 81. or / 75-76,79
- 82. 54 or 63 or 69 or 74
- 83. 81 not 80

Search steps 52–83 is the systematic reviews filter for EMBASE.

- 84. 51 and 83

Search step 84 combines the search with the systematic reviews filter to retrieve systematic reviews.

- 85. exp SOCIOECONOMICS /
- 86. exp "Cost Benefit Analysis" /
- 87. exp "Cost Effectiveness Analysis" /
- 88. exp "Cost of Illness" /
- 89. exp "Cost Control" /
- 90. exp Economic Aspect /
- 91. exp Financial Management /
- 92. exp "Health Care Cost" /
- 93. exp Health Care Financing /
- 94. exp Health Economics /
- 95. exp "Hospital Cost" /
- 96. (financial or fiscal or finance or funding).tw.
- 97. exp "Cost Minimization Analysis" /
- 98. (cost adj estimate\$.mp.
- 99. (cost adj variable\$.mp.
- 100. (unit adj cost\$.mp.
- 101. or / 83-100

Search steps 85–101 is a economic evaluations filter for EMBASE.

- 102. 51 and 101

Search step 102 combines the search with the economic filter to retrieve economic evaluations.

- 103. mixed method.tw.
- 104. mixed methods.tw.
- 105. mixed study.tw.
- 106. multi method.tw.

- 107. multiple sources of data.tw.
- 108. triangulation design.tw.
- 109. (qualitative adj99 quantitative).tw.
- 110. or / 103-109

Search steps 103–110 are terms for mixed methods.

- 111. 51 and 110

Search step 111 combines the search with the terms for mixed-methods to retrieve mixed-methods research.

- 112. findings.tw.
- 113. interview.tw.
- 114. qualitative.tw.
- 115. or / 112-114

Search steps 112–115 are a qualitative filter for EMBASE.

- 116. 51 and 115

Search step 116 combines the search with the qualitative filter to retrieve qualitative research.

- 117. \*puerperal depression /
- 118. 116 and 117

Search step 118 further refines the search to retrieve qualitative research with \*puerperal depression / as a major subject heading.

## Search strategy used on Cumulative Index to Nursing and Allied Health Literature

CINAHL (EBSCOhost) 1982 (searched on 11 December 2012).

S53 S51 and S52

S52 (MM "Depression, Postpartum")

S51 S41 AND S50

S50 TI (findings OR interview OR qualitative) OR AB (findings OR interview OR qualitative)

S49 S41 AND S48

S48 TI ("mixed method" OR "mixed methods" OR "mixed study" OR "multi method" OR "multiple sources of data" OR "triangulation design" OR (qualitative AND quantitative)) OR AB ("mixed method" OR "mixed methods" OR "mixed study" OR "multi method" OR "multiple sources of data" OR "triangulation design" OR (qualitative AND quantitative))

S47 S41 AND S46

S46 TI (economic\* OR cost\* OR fee\* OR charge\* OR budget\* OR pharmacoeconomic\* or price\* or pricing\*) OR AB (economic\* OR cost\* OR fee\* OR charge\* OR budget\* OR pharmacoeconomic\* or price\* or pricing\*)

S45 S41 AND S44

S44 TI (meta analy\* OR metaanaly\* OR meta-analysis OR systematic review OR overview\* OR revie) OR AB (meta analy\* OR metaanaly\* OR meta-analysis OR systematic review OR overview\* OR revie)

S43 S41 AND S42

S42 TI (randomised controlled trial\* OR randomized controlled trial\* OR random\* OR blind\* OR mask\* OR clinical trial\* OR placebo\*) OR AB (randomised controlled trial\* OR randomized controlled trial\* OR random\* OR blind\* OR mask\* OR clinical trial\* OR placebo\*)

S41 S25 OR S38 OR S40

S40 S17 AND S39

S39 TI (interven\* or program\* or target\* or educat\* or strat\*) OR AB (interven\* or program\* or target\* or educat\* or strat\*)

S38 S17 AND S37

S37 S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37

S37 (MH "Childbirth+")

S36 TI complication\* OR AB complication\*

S35 (MH "Labor Complications+")

S34 (MH "Pregnancy Complications+")

S33 TI (dyadic adjustment\* or parental adjustment\*) OR AB (dyadic adjustment\* or parental adjustment\*)

S32 (MH "Marriage")

S31 TI history of depression\* OR AB history of depression\*

S30 (MH "Life Change Events+")

S29 (MH "Socioeconomic Factors+")

S28 TI social support\* OR AB social support\*

S27 (MH "Support, Psychosocial+")

S26 TI (risk\* or indicat\* or predict\* or predispos\*) OR AB (risk\* or indicat\* or predict\* or predispos\*)

S25 S17 AND S24

S24 S18 OR S19 OR S20 OR S23

- S23 S21 AND S22
- S22 TI (enhanc\* or improv\* or increas\*) OR AB (enhanc\* or improv\* or increas\*)
- S21 TI (wellbeing or well-being or well being) OR AU (wellbeing or well-being or well being)
- S20 TI (decreas\* or reduc\* or lower\* or overcom\* or improv\* or avoid\*) OR AB (decreas\* or reduc\* or lower\* or overcom\* or improv\* or avoid\*)
- S19 TI prophyla\* OR AB prophyla\*
- S18 TI prevent\* OR AB prevent\*
- S17 S1 OR S2 OR S1
- S16 (S8 AND S15)
- S15 S9 OR S10 OR S11 OR S12 OR S13 OR S14
- S14 TI (peri-natal\* or peri natal\* or perinatal\*) OR AB (peri-natal\* or peri natal\* or perinatal\*)
- S13 TI (pre-natal\* or pre natal\* or prenatal\*) OR AB (pre-natal\* or pre natal\* or prenatal\*)
- S12 TI (ante-natal\* or ante natal\* or antenatal\*) OR AB (ante-natal\* or ante natal\* or antenatal\*)
- S11 TI (post-pregnan\* or post pregnan\* or postpregnan\*) OR AB (post-pregnan\* or post pregnan\* or postpregnan\*)
- S10 TI (postnatal\* or post natal\* or postnatal\*) OR AB (postnatal\* or post natal\* or postnatal\*)
- S9 TI (postpartum or post partum or postpartum) OR AB (postpartum or post partum or postpartum)
- S8 S3 OR S4 OR S5 OR S6 OR S7
- S7 TI affective OR AB affective
- S6 (MH "Anxiety+")
- S5 (MH "Affective Disorders, Psychotic+")
- S4 (MH "Anxiety Disorders+")
- S3 TI (depress\* OR stress\* OR anxi\*) OR AB (depress\* OR stress\* OR anxi\*)
- S2 TI pnd OR AB pnd
- S1 (MH "Depression, Postpartum")

Results from search line 43 were saved for RCTs, 45 for systematic reviews, 47 for economic evaluations, 49 for mixed-methods research and 53 for qualitative research.

## Search strategy used on PsycINFO

PsycINFO (via Ovid) was searched from 1806 to week 4 November 2012 (searched on 5 December 2012).

1. postpartum depression /
2. pnd.ab,ti.
3. (depress\$ or stress\$ or anxi\*).ab,ti.
4. anxiety /
5. anxiety disorders /
6. or / 3-5
7. postnatal period /
8. (postpartum or post partum or postpartum or postnatal\$ or post natal\$ or postnatal\$ or post-pregnan\$ or post pregnan\$ or postpregnan\$ or ante-natal\$ or ante natal\$ or antenatal\$ or pre-natal\$ or pre natal\$ or prenatal\$ or peri-natal\$ or peri natal\$ or perinatal\$).ab,ti.
9. 7 or 8
10. 6 and 9
11. 1 or 2 or 10

Search steps 1–11 are terms for the population PND.

12. exp Primary Mental Health Prevention /
13. (prevent\$ or prophyla\$ or decreas\$ or reduc\$ or lower\$ or overcom\$ or improv\$ or avoid\$).ab,ti.
14. (wellbeing or well-being or well being).ab,ti.
15. (enhanc\$ or improv\$ or increas\$).ab,ti.
16. 14 and 15
17. 12 or 13 or 16

Search steps 12–17 are terms for prevention.

18. 11 and 17

Search step 18 combines the population and prevention terms to find literature on prevention of PND.

19. risk factors /
20. (risk\$ or indicat\$ or predict\$ or predispos\$).ab,ti.
21. social support /
22. social support\$.ab,ti.
23. exp socioeconomic status /
24. life changes /
25. history of depression\$.ab,ti.
26. marriage /
27. (dyadic adjustment\$ or parental adjustment\$).ab,ti.
28. exp obstetrical complications /
29. complication\$.ab,ti.
30. birth /
31. 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30

Search steps 19–20 are terms for risk and 21–30 are terms for known risk factors for PND.

32. 11 and 31

Search step 32 combines 11 and 31 combining the population and risk terms to find papers about risk factors and PND to find trials that are focused on risk factors.

33. (interven\$ or program\$ or target\$ or educat\$ or strat\$).ab,ti.

Search step 33 is synonymous for the term intervention.

34. 11 and 33

Search step 34 combines PND and intervention terms to find trials of PND interventions.

35. 18 or 32 or 34

Search step 35 uses OR to combine the different subsets and try to find all PND trials.

36. limit 35 to (human and english language)

Search steps 36 limits the results of the search to studies about human in English.

37. (double-blind or random: assigned or control).tw.

Search step 37 is a one-line RCT filter for PsycINFO.

38. 36 and 37

Search step 38 combines the search with the RCT filter to retrieve RCTs of PND prevention trials.

39. (meta-analysis or search:).tw.

Search step 39 is a one-line systematic reviews filter for PsycINFO.

40. 36 and 39

### Search strategy used for cost-effectiveness studies with economic evaluations filter for MEDLINE

Search step 38 combines the search with the systematic reviews filter to retrieve systematic reviews on PND prevention.

41. exp "costs and cost analysis"/

42. economics /

43. exp economics hospital /

44. exp economics medical /

45. exp economics nursing /

46. economics pharmaceutical /

47. exp "fees and charges"/

48. exp budgets /

49. budget\$.tw.

50. cost\$.ti.

51. (cost\$ adj2 (effective\$ or utilit\$ or benefit\$ or minim\$)).ab.
52. (economic\$ or pharmacoeconomic\$ or pharmaco-economic\$).ti.
53. (price or pricing\$).tw.
54. (financial or finance or finances or finanaced).tw.
55. (fee or fees).tw.
56. or / 41-55

Step 56 is an economic evaluation filter for PsycINFO.

57. 36 and 56

Step 57 combines the search with the economic evaluation filter to retrieve economic evaluations.

58. mixed method.tw.
59. mixed methods.tw.
60. mixed study.tw.
61. multi method.tw.
62. multiple sources of data.tw.
63. triangulation design.tw.
64. (qualitative adj99 quantitative).tw.
65. or / 58-64

Search step 65 are terms for mixed-methods research.

66. 36 and 65

Search step 66 combined the search with the mixed-methods terms to retrieve research that utilises mixed methods.

67. findings.tw.
68. interview.tw.
69. qualitative.tw.
70. or / 67-69

Search step 70 is a qualitative filter for PsycINFO.

71. 36 and 70

Search step 71 combines the search with the qualitative filter to retrieve qualitative research.

72. \*Depression, Postpartum /
73. 71 and 72

Search step 73 further refines the search to retrieve qualitative research with \*Depression, Postpartum / as a major subject heading.

## Search strategy used on Conference Proceedings Citation Index and Social Science Citation Index Search and Science Citation Index

Science Citation Index (via ISI Web of Science) 1899–date, Social Science Citation Index (via ISI Web of Science) 1956–date and CPCI-S (via ISI Web of Science) 1990–date (searched on 5 December 2012).

# 29 #15 AND #28

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 28 (TS = (randomised controlled trial\* OR randomized controlled trial\* OR random\* OR blind\* OR mask\* OR clinical trial\* OR placebo\*)) AND **LANGUAGE:**(English)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 27 #15 AND #26

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 26 (TS = (findings OR interview OR qualitative)) AND **LANGUAGE:** (English)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 25 #15 AND #34

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 24 #22 OR #23

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 23 (TS = (“mixed method” OR “mixed methods” OR “mixed study” OR “multi method” OR “multiple sources of data” OR “triangulation design”)) AND **LANGUAGE:** (English)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 22 (TS = (qualitative AND quantitative)) AND **LANGUAGE:** (English)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 21 #15 AND #20

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 20 (TS = (“mixed method” OR “mixed methods” OR “mixed study” OR “multi method” OR “multiple sources of data” OR “triangulation design” OR “qualitative quantitative”)) AND **LANGUAGE:** (English)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 19 #15 AND #18

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 18 (TS = (economic\* OR cost\* OR fee\* OR charge\* OR budget\* OR pharmaco-economic\* or price\* or pricing\*)) AND **LANGUAGE:** (English)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 17 (#16) AND **LANGUAGE:**(English)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 16 #12 AND #15

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 15 #13 AND #14

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 14 #10 OR #11

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 13 #3 OR #4

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 12 TI = (meta analy\* OR metaanaly\* OR meta-analysis OR systematic review OR overview\* OR review)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 11 TI = (interven\* OR program\* OR target\* OR educat\* OR strat\*)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 10 #7 OR #8 OR #9

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 9 TI = (prevent\* OR prophyla\* OR decreas\* OR reduc\* OR lower\* OR overcom\* OR improv\* OR avoid\*)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 8 TI = (risk\* OR indicat\* OR predict\* OR predispos\* OR social support\* OR socioeconomic factor\* OR social class OR life change event\* OR history of depression\* OR marriage OR dyadic adjustment\* OR parental adjustment\* OR complication\* OR birth OR parturition)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 7 #6 AND #5

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 6 TS = (wellbeing OR well-being OR well being)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 5 TI = (decreas\* OR reduc\* OR lower\* OR overcom\* OR improv\* or avoid\*)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 4 TS = pnd

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 3 #2 AND #1

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 2 TI = (postpartum OR post partum OR postpartum OR postnatal\* OR post natal\* OR postnatal\* OR post-pregnan\* OR post pregnan\* OR postpregnan\* OR ante-natal\* OR ante natal\* OR antenatal\* OR pre-natal\* OR pre natal\* OR prenatal\* OR peri-natal\* OR peri natal\* OR perinatal\*)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

# 1 TI = (depress\* OR stress\* OR anxi\* OR affective)

*Indexes = SCI-EXPANDED, SSCI, CPCI-S, CPCI-SSH Timespan = All years*

Results from search line 29 were saved for RCTs, 16 for systematic reviews, 19 for economic evaluations, 25 for mixed-methods research and 27 for qualitative research.

## Search strategy used on Applied Social Sciences Index and Abstracts (via ProQuest)

### Applied Social Sciences Index and Abstracts (via ProQuest) 1987 – (searched on 19 December 2012)

1. (((SU.EXACT.EXPLODE("Postnatal depression") OR pnd) OR ((SU.EXACT("Depression") OR (depress\* OR stress\* OR anxi\*) OR SU.EXACT("Anxiety") OR SU.EXACT("Anxiety disorders") OR SU.EXACT("Affective disorders") OR affective) AND (SU.EXACT.EXPLODE("Postpartum women") OR all (postpartum OR post partum OR postpartum) OR (postnatal\* OR post natal\* OR postnatal\*) OR (post-pregnan\* OR post pregnan\* OR postpregnan\*) OR (ante-natal\* OR ante natal\* OR antenatal\*) OR all(peri-natal\* OR peri natal\* OR perinatal\*) OR all(pre-natal\*) OR all(prenatal\*)))) AND (SU.EXACT.EXPLODE("Primary prevention trials") OR (prevent\* OR prophyla\* OR decreas\* OR reduc\* OR lower\* OR overcom\* OR improv\* OR avoid\*) OR ((wellbeing OR well-being OR well being) AND (enhanc\* OR improv\* OR increas\*)))) OR (((SU.EXACT.EXPLODE("Postnatal depression") OR pnd) OR ((SU.EXACT("Depression") OR (depress\* OR stress\* OR anxi\*) OR SU.EXACT("Anxiety") OR SU.EXACT("Anxiety disorders") OR SU.EXACT("Affective disorders") OR affective) AND (SU.EXACT.EXPLODE("Postpartum women") OR all(postpartum OR post partum OR postpartum) OR (postnatal\* OR post natal\* OR postnatal\*) OR (post-pregnan\* OR post pregnan\* OR postpregnan\*) OR (ante-natal\* OR ante natal\* OR antenatal\*) OR all(peri-natal\* OR peri natal\* OR perinatal\*) OR all(pre-natal\*) OR all(prenatal\*))))

2. (((risk\* OR indicat\* OR predict\* OR predispos\*) OR (SU.EXACT. "Risk factors") OR SU.EXACT("Risk factors") OR SU.EXACT.EXPLODE("Computer based social support" OR "Perceived social support" OR "Social support") OR (social support\*) OR SU.EXACT.EXPLODE("Aristocracy" OR "Elites" OR "Gentrification" OR "Lumpenproletariat" OR "Middle class people" OR "Peerages" OR "Proletariat" OR "Ruling classes" OR "Social class" OR "Underclasses" OR "Upper class people" OR "Upper class women" OR "Upper middle class people" OR "Working class people") OR all(history of depress\*) OR SU.EXACT.EXPLODE("Arranged marriages" OR "Brides" OR "Conjugal contracts" OR "Consanguineous marriages" OR "Custody after divorce" OR "Divorce" OR "Endogamy" OR "Engaged couples" OR "Exogamy" OR "Extramarital affairs" OR "Homogamy" OR "Intermarriage" OR "Joint custody" OR "Marital quality" OR "Marital structure" OR "Marriage" OR "Monogamy" OR "Parental divorce" OR "Polyandry" OR "Polygamy" OR "Polygyny" OR "Prenuptial contracts" OR "Racial intermarriage" OR "Remarriages" OR "Serial monogamy" OR "Singleness" OR "Tahlil marriage" OR "Temporary marriages" OR "Transnational divorce" OR "Weddings") OR (dyadic adjustment\* OR parental adjustment\* OR complication\*) OR SU.EXACT.EXPLODE("Birth centres" OR "Caesarean section" OR "Childbirth" OR "Dystocia" OR "Home birth" OR "Labour" OR "Natural childbirth" OR "Placenta" OR "Premature labour" OR "Shoulder dystocia" OR "Vacuum extraction" OR "Vaginal birth" OR "Waterbirth"))))
3. (interven\* OR program\* OR target\* OR educat\* OR strat\*)
4. (random\* control\* OR blind\* OR trial\* singl\* OR doubl\* OR trebl\* OR tripl\* OR mask\* OR placebo\*)

Searches 1, 2, 3 and 4 were combined to find RCTs on prevention of PND.

5. (meta-analy\* OR meta analy\* OR metaanaly\* OR review\* OR overview\*)

Searches 1, 2, 3 and 5 were combined to find systematic reviews on prevention of PND.

6. (economic\* OR cost\* OR fee\* OR charge\* OR budget\* OR pharmacoeconomic\* or price\* or pricing\*)

Searches 1, 2, 3 and 6 were combined to find economic evaluations.

7. ("mixed method" OR "mixed methods" OR "mixed study" OR "multi method" OR "multiple sources of data" OR "triangulation design" OR "qualitative quantitative")

Searches 1, 2, 3 and 7 were combined to find mixed-methods research.

8. (findings OR interview OR qualitative)

Searches 1, 2, 3 and 8 were combined to find qualitative research.

## Search strategy used on Allied and Complementary Medicine Database (via Ovid)

Allied and Complementary Medicine Database (via Ovid) was searched from 1985 to 4 December 2012 and EconLit (via Ovid) was searched from 1961 to November 2012 (searched on 5 December 2012).

1. pnd.tw.
2. depress\$.tw.
3. stress\$.tw.
4. anxi\$.tw.
5. affective.tw.
6. or / 2-5
7. (postpartum or post partum or postpartum).tw.

8. (postnatal\$ or post natal\$ or postnatal\$).tw.
9. (post-pregnan\$ or post pregnan\$ or postpregnan\$).tw.
10. (ante-natal\$ or ante natal\$ or antenatal\$).tw.
11. (pre-natal\$ or pre natal\$ or prenatal\$).tw.
12. (peri-natal\$ or peri natal\$ or perinatal\$).tw.
13. or / 7-12
14. 6 and 13
15. 1 or 14
16. prevent\$.tw.
17. pc.fs.
18. prophyla\$.tw.
19. (decreas\$ or reduc\$ or lower\$ or overcom\$ or improv\$ or avoid\$).tw.
20. (wellbeing or well-being or well being).tw.
21. (enhanc\$ or improv\$ or increas\$).tw.
22. 20 and 21
23. or / 16-19,22
24. 15 and 23
25. (risk\$ or indicat\$ or predict\$ or predispos\$).tw.
26. social support\$.tw.
27. social class\$.tw.
28. life change event\$.tw.
29. history of depression\$.tw.
30. marriage.tw.
31. (dyadic adjustment\$ or parental adjustment\$).tw.
32. complication\$.tw.
33. parturition.tw.
34. or / 25-33
35. 15 and 34
36. (interven\$ or program\$ or target\$ or educat\$ or strat\$).tw.
37. 15 and 36
38. 24 or 35 or 37

No filters were used for AMED or EconLit due to the small size of the databases.

## Search strategy used on Midwives Information and Resource Service

### *Midwives Information and Resource Service Reference Database 1991 – (searched 24 July 2013)*

Owing to the small size of the database, searches were conducted for the population terms only and then reviewed for relevance.

## Electronic databases searched for the cost-effectiveness literature

The following electronic databases were searched:

- MEDLINE (via Ovid) 1946 – November week 3 2012 (searched on 30 November 2012).
- PreMEDLINE (via Ovid) (searched on 5 December 2012).
- EMBASE (via Ovid) 1974 – 4 December 2012 (searched on 5 December 2012).
- CINAHL (via EBSCOhost) 1982 – (searched on 11 December 2012).
- NHS EED (via Wiley) 1991 – (searched on 28 November 2012).

- EconLit (via Ovid) 1961 – November 2012 (searched on 5 December 2012).
- PsycINFO (via Ovid) 1806 – week 4 November 2012 (searched on 5 December 2012).
- Science Citation Index (via ISI Web of Science) 1899 – (searched on 5 December 2012).
- Social Science Citation Index (via ISI Web of Science) 1956 – (searched on 5 December 2012).
- AMED (via Ovid) 1985 – 4 December 2012 (searched on 5 December 2012).
- ASSIA (via ProQuest) 1987 – (searched on 19 December 2012).
- MIDIRS reference database 1991 – (searched 24 July 2013).

## Appendix 2 Randomised controlled trials and systematic reviews: number retrieved

Database searched	Number of RCTs	Number of systematic reviews
Cochrane Systematic Reviews Database	NA	60
Cochrane Controlled Trials Register	767	0
DARE	NA	38
HTA	NA	8
MEDLINE	NA	268
PreMEDLINE	NA	27
EMBASE	NA	393
CINAHL	408	124
PsycINFO	575	126
Citation Indexes (Science and Social Sciences): Science Citation Index expanded (1899 to date); Social Sciences Citation Index (1956 to date); CPCI-S (1990 to date); Conference Proceedings Citation Index – Social Science & Humanities (1990 to date)	7	29
ASSIA	107	132
AMED	3	3
MIDIRS reference database	2	0
NA, not applicable.		



## Appendix 3 Key journals hand-searched via electronic alerts

*Acta Psychiatrica Scandinavica.*

*American Journal of Obstetrics & Gynecology.*

*American Journal of Psychiatry.*

*American Journal of Family Therapy.*

*Archives of General Psychiatry.*

*Archives of Women's Mental Health.*

*Birth.*

*BJOG: An International Journal of Obstetrics and Gynaecology.*

*BMC Public Health.*

*British Journal of General Practice.*

*British Journal of Clinical Psychology.*

*British Journal of Psychiatry.*

*British Medical Journal.*

*Canadian Journal of Psychiatry.*

*International Journal of Methods in Psychiatric Research.*

*International Journal of Nursing Studies.*

*Journal of Advanced Nursing.*

*Journal of Affective Disorders.*

*Journal of Clinical Psychiatry.*

*Journal of Mental Health.*

*Journal of Midwifery and Women's Health.*

*Journal of Paediatrics and Child Health.*

*Journal of Psychiatry.*

*Journal of Psychopharmacology.*

*Journal of Psychosomatic Research.*

*Medical Journal of Australia.*

*Midwifery.*

*Nursing Research.*

*Obstetrics and Gynaecology.*

*Psychological Medicine.*

*Psychology and Health.*

*Therapeutic Research.*

*Therapy.*

## Appendix 4 Qualitative studies and mixed-methods studies: number retrieved

Database searched	Number of results	
	Qualitative	Mixed methods
MEDLINE	581	58
PreMEDLINE	0	3
EMBASE	691	78
CINAHL	304	53
PsycINFO	517	69
Citation Indexes (Science and Social Sciences): Science Citation Index expanded (1899 to date); Social Sciences Citation Index (1956 to date); CPCI-S (1990 to date); Conference Proceedings Citation Index – Social Science & Humanities (1990 to date)	246	2
ASSIA	0	21
AMED	16	0
MIDIRS reference database	0	0
Cochrane Systematic Reviews Database; Cochrane Controlled Trials Register; DARE; HTA	NA	NA
NA, not applicable.		



