

RESEARCH ARTICLE

Internet-based interventions for postpartum depression: A systematic review and meta-analysis

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Abstract

Aim: To determine the efficacy of Internet-based interventions in decreasing the prevalence of postpartum depression in perinatal women.

Design: This review was conducted according to the standards outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement.

Methods: We performed a systematic meta-analysis of randomized controlled trials on the efficacy of Internet-based interventions for postpartum depression. Studies (2008–2018) were identified through a search conducted on PubMed, EMBASE and the Cochrane Library. Risk ratios or weighted mean differences with 95% confidence intervals were calculated using a fixed-effects model or a random-effects model. Stata software 11.0 was used to perform the meta-analysis.

Results: Most of the seven eligible studies were randomized controlled trials. The random-effects model indicated that Internet-based interventions significantly improved postpartum depression ($d = 0.642$, $N = 7$). Attrition rates ranged from 4.5%–86.9% and from 0%–87.1% for the intervention and control groups, respectively.

KEYWORDS

depression, internet, literature review, nursing, perinatal, postpartum, pregnancy, systematic review and meta-analysis

Yu-Hong Li is Co-first author.

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1 | INTRODUCTION

Pregnancy induces a significant risk to the mental health of women, and mental illness related to pregnancy can have long-lasting consequences (Patabendige et al., 2020). Healthcare providers are often the most frequent point of medical contact with a potential for the early detection of pregnancy-related mental illness (Patabendige et al., 2020). Depression is a common complication of pregnancy and the postpartum period (Committee on Obstetric Practice, 2015), defined as the period of pregnancy up to 12 months postpartum (Gavin et al., 2005), with approximately 15% of women meeting the diagnostic criteria for depressive disorders (Dennis et al., 2017; Woody et al., 2017). The prevalence of depression varies greatly between countries and regions. The current version of the DSM-5 (American Psychiatric Association, 2013) defines postpartum depression (PPD) as a major depressive episode 'with peripartum onset' and specifies that the 'onset of mood symptoms occur during pregnancy or during the 4 weeks following delivery'. Postpartum depression symptoms in women can manifest as sleep disorder, mood swings, sadness and crying, fear of injury, loss of appetite, serious concerns about their child, a lack of interest in daily activities and even suicide and death (Norhayati et al., 2015). About 9% of women with PPD have suicidal thoughts (Howard et al., 2011), and some women with PPD also have thoughts of harming their child (Stewart & Vigod, 2016). PPD is also associated with an increased risk of low birthweight, impaired cognitive development and behavioural problems in infants and children (Conroy et al., 2012; Grote et al., 2010). The availability of efficient and timely interventions is important (Misri & Kendrick, 2007). The efficient and timely interventions also decreased the burden of maternal mental health problems on individuals, families and society. Health professionals working in reproductive health services and caring for pregnant women should be well trained to recognize symptoms of mental health problems and provide effective psychological support and other relevant interventions (Patabendige et al., 2020). Psychological intervention can improve PPD. Liu et al. (2010) suggested that in addition to pre-natal psychological interventions for pregnant women, husbands and parents should also be educated to provide increased maternal family support. Meanwhile, cognitive behavioural therapy (CBT), behavioural activation (BA), interpersonal psychotherapy (IPT) and mindfulness-based interventions (MBI) are common methods of treatment for perinatal depression.

2 | BACKGROUND

Along with the development of network technology, the use of computers or network intervention programmes has also become an increasingly popular method of enhancing treatment approaches. An increasing number of researchers have used the Internet to evaluate the health status of populations and implement Internet-based interventions (Ritterband & Tate, 2009). Internet-based interventions offer unique advantages: (a) Internet-based interventions can overcome the limitations of space and help more rural areas or areas with limited access to transport and primary health care; (b) the results

achieved can be consolidated by using information gathered during previous meetings more effectively than in a face-to-face environment; (c) users can set their own schedule and access information at a time suitable for them; and (d) there is low postdevelopment cost to deliver the programme to each participant (Danaher et al., 2012). In fact, many pregnant women use the Internet to obtain pregnancy-related information, such as information on foetal development or childbirth (Larsson, 2009). Internet-based interventions may be more feasible than traditional interventions in preventing and treating PPD due to its potentially high reach (Drozd et al., 2015). Pugh et al. (2014) showed that Internet-based interventions are highly flexible and accessible, and the anonymous environment created by the Internet helps protect maternal privacy, indicating its potential in becoming an effective mode of PPD intervention.