## Appendix 5 Reason for exclusion of quantitative studies

Reference	Reason for exclusion
Abel KM. Review: psychosocial and psychological interventions reduce postpartum depressive symptoms. <i>Evid Based Mental Health</i> 2008; <b>11</b> :79	Commentary or clinical overview
Armstrong K, Edwards H. The effectiveness of a pram-walking exercise programme in reducing depressive symptomatology for postnatal women. <i>Int J Nurs practice</i> 2004; <b>10</b> :177–94	PND treatment trial
Armstrong K, Edwards H. The effects of exercise and social support on mothers reporting depressive symptoms: a pilot randomized controlled trial. <i>Int J Ment Health Nursing</i> 2003; <b>12</b> :130–8	PND treatment trial
Austin MP, Lumley J. Antenatal screening for postnatal depression: a systematic review. <i>Acta Psychiatr Scand</i> 2003; <b>107</b> :10–17	Systematic review not about prevention of PND
Austin MP, Priest SR. Clinical issues in perinatal mental health: new developments in the detection and treatment of perinatal mood and anxiety disorders. <i>Acta Psychiatr Scand</i> 2005; <b>112</b> :97–104	Commentary or clinical overview
Austin MP. Targeted group antenatal prevention of postnatal depression: a review. <i>Acta Psychiatr Scand</i> 2003; <b>107</b> :244–50	Non-systematic review
Beddoe AE, Lee KA. Mind–body interventions during pregnancy. <i>JOGNN</i> 2008; <b>37</b> :165–75	Outcome measurements before 6 weeks postnatally
Bennett S, Alpert M, Kubulins V, Hansler RL. Use of modified spectacles and light bulbs to block blue light at night may prevent postpartum depression. <i>Med Hypotheses</i> 2009; <b>73</b> :251–3	PND treatment trial
Bergström M, Kieler H, Waldenström U. Effects of natural childbirth preparation versus standard antenatal education on epidural rates, experience of childbirth and parental stress in mothers and fathers: a randomised controlled multicentre trial. <i>BJOG</i> 2009; <b>116</b> :1167–76	Not a PND prevention trial
Bernard RS, Williams SE, Storfer-Isser A, Rhine W, Horwitz SM, Koopman C, <i>et al</i> . Brief cognitive-behavioral intervention for maternal depression and trauma in the neonatal intensive care unit: a pilot study. <i>J Trauma Stress</i> 2011; <b>24</b> :230–4	Outcome measurements before 6 weeks postnatally
Beucher G, Viaris de LB, Dreyfus M. Maternal outcome of gestational diabetes mellitus. <i>Diabetes Metab</i> 2010; <b>36</b> :522–37	Review not about prevention of PND
Bhutta ZA, Lassi ZS, Blanc A, Donnay F. Linkages among reproductive health, maternal health, and perinatal outcomes. <i>Semin Perinatol</i> 2010; <b>34</b> :434–45	Not a PND prevention trial
Bick DE, Kettle C, Macdonald S, Thomas PW, Hills RK, Ismail KM. Perineal Assessment and Repair Longitudinal Study PEARLS: protocol for a matched pair cluster trial. <i>BMC Pregnancy Childbirth</i> 2010; <b>10</b> :10	Protocol for or description of a study
Bijlenga D, Koopmans CM, Birnie E, Mol BW, Post JA, Bloemenkamp KW, <i>et al</i> . Health-related quality of life after induction of labor versus expectant monitoring in gestational hypertension or preeclampsia at term. <i>Hypertens Pregnancy</i> 2011; <b>30</b> :260–74	Not a PND prevention trial
Bledsoe SE, Grote NK. Treating depression during pregnancy and the postpartum: a preliminary meta-analysis. <i>Res Social Work Prac</i> 2006; <b>16</b> :109–20	Review not about prevention of PND
Boath E, Bradley E, Henshaw C. The prevention of postnatal depression: a narrative systematic review. <i>J Psychosom Obstet Gynecol</i> 2005; <b>26</b> (3):185–92	Non-systematic review
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Pearson RM, O'Mahen H, Burns A, Bennert K, Sheppard C, Baxter H, Chauhan D, Evans J. The normalisation of disrupted attentional processing of infant distress in depressed pregnant women following cognitive behavioural therapy. <i>J Affect Disord</i> 2013; <b>145</b> :208–13	Outcome measurements before 6 weeks postnatally
Peindl KS, Wisner KL, Hanusa BH. Identifying depression in the first postpartum year: guidelines for office-based screening and referral. <i>J Affect Disord</i> 2004; <b>80</b> :37–44	Secondary analysis of data from a RCT
Reay R, Matthey S, Ellwood D, Scott M. Long-term outcomes of participants in a perinatal depression early detection program. <i>J Affect Disord</i> 2011; <b>129</b> :94–103	Outcome measurements after 12 months postnatally
Rees AM, Austin MP, Parker GB. Omega-3 fatty acids as a treatment for perinatal depression: randomized double-blind placebo-controlled trial. <i>Aust NZ J Psychiat</i> 2008; <b>42</b> :199–205	Not a PND prevention trial
Robledo-Colonia AF, Sandoval RN, Mosquera-Valderrama YF, Escobar HC, Ramirez VR. Aerobic exercise training during pregnancy reduces depressive symptoms in nulliparous women: a randomised trial. <i>J Physiother</i> 2012; <b>58</b> :9–15	Outcome measurements before 6 weeks postnatally
Roman LA, Gardiner JC, Lindsay JK, Moore JS, Luo Z, Baer LJ, Paneth, N. Alleviating perinatal depressive symptoms and stress: a nurse-community health worker randomized trial. <i>Arch Womens Ment Health</i> 2009; <b>12</b> :379–91	Outcome measurements after 12 months postnatally
Rowan C, Bick D, Silva-Bastos MH. Postnatal debriefing interventions to prevent maternal mental health problems after birth: exploring the gap between the evidence and UK policy and practice (Structured abstract). <i>Worldviews Evid Based Nurs</i> 2007; <b>4</b> :97–105	Non-systematic review
Ryding EL, Wirén E, Johansson G, Ceder B, Dahlström AM. Group counseling for mothers after emergency cesarean section: a randomized controlled trial of intervention. <i>Birth</i> 2004; <b>31</b> :247–53	Intervention initiated after 6 weeks postnatally
Sainz-Bueno JA, Romano MR, Teruel RG, Benjumea AG, Palacín AF, González CA, <i>et al.</i> Early discharge from obstetrics-pediatrics at the Hospital de Valme, with domiciliary follow-up. <i>Am J Obstet Gynecol</i> 2005; <b>193</b> :714–26	Outcome measurements before 6 weeks postnatally

Reference	Reason for exclusion
Scott KD, Klaus PH, Klaus MH. The obstetrical and postpartum benefits of continuous support during childbirth. <i>J Womens Health Gen Based Med</i> 1999; <b>8</b> :1257–64	Non-systematic review
Seeman MV. Group oriented interpersonal therapy reduced postpartum depression in women at risk. <i>Evid Based Mental Health</i> 2001; <b>4</b> :118	Commentary or clinical overview
Shivakumar G, Brandon AR, Snell PG, Santiago-Munoz P, Johnson NL, Trivedi MH, <i>et al</i> . Antenatal depression: a rationale for studying exercise. <i>Depress Anxiety</i> 2011; <b>28</b> :234–42	Systematic review not about prevention of PND
Simons J, Reynolds J, Morison L. Randomised controlled trial of training health visitors to identify and help couples with relationship problems following a birth. <i>Br J Gen Practice</i> 2001; <b>51</b> :793–9	No measure of PND reported
Skibniewski-Woods D. A review of postnatal debriefing of mothers following traumatic delivery. <i>Community Pract</i> 2011; <b>84</b> :29–32	Non-systematic review
Spinelli MG, Endicott J. Controlled clinical trial of interpersonal psychotherapy versus parenting education program for depressed pregnant women. <i>Am J Psychiatry</i> 2003; <b>160</b> :555–62	Outcome measurements before 6 weeks postnatally
Stomp-van-den-Berg-SG, Poppel MN, Hendriksen IJ, Bruinvels DJ, Uegaki K, Buijine MC, <i>et al</i> . Improving return-to-work after childbirth: design of the Mom@Work study, a randomised controlled trial and cohort study. <i>BMC Public Health</i> 2007; <b>7</b> :43	Protocol for or description of a study
Stuart S, O'Hara MW, Gorman LL. The prevention and psychotherapeutic treatment of postpartum depression. <i>Arch Womens Ment Health</i> 2003; <b>6</b> (Suppl. 2):57–69	Commentary or clinical overview
Su KP, Huang SY, Chiu TH, Huang KC, Huang CL, Chang HC, <i>et al</i> . Omega-3 fatty acids for major depressive disorder during pregnancy: results from a randomized, double-blind, placebo-controlled trial. <i>J Clin Psychiatry</i> 2008; <b>69</b> :644–51	Outcome measurements before 6 weeks postnatally
Sunder KR, Wisner KL, Hanusa BH, Perel JM. Postpartum depression recurrence versus discontinuation syndrome: observations from a randomized controlled trial. <i>J Clin Psychiatry</i> 2004; <b>65</b> :1266–8	Secondary analysis of data from a RCT
Surkan PJ, Gottlieb BR, McCormick MC, Hunt A, Peterson KE. Impact of a health promotion intervention on maternal depressive symptoms at 15 months postpartum. <i>Matern Child Health J</i> 2012; <b>16</b> :139–48	Outcome measurements after 12 months postnatally
Svensson J, Barclay L, Cooke M. Randomised controlled trial of two antenatal education programmes. <i>Midwifery</i> 2009; <b>24</b> :114–25	No measure of PND reported
Sword W. Review: some specific preventive psychosocial and psychological interventions reduce risk of postpartum depression. <i>Evid Based Nurs</i> 2005; <b>8</b> :76	Commentary or clinical overview
Taft AJ, Small R, Hegarty KL, Watson LF, Gold L, Lumley JA. Mothers' advocates in the community mosaic – non-professional mentor support to reduce intimate partner violence and depression in mothers: a cluster randomised trial in primary care. <i>BMC Public Health</i> 2011; <b>11</b> :178	Intervention initiated after 6 weeks postnatally
Tandon SD, Perry DF, Mendelson T, Kemp K, Leis JA. Preventing perinatal depression in low-income home visiting clients: a randomized controlled trial. <i>J Consult Clin Psychol</i> 2011; <b>79</b> :707–12	Intervention initiated after 6 weeks postnatally
Tang YF, Shi SX, Lu W, Chen Y, Wang QQ, Zhu YY, <i>et al</i> . Prenatal psychological prevention trial on postpartum anxiety and depression. <i>Chin Ment Health J</i> 2009; <b>23</b> :83–9	Study reported in non-English language (Chinese)
Teissedre F, Chabrol H. Screening, prevention and postpartum treatment: a randomized comparative study on 450 women. <i>Neuropsychiatr Enfance Adolesc</i> 2004; <b>52</b> :266–73	Study reported in non-English language (French)
Tripathy P, Nair N, Barnett S, Mahapatra R, Borghi J, Rath S, <i>et al</i> . Effect of a participatory intervention with women's groups on birth outcomes and maternal depression in Jharkhand and Orissa, India: a cluster-randomised controlled trial. <i>Lancet</i> 2010; <b>375</b> :1182–92	Outcome measurements after 12 months postnatally
Ushiroyama T, Sakuma K, Ueki M. Efficacy of the Kampo Medicine Xiong-Gui-Tiao-Xue-Yin Kyuki-Chouketsu-In A. Traditional herbal medicine, in the treatment of maternity blues syndrome in the postpartum period. <i>Am J Chin Med</i> 2005; <b>33</b> :117–26	Outcome measurements before 6 weeks postnatally
Varo I. Impact of a nursing intervention on pregnant women as a preventive tool for postpartum depression. <i>Nure Investigación</i> 2012;1–17	Study reported in non-English language (Spanish)

Reference	Reason for exclusion
Vieten C, Astin J. Effects of a mindfulness-based intervention during pregnancy on prenatal stress and mood: results of a pilot study. <i>Arch Womens Ment Health</i> 2008; <b>11</b> :67–74	No measure of PND reported
Wiggins M, Oakley A, Roberts I, Turner H, Rajan L, Austerberry H, <i>et al.</i> Postnatal support for mothers living in disadvantaged inner city areas: a randomised controlled trial. <i>J Epidemiol Commun Health</i> 2005; <b>59</b> :288–95	Outcome measurements after 12 months postnatally
Wiggins M, Oakley A, Roberts I, Turner H, Rajan L, Austerberry H, <i>et al.</i> The Social Support and Family Health Study: a randomised controlled trial and economic evaluation of two alternative forms of postnatal support for mothers living in disadvantaged inner-city areas. <i>Health Technol Assess</i> 2001; <b>8</b> (32)	Outcome measurements after 12 months postnatally
Wilton G, Moberg DP, Fleming MF. The effect of brief alcohol intervention on postpartum depression. <i>MCN Am J Matern Child Nurs</i> 2009; <b>34</b> :297–302	Intervention initiated after 6 weeks postnatally
Wirz-Justice A, Bader A, Frisch U, Stieglitz R-D, Aldfer J, Bitzer J, <i>et al.</i> A randomized, double-blind, placebo-controlled study of light therapy for antepartum depression. <i>J Clin Psychiatry</i> 2011; <b>72</b> :986–93	Outcome measurements before 6 weeks postnatally
Wisner KL, Gelenberg AJ, Leonard H, Zarin D, Frank E. Pharmacologic treatment of depression during pregnancy Structured. <i>JAMA</i> 1999; <b>282</b> :1264–9	Non-systematic review
Wisner KL, Wheeler SB. Prevention of recurrent postpartum major depression. <i>Hosp Commun Psych</i> 1994; <b>45</b> :1191–6	Non-randomised control group
Yawn BP, Dietrich AJ, Wollan P, Bertram S, Graham D, Huff J, <i>et al.</i> TRIPPD: A practice-based network effectiveness study of postpartum depression screening and management. <i>Ann Fam Med</i> 2012; <b>10</b> :320–9	Intervention initiated after 6 weeks postnatally
Yonkers KA, Wisner KL, Stewart DE, Oberlander TF, Dell DL, Stotland N, <i>et al.</i> The management of depression during pregnancy: a report from the American Psychiatric Association and the American College of Obstetricians and Gynecologists. <i>Gen Hosp Psychiat</i> 2009; <b>31</b> :403–13	Non-systematic review
Zayas LH. Six-month multicomponent intervention improves postnatal depression in low-income settings. <i>Evid Based Mental Health</i> 2008; <b>11</b> :80 [Comment on Rojas G, Fritsch R, Solis J, Jadresic E, Castillo C, Gonzalez, <i>et al.</i> Treatment of postnatal depression in low-income mothers in primary-care clinics in Santiago, Chile: a randomised controlled trial. <i>Lancet</i> 2007; <b>370</b> :1629–37]	Protocol for or description of a study



# Appendix 6 Data extraction

## Data extraction for quantitative studies

### Data Extraction Form: HTA 11/95/03 Interventions to prevent postnatal depression

Initials of first data extractor:		Initials of second data extractor:	
Ref ID:			
	Citation	Author contact details	
1.			
<b>Characteristics</b>		<b>Options</b>	
Intervention type	<input type="checkbox"/> Complementary and alternative medicines ( <i>e.g. music, massage, aromatherapy, Japanese herbal medicine</i> ) <input type="checkbox"/> Maternity care organisation <input type="checkbox"/> Mind-body interventions ( <i>e.g. acupuncture, autogenic training, auto-suggestion, biofeedback, guided imagery, hypnosis, hypnotherapy, meditation, prayer, sleep deprivation, tai-chi, yoga</i> ) <input type="checkbox"/> Pharmacological ( <i>e.g. antidepressants, calcium, omega-3 supplements, hormone therapy, thyroxine</i> ) <input type="checkbox"/> Psychological / psychotherapeutic / psycheducational <input type="checkbox"/> Social support ( <i>e.g. exercise, lay support, peer support</i> ) <input type="checkbox"/> Other:		
Intervention mode	<input type="checkbox"/> Group <input type="checkbox"/> Individual <input type="checkbox"/> On-line <input type="checkbox"/> Other:		
Intervention provider	<input type="checkbox"/> Doula <input type="checkbox"/> Health visitor <input type="checkbox"/> Midwife <input type="checkbox"/> Nurse <input type="checkbox"/> Psychiatrist <input type="checkbox"/> Psychologist <input type="checkbox"/> Other:		
Intervention duration	<input type="checkbox"/> Single contact <input type="checkbox"/> Multiple contact		
Intervention time	<input type="checkbox"/> Antenatal only <input type="checkbox"/> During labour <input type="checkbox"/> Antenatal and postnatal <input type="checkbox"/> Postnatal only		
Sample selection criteria	<input type="checkbox"/> <b>Universal Preventive Interventions:</b> targeted at a whole population group not identified on the basis of increased risk <input type="checkbox"/> <b>Selective Preventive Interventions:</b> for population subgroups whose risk of developing postnatal depression is higher than average ( <i>e.g. psychosocial risk factors</i> ) <input type="checkbox"/> <b>Indicated Preventive Interventions:</b> for high-risk women identified as having a predisposition for PND but who do not meet diagnostic criteria for PND.		
<b>RCT details</b>			
<b>Country:</b> <input type="checkbox"/> Australia <input type="checkbox"/> Canada <input type="checkbox"/> China <input type="checkbox"/> France <input type="checkbox"/> Hong Kong <input type="checkbox"/> India <input type="checkbox"/> Italy <input type="checkbox"/> Japan <input type="checkbox"/> Korea <input type="checkbox"/> Mexico <input type="checkbox"/> Netherlands <input type="checkbox"/> Norway <input type="checkbox"/> South Africa <input type="checkbox"/> Sweden <input type="checkbox"/> Taiwan <input type="checkbox"/> UK <input type="checkbox"/> US <input type="checkbox"/> Other:			
<b>Study setting:</b> <input type="checkbox"/> Antenatal clinic <input type="checkbox"/> Home visits <input type="checkbox"/> Labour / delivery ward <input type="checkbox"/> Postnatal ward <input type="checkbox"/> Primary care <input type="checkbox"/> Other:			
<b>Number of centres:</b>			
<b>Recruitment:</b> <input type="checkbox"/> Pregnancy <input type="checkbox"/> During labour <input type="checkbox"/> Postnatally			
<b>Funding:</b> <input type="checkbox"/> Government <input type="checkbox"/> Private <input type="checkbox"/> Scholarship / award <input type="checkbox"/> Other:			
<b>Aim of the study</b>			
<b>Intervention</b> ( <i>same order as in the paper</i> )			
Provide description of experimental interventions and controls ( <i>e.g. pharmacological, social support, mind-body intervention, CAMs, maternity care, location, number and length of sessions, number per group, professional background making diagnosis</i> )			
<b>Intervention 1:</b>			
<b>Intervention 2 (if applicable):</b>			
<b>Control:</b>			

<b>Participant recruitment</b>				
<b>Recruitment dates:</b>				
Total number of women randomised (n) / screened (n):      /      %				
<b>Inclusion criteria:</b>				
<b>Exclusion criteria:</b> (e.g. risk, history, condition, antenatal anxiety, antenatal depression, social support, life events, domestic violence, method for identification)				
<b>Baseline characteristics</b>				
	All (Total sample) Mean (SD) / n (%)	Intervention 1 Mean (SD) / n (%)	Intervention 2 Mean (SD) / n (%)	Control Mean (SD) / n (%)
Age in years: Mean (SD) or range				
Number randomised				
EPDS				
Other measure				
Race/ethnicity				
Socio-demographic characteristics				
Education				
Diagnosis at baseline				
Populations of antenatal women				
Populations of early postnatal women				
Co-therapy or medication: (Specify dose if applicable)				
<b>Outcomes summary</b>				
<b>1. Maternal outcomes (e.g. depressive symptoms, morbidity, mortality):</b> <input type="checkbox"/> Yes <input type="checkbox"/> No				
<b>2. Neonatal, post-neonatal and infant outcomes (e.g. Apgar, morbidity, mortality, injury, development):</b> <input type="checkbox"/> Yes <input type="checkbox"/> No				
<b>3. Family outcomes (e.g. dyadic relationship, discord, separation / divorce, abuse, violence):</b> <input type="checkbox"/> Yes <input type="checkbox"/> No				
<b>4. Process outcomes (e.g. uptake, did not receive intervention, discontinued intervention, number of sessions received):</b> <input type="checkbox"/> Yes <input type="checkbox"/> No				
<b>5. Cost of use of service outcomes:</b> <input type="checkbox"/> Yes <input type="checkbox"/> No				
<b>Primary outcome:</b>				
<b>Secondary outcomes:</b>				
<b>Timing of outcome assessments (e.g. 6 weeks postnatally, 12 weeks, 6 months, 12 months):</b>				
<b>Total length of follow up:</b>				
<b>Did not receive allocated intervention: n=</b>				
<b>Number of participants</b>				
	All (Total sample)	Intervention 1	Intervention 2	Control
Randomised				
Losses to follow-up/drop out/sample attrition	Time: n:	Time: n:	Time: n:	Time: n:
Number analysed	Time: n:	Time: n:	Time: n:	Time: n:
<b>Results: Maternal outcomes</b>				
Report n, Mean (SD) for each time of assessment. Report all categorical outcomes in a separate table or provide details in the notes column				
Outcome (Note whether it is actual score or change score)	Intervention 1 Time: n: Mean (SD)	Intervention 2 Time: n: Mean (SD)	Control Time: n: Mean (SD)	Categorical outcomes / Notes
Anxiety measure:				
BDI				
CES-D				
Diagnostic interviews:				
DSM-IV				
EPDS				

<b>GHQ</b>				
<b>Hopkins Scale</b>				
<b>ICD-10</b>				
<b>Kellner symptom questionnaire</b>				
<b>MADRS</b>				
<b>Maternal dissatisfaction with intervention</b>				
<b>Maternal morbidity:</b>				
<b>Maternal mortality</b>				
<b>Maternal perceived support:</b>				
<b>Maternal-infant attachment:</b>				
<b>Mood measure:</b>				
<b>Other depressive symptoms:</b>				
<b>POMS</b>				
<b>SCID</b>				
<b>Self-harm:</b>				
<b>Stress measures:</b>				
<b>Suicide attempts</b>				
<b>Others:</b>				
<b>Results: Neonatal, post-neonatal and infant outcomes</b>				
<i>Report n, Mean (SD) for each time of assessment. Report all categorical outcomes in a separate table or provide details in the notes column</i>				
<b>Outcome</b> <i>(Note whether it is actual score or change score)</i>	<b>Intervention 1</b> <i>Time:</i> <i>n:</i> <i>Mean (SD)</i>	<b>Intervention 2</b> <i>Time:</i> <i>n:</i> <i>Mean (SD)</i>	<b>Control</b> <i>Time:</i> <i>n:</i> <i>Mean (SD)</i>	<b>Categorical outcomes / Notes</b>
<b>Apgar</b>				
<b>Child abuse:</b>				
<b>Infant developmental assessments:</b>				
<b>Infant health parameters:</b>				
<b>Injury:</b>				
<b>Morbidity:</b>				
<b>Mortality</b>				
<b>Neglect:</b>				
<b>Others:</b>				
<b>Results: Family outcomes</b>				
<i>Report n, Mean (SD) for each time of assessment. Report all categorical outcomes in a separate table or provide details in the notes column</i>				
<b>Outcome</b> <i>(Note whether it is actual score or change score)</i>	<b>Intervention 1</b> <i>Time:</i> <i>n:</i> <i>Mean (SD)</i>	<b>Intervention 2</b> <i>Time:</i> <i>n:</i> <i>Mean (SD)</i>	<b>Control</b> <i>Time:</i> <i>n:</i> <i>Mean (SD)</i>	<b>Categorical outcomes / Notes</b>
<b>Abuse:</b>				
<b>Dyadic relationship:</b>				
<b>Marital discord:</b>				
<b>PSI</b>				
<b>Separation / divorce</b>				
<b>Violence:</b>				
<b>Others:</b>				
<b>Results: Process outcomes, uptake</b>				
<i>(e.g. did not receive intervention, discontinued intervention, number of sessions received)</i>				
<i>Report n, Mean (SD) for each time of assessment. Report all categorical outcomes in a separate table or provide details in the notes column</i>				
<b>Outcome</b> <i>(Note whether it is actual score or change score)</i>	<b>Intervention 1</b> <i>Mean (SD)</i>	<b>Intervention 2</b> <i>Mean (SD)</i>	<b>Control</b> <i>Mean (SD)</i>	<b>Categorical outcomes / Notes</b>
<b>Please specify:</b>				
<b>Authors' conclusion</b>				
<b>Reviewers' conclusion</b>				

## Data extraction for qualitative studies

Evidence from women	To inform intervention – elements of the intervention	Service delivery
Data extraction	Data synthesis	Interpretation
What helped?	Which intervention elements helped?	Which intervention elements to include?
What did not help?	What not to do	How to counteract unhelpful experiences during pregnancy and postpartum
What did you need?	What to do and how to address it	Which intervention elements to include? Will it fit into an intervention?
How did you want it? evidence of preferred service delivery	Vehicle?	Delivery types (leaflet, peer group, midwife)
What didn't you want? (service delivery)	Avoid including in interventions; or assess which women were suitable for particular elements	Which elements should be removed from an intervention
Barriers to participation	To inform service delivery	Allow for different circumstances (e.g. unable to travel to group/physical limitations)

# Appendix 7 Synthesis of findings from personal and social support strategy studies

## Themes and subthemes from the synthesis of findings from personal and social support strategy studies

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
<b>Things that help to prevent feelings of depression from the women's perspective were ...</b>						
Support	Emotional support from family and friends. One respondent illustrated how friends and family provided emotional support:  ... <i>providing extra visits and extra phone calls, checking on me to make sure I'm ok, and if I need anything.</i>  Supporting references <sup>286,300,303,312,313,317,323,325</sup>  Emotional support from the mothers and grandmothers of the women. Such emotional support appeared to be particularly important for women of selective groups <sup>292,296-298</sup> and women who had recently moved to a new country living away from their extended family. A participant reported <sup>292</sup> on a relationship with her own grandma:  <i>It seems like when I got pregnant we got closer ... She asks me how my day went and what's going on with the baby and, you know, I'll tell her the problems and she'll be like, oh, well you'll be okay. Just try to do this and relax.</i>  Supporting references <sup>296-298,302,305,317,319,323</sup>  Emotional support from midwife/health professionals – this applied to midwives, health visitors and GPs. <sup>319</sup> This was particularly important when health professionals had knowledge about PND and related issues. <sup>303</sup>  Supporting references <sup>303,315,319</sup>	High/moderate	High/moderate	High/moderate	High certainty	Studies of high to moderate quality; finding seen across several studies, across general populations, and culturally different and selective groups