Based on the unique advantages of Internet-based interventions, an increasing number of articles have been published on the use of Internet-based interventions for PPD, with the most recent systematic review (Ashford et al., 2016) investigating computer-based or web-based interventions for the prevention and treatment of perinatal mental health. The review suggested that computer-based or web-based interventions could effectively alleviate depressive symptoms. However, this review was limited by using a heterogeneous research design, non-specific outcomes and a varied population comprising of antenatal and postpartum women and their partners. Thus, we performed an updated meta-analysis to understand the intervention effects of Internet-based interventions and to analyse the effect of the follow-up period and intervention type on the intervention effect for PPD in perinatal women.

3 | DESIGN

This review was conducted according to standards outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher et al., 2009).

4 | ETHICS

This systematic review synthesized evidence to determine the efficacy of Internet-based interventions in decreasing the prevalence of PPD among perinatal women. The results are to be disseminated through publication in a peer-reviewed journal. Data used were obtained from previously published studies, and therefore, ethics approval was not needed to be obtained for this systematic review.

5 | METHODS

5.1 | Aims

The aim of this review was to conduct an updated meta-analysis to understand the efficacy of Internet-based interventions for PPD among

perinatal women and to analyse the effect of the follow-up period and intervention type on the intervention effect for PPD in perinatal women.

5.2 | Search methods

A pre-specified search strategy was used to identify publications that had reported on Internet-based interventions for postpartum depression using the PubMed, EMBASE and Cochrane Library. The following keywords were used: (e-health OR ehealth OR internet* OR internet-based OR web-based OR m-health OR mhealth OR mobile phone OR tablet OR face book OR twitter OR online case-based learning OR mobile application) AND (antenatal* OR antepartum OR prenatal* OR pre-natal* OR perinatal* OR peripartum* OR puerper* OR pregnan* OR maternal*) AND (depression OR depressive OR depress*). The reference lists of the identified or related articles were manually scanned to identify other relevant articles.

The inclusion criteria followed a PICOS (population, intervention, comparison, outcomes and study) criteria model (Grekin & O'Hara, 2014):

1. Population: pregnant woman or puerpera, aged more than 18 years of age without pregnancy-related risk factors (such as gestational diabetes, gestational hypertension, preterm birth and abortion).

2. Intervention: interventions were delivered over the Internet using websites, email, phone or Skype.
3. Comparison: attention control, waitlist or treatment as usual (TAU).
4. Outcome: postintervention depressive symptoms or the prevalence of postpartum depression.
5. Study design: RCTs.

We excluded studies on teenage pregnancy (<18 years). We also did not include studies that had no Internet-based component in the intervention group; clinical controlled trials, cross-sectional, cohort, one-group pretest and posttest and qualitative designs; only abstracts, reviews, case reports, conference papers or letters and comments. The steps involved the identification of studies that met the inclusion criteria summarized in Figure 1.

5.3 | Search outcome

Based on the inclusion and exclusion criteria, 793 articles were included. Seven articles from among the other 69 potential articles were ultimately included in the meta-analysis after the title, study type, abstract and full text of the articles published between 1 January 2008–30 June 2018 were examined.