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
	Instrumental/practical support from family/friends were providing practical help at home. <sup>320</sup>  <i>I had my mother or mother-in-law who volunteered to stay with me a couple of weeks after the baby was born so I could rest. I have friends from my church who ... all volunteered to make a dinner and deliver it to my home ...</i> <i>Participant<sup>320</sup></i>	High/moderate	High/moderate	High/moderate; moderate		
	Instrumental support took the form of making food, to allow women to sleep and to care for other children. <sup>305,317</sup> This was particularly provided by mothers and mother-in-laws. <sup>319,320</sup>  Supporting references <sup>286,292,303,305-310,317,318,320,325</sup>	High/moderate	High/moderate	–		
	Instrumental/practical support from partner. Partners were credited for taking on practical tasks to support the women. These tasks included doing the housework and looking after the children. A respondent reported:  <i>My husband ... was running the house, working full time, doing everything with the children. He works nights, he was coming home getting the kids to school, going to sleep for 2 hours, getting up and getting the youngest child from nursery, going back to sleep, he was an absolute legend. Thank God.</i> <i>Participant<sup>322</sup></i>	High/moderate	High/moderate	–		
	Supporting references <sup>305,316,317,319,322,323,325</sup>					

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
	Instrumental/practical support from midwife/health professionals. However, interactions with health professionals varied:  <i>I had a nurse midwife that delivered the baby. She helped me learn how to nurse, but ... no one told me that it was gonna be that painful ... I didn't have that kind of support system from the hospital staff, but ... I had a wonderful midwife who was great about that.</i>  Supporting references <sup>303,304,423</sup>  <i>Participant<sup>20</sup></i>		Moderate/high	Moderate		
	Supporting references <sup>302,312,313,318,321,322</sup>  Peer support – sharing experiences and normalisation. Benefits for women often appeared to be specific to sharing experiences with peers, who had encountered similar difficulties during pregnancy and the postpartum, which helped to normalise the feelings they were experiencing.		Moderate/high	Moderate		
	Supporting references <sup>302,312,313,318,321,322</sup>					

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
Adjustment to pregnancy/motherhood	<p>Realistic expectations (because of antenatal education)/being prepared – recognition of the importance of having realistic expectations about pregnancy and the postpartum and being prepared for these. Antenatal education was credited as promoting realistic expectations by a respondent who said:</p> <p><i>I came into it expecting the worse and it ended up a lot better, you have prepared yourself. . . Basically, I think they told us everything in classes</i></p> <p><i>Participant</i><sup>319</sup></p> <p>Awareness of potential PND/learning about emotional lability – For others being prepared meant being aware of potential for PND and learning about emotional lability<sup>317,320</sup> Particularly for women with previous depression<sup>317</sup> but also in those with no previous history of depression. One respondent reported that she:</p> <p><i>Talked to all my friends, my family, my husband and said, if you think anything is different with me don't hesitate to tell me, tell someone immediately because I don't want the worse that could happen to happen</i></p> <p><i>Participant</i><sup>317</sup></p> <p>Practical experience/having routines/getting to know the baby – Women spoke of importance of having practical experience of looking after the baby<sup>320</sup> including having routines<sup>322</sup> and getting to know the baby.<sup>320</sup> Women reported they needed more practical skills and experience for early postnatal period (e.g. changing nappies, bottle feeding and bathing the baby<sup>305,321</sup>)</p> <p>Approval of mum at announcement of pregnancy/validation of the pregnancy<sup>296–298</sup></p>	Moderate/high	–	Moderate	Studies on adjustment to pregnancy and motherhood mainly of moderate quality, finding seen across several studies, although mostly in general populations	
		Moderate/high	–	–		
		High	–	–		
		–	–	–		

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
Faith/rituals/religion	<p>Praying strategy to help manage emotional distress and to provide emotional and spiritual support<sup>317</sup></p> <p>Supporting references<sup>304,306-310,314,318</sup></p>	Moderate	Moderate	Moderate (x 3); high; moderate	Moderate certainty	Studies relating to faith, rituals and religion mainly of moderate quality; finding seen across several studies of culturally different populations
Health care	<p>Medication – Respondents had used professional medical and mental health services, such as counselling, consultation with physicians and midwives, and hospitalisation.<sup>303</sup> Nearly half of respondents<sup>303</sup> reported using medication for emotional distress</p> <p>Women also reported beneficial effects of alternative treatment modalities such as massage, acupuncture, and hypnotherapy<sup>322</sup></p> <p>Continuity of care, in the form of one-to-one care from a community midwife, was also particularly helpful in one study<sup>315</sup></p>	Moderate	Moderate	–	Low certainty	Studies of high to moderate quality, finding seen only in few studies, although in both general population and selective groups
Self-help/coping strategies	<p>Engage in activities (counter isolation)/talking to others/maintaining a sense of being in control/Asking for help/peer support groups/problem-solving/having a cultural identity to be strong. Participants reported that asking for physical help or simply asking for a break was used as a strategy to combat feelings of being down. Asking those around her to give her a break was one important strategy used by a young mother.</p> <p><i>She said, 'I'll just tell them, 'Look Mom's got a headache. I need a break. Y'all give me 15 minutes.' That's what I'll tell them. I'll tell my husband, 'J. . ., just give me 15 minutes.'</i></p> <p style="text-align: right;"><i>Participant<sup>286</sup></i></p>	Moderate/High	Moderate/High	Moderate	Moderate certainty	Studies of high to moderate quality, finding seen across several studies, in both general population and cultural groups
Supporting references <sup>286,303,306-310,312-314,317,322</sup>						

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
Baby-related issues	Feelings of wonder and joy/gaining strength from the baby <sup>318,319</sup> Good infant temperament <sup>317</sup>	High Moderate	High Moderate	Moderate –	Low certainty	Studies of high to moderate quality, finding seen only in few studies, although in both general population and cultural groups
<b>Synthesised finding – things that did not help to prevent depression from the women's perspective/exacerbated feelings of depression were ...</b>						
Lack of support from key people	Lack of support/understanding from partner (Taniguchi <sup>318</sup> /harassment by baby's father <sup>296-298</sup> /fear of abandonment <sup>315</sup> ). Some participants indicated that their distress had a negative impact on their relationship and caused further stress:  <i>My partner keeps saying 'For God's sake, I wish we'd never got pregnant. I wish you'd have got rid of him'. He doesn't understand. He's just 'What's up? You in a mood?' and I find that a bit hard</i>  <i>Participant<sup>322</sup></i>  Lack of practical support – a detrimental effect of a lack of practical support was reported. <sup>314,318</sup> Respondents reported having to deal with everything by themselves without practical support:  <i>You bring the baby home. You need to eat, the family need to eat, have to clean the house, have to wash the children, take them to school, take them to Arabic reading (Classes). You have to do all this work in 1 day, how can you get rest?</i>  <i>Participant<sup>314</sup></i>	High/moderate	Moderate/moderate	Moderate certainty	Studies of high to moderate quality, finding seen across several studies, and across culturally different and selective groups	

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
	<p>Contrary to popular beliefs about the nature of the extended Asian family in Britain, help from relatives was not available to many women <i>Participant</i><sup>3,14</sup></p> <p>Negative interactions with health-care professionals – in some cases care provided by health professionals was seen as inadequate.<sup>4,24</sup> One respondent revealed:</p> <p><i>The infant cried a lot. I called the midwife and she said 'what do you want me to do?' I was very disappointed. I needed someone to give me support</i> <i>Participant</i><sup>4,24</sup></p> <p>Interference by mother or family members/unreliable mother/rejection by family member/disapproval. In one study a woman talked about her mother who she lived with and her sister who lived nearby who were initially very supportive but this support became unhelpful.<sup>3,21</sup></p> <p><i>I felt quite jealous. He had colic and because he cried from between 6 and 10, and of course my mum's: 'Oh give him here. You don't know what to do with him ...' and I remember having a few tears over that because she'd taken him away from me ...'</i><sup>4,21</sup> <i>Participant</i></p>					
		Moderate		High		
		High/moderate		Moderate		

Themes	Subtheme(s)	Evidence source(s) [CASP]		Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
		Evidence from studies with general population participants	Selective group data		
	Teenagers described their own mother as 'unreliable', and she could not provide required support <sup>305,319,321</sup>				
	Negative effect of peers – women reported that peers had embellished their own experience to conform to social norms of being a 'good mother' <sup>316</sup> for them only to discover later that their account of their experiences had not been entirely truthful:  <i>I asked friends . . . : 'how is your daughter? . . . They said . . . she never cries. Recently, . . . they then said they could not even take a shower! And I said . . . 'but I thought that she did not cry?'. And even worse, they had not told me the truth, and I found this extremely distressing</i>  <i>Participant</i> <sup>316</sup>	Moderate	–	–	
	Cultural beliefs did not help in accessing support – respondents reported that women were expected to not discuss private matters by other members of their community <sup>314</sup>	–	Moderate	–	–
	Cultural and community beliefs included that men were not expected to provide support, and therefore women were deprived of the support of their partners <sup>314</sup>	–	Moderate	–	–

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
Unsatisfactory health care	Multiple carers during pregnancy – dissatisfaction with the health-care system was also reported <sup>303,311,315,316</sup> including negative perceptions of having multiple carers during pregnancy <sup>315</sup>	–	–	Moderate	Moderate certainty	Studies of high to moderate quality, finding seen across a number of studies, across general populations and across culturally different and selective groups
	Poor-quality hospital care. <sup>311</sup> One respondent reported: <i>... the [community] midwife ... she was very helpful but the midwives in hospital, ... I would never advise anyone to go and see them ... You could be crying with pain and [they] will be treating you like a log. I didn't feel like a human being at all</i> <sup>Participant<sup>311</sup></sup>	–	–	High		
	Simply normalising problems – respondents expressed disappointment when seeking health care and felt that health professionals merely focused on normalising problems: <sup>323</sup> <i>I go there only when I have to ... I feel I haven't gotten any help there, they haven't taken me seriously, and all they say is that 'this is normal'</i> <sup>Participant<sup>323</sup></sup>	–	–	–	–	
	Protocol-driven care – no scope to discuss psychological distress – respondents complained that they found the health-care system to be protocol driven with no room to discuss psychological distress or to deliver interventions to maintain maternal mental health <sup>311</sup>	–	–	High	–	
	Antenatal class did not help – antenatal classes appeared of little use to respondents. <sup>316</sup> Women did not want an intervention in the form of a class <sup>296–298</sup>	Moderate	–	–	–	
	Medication did not help – medication made things worse or was ineffective <sup>303</sup>	Moderate	–	–	–	

Evidence source(s) [CASP]					
Themes	Subtheme(s)	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
Negative effect of self-help/coping strategies/inability to apply self-help/coping strategies	Repetitive cleaning – compulsive behaviours – participants noted that some strategies could become unhelpful, and could in some cases develop into compulsive behaviours, such as repetitive cleaning. <sup>322</sup> Respondents complained that they were unable to apply strategies they had relied on in the past because of their inappropriateness in the prenatal and postnatal period, such as drinking alcohol <sup>322</sup>	High	–	Low certainty	Finding from one study of high quality; finding cannot be generalised to other populations
	Too much information – books and internet increased distress <sup>322</sup>	High	–		
	Inability to apply previously used coping strategies <sup>322</sup>	High	–		
	Inability to do anything – lack of motivation <sup>322</sup>	High	–		
Baby-related difficulties	Baby crying <sup>318</sup>	–	Moderate	Low certainty	Finding from one study of moderate quality; finding cannot be generalised to other populations
	Breast feeding difficulties <sup>318</sup>				
	Guilt because of prematurity <sup>318</sup>				
Physical difficulties, physical tiredness 'limited time for self-care'	Difficulties included fatigue, pain and the physical recovery from labour and delivery, <sup>312,313,317</sup> cognitive difficulties <sup>316</sup> and also having limited time for self-care to address such issues <sup>312,313</sup>	Moderate/high	Moderate	Moderate certainty	Studies of high to moderate quality; finding seen across a few studies, across general populations and across cultural groups

Themes	Subtheme(s)	Evidence source(s) [CASP]	Evidence from studies with general population participants	Selective group data	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
Personal insecurity	Worries about being a good parent, self-doubt, feeling a pressure of responsibility and feelings of inadequacy. <sup>286,292,312,313,321</sup>	High	High	Moderate	Moderate certainty	Studies of generally high quality; finding seen across several studies, across general populations and across culturally different and selective groups
	Women reported that they put themselves under a lot of pressure to be perfect mothers and experienced feelings of inadequacy when motherhood did not come naturally. <sup>221</sup>	High	High	–	–	
	Personal insecurity was associated with a loss of a sense of self. Loss of self included a loss of occupational identity <sup>312,313</sup> and a loss of appearance/physical attractiveness. <sup>312,313</sup>	High	High	–	–	
	Loss of self included a loss of autonomy in which the focus was on the baby and there was a sense of sacrificing oneself for the baby, <sup>312,313,321</sup> and a loss of sexuality. <sup>312,313</sup>	High	High	High	High	
	Women reported that having financial concerns was detrimental to their mental health. They believed that they would be better able to counter emotional distress if these concerns were alleviated. <sup>286,306–310</sup>	High	High	High	High	

Where there were two studies, the risk of bias is indicated in the order in which the studies are cited.

## Appendix 8 Included systematic reviews

First author, year, reference number	Full reference	Review type
Austin, 2008 <sup>230</sup>	Austin MP, Priest SR, Sullivan EA. Antenatal psychosocial assessment for reducing perinatal mental health morbidity. <i>Cochrane Database Syst Rev</i> 2008; <b>8</b> :CD005124	Cochrane review
Bennett, 2008 <sup>425</sup>	Bennett C, Macdonald GM, Dennis J, Coren E, Patterson J, Astin M, <i>et al.</i> Home-based support for disadvantaged adult mothers [Update of <i>Cochrane Database Syst Rev</i> 2007; <b>3</b> :CD003759]. <i>Cochrane Database Syst Rev</i> 2008; <b>1</b> :CD003759	Cochrane review
Cuijpers, 2005 <sup>68</sup>	Cuijpers P, Straten A, Smit F. Preventing the incidence of new cases of mental disorders: a meta-analytic review. <i>J Nerv Ment Dis</i> 2005; <b>193</b> :119–25	Systematic review and meta-analysis
Dale, 2008 <sup>232</sup>	Dale J, Caramlau IO, Lindenmeyer A, Williams SM. Peer support telephone calls for improving health. <i>Cochrane Database Syst Rev</i> 2008; <b>4</b> :CD006903	Cochrane review
Dennis, 2004 <sup>233</sup>	Dennis CL, Creedy D. Psychosocial and psychological interventions for preventing postpartum depression. <i>Cochrane Database Syst Rev</i> 2004; <b>4</b> :CD001134	Cochrane review
Dennis, 2005 <sup>234</sup>	Dennis CL. Psychosocial and psychological interventions for prevention of postnatal depression: systematic review. <i>BMJ</i> 2005; <b>331</b> :15–21	Systematic review
Dennis, 2008 <sup>118</sup>	Dennis CL, Allen K. Interventions (other than pharmacological, psychosocial or psychological) for treating antenatal depression. <i>Cochrane Database Syst Rev</i> 2008; <b>4</b> :CD006795	Cochrane review
Dennis, 2004 <sup>235</sup>	Dennis CL. Preventing postpartum depression part I: a review of biological interventions. <i>Can J Psychiatry</i> 2004; <b>49</b> :467–75	Systematic review
Dennis, 2008 <sup>236</sup>	Dennis CL, Kingston D. A systematic review of telephone support for women during pregnancy and the early postpartum period. <i>J Obstet Gynecol Neonatal Nurs</i> 2008; <b>37</b> :301–14	Systematic review
Dennis, 2008 <sup>237</sup>	Dennis CL, Ross LE, Herxheimer A. Oestrogens and progestins for preventing and treating postpartum depression. <i>Cochrane Database Syst Rev</i> 2008; <b>4</b> :CD001690	Cochrane review
Dennis, 2004 <sup>238</sup>	Dennis CL. Preventing postpartum depression part II: A critical review of nonbiological interventions. <i>Can J Psychiatry</i> 2004; <b>49</b> :526–38	Critical review
Dodd, 2012 <sup>239</sup>	Dodd JM, Crowther CA. Specialised antenatal clinics for women with a multiple pregnancy for improving maternal and infant outcomes. <i>Cochrane Database Syst Rev</i> 2012; <b>8</b> :CD005300	Cochrane review
Fontein-Kuipers, 2014 <sup>240</sup>	Fontein-Kuipers YJ, Nieuwenhuijze MJ, Ausems M, Bude L, Vries R. Antenatal interventions to reduce maternal distress: a systematic review and meta-analysis of randomised trials. <i>B/OG</i> 2014; <b>121</b> :389–97	Systematic review
Howard, 2005 <sup>241</sup>	Howard LM, Hoffbrand S, Henshaw C, Boath L, Bradley E. Antidepressant prevention of postnatal depression. <i>Cochrane Database Syst Rev</i> 2005; <b>2</b> :CD004363	Cochrane review
Jans, 2010 <sup>242</sup>	Jans LA, Giltay EJ, Does AJ. The efficacy of n-3 fatty acids DHA and EPA (fish oil) for perinatal depression. <i>Br J Nutr</i> 2010; <b>104</b> :1577–85	Review
Lawrie, 2008 <sup>243</sup>	Lawrie TA, Herxheimer A, Dalton K. Oestrogens and progestogens for preventing and treating postnatal depression. <i>Cochrane Database Syst Rev</i> 2008; <b>2</b> :CD001690	Cochrane review

First author, year, reference number	Full reference	Review type
Leis, 2009 <sup>244</sup>	Leis JA, Mendelson T, Tandon SD, Perry DF. A systematic review of home-based interventions to prevent and treat postpartum depression. <i>Arch Womens Ment Health</i> 2009; <b>12</b> :3–13	Systematic review
Lumley, 2004 <sup>245</sup>	Lumley J, Austin MP, Mitchell C. Intervening to reduce depression after birth: a systematic review of the randomized trials. <i>Int J Technol Assess Health Care</i> 2004; <b>20</b> :128–44	Systematic review
Marc, 2011 <sup>246</sup>	Marc I, Toureche N, Ernst E, Hodnett ED, Blanchet C, Dodin S, <i>et al</i> . Mind–body interventions during pregnancy for preventing or treating women’s anxiety. <i>Cochrane Database Syst Rev</i> 2011; <b>7</b> :CD007559	Cochrane review
Miller, 2013 <sup>247</sup>	Miller BJ, Murray L, Beckmann MM, Kent T, Macfarlane B. Dietary supplements for preventing postnatal depression. <i>Cochrane Database Syst Rev</i> 2013; <b>10</b> :CD009104	Systematic review and meta-analysis
Sado, 2012 <sup>248</sup>	Sado M, Ota E, Stickley A, Mori R. Hypnosis during pregnancy, childbirth, and the postnatal period for preventing postnatal depression. <i>Cochrane Database Syst Rev</i> 2012; <b>6</b> :CD009062	Cochrane review
Shaw, 2006 <sup>249</sup>	Shaw E, Levitt C, Wong S, Kaczorowski J, McMaster University Postpartum Research G. Systematic review of the literature on postpartum care: effectiveness of postpartum support to improve maternal parenting, mental health, quality of life, and physical health. <i>Birth</i> 2006; <b>33</b> :210–20	Systematic review
Sockol, 2011 <sup>250</sup>	Sockol LE, Epperson CN, Barber JP. A meta-analysis of treatments for perinatal depression. <i>Clin Psychol Rev</i> 2011; <b>31</b> :839–49	Systematic review
Sockol, 2013 <sup>423</sup>	Sockol LE, Epperson CN, Barber JP. Preventing postpartum depression: a meta-analytic review. <i>Clin Psychol Rev</i> 2013; <b>33</b> :1205–17	Meta-analysis

## Appendix 9 Qualitative review: participant characteristics

## Characteristics of participants receiving preventive interventions

### Universal preventive interventions: included studies concerned with midwifery models of working (n = 5)

First author, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/ self-reported/ mixed/ mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Andersson, 2012 <sup>277</sup>	Sweden	CenteringPregnancy	28 (included 8 male partners)	Individual and group interviews	General population	None reported	NR	Swedish, n = 16; non-Swedish, n = 4	NR	First baby, n = 14; second baby, n = 7	NR	NR
Kennedy, 2009 <sup>283</sup>	USA	CenteringPregnancy	234 (both arms)	Semistructured telephone interview	Military population	None reported	Mean 25 (SD 4.9)	African American, 18.4% (n = 29); Latina, 10.8% (n = 17); white, 59.2% (n = 92); Asian/Pacific Islander, 5.7% (n = 9); other 7.0% (n = 11)	WIC eligible (low income), 50.3% (n = 77)	Nulliparous, 59.2% (n = 77)	< High school, 3.5% (n = 5); high school, 35% (n = 50); some college, 47.7% (n = 68); college graduate, 9.8% (n = 14); graduate school 4.2% (n = 6)	Single, 10.8% (n = 17); married, 74.5% (n = 117); partnered, 12.1% (n = 19); divorced/separated, 2.5% (n = 4)
Klima, 2009 <sup>284</sup>	USA	CenteringPregnancy	5	Focus group	General population	None reported	NR	All African American	NR	NR	NR	NR
McNeil, 2012 <sup>285</sup>	Canada	CenteringPregnancy	12	Interviews and focus groups	General population	None reported	Range 27–39	5/12 were born outside Canada and 4/12 were non-Caucasian	2/12 had less than CA\$40,000 annual income and 4/12 had CA\$100,000 or more	10/12 were first-time mothers	Ranged from less than high school to graduate school	11/12 were married
Teate, 2011 <sup>289</sup>	Australia	CenteringPregnancy	NR	Questionnaire	General population	None reported	NR	NR	NR	NR	NR	NR

Key: NR, not reported; WIC, Women and Infants (supplemental nutrition programme).

*Universal preventive interventions: included studies concerned with CAM (n = 3)*

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/ self-reported/ mixed/mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Carolan, 2012 <sup>278,279</sup>	Ireland	Singing lullabies	6	In-depth interview	General population	None reported	29–35	NR	5/6 employed in professional occupations	All primiparous	5 tertiary, 1 secondary	NR
Doran, 2013 <sup>280</sup>	Australia	Yoga and group discussion	15	In-depth interview	General population	None reported	Mean 32 (range 22–45)	14 women were born in Australia, one of whom identified as Indigenous, and one was born in the Pacific	NR	Mean 1.6 children	All participants had a technical education or university qualification	NR
Migl, 2009 <sup>286</sup>	USA	MBE techniques	10	Open-ended interview	General population	None reported	27–38	1 Hispanic, 2 African American, 7 Caucasian	8 in employment	1–7 pregnancies	High school to graduate degree	8 married, 2 single

Key: NR, not reported.

**Universal preventive interventions: included studies concerned with psychological interventions (n = 2)**

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/ self-reported/ mixed/ mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Gao, <sup>282</sup> 2012	China	IPT-oriented programme	20	Interview	General population	None reported	Mean 28.8 (SD 2.35), range 25–34	Chinese	Professional, n=10; semiprofessional, n=8; skilled, n=2	First-time mothers	High school or below, n=2; college or above, n=18	All married

**Universal preventive interventions: included studies concerned with the organisation of maternity care (n = 1)**

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/ self-reported/ mixed/ mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Scott, <sup>288</sup> 1987	Australia	Maternal and child health nurses	Unclear – 7 (plus 3 nurses)	Interview and observation	General population	Self-reported as depressed	NR	NR	NR	NR	NR	NR

Key: NR, not reported.

### Universal preventive interventions: included studies concerned with the social support (n = 1)

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/self-reported/mixed/mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Evans, 2012 <sup>261</sup>	Canada	Online discussion support group	512 postings	Online messages	General population	Self-reported as depressed	NR	NR	NR	NR	NR	NR
Morrell, 2002 <sup>267</sup>	UK	Postnatal support worker	NR	Questionnaire	General population	None reported	NR	NR	NR	NR	NR	NR

Key: NR, not reported.

### Universal preventive interventions: included studies concerned with usual care (n = 1)

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/self-reported/mixed/mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Kennedy, 2009 <sup>283</sup>	USA	Individual prenatal care	234 (both arms)	Semistructured telephone interview	Military population	None reported	Mean 25.5 (SD 5.4)	African American, 19.0% (n = 30); Latina, 8.9% (n = 14); white, 60.1% (n = 95); Asian/Pacific Islander, 5.1% (n = 8); other, 7.0% (n = 11)	WIC eligible (low income), 47.8% (n = 69)	Nulliparous, 45.9% (n = 61)	< High school, 5.6% (n = 8); high school, 21.1% (n = 30); some college, 50.0% (n = 71); college completed, 12.7% (n = 18)	Single, 9.5% (n = 15); married, 82.9% (n = 131); divorced/separated, 3.8% (n = 6); partnered, 3.8% (n = 6)

### Selective preventive interventions: included studies concerned with midwifery models of working (n = 2)

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/self-reported/mixed/ diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Lehman, 2011 <sup>291</sup> , <sup>292</sup>	USA	CenteringPregnancy	10	Interview	African American/Latina low income	None reported	20–30 (mean 22)	African American	Low-income	Number of children 1–4 (mean 2.3)	NR	4 single, 6 unknown
Novick, 2011, <sup>294</sup> , <sup>363</sup> 2012, <sup>293</sup> 2013 <sup>362</sup>	USA	CenteringPregnancy	21 pregnant women (18 others attending sessions not interviewed formally)	Interviews and observation	African American/Hispanic low income	None reported	Mean 21.6	18 African American; 3 Hispanic	NR	NR	Ranged from grade school to some college	19 single; 2 married

Key: NR, not reported.

### Indicated and selective preventive interventions: included studies concerned with psychological interventions (n = 1)

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/self-reported/mixed/ diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Shanok, 2007 <sup>296-298</sup>	USA	IPT	42 (plus 4 clinicians)	Semistructured interviews; clinical interviews; videoed therapy sessions transcribed	Teenagers	14 participants had a current depressive disorder with no psychotic symptoms. EPDS score 8 or more	13–19 (mean 5.50, SD 1.47)	49% Hispanic, 38% black, 10% black and Hispanic	Impoverished urban area	All first child; 93% pregnant; 7% parenting	NR	NR

Key: NR, not reported.

**Indicated preventive interventions: included studies concerned with social support (n = 1)**

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/self-reported/mixed/mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Dennis, 2010 <sup>299</sup>	Canada	Telephone-based peer support	NR	Questionnaire	General population	EPDS score 10 or more	NR	NR	NR	NR	NR	NR

Key: NR, not reported.

**Indicated preventive interventions: included studies concerned with the organisation of maternity care (n = 1)**

First author, year, reference number	Population details											
	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Depression status: none reported/self-reported/mixed/mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Myors, 2013 <sup>300</sup>	Australia	Specialist perinatal and infant mental health service	11	Interview	General population	Identified as having multiple mental health and psychosocial issues	20–39	9 from an English-speaking background	NR	1–4 children	NR	All women partnered at time of referral

Key: NR, not reported.

**Selective preventive interventions: included studies concerned with educational interventions (n = 1)**

First author, year, reference number	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	Population details							
					General population, minority group	Depression status: none reported/ self-reported/ mixed/mixed diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Wheatley, 1999, <sup>233</sup> 2003, <sup>254</sup>	UK	Preparing for parenthood	9	Interview	General population	None reported (scoring as high risk on GHQ)	NR	NR	NR	First pregnancy	NR	NR

Key: GHQ, General Health Questionnaire; NR, not reported.

## Population characteristics for the service providers of preventive interventions

### *Universal preventive interventions: included studies concerned with midwifery models of working (n = 3)*

First author, year, reference number	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	Population details			
					Age (years)	Gender	Ethnicity	Parity
Klima, 2009 <sup>284</sup>	USA	CenteringPregnancy	4 certified nurse midwives; 5 health-centre staff; 5 administrators	Focus groups	NR	NR	NR	NR
McNeil, 2013 <sup>290</sup>	Canada	CenteringPregnancy	3 physicians	Interview/focus groups	NR	All female	NR	NR
Tanner-Smith, 2012 <sup>291</sup>	USA	CenteringPregnancy	NR	Questionnaire	NR	NR	NR	NR

Key: NR, not reported.

### *Universal preventive interventions: included studies concerned with social support (n = 1)*

First author, year, reference number	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	Population details			
					Age (years)	Gender	Ethnicity	Parity
Morrell, 2002 <sup>287</sup>	UK	Support workers	NR – SWs, MWs, HVs	Questionnaire	NR	NR	NR	NR

Key: HV, health visitors; MW, midwife; NR, not reported; SW, support workers.

### *Universal preventive interventions: included studies concerned with the organisation of maternity care (n = 1)*

First author, year, reference number	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	Population details			
					Age (years)	Gender	Ethnicity	Parity
Scott, 1987 <sup>288</sup>	Australia	Maternal and child health nurses	3 nurses	Interview and observation	NR	NR	NR	NR

Key: NR, not reported.

### Selective preventive interventions: included studies concerned with midwifery models of working (n = 1)

First author, year, reference number	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	Population details			
					Age (years)	Gender	Ethnicity	Parity
Novick, 2011 <sup>363</sup> 2012 <sup>293,294</sup>	USA	CenteringPregnancy	2 certified nurse-midwife group leaders; 2 medical assistants	Interviews and observation	NR	NR	NR	NR

Key: NR, not reported.

### Indicated preventive interventions: included studies concerned with social support (n = 1)

First author, year, reference number	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	Population details			
					Age (years)	Gender	Ethnicity	Parity
Dennis, 2013 <sup>301</sup>	Canada	Telephone-based peer support	Peer volunteers – mother from the community with resolved history of PND who participated in a 4-hour training session	Questionnaire	NR	NR	NR	NR

Key: NR, not reported.

### Indicated and selective preventive interventions: included studies concerned with psychological interventions (n = 1)

First author, year, reference number	Country	Intervention name	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	Population details			
					Age (years)	Gender	Ethnicity	Parity
Shanok, 2007 <sup>296-298</sup>	USA	IPT	4 clinicians	Semistructured interviews, clinical interviews, videoed therapy sessions transcribed	26–35	All female	2 Caucasian, 1 Hispanic, 1 Middle Eastern	One pregnant and parenting, others did not have children

### Personal and social support strategy studies: population characteristics

First author, year, reference number	Population details												
	Country	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Specific group if any: cultural, selective	Antenatal/postnatal	Depression status: none reported/self-reported/mixed/other diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Choi, 2005 <sup>321</sup>	UK	24	Interview	General	-	Recruited antenatally	Mixed, some self-reported depression	27-45 (mean age 35.92, SD 4.43)	Caucasian	Variety of occupations, social classes	9 first child; 11 had one other and 4 had two others	Variety of educational levels	22 were married or cohabiting, 1 was single and 1 was divorced
Corrigan, 1997 <sup>302</sup>	USA	8	Semistructured interview	General	-	Recruited antenatally	Mixed, half scoring highly on BDI	NR	NR	NR	NR	NR	NR
Curtis, 2007 <sup>303</sup>	USA	252	Open-ended online survey	General	-	Recruited postnatally	Self-reported as depressed	10-62 (mean 37, SD 7.6)	Caucasian, 228; African American, 3; Asian, 1; Latina, 6; Filipino, 1; Native American, 1; mixed ethnicity, 9	NR	NR	NR	NR
Edge, 2005 <sup>306-310</sup>	UK	12	In-depth interviews	Black Caribbean	Cultural	Recruited antenatally	Mixed, sample represented the full range of EPDS scores	24-42	Black Caribbean	NR	NR	NR	6 married, 3 cohabiting, 3 single
Edge, 2011 <sup>311</sup>	UK	42	Focus group interviews	Black Caribbean	Cultural	Recruited postnatally	None reported	18-43	Black Caribbean	Lived in inner city and suburbs	NR	NR	Married, cohabiting or single
Furber, 2009 <sup>322</sup>	UK	12	Interview	General	-	Recruited antenatally	None reported	24-39	NR	12 not working; 4 worked full time; 5 worked part time; 2 studying full time; 1 on maternity leave	8 primiparous; 16 multiparous	NR	19 living with partners, 2 not living with partner, 2 single; 1 separated
Haga, 2012 <sup>323</sup>	Norway	12	Interview	General	-	Recruited postnatally	Mixed, some self-reported depression	25-44 (mean 32.8)	NR	NR	All first time mothers	All university or college	All cohabiting with father of baby

First author, year, reference number	Population details												
	Country	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Specific group if any; cultural, selective	Antenatal/postnatal	Depression status: none reported/self-reported/mixed/ diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Hanley, 2007 <sup>304</sup>	UK	10	Focus group interview	Minority	Cultural	Recruited postnatally	Mixed, 2 self-reported as depressed	16–24	Bangladeshi	8 husbands worked in catering industry; 2 professional	1–4	8 educated in Britain	All married
<sup>a</sup> Lehman, 2011 <sup>292</sup>	USA	10	Interview	Minority – low income	–	Recruited antenatally	Deprived	20–30 (mean 22)	African American	Low-income	1–4 (mean 2.3)	NR	4 single, 6 unknown
Leung, 2001 <sup>305</sup>	China	59	Interviews	General population: Hong Kong Chinese	Cultural: Hong Kong Chinese	Recruited antenatally	Mixed, 32 depressed, 27 non-depressed	NR	Hong Kong Chinese	Working women and housewives	NR	NR	NR
Lewis, 1998 <sup>312, 313</sup>	UK	36	Interview	General	–	1 study antenatally; 2 study postnatally	Mixed, some self-reported depression	22–41	All city dwellers, 2 were black (in study 1, 1 from Zimbabwe, 1 London with West Indian origin, 1 Irish) remainder British and white	Broad range	18 already had children with at least 1 under 5 years; 18 expecting first child	NR	7 single mothers, others in permanent or long-term relationships
Maunther, 1998 <sup>324</sup>	UK	40	Interview	General	–	Recruited postnatally	Mixed, some self-reported depression, some diagnosed depression	20–39	39 white; 1 Afro-Caribbean	5 non-skilled; 7 skilled non-manual; 6 professional	NR	7 secondary education; 9 vocational training; 2 university	All living with father of children
<sup>a</sup> Migl, 2009 <sup>286</sup>	USA	10	Open-ended interview	General	–	Recruited antenatally	–	27–38	1 Hispanic; 2 African American; 7 Caucasian	8 in employment	1 to 7 pregnancies	High school to graduate degree	8 married, 2 single
Oates, 2004 <sup>7</sup>	15 centres	NR	Interview and focus group	General	–	Recruited postnatally	None reported	NR	NR	NR	NR	NR	NR

First author, year, reference number	Population details												
	Country	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, any: minority group	Specific group if any: cultural, selective	Antenatal/postnatal	Depression status: none reported/self-reported/mixed/antenatal diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Parvin, 2004 <sup>314</sup>	UK	25	Focus groups	Minority: cultural/ethnic differences	Cultural	Recruited postnatally	None reported	21–54	Bangladeshi and British-Bangladeshi	Head of household skilled 8%, unskilled 50%, unemployed 42%	Mean 3.9	NR	Living in a nuclear family 73%
Raymond, 2009 <sup>315</sup>	UK	9	Semistructured interviews	Minority	Selective	Recruited postnatally	Self-reported as depressed (antenatal depression)	23–40	6 white; 1 black Caribbean; 1 black African; 1 mixed Asian British	Deprived area	1–3	NR	5 living with or had support of partner; 4 not in contact with partner
Razurel, 2011 <sup>316</sup>	Switzerland	60	Semistructured interviews	General	–	Recruited postnatally	None reported	Mean 31	Unclear	51% – medium category office workers, service workers, skilled manual workers	All primiparous	NR	97% living as a couple
Rodrigues, 2003 <sup>315</sup>	Goa, India	39	Interview	General	–	Recruited antenatally	EPDS score 19 or more	24.1–29.3	NR	NR	10 first-time mothers	33 literate	NR for participants overall
<sup>a,b</sup> Shanok, 2007 <sup>316–318</sup>	USA	42	Semistructured interviews, clinical interviews, videoed therapy sessions transcribed	Minority	Selective (teenagers)	Recruited antenatally	NR	13–19 (mean 15.50, SD 1.47)	49% Hispanic, 38% black, 10% black and Hispanic	Impoverished urban area	All first child: 93% pregnant, 7% parenting	NR	NR
Sword, 2012 <sup>317</sup>	Canada	20	In-depth interview	General	–	Recruited antenatally	Mixed, some women had previously been depressed	Mean 29.8 (SD 4.5)	White, 18 (90%); other, 2 (10%). 90% born in Canada	Household income CA\$10,000–CA\$39,999 (10%); CA\$40,000–CA\$79,999 (20%); CA\$80,000 or more (60%)	NR	1 (5%) high school or less, 9 (45%) some/ completed community college or technical school, 10 (50%) university degree	All married or living with partner

First author, year, reference number	Population details												
	Country	Sample size (contributing qualitative evidence)	Study methods (yielding qualitative data)	General population, minority group	Specific group if any: cultural, selective	Antenatal/postnatal	Depression status: none reported/self-reported/mixed/other diagnosed	Age (years)	Ethnicity	Socioeconomic status	Parity	Education	Marital status
Taniguchi, 2007 <sup>318</sup>	USA	45	Semistructured interview	Minority: Japanese women in USA	Cultural	Recruited postnatally	Mixed, some self-reported antenatal and PND, some diagnosed	21–46	Japanese	NR	35 primiparas, 10 multiparas	> 2 years college	All partnered
Thurtle, 2003 <sup>319</sup>	UK	14	Semistructured interview	General	–	Recruited antenatally	Mixed, 1/3 self-reported depressed	17–38	NR	All 13 husbands were in employment, socioeconomic groups II/III. Living in self-contained housing	All primiparous	NR	13 married or living with partner; 1 lone parent
Ugarriza, 2007 <sup>320</sup>	USA	20	Open-ended interview	General	–	Postnatal, 1 month to 1 year at time of study	None reported	23–42 (mean 32)	All Anglo American	NR	1–4	Masters n=3; Bachelors n=9; some college n=7; high school n=1	17 married, 3 single

Key: NR, not reported.

- a Some studies had separate data relating to both intervention and PSS strategies and are therefore included in both sections.
- b These intervention studies have additional PSS data.

## Qualitative studies of universal preventive interventions

First author, year, reference number	Full reference
Andersson, 2012 <sup>277</sup>	Andersson E, Christensson K, Hildingsson I. Parents' experiences and perceptions of group-based antenatal care in four clinics in Sweden. <i>Midwifery</i> 2012; <b>28</b> :502–8
Carolan, 2012 <sup>278</sup>	Carolan M, Barry M, Gamble M, Turner K, Mascarenas O. Experiences of pregnant women attending a lullaby programme in Limerick, Ireland: a qualitative study. <i>Midwifery</i> 2012; <b>28</b> :321–8
Carolan, 2012 <sup>279</sup>	Carolan M, Barry M, Gamble M, Turner K, Mascarenas O. The Limerick Lullaby project: an intervention to relieve prenatal stress. <i>Midwifery</i> 2012; <b>28</b> :173–80
Doran, 2012 <sup>280</sup>	Doran F, Hornibrook J. Women's experiences of participation in a pregnancy and postnatal group incorporating yoga and facilitated group discussion: a qualitative evaluation. <i>Women Birth</i> 2013; <b>26</b> :82–6
Evans, 2012 <sup>281</sup>	Evans M, Donelle L, Hume-Loveland L. Social support and online postpartum depression discussion groups: a content analysis. <i>Patient Educ Couns</i> 2012; <b>87</b> :405–10
Gao, 2012 <sup>282</sup>	Gao LL, Luo SY, Chan SWC. Interpersonal psychotherapy-oriented program for Chinese pregnant women: delivery, content, and personal impact. <i>Nurs Health Sci</i> 2012; <b>14</b> :318–24
Kennedy, 2009 <sup>283</sup>	Kennedy HP, Farrell T, Paden R, Hill S, Jolivet R, Willetts J, <i>et al</i> . 'I wasn't alone' – a study of group prenatal care in the military. <i>J Midwifery Womens Health</i> 2009; <b>54</b> :176–83
Klima, 2009 <sup>284</sup>	Klima C, Norr K, Vonderheid S, Handler A. Introduction of CenteringPregnancy in a public health clinic. <i>J Midwifery Womens Health</i> 2009; <b>54</b> :27–34
McNeil, 2012 <sup>285</sup>	McNeil DA, Vekved M, Dolan SM, Siever J, Horn S, Tough SC. Getting more than they realized they needed: a qualitative study of women's experience of group prenatal care. <i>BMC Pregnancy Childbirth</i> 2012; <b>12</b> :17
Migl, 2009 <sup>286</sup>	Migl KS. <i>The Lived Experiences of Prenatal Stress and Mind–body Exercises: Reflections of Post-Partum Women</i> . PhD thesis. Texas: University of Texas Medical Branch Graduate School of Biomedical Sciences; 2009
Morrell, 2002 <sup>287</sup>	Morrell C. <i>Postnatal Support: Who Wants it, What is its Benefit and How Much Does it Cost</i> . PhD thesis. Sheffield: University of Sheffield; 2002
Scott, 1987 <sup>288</sup>	Scott D. Maternal and child health nurse: role in post-partum depression. <i>Aust J Adv Nurs</i> 1987; <b>5</b> :28–37
Teate, 2011 <sup>289</sup>	Teate A, Leap N, Rising SS, Homer CS. Women's experiences of group antenatal care in Australia – the CenteringPregnancy Pilot Study. <i>Midwifery</i> 2011; <b>27</b> :138–45

## Qualitative studies (universal) reporting data from service providers

First author, year, reference number	Full reference
McNeil, 2013 <sup>290</sup>	McNeil DA, Vekved MF, Dolan SM, Siever J, Siever JF, Horn S, <i>et al</i> . A qualitative study of the experience of CenteringPregnancy group prenatal care for physicians. <i>BMC Pregnancy Childbirth</i> 2013; <b>13</b> (Suppl. 1):6
Tanner-Smith, 2012 <sup>291</sup>	Tanner-Smith EE, Steinka-Fry KT, Lipsey MW. <i>A Multi-site Evaluation of the Centering Pregnancy® Programs in Tennessee</i> . Nashville, TN: Peabody Research Institute, Vanderbilt University. 2012. URL: <a href="https://my.vanderbilt.edu/emilytannersmith/files/2012/02/Contract19199-GR1030830-Final-Report.pdf">https://my.vanderbilt.edu/emilytannersmith/files/2012/02/Contract19199-GR1030830-Final-Report.pdf</a> (accessed August 2014)

## Qualitative studies of selective preventive interventions

First author, year, reference number	Full reference
Lehman, 2012 <sup>292</sup>	Lehman E. <i>Centering pregnancy: A Combined Quantitative and Qualitative Appraisal of Women's Experiences of Depression and Anxiety During Group Prenatal Care</i> . Wheaton, IL: Wheaton College; 2012
Novick, 2012 <sup>293</sup>	Novick G, Sadler LS, Knafl KA, Groce NE, Kennedy HP. The intersection of everyday life and group prenatal care for women in two urban clinics. <i>J Health Care Poor Underserved</i> 2012; <b>23</b> :589–603
Novick, 2013 <sup>295</sup>	Novick G, Sadler LS, Knafl KA, Groce NE, Kennedy HP. In a hard spot: providing group prenatal care in two urban clinics. <i>Midwifery</i> 2013; <b>29</b> :690–7
Novick, 2011 <sup>363</sup>	Novick G, Sadler LS, Kennedy HP, Cohen SS, Groce NE, Knafl KA. Women's experience of group prenatal care. <i>Qual Health Res</i> 2011; <b>21</b> :97–116
Shanok, 2007 <sup>296</sup>	Shanok AF, Miller L. Stepping up to motherhood among inner-city teens. <i>Psychol Women Q</i> 2007; <b>31</b> :252–61
Shanok, 2007 <sup>297</sup>	Shanok AF, Miller L. Depression and treatment with inner city pregnant and parenting teens. <i>Arch Womens Ment Health</i> 2007; <b>10</b> :199–210
Shanok, 2007 <sup>298</sup>	Shanok AF. <i>Experiences of Pregnancy and Parenting Among Inner City Teens Attending an Alternative Public School</i> . PhD thesis. New York, NY: Columbia University; 2007
Wheatley, 1999 <sup>253</sup>	Wheatley SL, Brugha TS. 'Just because I like it doesn't mean it has to work': personal experiences of an antenatal psychosocial intervention designed to prevent postnatal depression. <i>Int J Ment Health Promot</i> 1999; <b>1</b> :26–31
Wheatley, 2003 <sup>254</sup>	Wheatley SL, Brugha TS, Shapiro DA. Exploring and enhancing engagement to the psychosocial intervention 'Preparing for Parenthood'. <i>Arch Womens Ment Health</i> 2003; <b>4</b> :275–85

## Qualitative studies of indicated preventive interventions

First author, year, reference number	Full reference
Dennis, 2010 <sup>299</sup>	Dennis CL. Postpartum depression peer support: maternal perceptions from a randomized controlled trial. <i>Int J Nurs Stud</i> 2010; <b>47</b> :560–8
Myors, 2014 <sup>300</sup>	Myors KA, Schmied V, Johnson M, Cleary M. 'My special time': Australian women's experiences of accessing a specialist perinatal and infant mental health service. <i>Health Soc Care Community</i> 2014; <b>22</b> :268–77

## Qualitative studies (indicated) reporting data from service providers

First author, year, reference number	Full reference
Dennis, 2013 <sup>301</sup>	Dennis CL. Peer support for postpartum depression: volunteers' perceptions, recruitment strategies and training from a randomized controlled trial. <i>Health Promot Int</i> 2013; <b>28</b> :187–96

## Appendix 10 Studies omitted from the network meta-analysis

## Universal preventive intervention studies omitted from network meta-analysis

Intervention summary	First author and reference	Reason not included	Total number of participants	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
CBT-based intervention	Mao <sup>157</sup>	No usual-care comparison	204	Usual care in China	EPDS mean score (Chinese version)	In the emotional self-management group-training arm, the EPDS mean score at 6 weeks postnatally was 6.45 (SD 1.09) vs. 9.23 (SD 2.91) in the CG. Using the Structured Clinical Interview for DSM-IV (SCID) 2.7% women (3/113) in the IG had PND vs. 9.3% women (10/108) in the CG	Unclear
IPT-based intervention	Gao <sup>154,327</sup>	No usual-care comparison	194	Usual care in China	EPDS score 13 or more (Chinese version)	In the IG, the EPDS mean score at 6 weeks postnatally was 6.59 (SD 4.10) vs. 8.87 (SD 4.37) in the CG	Low
IPT-based intervention	Leung <sup>156</sup>	No usual-care comparison	156	Usual care in Hong Kong	EPDS score 13 or more	<i>Intention-to-treat analysis showed IG had significantly lower perceived stress and greater happiness than CG immediately after the intervention (in pregnancy). Effects not sustained at postnatal follow-up<sup>56</sup></i>	Low
Promoting parent–infant interaction	Cooper <sup>153</sup>	No usual-care comparison	449	Usual care in South Africa	EPDS mean score	At 6 months postnatally, 12.4% (21/170) women in the IG were depressed according to the SCID, compared with 15.8% (29/184) women in the CG. The EPDS mean score was 2.78 (SD 4.54) in the IG and 3.91 (SD 5.80) in the CG	Unclear
Psychoeducational intervention	Kozinszky <sup>155</sup>	No EPDS score	1762	Usual care in Hungary, educational information	Leverton Questionnaire	<i>Differences 6 weeks postpartum in PPD prevalence (12.7 vs. 17.5%, <math>\chi^2</math>, <math>p &lt; 0.01</math>; OR: 0.68) and LQ scores (9.43 <math>\pm</math> 2.168 vs. 10.12 <math>\pm</math> 3.632; Mann-Whitney U probe, <math>p &lt; 0.001</math>) for IG vs. CG, likely reflect the effect of the group intervention<sup>55</sup></i>	High
Booklet on PND	Hayes <sup>182,329</sup>	No EPDS score	188	Usual care in Australia	POMS	Significant and steady reduction in scores (overall and on the subscales) was observed over time for both groups that showed significant improvement in symptoms of depression. No difference when comparing IG vs. CG	Unclear

Intervention summary	First author and reference	Reason not included	Total number of participants	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
Booklet on PND	Ho <sup>183</sup>	No usual-care comparison	200	Usual care in Taiwan	EPDS score 10 or more (Chinese version)	No significant difference for IG vs. CG at 6 weeks ( $\chi^2 = 1.90$ , $d.f. = 1$ , $p = 0.17$ ) and 3 months postpartum ( $\chi^2 = 1.02$ , $d.f. = 1$ , $p = 0.31$ ) <sup>183</sup>	High
Education on preparing for parenting	Feinberg <sup>180</sup>	No EPDS score	169	Usual care in the USA	CES-D (subset of seven items)	Intent-to-treat analyses indicated significant program effects on coparental support, maternal depression and anxiety, distress in the parent—child relationship, and several indicators of infant regulation <sup>180</sup>	Unclear
Education on preparing for parenting	Gjerdengen <sup>181</sup>	No EPDS score	151	Usual care in the USA	SF-36	No significant group differences on postpartum health or work outcomes <sup>181</sup>	High
Education on preparing for parenting	Milgrom <sup>185</sup>	No usual-care comparison	143	Educational information	BDI, EPDS score 13 or more	IG reported significantly lower levels of depression (BDI-II) post-treatment than participants in routine care ( $F(1, 86) = 7.82$ , $p < 0.01$ . Cohen's $d = 0.6$ ) <sup>185</sup>	Unclear
Education on preparing for parenting	Shapiro <sup>187</sup>	No EPDS score	38	Usual care in the USA	SCL	In general, intervention was effective compared to CG for wife and husband marital quality, for wife and husband postpartum depression. The major change in postpartum depression was from 3 months to 1 year: CG increased and IG decreased, $t(32) = 2.13$ , $p < .05$ <sup>187</sup>	High
Self-help support	Reid <sup>200,268</sup>	No usable EPDS score	1004	Usual care in the UK	EPDS score 12 or more	At 3 and 6 months postnatally there were no significant differences in the EPDS scores between the IG and the CG	Low
Social support	Kieffer <sup>198</sup>	No usual-care comparison	278	Educational information	CES-D	From baseline to postpartum, the mean CES-D score of the MOMs group decreased 1.45 points more than the mean CES-D score of the CG, although this difference in overall change scores was not significant (95% CI: -3.26, 0.37; $p = 0.12$ ) <sup>198</sup>	Low
DHA	Doornbos <sup>207</sup>	No network	119	Usual care in the Netherlands	EPDS score 12 or more (Dutch version)	IG did not differ in mean EPDS scores or changes in EPDS scores or in incidence or severity of postpartum blues	High

Intervention summary	First author and reference	Reason not included	Total number of participants	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
DHA 200 mg/day	Llorente <sup>210</sup>	No network	89	Usual care in the USA	BDI, EPDS mean	After 4 months, no difference between groups in either self-rating or diagnostic measures of depression	Unclear
Norethisterone ethanate 200 mg administered intramuscular	Lawrie <sup>209</sup>	No usual-care comparison	180	Usual care in South Africa	EPDS score 12 or more	Mean depression scores significantly higher in IG vs. CG at 6 weeks postpartum (mean MADRS score 8.3 vs. 4.9; $p = 0.0111$ ; mean EPDS score 10.6 vs. 7.5; $p = 0.0022$ ) <sup>209</sup>	Low
Midwife-led debriefing or counselling after childbirth	Priest, <sup>217</sup> Henderson <sup>330</sup>	No network	1745	Usual care in Australia	EPDS score 13 or more	No differences in median time to onset of depression (intervention, 6 [interquartile range, 4–9] weeks vs. control, 4 weeks; $p = 0.84$ ), or duration of depression (intervention, 24 weeks vs. control, 22 weeks; $p = 0.98$ )	Unclear; unclear
Midwife-led Debriefing or Counselling after childbirth	Selkirk <sup>218</sup>	No network	149	Usual care in Australia	EPDS mean score	No significant differences for IG vs. CG on measures of personal information, depression, anxiety, trauma, perception of the birth, or parenting stress at any assessment points, postpartum <sup>218</sup>	High
Early contact with care provider	Serwint <sup>227</sup>	No EPDS score	251	Usual care in the USA	CES-D	No differences for IG vs. CG for emergency room utilisation, % who received immunisations by 90 days of age, maternal knowledge of infant care, maternal anxiety or postpartum depression	High
Program for HIV, alcohol, mental health	Rotheram-Borus, <sup>226</sup> le Roux <sup>270</sup>	No usual-care comparison	1144	Usual care in South Africa	EPDS score 14 or more	PIP is a model for countries facing significant reductions in HIV funding whose families face multiple health risks <sup>225</sup>	Low
Six planned health visitor visits	Christie <sup>150</sup>	No usual-care comparison	295	Health visitor single visit	EPDS	Intervention had no impact on most outcomes, however, it was associated with an increased EPDS score (after adjustment: 0.16, 2.36 95% CI) at 8 weeks (before accounting for outliers) but not at 7 months (–0.62, 1.65 95% CI)	Unclear
Baby massage	Fujita <sup>228</sup>	No usual-care comparison. No EPDS score	57	Usual care in Japan	POMS Japanese version	3 months after delivery scores had improved more positively in depression and vigour in IG vs. CG (depression; $t = -2.57$ ; $p = 0.02$ , vigour; $t = 2.39$ ; $p = 0.02$ )	High

Key: CG, control group; CI, confidence interval; high, high risk of bias; IG, intervention group; low, low risk of bias; MADRS, Montgomery–Åsberg Depression Rating Scale; OR, odds ratio. POMS, Profile of Mood States; unclear, unclear risk of bias. Where there were two studies, the risk of bias is indicated in the order in which the studies are cited.