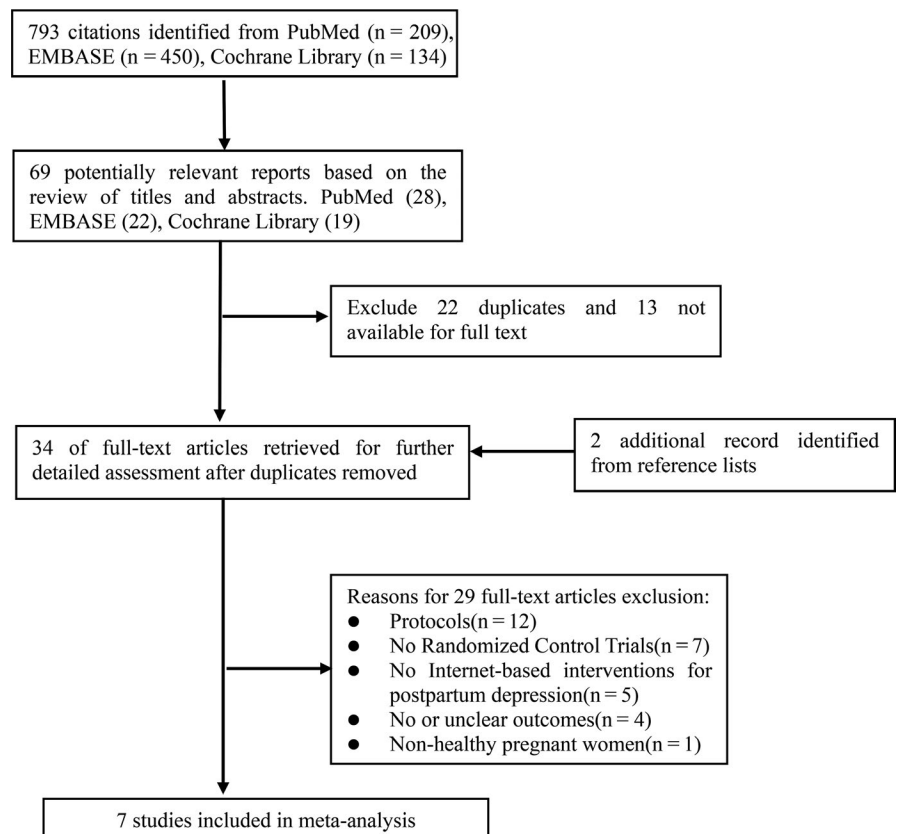


FIGURE 1 Flow chart of selected articles

5.4 | Quality appraisal

The quality of the studies was independently assessed and scored by two investigators (Ting-Yu Mu and Ri-Xiang Xu) using the Jadad scale (Jadad et al., 1996). In the case of a disagreement, a third investigator (Jun Chen) was consulted. The assessment standard was based on the following: randomization, double blind, failure of follow-up and cancellation of the investigation. Scoring was done using a 0–5 scale, with a score ≤ 2 indicating lower quality and a score of ≥ 3 indicating high quality.

5.5 | Data extraction

From each study, the following information was extracted: the first author's name, region of study, year of publication, name of Internet-based intervention, sample size, age, number of pregnant women included in both the intervention and control groups, evaluation criteria of the postpartum depressive symptoms and follow-up. Coded values were then aggregated to ensure accuracy. If important data were not available in the relevant articles, we contacted the corresponding author to obtain the necessary information.

5.6 | Analysis

The outcomes of all eligible studies were described using dichotomous data (PPD or not). The effect size (ES) of PPD between Internet-based intervention group and control subjects was calculated using the relative risk value (RR) and its 95% confidence intervals (95% CI) were described using a forest plot. The data distribution was assumed to be normal, with a z value of +0.68, corresponding to the reported 25th and 75th percentiles. The standard deviation was also calculated in the same manner (Nakken & Szodoray, 2010). The statistical heterogeneity within studies was measured by calculating the Q statistic (Higgins & Thompson, 2002). Next, we estimated the effect of heterogeneity on each study via the $I^2 = [(Q - df)/Q] \times 100\%$ method (Higgins et al., 2003). The fixed-effects model was used if heterogeneity was not statistically different ($p > .05$ or $I^2 < 50\%$); otherwise, a random-effects model was used for further analyses. We planned to construct funnel plots to determine the possible influence of publication biases if the number of eligible trials was more than 10 (Higgins & Green, 2017). To detect the sources of heterogeneity, subgroup analyses were performed based on the duration of follow-up ($>12W$, $<12W$, $=12W$), type of intervention (cognitive behavioural therapy, behavioural activation), number of sessions (<8 sessions, ≥ 8 sessions) and professional support received (exclusive support from a therapist, without support of a therapist). All statistical analyses were conducted using Stata 11.0 software.