### Selective preventive intervention studies omitted from network meta-analysis

Intervention summary	First author and reference	Reason not included	Total number of R	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
CBT-based	Hagan <sup>159</sup>	No EPDS score	199	Usual care in Australia	BDI	... Program did not alter the prevalence of depression in these mothers <sup>159</sup>	Low
CBT-based	Silverstein <sup>161</sup>	No EPDS score	50	Usual care in the USA	QIDS	Problem-solving education appears feasible and ... promising strategy to prevent depression among mothers of preterm infants <sup>161</sup>	Low
IPT-based	Phipps <sup>160</sup>	No usual-care comparison, no EPDS score	106	Educational information	KID-SCID	Intervention has potential to reduce risk for postpartum depression in [Hispanic and black] primiparous adolescent mothers <sup>160</sup>	Low
Psychoeducational	Tam <sup>162</sup>	No usual-care comparison, no EPDS score	516	Usual care in China	CGI, GHQ, HADS	Educational counselling may have deleterious effect to women's quality of life in those who had instrumental delivery <sup>162</sup>	Unclear
Booklet on PND and social worker call	Howell <sup>190</sup>	No usual-care comparison	540	Educational information	EPDS score 10 or more, PHQ-9	Intervention reduced positive depression screens among black and Latina postpartum mothers <sup>190</sup>	Low
Education on preparing for parenting	Walkup <sup>192</sup>	No usual-care comparison, no EPDS score	167	Educational information	CES-D	Supports efficacy of paraprofessional-delivered Family Spirit home-visiting intervention for young American Indian mothers on maternal knowledge and infant behavior outcomes <sup>192</sup>	Unclear
Booklet plus video	Logsdon <sup>202</sup>	No EPDS score	128	Usual care in the USA	CES-D	No significant differences found in CES-D scores among groups at 6 weeks postpartum <sup>202</sup>	Unclear

Intervention summary	First author and reference	Reason not included	Total number of R	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
Peer mentors living with HIV	Richter, <sup>203</sup> Rotheram-Borus <sup>269</sup>	No usual-care comparison	262	Usual care in South Africa for women with HIV	EPDS score 13 or more, GHQ	Adherence to IGs was low <sup>203</sup> Significant difference	High
Peer support	Cupples <sup>201</sup>	No EPDS score	343	Usual care in the UK	SF-36	No benefit for infant development or maternal health at 1 year <sup>201</sup>	Low
Support in labour	Wolman, <sup>204</sup> Trotter, <sup>276</sup> Nikodem <sup>275</sup>	No usual-care comparison	189	Usual care in South Africa	EPDS mean score, HDRS, PDI	IG attained higher self-esteem scores and lower postpartum depression and anxiety ratings 6 weeks after delivery <sup>204</sup>	Unclear
CenteringPregnancy Plus	Ickovics <sup>222,262</sup>	No EPDS score	1047	Usual care in the USA	CES-D	'Bundled' intervention has promise for improving psychosocial outcomes, especially for young pregnant women <sup>222</sup>	Low

Key: CGI, Clinical Global Impressions; GHQ, General Health Questionnaire; HDRS, Hamilton Depression Rating Scale; high, high risk of bias; KID-SCID, childhood version of Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders; low, low risk of bias; unclear, PDI, Pitt Depression Inventory, QIDS, Quick Inventory of Depressive Symptoms; unclear risk of bias.

### Indicated preventive intervention studies omitted from network meta-analysis

Intervention summary	First author and reference	Reason not included	Total number of R	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
CBT-based intervention	El-Mohandes <sup>167</sup>	No EPDS score	1070	Usual care in the USA	BDI	Depression at postpartum interview was 25.5% in the intervention group and 29.0% in the control group, $p = 0.303$ <sup>167</sup> No significant difference	Low
CBT-based intervention	Le <sup>171</sup>	No EPDS score	217	Usual care in the USA	BDI-II	A CBT intervention for low-income, high-risk Latinas reduced depressive symptoms during pregnancy but not during the postpartum period <sup>171</sup> No significant difference	Unclear
CBT-based intervention	McKee <sup>172</sup>	No EPDS score	90	Usual care in the USA	BDI-II	The two intervention conditions were equally effective in reducing depression <sup>172</sup> No significant difference	High
CBT-based intervention	Rahman <sup>148</sup>	No usual-care comparison, no EPDS score	903	Usual care in Pakistan	HDRS	This psychological intervention delivered by community-based primary health workers has the potential to be integrated into health systems in resource-poor settings <sup>148</sup> No significant difference	Low
Empowerment training	Tiwari <sup>175</sup>	No usual-care comparison	110	Usual care in Hong Kong	EPDS score 10 or more	An empowerment intervention specially designed for Chinese abused pregnant women was effective in reducing IPV and improving the health status of the women <sup>175</sup> Significant difference	Low
IPT-based intervention	Crockett <sup>166</sup>	No EPDS score	36	Usual care in the USA	DSM-IV	At 3 months postpartum, the study found no significant differences between the two conditions in degree of depressive symptoms or level of parental stress No significant difference	Unclear

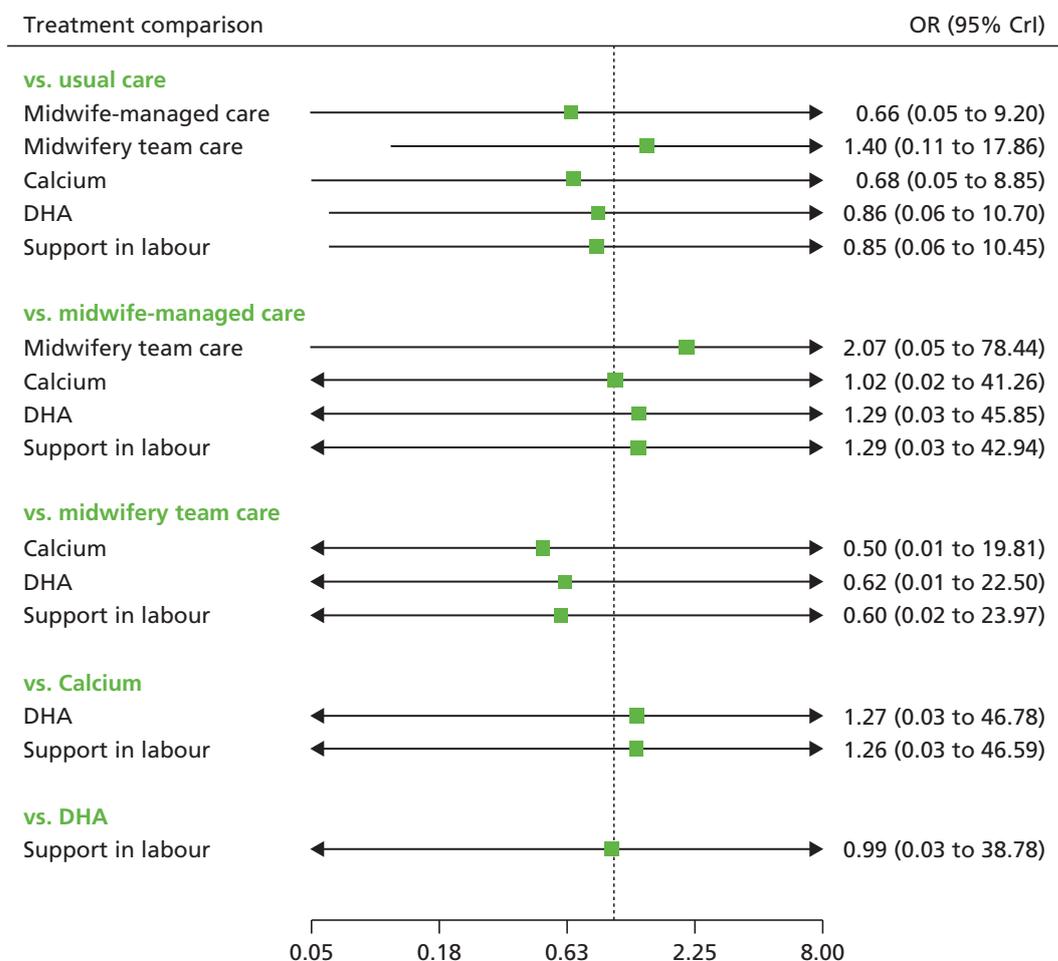
Intervention summary	First author and reference	Reason not included	Total number of R	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
IPT-based intervention	Zlotnick <sup>178</sup>	No EPDS score	35	Usual care in the USA	BDI, SCID	A four-session IPT-oriented group intervention was successful in preventing the occurrence of major depression during a postpartum period of 3 months in a group of financially disadvantaged women <sup>178</sup>  Significant difference	Unclear
IPT-based intervention	Zlotnick <sup>179</sup>	No EPDS score	99	Usual care in the USA	BDI	This study provides further evidence for the efficacy of a brief intervention to reduce the occurrence of major depressive disorder among financially disadvantaged women during a postpartum period of 3 months <sup>179</sup>  Significant difference	Unclear
Mindfulness-based intervention	Vieten <sup>121</sup>	No EPDS score	34	Usual care in the USA	CES-D, PANAS-X	Differences observed between treatment and wait-list controls at 3-month follow-up were not statistically significant <sup>121</sup>  No significant difference	High
Promoting parent–infant interaction	Wilson <sup>177</sup>	No usual-care comparison	31	Usual care in the UK	EPDS mean	The results suggest that psychoeducational interventions in pregnancy may benefit women with major psychosocial needs <sup>177</sup>  No significant difference	High
Psychoeducational intervention	Weidner <sup>176</sup>	No EPDS score	238	Usual care in Germany	HADS	The psychosomatic intervention had a significant effect on anxiety scores ( $p = 0.006$ ), but not on depression scores, physical complaints and characteristics of labour and delivery <sup>176</sup>  No significant difference	High

Intervention summary	First author and reference	Reason not included	Total number of R	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
Booklet on PND	Heh <sup>193</sup>	No usual-care comparison	70	Usual care in Taiwan	EPDS score 10 or more (Chinese version)	The mean EPDS score was 10.8 SD 4.4, in the intervention group and 12.1 SD 3.0 in the control group (p = 0.02) <sup>193</sup> Significant difference	High
Booklet on PND	Lara <sup>194,334</sup>	No usual-care comparison	377	Usual care in Mexico	BDI-II, SCID	Available data are consistent with the possibility that the incidence of depression may have been reduced by the intervention, but differential attrition makes interpretation of the findings difficult <sup>194</sup> Mixed results	High
Peer support	Harris <sup>206</sup>	No EPDS score	65	Usual care in the UK	SCAN PSE	The onset of perinatal major depression was 27% (8/30) for the Newpin befriender group and 54% (19/35) for the control group (x2 = 4.00, p = .045, two-tailed test) <sup>206</sup> Significant difference	Unclear
EPA: 1060 mg EPA plus 274 mg DHA	Mozurkewich <sup>214</sup>	No EPDS score	126	Usual care in the USA	BDI, MINI	No differences between groups in BDI scores or other depression endpoints at any of the 3 time points after supplementation <sup>214</sup> EPA-rich fish oil and DHA-rich fish oil supplementation did not prevent depressive symptoms during pregnancy or postpartum <sup>214</sup> No significant difference	Low

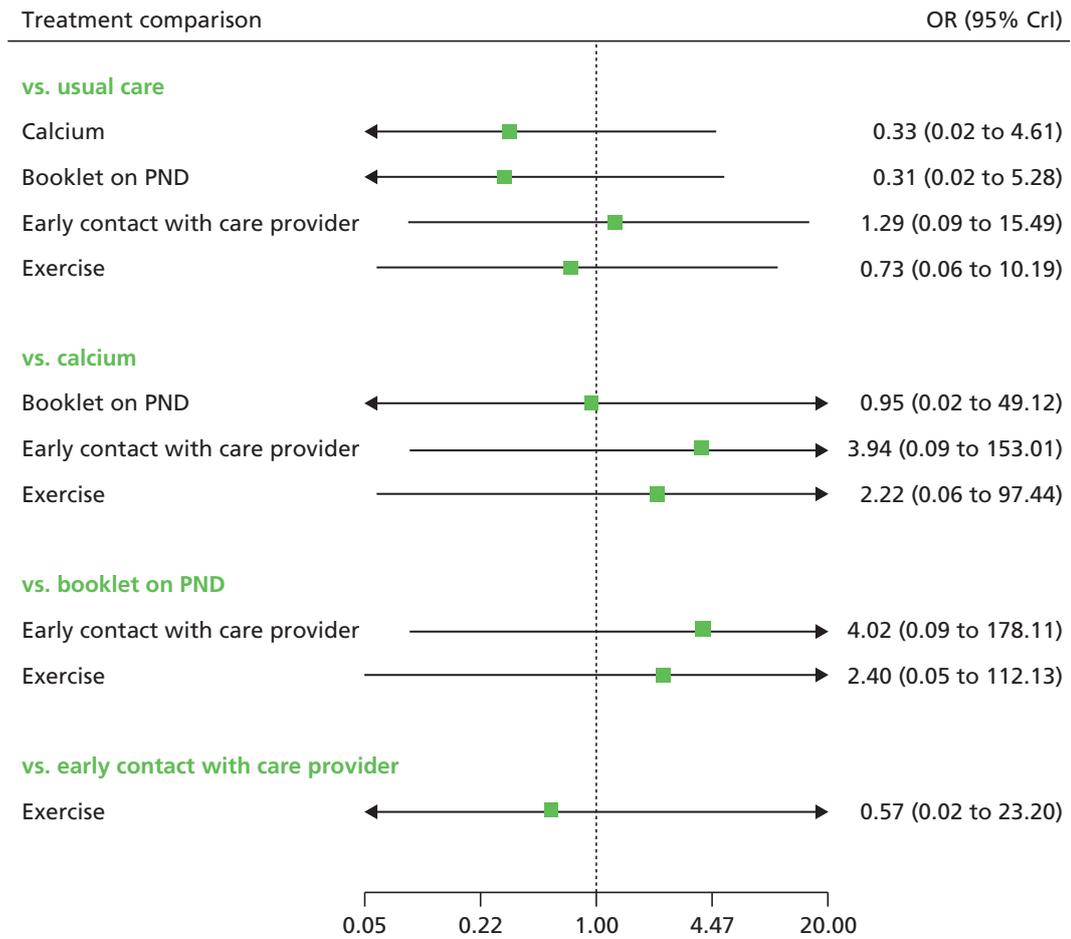
Intervention summary	First author and reference	Reason not included	Total number of R	Comparison group(s)	Depression outcomes	Main findings	Overall risk of bias
Nortriptyline	Wisner <sup>215</sup>	No EPDS score	51	Usual care in the USA	HDRS (HAM-D)	Of 26 subjects who took nortriptyline preventively, 6 (0.23, 95% exact confidence interval [CI] = 0.09 to 0.44) suffered recurrences. Of 25 subjects who took placebo, 6 (0.24, 95% exact CI = 0.09 to 0.45) suffered recurrence (Fisher exact p = 1.00) <sup>215</sup>	Low
Sertraline	Wisner <sup>216</sup>	No EPDS score	25	Usual care in the USA	HDRS, SCID	No significant difference Recurrences in the 17-week preventive treatment period occurred in four of the eight women taking placebo (proportion = 0.07, 95% exact CI = 0.00–0.34) (p = 0.04, Fisher's exact test) <sup>216</sup>	Low
Acupuncture for depression	Manber <sup>229</sup>	No usual-care comparison, no EPDS score	61	Acupuncture non-specific	BDI, HDRS	Significant difference At 10 weeks postnatally, the mean BDI score in the 16 women in the acupuncture group was 6.9 (SD 7.7). In the 19 women in the active control it was 10.8 (SD 9.8) and in the 19 women in the massage group it was 10.2 (SD 6.6). There was no pure control Limited by small sample	Unclear

Key: CI, confidence interval; HAM-D, Hamilton Rating Scale for Depression; HDRS, Hamilton Depression Rating Scale; high, high risk of bias; IPV, Intimate Partner Violence; low, low risk of bias; MINI, Mini International Neuropsychiatric Interview; SCAN PSE, SCAN Present State Examination; unclear, unclear risk of bias.

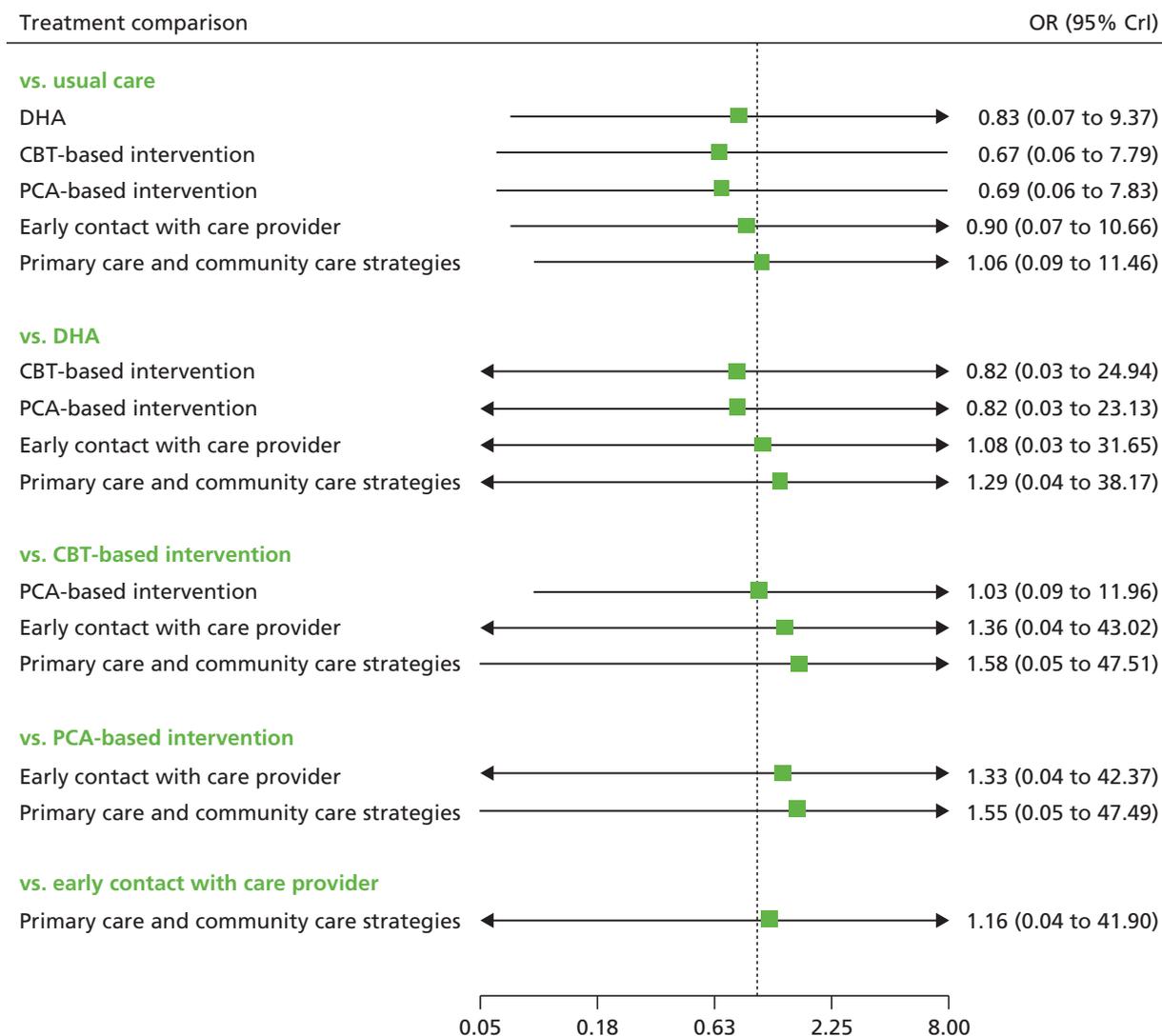
## Appendix 11 Sensitivity analysis of Edinburgh Postnatal Depression Scale threshold score data using vague prior distribution for the between-study standard deviation



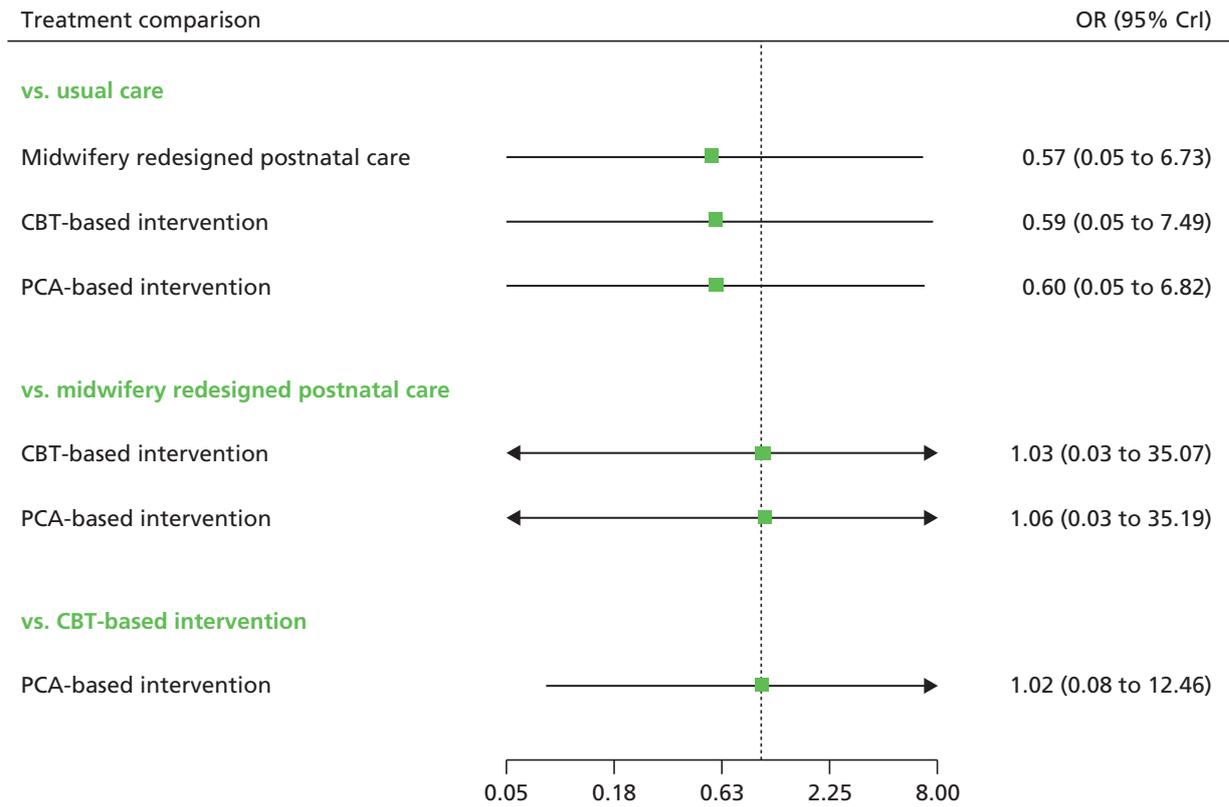
**FIGURE 79** EPDS threshold score for universal preventive interventions at 6 weeks postnatally: odds ratios all treatment comparisons.