6 | RESULTS

6.1 | Study characteristics

The seven studies included provided information on 2,277 women with PPD and were conducted across five countries, including Australia (1/7), Sweden (1/7), the United States (1/7), Canada (1/7) and the United Kingdom (3/7). Due to loss during follow-up, only a total of 856 patients were included in the final analysis. The sample sizes were between 42–910 patients each. Attrition rates ranged from 4.5%–86.9% and from 0%–87.1% for the intervention and control groups, respectively. The mean age of the participants in the studies ranged from 30.55 (4.99)–35.6 (11.9) years and 29.81 (6.09)–34.3 (11.3) years for the intervention and control groups, respectively. Six of the studies had a follow-up period of 10–17 weeks after intervention, while one study had a follow-up that ranged from pregnancy and until 6 months postpartum. The measurement of PPD in these studies was conducted using the Edinburgh Postnatal Depression Scale (EPDS), Beck Depression Inventory (BDI), Beck Depression Inventory-II (BDI-II), Montgomery-Åsberg Depression Rating Scale-Self-report version (MADRS-S) and Epidemiological Studies-Depression (CES-D). The EPDS is a 10-item self-reporting questionnaire (range 0–30) that is widely used in many countries to identify women suffering from depression during the perinatal period. BDI-II is an updated version of BDI and they all are designed to assess the degree of depressive symptoms. The MADRS-S is a 9-item self-reporting scale that measures depressive symptoms, while the CES-D is a 20-item self-reporting questionnaire used to measure symptoms associated with depression that have been experienced within a week. The major characteristics of the selected studies are summarized in Table 1. At the same time, we identified 11 studies that provided protocols of Internet-based interventions for PPD. Although they were not included in the meta-analysis, they have been described in brief (Table S1). Since we found that these studies were mainly conducted in the most developed countries and only two were conducted in least developed countries (classified based on the Human Development Index [HDI]), HDI is assessed at four HDI levels (low, medium, high and very high), where the low HDI level included countries that are least developed and the very high HDI level included the most developed countries (United Nations Development Programme, 2015).

6.2 | Heterogeneity test results

Heterogeneity was evaluated by calculating the heterogeneity statistic Q and quantified using I^2 . The results showed marked heterogeneity among the studies ($I^2 = 59.9\%$, $p < .001$) (Figure 2).

6.3 | Overall effects and subgroup analysis

Figure 2 shows that Internet-based interventions produced a moderate effect size of 0.642 (95% CI: 0.508–0.813) in

TABLE 1 Major characteristics of primary studies

Author (Year)	Country	Depressive condition (recruitment)	Intervention (I)	Control(C)	Age (mean (SD))	Sample size (initial enrolment, N)	Sample size (follow-up, N)	Outcomes (measures)	Follow-up (in weeks)
Kessler et al. (2009)	United Kingdom	BDI ≥ 14	Therapist-delivered Internet psychotherapy	TAU	I:35.6(11.9) C:34.3(11.3)	I:149 C:148	I:113 C:97	BDI	16, 32
O'Mahen et al. (2013)	United Kingdom	EPDS > 12	Internet behavioural activation(iBA)	TAU	I:32.3(4.7) C:32.2(5.7)	I:462 C:448	I:181 C:162	EPDS	15
O'Mahen et al. (2014)	United Kingdom	DSM-IV	Netmums Helping With Depression (Netmums HWD)	TAU	N/A	I:41 C:42	I:37 C:34	EPDS	17
Barrera et al. (2015)	United States	EPDS ≥ 10	Mood management Internet intervention	TAU	I:30.55(4.99) C:29.81(6.09)	I:435 C:417	I:57 C:54	CES-D	During pregnancy and up to 6 months postpartum
Pugh et al. (2016)	Canada	EPDS ≥ 10	Therapist-assisted Internet-delivered cognitive behavioural therapy	Waitlist	N/A	I:25 C:25	I:21 C:20	EPDS	10
Milgrom et al. (2016)	Australia	DSM-IV	MumMoodBooster	TAU	N/A	I:21 C:22	I:19 C:22	BDI-II, DSM-IV	12
Forsell et al. (2017)	Sweden	Major depressive disorder	Internet-delivered cognitive behavioural therapy	TAU	I:31.2(3.7) C:30.8(5.3)	I:22 C:20	I:21 C:18	MADRS-S	10

Abbreviations: BDI, Beck Depression Inventory; BDI-II, Beck Depression Inventory-II; CES-D, Epidemiological Studies-Depression; DSM-IV, The Diagnostic and Statistical Manual of Mental Disorders-IV; EPDS, Edinburgh Postnatal Depression Scale; MADRS-S, Montgomery-Åsberg Depression Rating Scale-Self-report version; TAU, Treatment as usual.