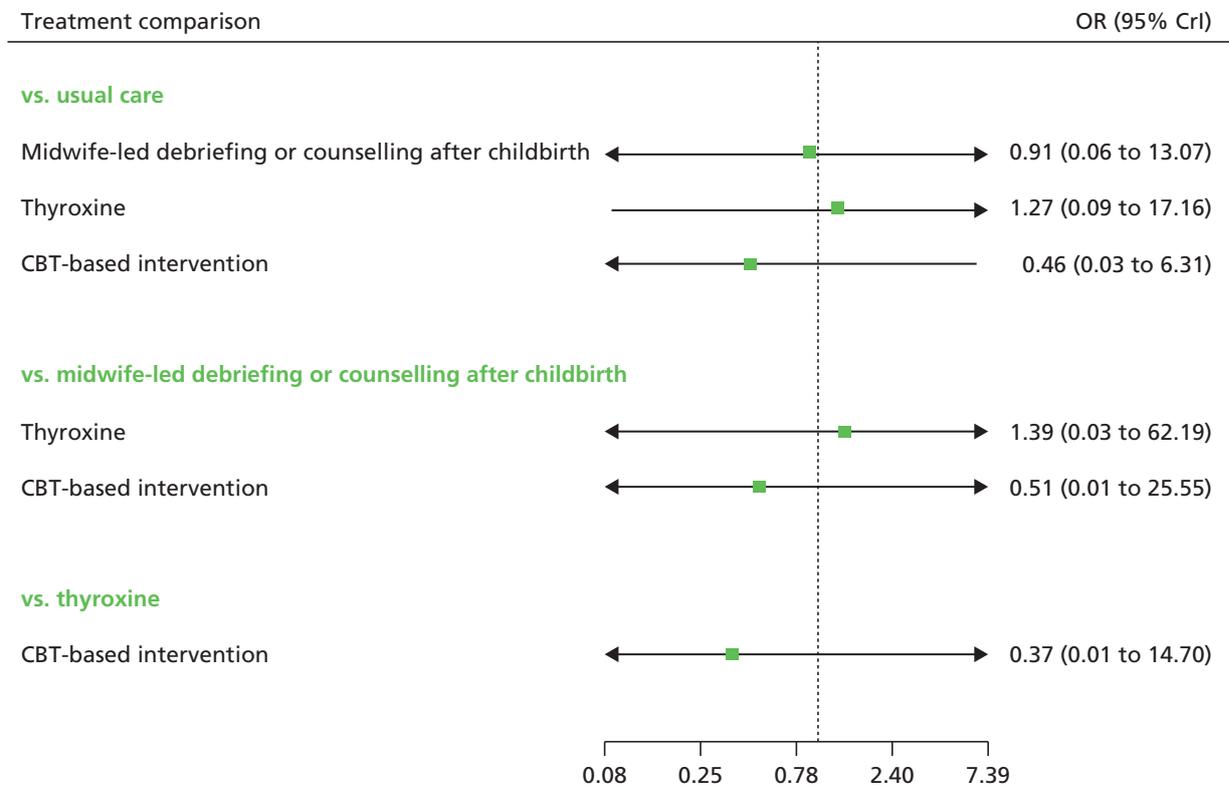
**FIGURE 80** EPDS threshold score for universal preventive interventions at 3 months postnatally: odds ratios all treatment comparisons.



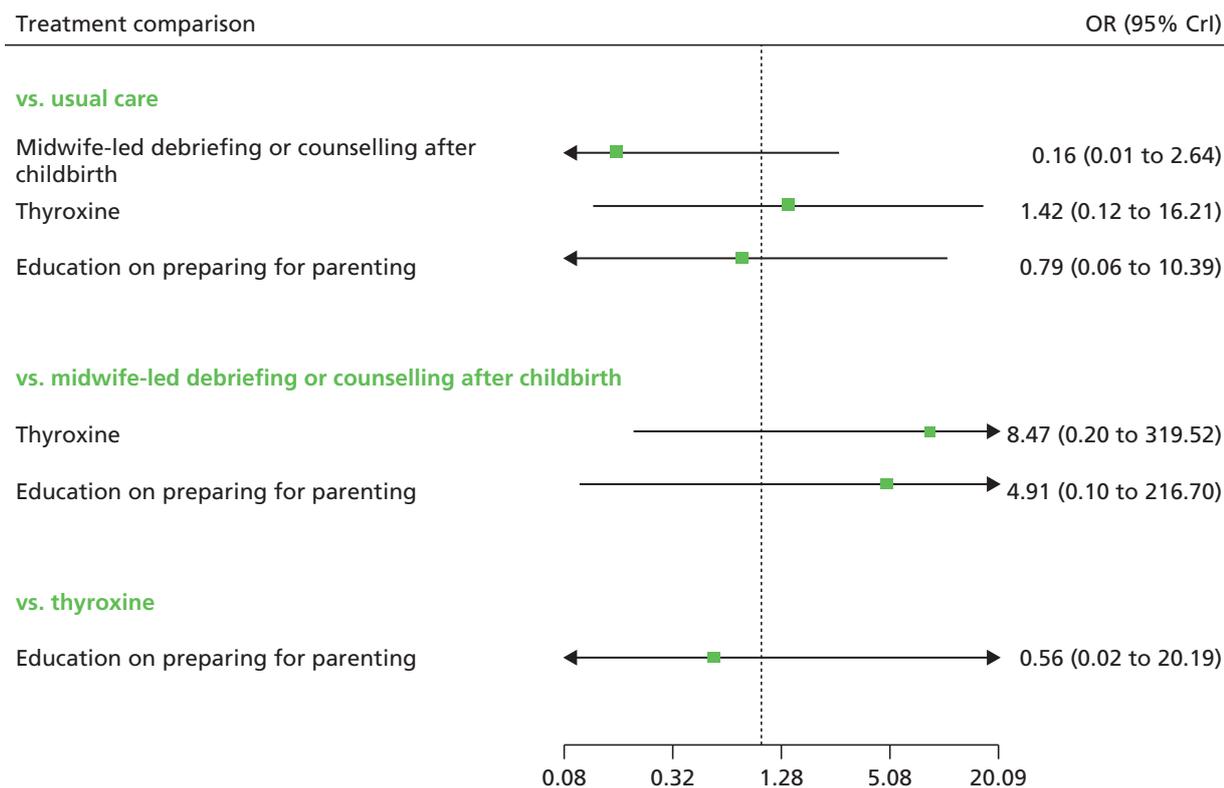
**FIGURE 81** EPDS threshold score for universal preventive interventions at 6 months postnatally: odds ratios all treatment comparisons.



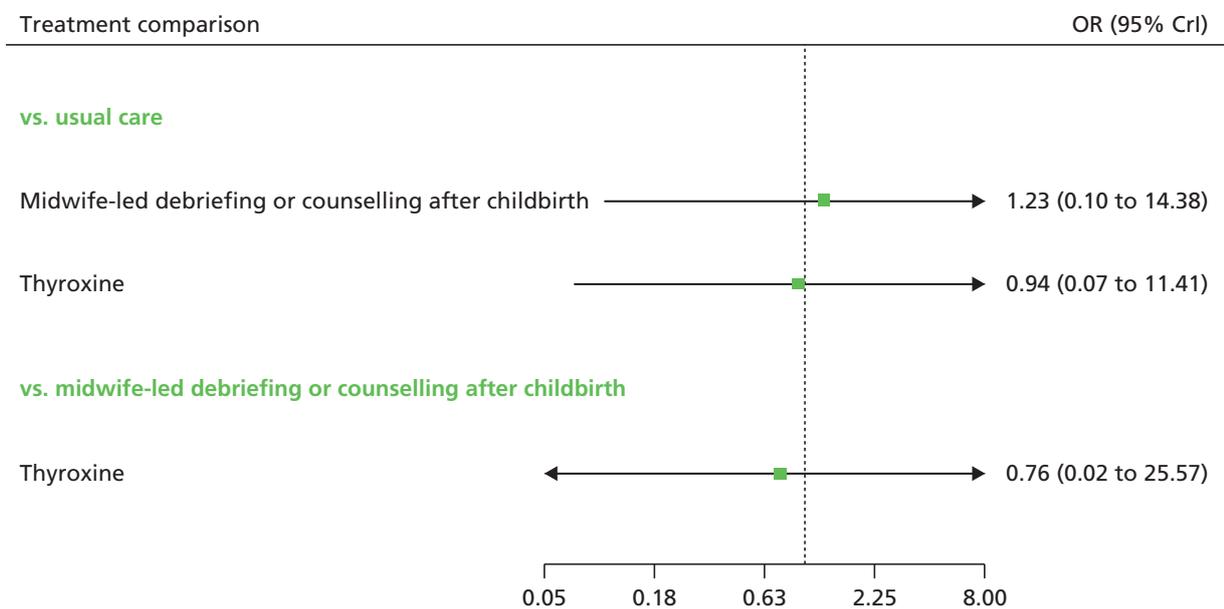
**FIGURE 82** EPDS threshold score for universal preventive interventions at 12 months postnatally: odds ratios all treatment comparisons.



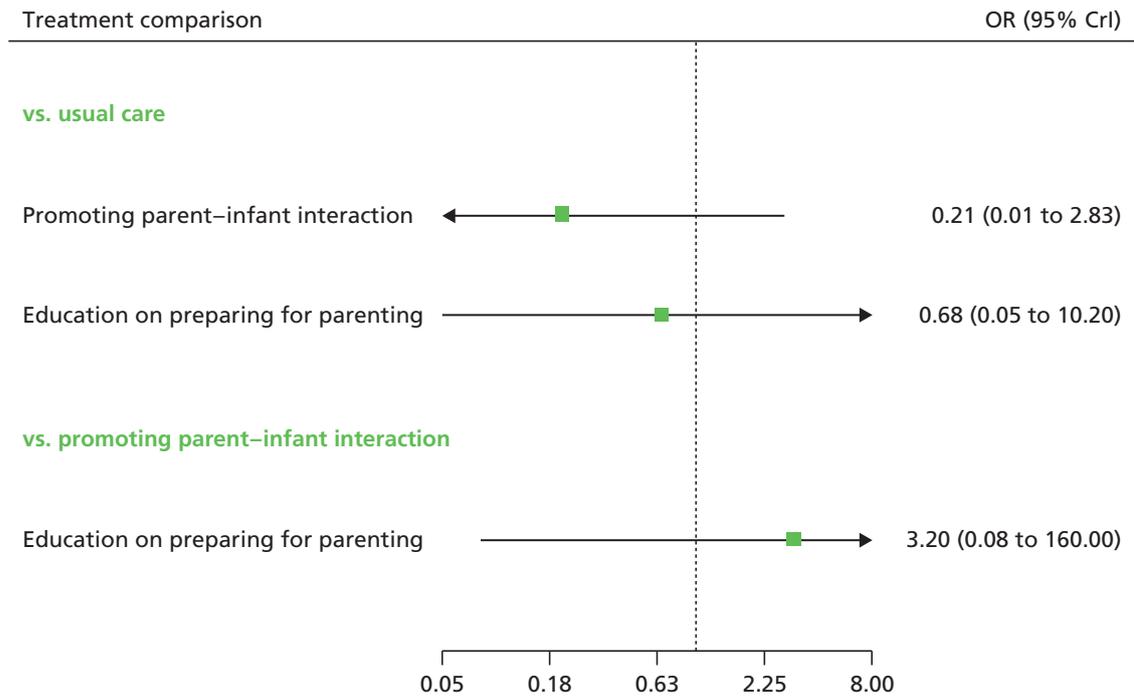
**FIGURE 83** EPDS threshold score for selective preventive interventions at 6 weeks postnatally: odds ratios all treatment comparisons.



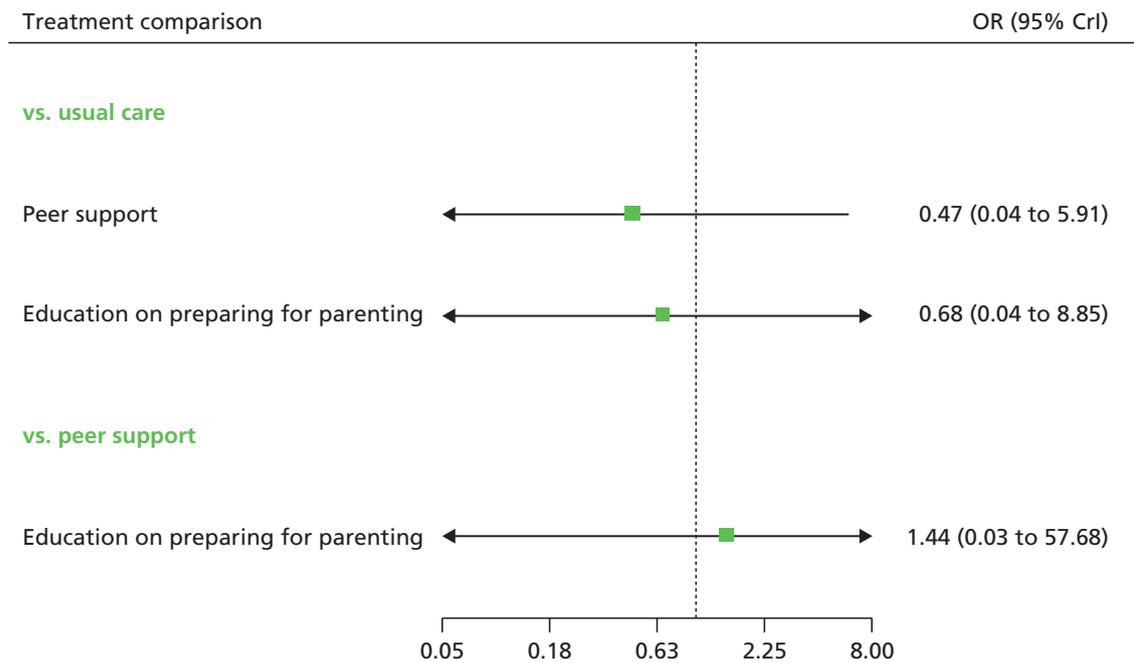
**FIGURE 84** EPDS threshold score for selective preventive interventions at 3 months postnatally: odds ratios all treatment comparisons.



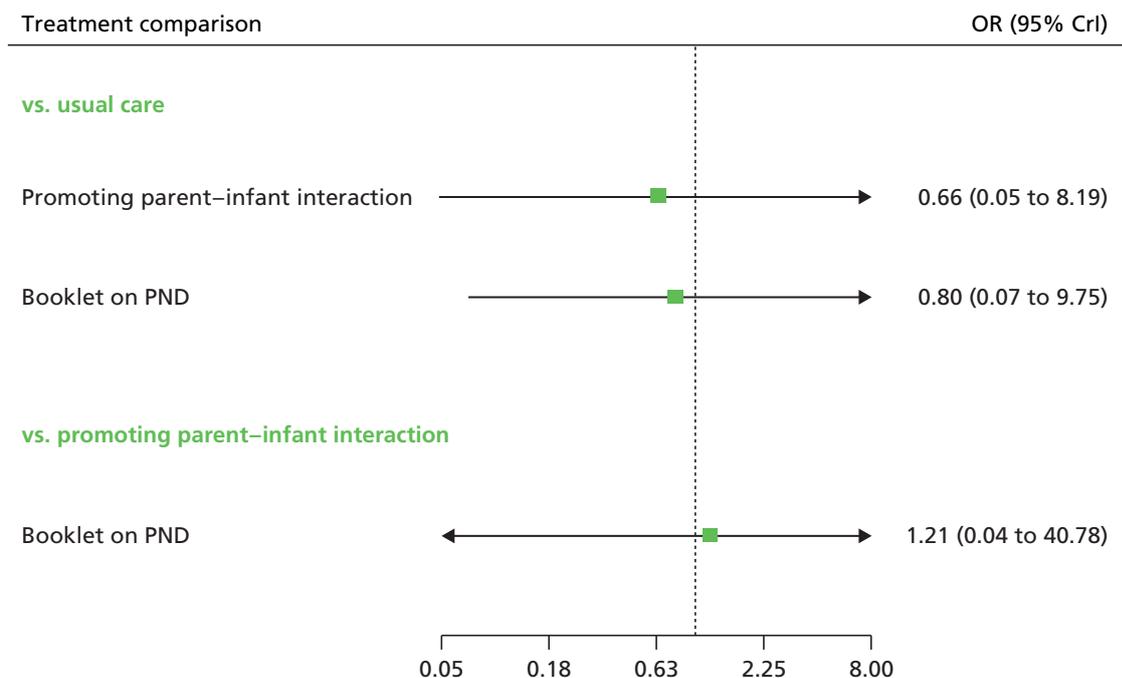
**FIGURE 85** EPDS threshold score for selective preventive interventions at 6 months postnatally: odds ratios all treatment comparisons.



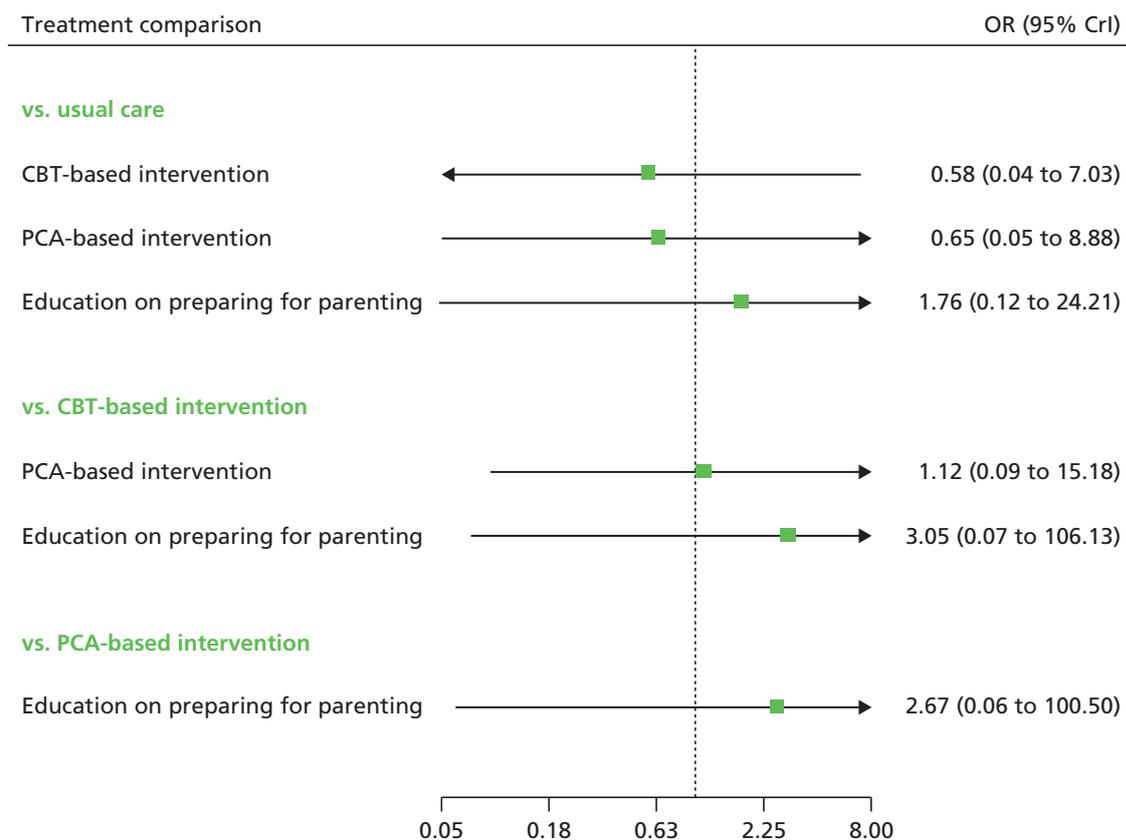
**FIGURE 86** EPDS threshold score for indicated preventive interventions at 6 weeks postnatally: odds ratios all treatment comparisons.



**FIGURE 87** EPDS threshold score for indicated preventive interventions at 3 months postnatally: odds ratios all treatment comparisons.



**FIGURE 88** EPDS threshold score for indicated preventive interventions at 4 months postnatally: odds ratios all treatment comparisons.



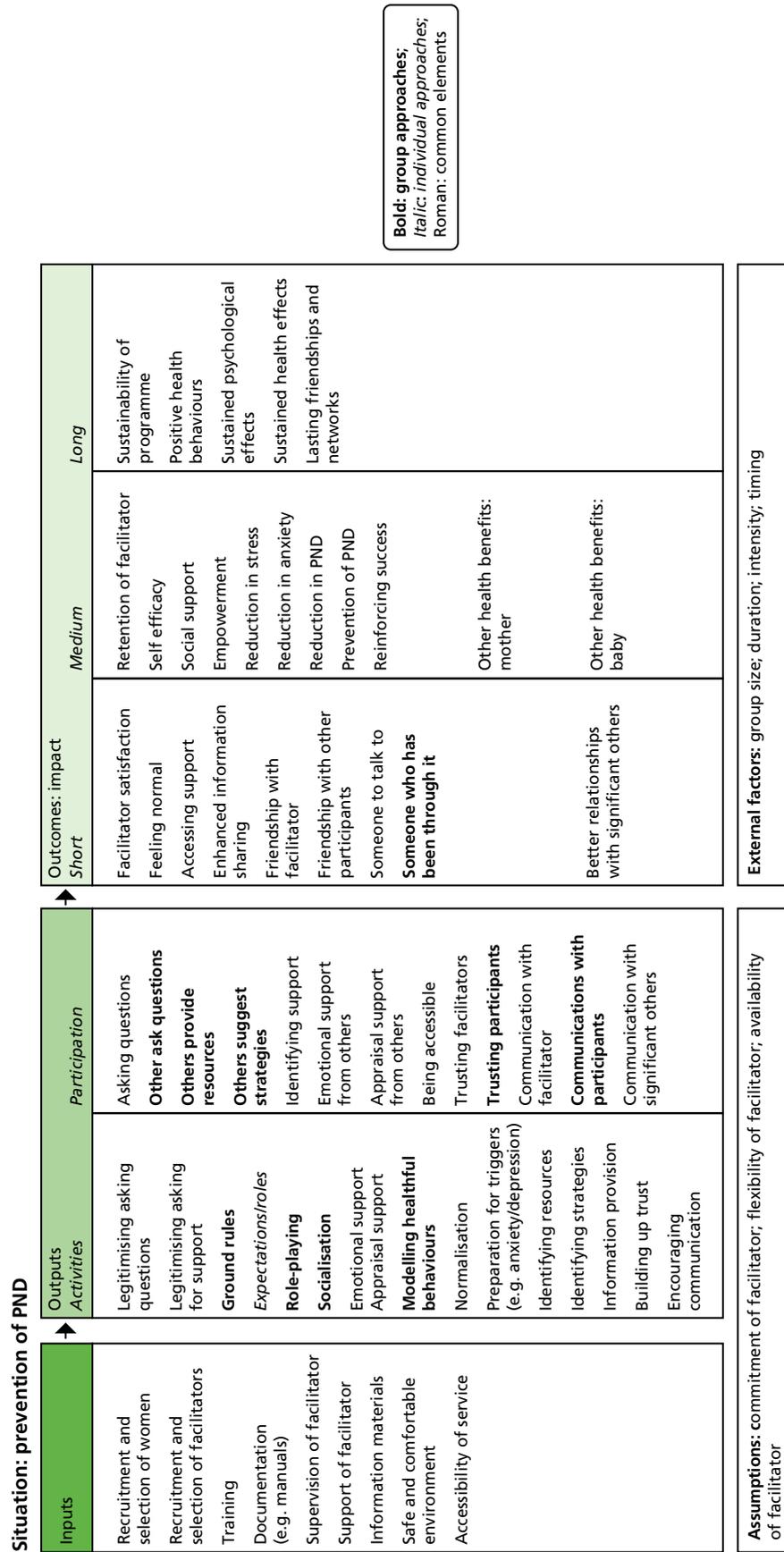
**FIGURE 89** EPDS threshold score for indicated preventive interventions at 6 months postnatally: odds ratios all treatment comparisons.



## Appendix 12 Similarities and differences between group- and individual-based approaches

### Preliminary synthesis and construction of a theoretical model

This formative analysis helped in looking for similarities and differences across programmes, for example, in characterising the different mechanisms by which lay support might work compared with delivery by health professionals.