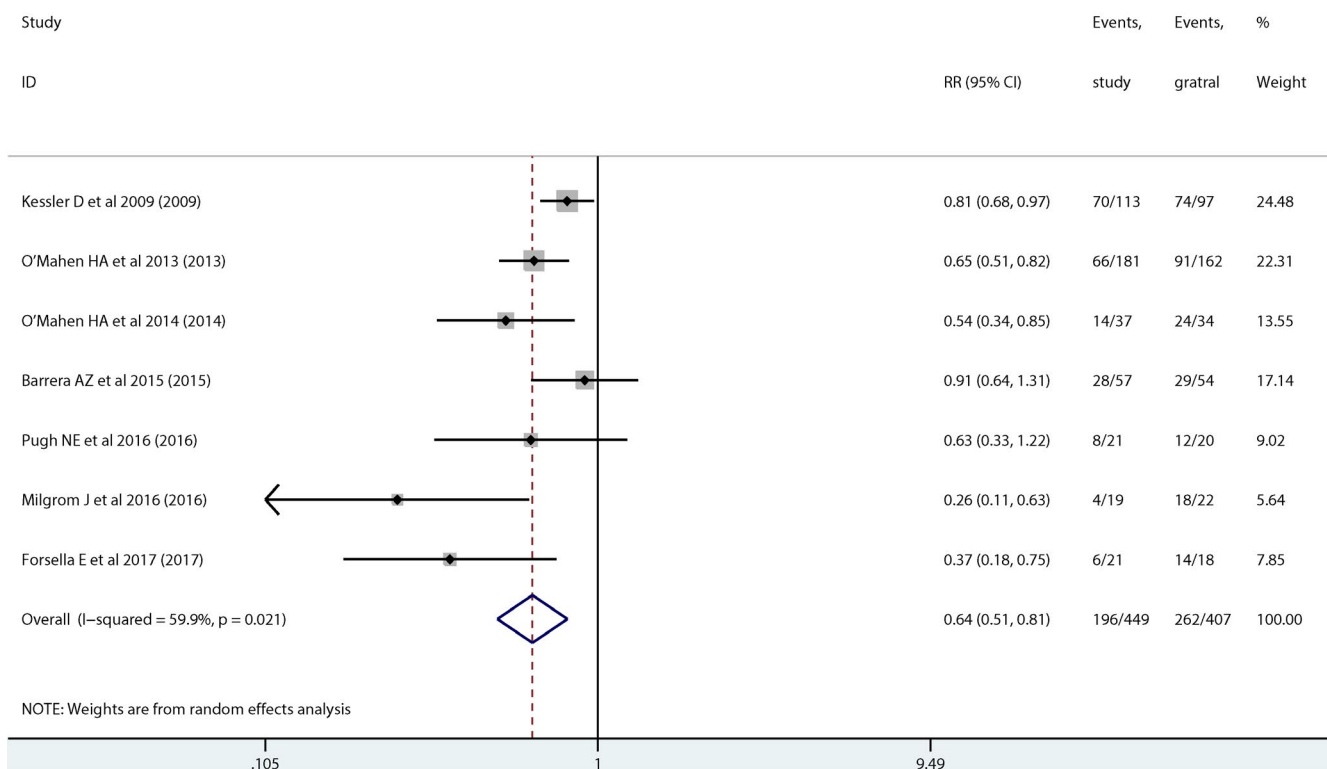


FIGURE 2 Forest plot for prevalence of PPD outcomes of intervention versus control groups

eliminating PPD. A series of subgroup analyses was performed to obtain more information on these Internet-based interventions. The subgroup analyses showed that the type of intervention and follow-up were positively associated with the prevalence of PPD (Table 2).

The RR was highest in studies followed up for over 12 weeks after intervention (0.727, 95% CI: 0.637–0.831) (Table 2). In the subgroup analysis of intervention types, we found that five studies conducted on CBT interventions showed higher heterogeneity ($I^2 = 67.0\%$, $p = .013$) (Table 2).

7 | DISCUSSION

In this meta-analysis, we determined the efficacy of Internet-based interventions for PPD during the postpartum period and included seven studies conducted on a total of 2,227 women during the perinatal period. It is vital for all healthcare providers involved in the care of women with PPD, including medical practitioners, nurses and midwives, to be aware of even subtle indicators of maternal mental illnesses and their management options (Patabendige et al., 2020). Therefore, healthcare providers can integrate the Internet into the management of the mental health of pregnant women and form a multidisciplinary team that can jointly conduct Internet-based screening and interventions for women with a high risk of PPD.

7.1 | Quality of the evidence and potential biases

Data were independently extracted, checked and entered. The methodological quality of the eligible studies was rated to assess subjective bias. The overall methodological quality of the studies included in this meta-analysis was mixed. In all studies, patients were randomly assigned to either the intervention group or control group using methods that are believed to carry a low risk of bias. Therefore, this result may be due to the selection criteria used for the RCTs. However, all studies achieved adequate allocation concealment. Therefore, participants were unlikely to have faced selection bias. The results may also be affected by performance bias because treatment conditions cannot be hidden. Meanwhile, a high risk of detection bias is possible for outcomes that rely on self-reporting.

7.2 | High rate of attrition rates in Internet-based intervention

The attrition rates for the intervention and control groups covered a wide range (0%–87.1%). Among the seven studies included, studies with a higher attrition rate indicated that novel technological prompting approaches and social networking approaches could be employed to improve human interactions with other participants (Beattie et al., 2009; O'Mahen et al., 2013). The provision of reminders or a tracking system to intervention users at a

TABLE 2 Subgroup analysis of Internet-based interventions for prevalence of postpartum depression according to follow-up, type of intervention, number of sessions and professional support

Stratification group	N	Sample Size	RR ^a (95% CI)	Z-statistics	p	Heterogeneity I ² (%)	Chi-square, χ^2 (df), comparison
Total	7	856	0.642 (0.507–0.813)	3.67	<.001	59.9	14.96 (6)
Follow-up							
>12W	4	735	0.727 (0.637–0.831)	4.69	<.001	45.3	5.48 (3)
<12W	2	80	0.488 (0.302–0.788)	2.93	.003	18.3	1.22 (1)
=12W	1	41	0.257 (0.105–0.628)	2.98	.003	/	/
Type of intervention							
Cognitive behavioural therapy	5	442	0.628 (0.435–0.906)	2.49	.013	67.0	12.14 (4)
Behavioural activation	2	414	0.626 (0.507–0.772)	4.37	<.001	0.0	0.52 (1)
Number of sessions							
<8 sessions	2	80	0.418 (0.246–0.708)	3.24	.001	63.2	2.72 (1)
≥8 sessions	5	776	0.692 (0.554–0.865)	3.23	.001	56.7	9.24 (4)
Professional support							
Exclusive therapist support	6	817	0.693 (0.609–0.789)	5.56	<.001	56.3	11.43 (5)
Without therapist support	1	39	0.367 (0.179–0.755)	2.73	.006	/	/

^aES: Effect size represents the prevalence of depressive mood.

pre-specified time interval can decrease the rate of attrition, which ultimately enhances the results (Nieminen et al., 2016). Internet-based interventions are highly flexible, accessible and can overcome limitations that prevent maternal women from participating in one-on-one consultations, visits, as well as time and geographical restraints (Andrusyna et al., 2001; Pugh et al., 2014). However, Internet-based interventions may also result in a higher attrition rate. Website contact systems and phone calls can be employed to remind postpartum women to use the site, point to helpful resources, or provide a point of contact with the treatment team (Lau et al., 2017). Internet-based interventions for PPD should include a variety of modes of communication (e-mail/phone/message/chat-room/website) to strengthen the connection between the health-care provider and new mother, to frequently remind them to use the online resources available.