**FIGURE 90** Theory of change logic model for the prevention of PND.

## Appendix 13 Findings relating to a potential service/intervention

Meta-theme	Subtheme(s)	Evidence source(s) (CASP). Evidence from studies with general population participants	Evidence source(s) (CASP)	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
<b>Synthesised finding – things that would have been needed to help prevent feelings of depression are ... [retrospective]</b>					
Support	Support of midwives was reported as important. Participants felt they needed to be in hospital <sup>314</sup>	–		Moderate	Moderate certainty  Studies of generally high quality; finding seen across a small number of studies and in only culturally different and selective groups
	Deprived women reported that they needed peer support and to share experiences <sup>315</sup>	–		High	
Health-care treatment	Mono-ethnic, 'culturally sensitive' interventions are favoured less than care and support in mixed ethnic groups <sup>311</sup>	–		High	Moderate certainty  Studies of high to moderate quality; finding seen across several studies, across general populations and across culturally different and selective groups
	Peer support groups <sup>315,323</sup> and having somewhere to go (for treatment) <sup>315</sup>	–		–	
	Counselling <sup>306–310</sup> and alternative medicine, such as massage <sup>315</sup>	–		High	
	The prescription of medication by the GP <sup>314</sup>	–		Moderate	
	a community-based multiagency women-centred approach – two studies of culturally different women recommended a service to be a community-based multiagency women-centred approach and to address the full spectrum of need <sup>311</sup>	–		High	
	More open discussion of realities of new motherhood, specifically in relation to breastfeeding <sup>323</sup>	High		–	
Practical skills and experience	Knowledge of how to breastfeed and how to bath a baby <sup>305,321</sup>	High/moderate	–	Low certainty	Finding seen in only two general population studies of high to moderate quality

Meta-theme	Subtheme(s)	Evidence source(s) (CASP). Evidence from studies with general population participants	Evidence source(s) (CASP)	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
<b>Barriers to help-seeking</b>					
Negative perceptions of help seeking	Perceptions of not coping/pressure to be seen as a good mother – fear of being perceived as not able to cope <sup>315,319</sup> and thus not being seen as a good mother <sup>315,324</sup>	High/moderate	Moderate	Moderate certainty	Studies of high to moderate quality; finding seen across several studies, across general populations and across culturally different and selective groups
	Stigma/fear of children being removed – women also worried about the stigma attached to help seeking <sup>303,315,325</sup> and in some cases a fear of their children being removed if they sought help. <sup>303</sup> Women were worried about being labelled as having a mental illness and the effect this may have <sup>306-310</sup>	Moderate	Moderate	–	–
	Cultural bias towards the unacceptability of help seeking for black Caribbean women <sup>306-310</sup> – these women felt they were ‘not allowed to get depressed’ and that depression was not recognised in their culture <sup>306-310</sup>	–	High	–	–
Barriers to gaining support	Woman’s withdrawal from relationship with their partner and inability to share their feelings with their partner as a result of emotional distress. <sup>324,325</sup> Participants felt unable to access partner support	High/moderate	–	Low certainty	Studies of high to moderate quality; finding seen in only a few studies, across general populations and across culturally different groups
	Cultural beliefs – respondents were advised to perform certain rituals, (e.g. wearing particular items of jewellery or clothing), to ensure protection from harm during pregnancy and the postnatal period. <sup>304</sup> A study <sup>304</sup> reported a belief in the existence of Jinn (evil spirits).	–	Moderate	–	–

Meta-theme	Subtheme(s)	Evidence source(s) (CASP). Evidence from studies with general population participants	Evidence source(s) (CASP)	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
Barriers to approaching health-care professionals	Authors commented that ailments given to women, as a result of being possessed by the Jinn, were indistinguishable from symptoms of PND. Cultural beliefs may create a barrier to seeking help from mainstream routes	–			
	Not understanding the health visitor's role (to address mothers' mental health)/not understanding the GP's role – respondents reported not feeling that the mothers' mental health was the role of the health visitor or the GP, and therefore they did not address any symptoms of emotional distress in their interactions with these health professionals <sup>304,311,314</sup>	–	Moderate/high	Moderate certainty	Studies of high to moderate quality; finding seen across several studies, across general populations and across culturally different and selective groups
	Health visitor not appropriate person to discuss with/poor relationship with GP/did not want to discuss with GP – in one study women reported that they did not consider the health visitor or GP an appropriate person with whom to discuss mental health issues. <sup>314</sup> Some women felt they had a poor relationship with the GP <sup>314</sup>	–	Moderate		

Meta-theme	Subtheme(s)	Evidence source(s) (CASP). Evidence from studies with general population participants	Evidence source(s) (CASP)	Certainty in the evidence (CERQual)	Explanation of certainty in the evidence assessment
	Health professionals' lack of awareness/ uncaring hospital midwives/health-care providers perceived as too busy – women felt that they were a burden. Health professionals, particularly hospital midwives, were considered to have a lack of awareness around emotional distress, they were perceived as uncaring, and too busy, making women feel like they were a burden <sup>306-311,315</sup>	High	Moderate		
	Respondents reported not knowing how to get help <sup>305</sup>	Moderate	–		
	Health professional focus on the baby – health visitor focus on baby was a barrier to seeking help for emotional difficulties. <sup>315,321</sup> Women reported care givers were concerned only with the well-being of the fetus and never asked about them <sup>315</sup>	High	Moderate	–	–
Practical barriers to seeking health care	Long waiting times	–	High	Low certainty	Studies of high to moderate quality; finding seen in only two studies across culturally different and selective groups
	Lack of black therapists for black women				
	Lack of child-care facilities <sup>306-310</sup>				
	Inappropriate (male) interpreter – for some minority group women, a language barrier presented difficulties. <sup>314,318</sup> Women reported that they were unable to understand the midwives or gain access to the information they needed	–	Moderate		

# Appendix 14 CLUSTERS receiving detailed examination

## Sibling papers and kinship studies for CLUSTERS examined in detail

Sibling papers	Kinship studies	Reviews and syntheses
Definition: papers conducted by same authorial team or describing same phenomenon of interest	Definition: studies that relate to original phenomenon of interest across one or two variables, e.g. use of theory, setting of intervention, main components et cetera	Secondary studies sharing topic or drawing on primary study data from index paper
<b>CenteringPregnancy</b>		
<ul style="list-style-type: none"> <li>• [I] Ickovics<sup>262</sup></li> <li>• Baldwin<sup>426</sup></li> <li>• [S] Baldwin<sup>427</sup></li> <li>• Novick<sup>294</sup></li> <li>• [W] Herrman<sup>368</sup></li> <li>• Ickovics<sup>222</sup></li> <li>• [S] Tanner Smith<sup>291</sup></li> <li>• [W] Novick<sup>293</sup></li> <li>• [W] Novick<sup>363</sup></li> <li>• Rising<sup>44</sup></li> <li>• [W] Novick<sup>382</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Shakespear<sup>428</sup></li> <li>• [W] Kennedy<sup>283</sup></li> <li>• Shakespear<sup>429</sup></li> <li>• [W] McNeil<sup>285</sup></li> <li>• Xaverius<sup>430</sup></li> <li>• [W] Gaudion<sup>431</sup></li> <li>• [W] Gaudion<sup>42</sup></li> <li>• [W] Gaudion<sup>43</sup></li> <li>• [S] Teate<sup>432</sup></li> <li>• Robertson<sup>433</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Sheeder<sup>434</sup></li> </ul>
<b>Health Visitor PoNDER Training</b>		
<ul style="list-style-type: none"> <li>• Morrell<sup>151</sup></li> <li>• [W] Slade<sup>435</sup></li> <li>• Morrell<sup>61</sup></li> <li>• Morrell<sup>436</sup></li> <li>• Brugh<sup>152</sup></li> <li>• Morrell<sup>326</sup></li> </ul>	–	–
<b>Home-based intervention</b>		
<ul style="list-style-type: none"> <li>• [I] Armstrong<sup>164</sup></li> <li>• [I] Armstrong<sup>251</sup></li> <li>• [I] Fraser<sup>252</sup></li> </ul>	–	–
<b>IPT standard antenatal care plus the ROSE programme</b>		
<ul style="list-style-type: none"> <li>• [I] Zlotnick<sup>179</sup></li> <li>• Zlotnick<sup>163</sup></li> <li>• Crockett<sup>166</sup></li> </ul>	–	–
<b>IPT plus telephone follow-up</b>		
<ul style="list-style-type: none"> <li>• [I] Gao<sup>154</sup></li> <li>• [W] Gao<sup>282</sup></li> <li>• [I] Gao<sup>327</sup></li> <li>• [W] Gao<sup>437</sup></li> <li>• [W] Ngai and Chan<sup>438</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Phipps<sup>160</sup></li> <li>• Zlotnick<sup>178</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Rahman<sup>8</sup></li> <li>• Chowdhary<sup>389</sup></li> </ul>
<b>IPT- brief</b>		
<ul style="list-style-type: none"> <li>• [I] Grote<sup>170</sup></li> <li>• [W] Grote<sup>439</sup></li> <li>• Grote<sup>440</sup></li> <li>• Grote<sup>441</sup></li> <li>• Grote<sup>442</sup></li> <li>• Grote<sup>443</sup></li> </ul>	–	<ul style="list-style-type: none"> <li>• Dennis<sup>444</sup></li> </ul>

Sibling papers	Kinship studies	Reviews and syntheses
<b>Midwife-led brief counselling</b>		
<ul style="list-style-type: none"> <li>[I] Gamble<sup>221</sup></li> </ul>	<ul style="list-style-type: none"> <li>[W] Fenwick<sup>445</sup></li> <li>Fenwick<sup>446</sup></li> <li>Gamble<sup>447</sup></li> <li>Reed<sup>448</sup></li> <li>Turkstra<sup>449</sup></li> </ul>	–
<b>Midwife-managed care</b>		
<ul style="list-style-type: none"> <li>[I] Shields<sup>219</sup></li> <li>[W/E] Young<sup>339</sup></li> <li>[I] Shields<sup>337</sup></li> <li>[W] Turnbull<sup>450</sup></li> <li>Turnbull<sup>338</sup></li> <li>[W] Shields<sup>451</sup></li> <li>[E] Young<sup>452</sup></li> </ul>	–	–
<b>The Newpin Project</b>		
<ul style="list-style-type: none"> <li>Harris<sup>206</sup></li> <li>[W] Ferguson<sup>453</sup></li> <li>Harris<sup>387</sup></li> <li>[W] Beynon<sup>340</sup></li> <li>Lederer<sup>454</sup></li> <li>[W] Barlow<sup>455</sup></li> </ul>	–	–
<b>Midwifery redesigned postnatal care</b>		
<ul style="list-style-type: none"> <li>Bick<sup>456</sup></li> <li>[S] Morrow<sup>457</sup></li> <li>Macarthur<sup>146</sup></li> <li>[W] Macarthur<sup>458</sup></li> <li>Glavin<sup>459</sup></li> <li>Macarthur<sup>264</sup></li> </ul>	–	<ul style="list-style-type: none"> <li>[QS] Furuta<sup>460</sup></li> <li>[NR] Bick<sup>461</sup></li> </ul>
<b>Telephone peer support</b>		
<ul style="list-style-type: none"> <li>Dennis<sup>386</sup></li> <li>[W] Dennis<sup>299</sup></li> <li>[E] Dukhovny<sup>396</sup></li> <li>[S] Dennis<sup>301</sup></li> <li>Dennis<sup>205</sup></li> </ul>	–	<ul style="list-style-type: none"> <li>[QS] Dennis and Chung-Lee<sup>366</sup></li> <li>[SR] Dennis and Kingston<sup>236</sup></li> <li>[SR] Dennis and Dowswell<sup>417</sup></li> <li>[SR] Lavender<sup>462</sup></li> </ul>
<b>Thinking Healthy Programme</b>		
<ul style="list-style-type: none"> <li>Rahman<sup>148</sup></li> <li>[W] Rahman<sup>463</sup></li> <li>Simon<sup>464</sup></li> <li>[W] Rahman<sup>465</sup></li> </ul>	–	<ul style="list-style-type: none"> <li>Rahman<sup>8</sup></li> </ul>
<b>Two-step behavioural educational intervention</b>		
<ul style="list-style-type: none"> <li>Howell<sup>190</sup></li> <li>[W, S] Martin<sup>466</sup></li> <li>Howell<sup>335</sup></li> <li>[W] Negron<sup>467</sup></li> <li>Martin<sup>336</sup></li> </ul>	–	–

Key: E, Economic Study; I, Included trial; NR, Narrative Review; QS, Qualitative Synthesis; S, Service Providers' views; SR, Systematic Review; W, Women's views.

## Appendix 15 Examples of 'if-then' propositions used to refine 'best fit' analytic framework

### Illustration of 'if-then' statements to refine 'best fit' analytic framework

Category number	If ...	Then	Source reference
Population	First-time mothers attend group care	First-time mothers receive helpful information especially to help prepare for labour	McNeil <i>et al.</i> <sup>285</sup>
	First-time mothers attend group care	First-time mothers know what to expect	McNeil <i>et al.</i> <sup>285</sup>
Facilitation	Women feel group leaders extend themselves above and beyond the usual norms of care to help them navigate through complex, even daunting, health systems	Women perceive the programme as successful	Novick <i>et al.</i> <sup>293</sup>
	Providers ensure a favourable group setting and atmosphere	Women realise it is a safe place to ask questions and share	McNeil <i>et al.</i> <sup>285</sup>
Group size	Group size falls within range of 8 to 12 women	Group size is efficient for system and effective to promote the process	Rising <sup>44</sup>
	Group size is kept small	Women enjoy the group sessions	Dennis <sup>301</sup>
Components	Women gain exposure to different pregnancy experiences and advice derived from diverse perspectives	Women value the group sessions	Novick <i>et al.</i> <sup>293</sup>
	Group leaders spend extended time for discussion in a facilitative format	Group leaders gain a different perspective on women's lives than they would get from conducting individual visits	Novick <i>et al.</i> <sup>293</sup>
Frequency	Group meetings take place weekly	Women look forward to the opportunity to meet with those of like mind	Hanley and Long <sup>390</sup>
	Home visits are more intensive (e.g. longer and more frequent)	Women find intervention more beneficial	Morrell <sup>287</sup>
Duration	Women attend 2-hour group appointments (compared with 15-minute individual sessions)	Women have more time to learn about pregnancy-related topics and become 'active participants in their own health care'	Novick <i>et al.</i> <sup>293</sup>
	Women are offered inflexibly scheduled 2-hour group appointments	Women do not attend because of limited control over transportation or their daily schedule	Novick <i>et al.</i> <sup>293</sup>
Follow-up	Women are offered arrangements for individualised follow-up	Women have opportunity to discuss medical or personal issues requiring more time or privacy	Novick <sup>468</sup>

Category number	If ...	Then	Source reference
Peer support			
Appraisal support	Women are provided with information and appraisal from their peers	Women assimilate knowledge more effectively	Dennis <sup>299</sup>
Informational support	Women receive informational support about PND within 6 weeks after birth	Women experience PND that is less severe	Fu and Heh <sup>469</sup>
	Peer supporters are recruited for extroversion and communication characteristics	Women perceive that they talk too much	Dennis <sup>299</sup>
Emotional support	Women discover that they are not alone in their experiences	Women are 'delighted and often surprised'	Kennedy <i>et al.</i> <sup>283</sup>
	Women raise concerns or share frightening stories	Women's anxieties are heightened, not decreased	Novick <i>et al.</i> <sup>293</sup>
Instrumental support	No data	No data	No data
Team composition	No data	No data	No data
Other contacts	Antenatal support groups are offered separate from antenatal classes	Women do not attend	Stamp <i>et al.</i> <sup>195</sup>
Women's characteristics	No data	No data	No data
Built environment	Women have comfortable chairs, food and pleasant décor	Women gain a sense of attending a friendly social gathering	Novick <i>et al.</i> <sup>293</sup>
	Dimensions of the group space permit pregnant women to move around comfortably, and an area rug is provided for floor exercises	Women enjoy relaxed, pleasant atmosphere that promotes interaction and development of relationships among women	Novick <i>et al.</i> <sup>293</sup>
Social support	Women only receive help if they have to ask for it	Women suffer PND	Brugha <i>et al.</i> <sup>152</sup>
	Women have someone to talk openly with who has shared a similar problem	Women do not suffer PND	Brugha <i>et al.</i> <sup>152</sup>
	Women lack an intimate confidant or friend to converse with	Women suffer PND	Brugha <i>et al.</i> <sup>152</sup>
	Women feel socially isolated	Women suffer PND	Mills <i>et al.</i> <sup>470</sup>

Category number	If ...	Then	Source reference
Partner support			
Appraisal support	No data	No data	No data
Informational support	No data	No data	No data
Emotional support	Women do not receive support from their partners	Women suffer PND	Mason <i>et al.</i> <sup>471</sup>
Family support	Women have little or no family support	Women perceive themselves as being under stress	Novick <i>et al.</i> <sup>293</sup>
Instrumental support	Women have someone to offer practical help	Women are able to get more rest	Ugarriza <i>et al.</i> <sup>320</sup>
	Women feel able to ask for help	Others are likely to provide practical support	Knaak, <sup>472</sup> Ugarriza <i>et al.</i> <sup>320</sup>
	Women ask for help	Others perceive that they are not able to handle things on their own	Knaak <sup>472</sup>
Support from health professional	Women experience continuity of care from the health professional	Women develop a relationship with their care provider and trust them with sensitive issues	Novick <i>et al.</i> <sup>293</sup>
Appraisal support	No data	No data	No data
Informational support	Physicians and educators provide information that 'you can't get from books'	Women feel supported	McNeil <i>et al.</i> <sup>285</sup>
Emotional support	No data	No data	No data
Instrumental support	Women are given practical demonstrations of how to bath the baby, change a nappy and put the baby to sleep	Women experience reduction in their perceived stressors	Razurel <i>et al.</i> <sup>316</sup>
Adherence	Women are members of groups with short duration, high turnover or irregular attendance	Groups are less stable and cohesive and thus less therapeutic	Novick <i>et al.</i> <sup>293</sup>
Physical signs and symptoms (was biophysical markers)	Women experience high expectations on what they need to purchase for the imminent baby	Women may feel overwhelmed to the point of tears	Migl <sup>286</sup>
	Women learn practical strategies during the group intervention	These strategies prevent panic attacks, combat physical symptoms of stress, and could be combined with existing strategies	Carolan <i>et al.</i> ; <sup>278,279</sup> Migl <sup>286</sup>
	Women perceive that depressive symptoms are associated with stigma	Women complain about physical symptoms such as headaches and tiredness	Rodrigues <i>et al.</i> <sup>325</sup>
	Women hear other women describing and comparing symptoms	Women feel reassured that their own experience is normal	Teate <i>et al.</i> <sup>432</sup>

Category number	If ...	Then	Source reference
<b>Self-efficacy</b>			
Self-efficacy	Women experience discomfort at the level of responsibility required for self-care	Women do not engage with group care programme	McNeil <i>et al.</i> <sup>285</sup>
	Women experience a loss of control as a result of the feelings engendered by pregnancy	Women feel powerless over their physical responses, emotions and interactions	Mason <i>et al.</i> <sup>473</sup>
	Women feel able to develop a conscious resistance to dominant cultural norms about good mothering	Women develop 'realistic' core beliefs and expectations	Knaak <sup>472</sup>
Women's participation	Women feel that that selection for the intervention is based upon being at increased vulnerability to PND	Women do not participate in programme	Wheatley <sup>254</sup>
	Women find it difficult to access group interventions because of transport constraints	Women do not participate in programme	Wheatley <sup>254</sup>
Prevention of PND (was long-term symptom management)	Women learn practical strategies at the group intervention	Women find it difficult to allocate time to use the practical strategies learned	Migl <sup>286</sup>
	Women learn practical strategies at the group intervention	Women report that they forget to implement the strategies	Migl <sup>286</sup>
	Women learn practical strategies at the group intervention	Women report that they do not use the strategies because of perceptions of stigma	Migl <sup>286</sup>
Psychological status (was functional status)	Women do not feel that the mental health of the mother is the role of the health visitor or the GP	Women do not discuss their symptoms of emotional distress in their interactions with these health professionals	Parvin <i>et al.</i> <sup>314</sup>
	Black Caribbean women have a deep-seated fear of mental health services	Women are reluctant to seek help	Edge <i>et al.</i> <sup>308</sup>
Quality of life	No data	No data	No data
Unplanned utilisation of health services (was emergency department visits, rehospitalisations and unplanned office visits)	No data	No data	No data
Suicide ideation (was mortality)	Women isolate themselves from friends, family and providers	Women entertain thoughts of suicide	Beck <sup>381</sup>
	Women put their child's needs above their own and want to protect their infant	Women resist temptation to attempt suicide	Beck <sup>381</sup>
Costs	Classes are run by suitably qualified and experienced staff	Costs may be prohibitive	Saligheh <sup>474</sup>

Category number	If ...	Then	Source reference
Confidentiality	Examinations are conducted in a manner that affords women privacy	Women are more likely to feel comfortable about participation	Novick <i>et al.</i> <sup>293</sup>
	Examination space is located away from other activities, using visual barriers (e.g. screens or large plants), and playing recorded music to create sound privacy	Women feel less anxious about participation	Novick <i>et al.</i> <sup>293</sup>
Participation (non-)	First sessions get off to a slow start with reluctance to talk	Women feel sessions are waste of time	McNeil <i>et al.</i> <sup>285</sup>
Missed appointments	Women do not attend regularly	Other women express disapproval and perceive a lack of commitment	Novick <i>et al.</i> <sup>293</sup>



# Appendix 16 TIDieR checklists for focal interventions

## TIDier checklist for Health Visitor PoNDER training

### Psychological

#### Brief name

- 1 Health Visitor PoNDER Training<sup>61,151</sup>

#### Why

- 2 Person-centred counselling is based on idea that opportunities to explore difficulties with another, who listens non-judgementally and reflects empathically, allows a person to feel validated as a person and facilitates their abilities to manage their distress and find their own solutions. Cognitive Behavioural Counselling assumes that events, thoughts and feelings are linked in a predictable way and that, by understanding these patterns, particularly where patterns of thinking lead to distress, there is the opportunity to make active change and test out new ways of thinking and behaving

#### What

- 3 Materials: manualised HV training addressed therapy allegiance and prepared HVs to provide appropriate, pragmatic, distinctive, derivative approach, delivering critical elements from CBT or person-centred therapy, not psychotherapy
- 4 Procedures: both training approaches sought to enable HVs to acquire further generic skills in developing helpful relationships, for example, positive regard and empathy. CBT-based intervention training emphasised normalising rationale and identification of unhelpful patterns of behaviours, perceptions or thoughts in the woman's life to help woman to change these herself<sup>347</sup>

Person-centred training used three principles of the actualising tendency, a non-directive attitude and the necessary and sufficient conditions of change.<sup>348</sup> Details of the HV training are provided in the section on training of the intervention group HVs

#### Who provided

- 5 Two main psychotherapist trainers were specialists with experience in practice as trainers and supervisors. They prepared a manual for each HV and a separate trainer's manual. Manuals included theoretical basis for relevant psychological approach and training plan so that, if necessary, training could be replicated

#### How

- 6 Face-to-face training

#### Where

- 7 No details

#### When and how much

- 8 No details

#### Tailoring

- 9 No details

#### Modifications

- 10 No details

#### How well

- 11 Planned: to enhance rigour and effectiveness of training for both psychotherapeutic approaches, to maximise comparability of programmes and to ensure that trial was a credible and fair test, a training reference group was established before the trial. This comprised experienced academically based psychotherapy trainers from England and Scotland, including representatives of both CBAs and PCAs
- 12 Actual: no details

**Psychological****Brief name**

- 1 IPT-brief

**Why**

- 2 Multicomponent model of care derived from IPT.<sup>440</sup> It retains essential theory, targets and techniques of IPT by helping women resolve one of four interpersonal problem areas (role transition, role dispute, grief and interpersonal deficits) related to the onset or maintenance of a depressive episode. It differs from IPT in several ways: e.g., to reduce treatment burden and activate change in (participant), format is restructured into eight rather than 16 sessions, a focus on the long-term problem area of interpersonal deficits is avoided, and between-session behavioural activation strategies with interpersonal focus are encouraged

**What**

- 3 Materials: participants given written educational materials about depression
- 4 Procedures: participants informed of their diagnoses, given written educational materials and referred for treatment. Interviewer approaches (participant) in culturally sensitive manner consistent with principles of ethnographic interviewing: the interviewer adopts a one-down position as a learner; tries to understand cultural perspectives and values of woman without bias; inquires about the woman's view of depression, health-related beliefs and coping practices (e.g. the importance of spirituality or familismo in her life); and asks what woman would like in a therapist, including the importance of race-ethnicity

**Who provided**

- 5 One doctoral-level clinician and one master-level clinician, both of whom had supervised training and experience in enhanced IPT-brief, served as therapists, followed detailed treatment manuals and received weekly supervision by an expert

**How**

- 6 Delivered face to face, when participants could not attend treatment, session conducted on phone to maintain continuity

**Where**

- 7 Engagement and IPT-brief sessions delivered in an office in the large obstetrics and gynaecology clinic to make treatment more accessible and less stigmatising. Therapist's office displayed culturally relevant pictures of racially and ethnically diverse infants

**When and how much**

- 8 Consists of engagement session, followed by eight acute IPT-brief sessions before the birth and maintenance IPT up to 6 months postpartum.<sup>475</sup> Engagement session, described elsewhere,<sup>439,476</sup> is based on principles of motivational interviewing and ethnographic interviewing and is designed to promote engagement by building trust and addressing the practical, psychological and cultural barriers to care experienced by individuals who are socioeconomically disadvantaged. Biweekly or monthly maintenance IPT sessions help participants deal effectively with social and interpersonal stressors associated with remission.<sup>475</sup> As goal of maintenance is to maintain recovery, the woman is encouraged to be watchful for the appearance of early somatic, affective or cognitive symptoms related to prior depressive episodes and to practice skills learned in IPT-brief to prevent relapse. Maintenance IPT differs from IPT-brief in that a woman can focus on more than one interpersonal problem area while in remission

**Tailoring**

- 9 During engagement, interviewer elicits each (participant)'s unique barriers to care and engages in collaborative problem-solving to ameliorate each barrier, for example if (participant) doubts relevance of treatment (e.g. specifically whether enhanced IPT-brief could reduce depression triggered by losing her job) – interviewer would inform her that IPT-brief can assist her in finding a new job or job training, as well as help her manage the interpersonal difficulties resulting from the job loss

**Psychological****Modifications**

- 10 Augmented with modifications to make it culturally relevant to socioeconomically disadvantaged women.<sup>440</sup> Enhanced IPT-brief reflected seven of eight components from culturally centred framework of Bernal and Saez-Santiago<sup>477</sup>: persons, metaphors, concepts, content, goals, methods and contexts (e.g. addressed component of persons by employing therapists trained in cultural competence with considerable experience working with persons of racial-ethnic minority groups who were living in poverty).<sup>477</sup> Components of metaphors and stories from the participants' cultural background were used to reinforce treatment goals. To address concepts, therapists provided education about depression congruent with (participant)'s culture and used the word 'stressed' instead of the word 'depressed', if (participant) desired, to minimise perceived stigma of depression. Content addressed by exploring which coping mechanisms and cultural resources, such as spirituality or familismo, had helped participants through adversity in the past and by building on these resources during treatment. Therapists helped clients develop treatment goals personally and culturally relevant to them. Methods addressed by intensive outreach and shortening treatment to reduce (participant) burden. Contexts addressed by pragmatic additions, such as free bus passes, child care and the facilitation of access to needed social services (i.e. food, job training, housing and free baby supplies)

**How well**

- 11 Planned: no details reported
- 12 Actual: engagement and IPT-brief sessions were audiotaped, and 77% were reviewed for fidelity to the model

## TIDieR checklist for Thinking Healthy Programme

### Psychological interventions

#### Brief name

- 1 Thinking Healthy Programme<sup>148,463,465</sup>

#### Why

- 2 Intervention: CBT-based intervention especially for developing countries such as Pakistan. Intervention targets mothers who have many psychosocial stresses and may be depressed. However, it can be used as a motivation tool for all mothers living in socioeconomically deprived areas with low literacy rates. It focuses on health of both mother and baby and encourages participation of the whole family. Approach used is simple and pictorial but retains the essential characteristics of CBT

#### What

- 3 Materials: training manual in English and/or Urdu.<sup>478</sup> Activity workbooks: Each of five modules had specially designed pictorial activity workbook used by trainer to conduct a session with the mother. Each mother had her own activity workbook where activities carried out in each session were noted. Calendar consists of pictorial and verbal key messages of each session, and serves as a visual cue for whole family to follow programme between sessions. In addition, calendar has monitoring tools to help the mother chart her own progress, and that of infant, throughout the programme
- 4 Procedures: Thinking Healthy has five modules covering period from third pregnancy trimester to first year of infant's life: preparing for the baby, the baby's arrival and early, mid and late infancy. Each module contains sessions on the mother's health, her relationship with her baby and the relationships with people around her

#### Who provided

- 5 Designed for delivery by supervised female health workers, following brief 2-day training, strengthened by experiential learning and monthly half-day facilitated group supervision

#### How

- 6 Face-to-face delivery to individual mothers

#### Where

- 7 Delivered in home visits

#### When and how much

- 8 Sixteen-session programme targeted at women with depression and their families, beginning around 30 weeks' gestation and continuing to 10 months postpartum

#### Tailoring

- 9 No details although has been adapted to Vietnam

#### Modifications

- 10 No details

#### How well

- 11 Planned: no details
- 12 Actual: no details

## TIDieR checklist for home-based intervention

### Psychological interventions

#### **Brief name**

1 Home-based intervention<sup>164,251,252</sup>

#### **Why**

2 The focus of the programme was to (1) establish relationship of trust with infant's family; (2) enhance parenting esteem and confidence through reinforcement of success; (3) provide anticipatory guidance for normal child development; (4) promote preventive child care; and (5) facilitate access to appropriate community services

#### **What**

3 Materials: no details given

4 Procedures: structured programme of child health nurse visits. Weekly case conference

#### **Who provided**

5 Child health-care nurses; social worker and community paediatrician (for case conferences only)

#### **How**

6 Face to face provided to individuals

#### **Where**

7 In woman's home

#### **When and how much**

8 Weekly for first 6 weeks, fortnightly until 3 months, then monthly until 6 months postpartum

#### **Tailoring**

9 No details

#### **Modifications**

10 No details

#### **How well**

11 Planned: no details

12 Actual: no details

## TIDieR checklist for IPT standard antenatal care plus the ROSE programme

### Psychological interventions

#### Brief name

- 1 IPT standard antenatal care plus the ROSE programme<sup>179</sup>

#### Why

- 2 Intervention based on IPT, treatment for depression targeting factors (e.g. poor social support, role transition and life stressors) that may play a crucial role in onset of PND. ROSE programme designed to help mothers-to-be in an ethnically diverse population to improve their close interpersonal relationships and change their expectations about them, build and use their social support networks and master their role transition to motherhood. The emphasis was on social relationships, especially relevant for low-income women who have recently delivered; research suggests that social support can limit the negative effects of chronic stress<sup>479</sup> and that social support is inversely associated with perinatal symptoms of depression<sup>480</sup>

#### What

- 3 Materials: handouts based on the material presented in each session were given as well as session-related homework assignments. Therapists were nurses who had received intensive training and supervision in delivery of the intervention
- 4 Procedures: the intervention, Survival Skills for New Moms, involved four sessions, (1) rationale for the programme and psychoeducation on 'baby blues' and postpartum depression; (2) identifying role transitions, changes associated with role transitions and goals for successfully managing role transitions, with emphasis on transition to motherhood; (3) setting goals, developing supports and identifying potential interpersonal conflicts, especially once the baby was born; and (4) skills for resolving interpersonal conflicts and review of main themes of intervention.<sup>178</sup> Booster session aims to reinforce skills learned in the group sessions and to address current or expected mood changes associated with interpersonal difficulties on arrival of the newborn infant: ROSE programme

#### Who provided

- 5 Nurses who had received 'intensive training and supervision'

#### How

- 6 Face to face, delivered to group

#### Where

- 7 Not specified

#### When and how much

- 8 Four 60-minute group sessions (3–5 women/group) over 4-week period and 50-minute individual booster session after delivery

#### Tailoring

- 9 Not specified

#### Modifications

- 10 Not specified

#### How well

- 11 Planned: no details
- 12 Actual: no details

## TIDieR checklist for IPT plus telephone follow-up

### Psychological interventions

#### Brief name

- 1 IPT plus telephone follow-up<sup>154,327</sup>

#### Why

- 2 IPT specifically targets interpersonal relationships and is designed to assist clients in modifying either their relationships or their expectations about those relationships. IPT could help new mothers in three areas:
- role transitions – situations in which clients have to adapt to change in life circumstances
  - interpersonal disputes – occur in marital, family, social or work settings. Clients may have diverging expectations of a situation. Conflict is excessive enough to lead to significant distress
  - interpersonal deficits – situations when clients report impoverished interpersonal relationships in term of both number and quality of the relationships

#### What

- 3 Materials: written material for programme provided to participants in each session
- 4 Procedures: intervention targeted specific concerns and interpersonal problem areas (role transitions and interpersonal conflicts) experienced by women during the postpartum period: Two 2-hour group sessions and one telephone follow-up in postpartum period

Each programme consisted of no more than 10 participants. Specific IPT techniques, such as information giving, clarification, communication analysis, role-playing and brainstorming, were applied throughout the programme. During session, participants are encouraged to express emotions attached to each of their new roles in motherhood and to explore any ambivalent feelings. Through role-play and discussion, participants could develop a more balanced view of each role and to modify their expectations and restructure their priorities. Participants were encouraged to share and role-play their experiences. Group could learn from analysing ways of communication through the role-play. Brainstorming session could enable participants to consider different ways to cope with difficulties that they would encounter after delivery

Telephone follow-up provided within 2 weeks after delivery. Aims of follow-up were to reinforce skills learned in sessions to deal with any current or expected mood changes or interpersonal issues during the postpartum period. A brief outline of IPT-oriented childbirth psychoeducation programme is provided<sup>154</sup>

#### Who provided

- 5 Group sessions run by midwife educator, who had received intensive training and supervision in delivery of IPT intervention. Telephone follow-up provided by same midwife educator

#### How

- 6 Two group sessions, telephone follow-up provided individually

#### Where

- 7 Group sessions arranged to follow routine childbirth education sessions to encourage attendance

#### When and how much

- 8 Two group sessions and telephone follow-up within 2 weeks of birth

#### Tailoring

- 9 No details

#### Modifications

- 10 No details

#### How well

- 11 Planned: five experts in postpartum depression and childbirth education confirmed the validity of the intervention
- 12 Actual: no details

## TIDieR checklist for two-step behavioural educational intervention

### Education

#### Brief name

- 1 Two-step behavioural educational intervention<sup>190,337,388</sup>

#### Why

- 2 Based on prior research, suggesting that situational factors (i.e. postpartum physical symptoms, overload from daily demands and poor social support) play a major role in generation of depressive symptoms, the team created a behavioural educational intervention aimed at reducing frequency of depressive symptoms in postpartum mothers by preparing women about specific situational triggers of depressive symptoms, bolstering their personal and social resources, suggesting specific actions to enhance self-management skills and buffer postpartum demands. Content of intervention based on prior studies, focus groups with postpartum mothers, obstetricians, psychiatrists, social workers and community advisory board

#### What

- 3 Materials: pamphlet represented each potential trigger of depressive symptoms as a 'normal' aspect of the postpartum experience, and provided specific suggestions for management (e.g. prevalence of moderate or heavy vaginal bleeding immediately postpartum was depicted by 8 of 10 female silhouettes coloured red; whereas only 1 of the 10 silhouettes was red 3 months post delivery). Simple 'to do' statements (rest; use pads) were listed between the two rows of figures. Postpartum and 3-month rates and intermediate 'to do' lists also were provided. A separate page was dedicated to social support and 'helpful organisations'. A partner summary sheet spelled out the typical pattern of experience for mothers postpartum, that is to 'normalise' the feelings and behaviours experienced and enacted by most mothers postpartum and stress the importance of social support for the woman. Content, pictures, wording and length were revised after input from two focus groups and a community advisory board. Materials were translated to Spanish and back, and were translated for accuracy and consistency of meaning
- 4 Procedures: 15-minute, in-hospital review of an education pamphlet and partner summary sheet by the mother with social worker. Social worker reviewed the education pamphlet and partner summary sheet with the woman during postpartum hospital stay and answered questions. Two-week post-delivery call when social worker assessed woman's symptoms, skills in symptom management and other needs. 'To do' lists to help alleviate symptoms were reviewed as needed and woman and social worker created action plans to address current needs including accessing community resources

#### Who provided

- 5 1 and 2: master's-trained bilingual social worker

#### How

- 6 1: face-to-face individual interaction. 2: individual telephone call

#### Where

- 7 1: in hospital. 2: in woman's home

#### When and how much

- 8 1: 15-minute session. 2: telephone call – duration unspecified

#### Tailoring

- 9 In the telephone call the social worker assessed the woman's symptoms, skills in symptom management and other needs

#### Modifications

- 10 Not described

#### How well

- 11 Planned: fidelity of intervention maintained by repeated training and review of scripts for both in person in-hospital and telephone components of intervention
- 12 Actual: approximately 5% of in-hospital sessions and 2-week telephone needs assessments were observed by a physician or project manager on the team

## TIDieR checklist for telephone peer support

### Social support

#### Brief name

1 Telephone peer support

#### Why

- 2 Three theoretical mechanisms for behaviour change underpin peer support interventions:
- impact through 'direct effect'; peer support directly influences outcomes, for example by enabling social integration, access to information or through provision of informal health care
  - impact via a 'buffering effect'; peer support protects individuals from potentially harmful influences or stressors
  - impact occurs as a result of a 'mediating effect'; peer support indirectly influences health outcomes by changing emotions, thoughts and behaviours

#### What

- 3 Materials: a Mothers Helping Mothers with Postpartum Depression manual was developed, pilot-tested and distributed to trainees.<sup>205</sup> A take-home 121 page training manual developed and piloted by the principal investigator<sup>386</sup> was distributed to new peer volunteers to guide the training session and intervention. Manual outlined professional services available for referral and covered: (1) introduction to peer support; (2) potential benefits of peer support; (3) relationship development; (4) techniques for effective telephone support; (5) general postpartum depression information; and (6) the helping process. All peer volunteers participated in a 4-hour training session. Role-playing and strategising were important components of the training session. Focus of training was to develop skills required for effective telephone-based support and to make referrals to health professionals as necessary. Peer volunteers provided with clear guidelines regarding thoughts of self-harm, indicating when to refer mothers to professional health services or crisis care. Training workshop provided opportunity to select applicants best suited for peer support with postpartum mothers
- 4 Procedures:
- Peer volunteer recruitment and training – recruited through distribution of flyers, advertisements in the local newspapers and word of mouth. Selection criteria were ability to speak and understand English and self-reported history of and recovery from PND. It employed a paid peer volunteer co-ordinator to organise recruitment of peer volunteers and obtain informed consent, conduct training sessions for peer volunteers, match women with appropriate peer volunteer and monitor implementation of the intervention
  - Contact – telephone contact to be initiated in the 48–72 hours after randomisation. Peer volunteers were requested to make a minimum of four contacts and then to interact as deemed necessary

#### Who provided

- 5 Those whose communication skills were deemed inadequate, who demonstrated difficulties participating in discussions about postpartum depression or who showed evidence of unresolved depression were excluded from the peer support programme. Of those attending training, approximately 86% were accepted as peer volunteers and were matched with at least one new mother in the trial, based on residency and ethnicity if the mother desired

#### How

- 6 By telephone having been matched individually by a volunteer co-ordinator

#### Where

- 7 Based in woman's own home

#### When and how much

- 8 Each peer volunteer who actively participated in the trial and was matched with a (participant) on average supported two women with a range from one to seven

#### Tailoring

- 9 Only according to ethnicity

#### Modifications

- 10 No details

#### How well

- 11 Planned: during training sessions, peer volunteers were given activity logs to complete for each supported mother. To document initiation of the intervention, the volunteer co-ordinator interacted with the peer volunteer 1 week after matching to confirm that contact was made with the (participant). All peer volunteers were requested to complete an activity log<sup>386</sup> for each woman supported to document specific intervention activities and duration to 12 weeks postpartum
- 12 Actual: no details

## TIDieR checklist for The Newpin Project

### Social support

#### Brief name

- 1 The Newpin Project<sup>340</sup>

#### Why

- 2 An empowering strengths-based model that helps parents face their responsibilities with support from other parents as well as from trained staff. Lack of marital and extended family support, adverse experiences in the mother's own childhood and poor material circumstances are implicated not only in the causation and maintenance of maternal depression, but also in child abuse and neglect. Befriending schemes may be accessible to many clients. Volunteers may show more commitment and flexibility in work with the families than is possible by professional health or social services. Such schemes are also cheaper than a professionally staffed service

#### What

- 3 Materials: group uses variety of methods including information handouts, structured group discussion and detailed video feedback on parenting practice
- 4 Procedures: key to the model is mutual support, with every member being expected to support other parents by drawing on their own strengths and abilities. The combined support from both trained staff and other parents enables vulnerable families to be held through times of extreme distress

#### Who provided

- 5 Women in the intervention group matched with a Newpin volunteer befriender. Befrienders were recruited through advertising or family centres where service users have already gained some experience of befriending other parents using the centre. Most befrienders were aged 31–45 years and young befrienders were matched with younger parents. Volunteer training consists of two half-days per week over a 6-month period. One session consists of lectures and workshops on topics such as child development, play, marriage and childbirth, problems in parenting and the befriending relationship. The other consists of a self-development group run by a group therapist, in which members are encouraged to explore current and past relationships and to come to terms with earlier trauma and loss. On conclusion of training, volunteers are assigned to support new clients and continue to receive weekly supervision while befriending

#### How

- 6 No details

#### Where

- 7 No details

#### When and how much

- 8 Group ran for one day a week for 12–14 weeks from 10.00 until 14.30 and was open to mothers; it was facilitated by two trainers

#### Tailoring

- 9 The only adaptation is the additional 2 weeks 'settling in' period

#### Modifications

- 10 No details

#### How well

- 11 Planned: no details
- 12 Actual: no details

## TIDieR checklist for CenteringPregnancy

### Midwifery-led intervention

#### Brief name

- 1 CenteringPregnancy<sup>262</sup>

#### Why

- 2 Founded on set of 'Essential Elements' providing structure for effective group prenatal care. Premise of CenteringPregnancy model is that by receiving prenatal care and education through a supportive group process, women gain power and confidence as knowledgeable health consumers, increased personal and maternal self-efficacy and strengthened community networks. Theory of mutual intentionality posits that the giver and recipient of social support make active decisions to give and receive support. Women give support to others as they seek to have their own needs met in the group and less through an active, conscious choice

#### What

- 3 Materials: hand-outs and worksheets facilitate the discussion and are completed during the initial minutes
- 4 Procedures: women are invited to join group sessions after initial prenatal assessment and laboratory testing is completed. Sessions comprise prenatal health care and education and within the group space, women learn self-care skills including measuring their own blood pressure and weight, which they record in their medical record and they receive individual physical assessment from prenatal care provider. Women then meet as a group to discuss issues around the content of pregnancy, childbirth and parenting

#### Who provided

- 5 Groups led by a certified nurse midwife /certified midwife or nurse practitioner skilled in group process. An additional person, a nurse or aide, facilitates flow of the group and help with any follow-up necessary. Consistency in leadership is important to provide continuity to the group and ensure comprehensive content presentation. Other professionals who assist as group leaders include social workers, nutritionists, physical therapists, birthing unit nurses and parent educators

#### How

- 6 Face-to-face group sessions supplemented with individual sessions as considered necessary

#### Where

- 7 Hospital clinic, requires space for self-examination activities and possibly private office space for individual consultations

#### When and how much

- 8 Ten 2-hour prenatal group sessions with 8 to 12 women with similar due dates. Sessions begin at 12 to 16 weeks of pregnancy, concluding in the early postpartum

#### Tailoring

- 9 Group discussion, facilitated by prenatal care provider, stimulated by self-assessment sheets geared to the content plan for each session and completed by women at beginning of each session

#### Modifications

- 10 Not identified

#### How well

- 11 Planned: no details
- 12 Actual: process fidelity reflected how facilitative leaders were and how involved participants were in each session. Content fidelity reflected whether recommended content was discussed in each session. Fidelity rated at each session by trained researcher<sup>294</sup>

## TIDieR checklist for midwife-led brief counselling

### Midwifery-led intervention

#### **Brief name**

- 1 Midwife-led brief counselling<sup>221</sup>

#### **Why**

- 2 Counselling intervention based on a theoretical perspective, focus group discussions with childbearing women and midwives, and reviews of the literature

#### **What**

- 3 Materials: none described
- 4 Procedures: counselling processes incorporated elements of critical stress debriefing and issues pertinent to the childbearing context. Content of the intervention specifically reviewed 'management of labour'. This review of the actions of others, particularly professionals involved in, and possibly contributing to, traumatic aspects of the birth, differs from standardised debriefing or other counselling interventions reported to date

#### **Who provided**

- 5 A midwife, knowledgeable about childbirth and trained in counselling approach, conducted sessions. Intervention does not require sophisticated psychotherapeutic skills. Model did not require substantial training and were a brief intervention that could be integrated with existing service frameworks

#### **How**

- 6 Delivered face to face on postnatal ward and then via the telephone

#### **Where**

- 7 On postnatal ward and then remotely via telephone

#### **When and how much**

- 8 Intervention group received face-to-face counselling within 72 hours of birth and again via telephone at 4 to 6 weeks postpartum. Counselling duration ranged from 40 to 60 minutes

#### **Tailoring**

- 9 None described

#### **Modifications**

- 10 None described

#### **How well**

- 11 Planned: adherence to a standard time frame enabled the incidence of acute and chronic trauma symptoms in childbearing women to be determined according to DSM-IV criteria
- 12 Actual: not described

## TIDieR checklist for midwife-managed care

### Midwifery-led intervention

#### Brief name

1 Midwife-managed care<sup>338</sup>

#### Why

2 Based on continuity of care and building of relationship of trust with care provider

#### What

3 Both intervention and control group women encouraged to access community-based child health services. Provided with written information on service

4 Procedures: each pregnant woman had named midwife whom she met at first antenatal visit and who aimed to provide the majority of planned episodes of care from booking to discharge to the health visitor

#### Who provided

5 Care was provided by group of 20 midwives who volunteered to join the unit from the hospital's existing complement of midwives. When named midwife was unavailable, the woman was cared for by an associate midwife from the MDU team; women were referred to the obstetric medical team when there was deviation from normal, rather than at routinely specified times. The programme of care in comparison with shared care is care is described elsewhere<sup>481,482</sup>

#### How

6 Face to face, provided individually

#### Where

7 Antenatal and postnatal care provided within existing facilities which included the hospital, home and community health centres. Designated birth rooms provided in hospital so that women could deliver in less clinical surroundings

#### When and how much

8 Each mother offered the opportunity of one home visit and unlimited visits to the centre

#### Tailoring

9 No details

#### Modifications

10 No details

#### How well

11 Planned: no details

12 Actual: no details

## TIDieR checklist for midwifery redesigned postnatal care

### Midwifery-led interventions

#### Brief name

- 1 Midwifery redesigned postnatal care<sup>146,264</sup>

#### Why

- 2 No theory. Government recommendations for wide-ranging changes to maternity, highlighting often inappropriate and fragmented delivery of postnatal care, led to a midwife-led service with continuity of care and involvement of women that is sensitive to the women's individual needs and preferences at the centre of the reforms

#### What

- 3 Ten evidence-based guidelines for main postpartum disorders identified from literature for subsequent midwife management of physical and psychological disorders, all with clear criteria for referral to GPs. Each guideline peer-reviewed by national experts and summarised in a leaflet. A description of how to use the checklists and guidelines to make visits more flexible also included. A symptom checklist was used alongside usual clinical judgement. An abbreviated version of the checklists was used at the first visit, to assess more immediate symptoms, and then a full list was used at the 10- and 28-day visits and again at the postnatal discharge check. EPDS was also completed at the 28-day visit and at the discharge check to screen for PND
- 4 Procedures: particular symptoms or problems included on checklist were main ones shown by literature to occur after birth and those for which guidelines were developed. From this information, care plans were made, after discussing needs with the woman

#### Who provided

- 5 Midwifery-led, with GP contact only if midwife considered necessary, if requested/preferred by woman or GP. Midwife undertook all postnatal home visits and postnatal maternity discharge check. Midwives attached to recruited practices attended an English National Board for Nursing, Midwifery and Health Visiting accredited training day provided by the study team. Midwifery managers were able to claim the cost of bank staff to cover clinical work of attending midwives, although most did not claim. Four training days held and midwives attended in groups of about 15

#### How

- 6 EPDS used to screen for depression at day 28 and at discharge consultation

#### Where

- 7 In woman's home

#### When and how much

- 8 To identify specific needs, even if not spontaneously reported by women or observed by midwife, symptom checklist used at first visit (immediate symptoms only), at days 10 and 28 and at discharge consultation at 10–12 weeks

#### Tailoring

- 9 Care plans made/visits scheduled based on EPDS results so care tailored to individual needs rather than based on predetermined schedule

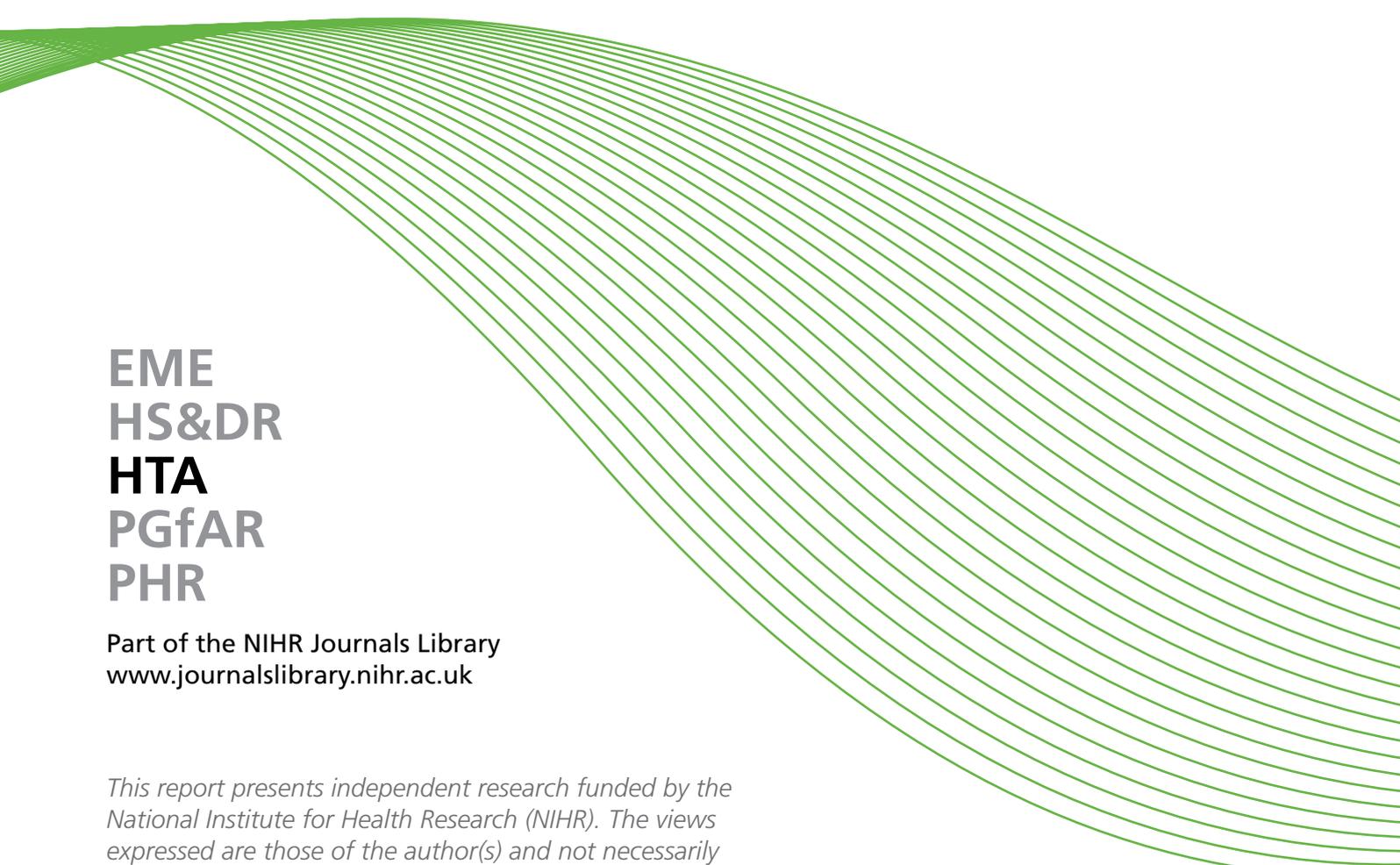
#### Modifications

- 10 No details

#### How well

- 11 Planned: no details
- 12 From trial documentation, most midwives in intervention group recorded care plans and visits as part of care, regular use of the guidelines and the completion of symptom checklists, suggesting package was implemented with reasonable fidelity



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**EME  
HS&DR  
HTA  
PGfAR  
PHR**

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