7.3 | Efficacy of Internet-based interventions on the treatment of postpartum depression

Internet-based interventions provided a significant improvement in the prevalence of PPD with effect size of 0.642 in this study, which was supported by effect size of 0.63 obtained in the therapist-supported iCBT on depressive symptoms (Lau et al., 2017) and effect size of 0.46 obtained for the use of computer-based or web-based interventions to alleviate perinatal depressive symptoms (Ashford et al., 2016). Among the studies included in this meta-analysis, there were six studies (6/7) on network interventions that could efficacy decrease PPD and only one study (1/7) failed to demonstrate a significant reduction in PPD

(*mood management Internet intervention*) (Barrera et al., 2015). Even though this study did not decrease the prevalence of PPD, it found that women with the most severe pre-natal depressive symptoms showed a significantly lower risk of PPD after the use of *mood management Internet intervention* (Barrera et al., 2015). The development and evaluation of Internet-based interventions were found to decrease the prevalence of PPD among high-risk, ethnically diverse, pregnant women as shown by Le et al. (2015). We suggest that screening for depressive symptoms during pregnancy should be strengthened in primary care and that women at a high risk should be identified and provided with interventions. In summary, Internet-based interventions can decrease the prevalence of PPD and alleviate depressive symptoms in women with a high risk of PPD with a high level of efficacy.

7.4 | The effect of Internet-based interventions weakened as the follow-up duration increased

In this meta-analysis, four studies (4/7) had a follow-up period of more than 12 weeks and three of these studies (Kessler et al., 2009; O'Mahen et al., 2013, 2014) suggested that the Internet-based interventions were effective. Moreover, in this meta-analysis, along with the increase in the duration of follow-up, the value of the medium effect size also increased, which indicates that the effect of Internet-based interventions weakened. In fact, as time passes, postpartum depression symptoms gradually improve without intervention (this is also limited to women with mild-to-moderate postpartum depression). Internet-based interventions could provide women with the flexibility of receiving treatment at a time and place convenient for

them (Henshaw et al., 2011). However, more requirements must be met by researchers for the management of the intervention group. Assessment of how the quality of postpartum depression Internet-based interventions can be improved and how the management of the follow-up can be strengthened are also very important.

7.5 | Internet-based interventions for postpartum depression are mostly based on cognitive behavioural therapy (CBT)

In this review, five of the studies included (5/7) were based on CBT and the remaining two studies were based on behavioural activation. At the same time, the five studies based on CBT resulted in a significantly improved level of PPD with a medium effect size of 0.628 in this meta-analysis, which was supported by effect size of 0.63 obtained as a result of therapist-supported iCBT on depressive symptoms (Lau et al., 2017). This indicates that Internet-based interventions based on CBT may significantly improve PPD among postpartum women with small to large effects. However, since the experimental design and evaluation methods varied between studies, the effect of CBT alone could not be concluded on the prevention effect of PPD, but the overall trend was optimistic (Morrell et al., 2016). In this meta-analysis, only two studies used behavioural activation and there have been fewer research studies conducted on behavioural activation therapy than cognitive behavioural therapy. At the same time, the results of this meta-analysis show that behavioural activation can also significantly improve PPD. Richards et al. (2016) suggested that behavioural activation and CBT are equally effective and more cost-effective methods for the treatment of depression. Further research is needed to confirm that Internet-based behavioural activation can improve PPD.

7.6 | Internet-based interventions for postpartum depression are developing rapidly and the least developed countries should gradually implement Internet-based interventions for PPD

During the screening literature for inclusion in this meta-analysis, we found 11 studies on protocols for providing Internet-based intervention for PPD. Although they were not included in the meta-analysis, they have been described in brief (Table S1). These studies were published from 2012–2018, and more than half of these reports have been published during the past 5 years. The main objective of these studies is to improve postpartum symptoms using web-based tools, mobile applications and Facebook. At the same time, Internet-based interventions for PPD tend to use individual applications or depend on existing social networks (e.g. Facebook). Meanwhile, these studies were mainly carried out in the most developed countries, with only two conducted in least developed countries (Pakistan and Nigeria). The economic status of populations in most developed countries is remarkably high, and people

may pay more attention to mental health. Developed countries have relatively better access to Internet technology, which can provide technical support for PPD network interventions. Villegas et al. (2011) showed that the prevalence of PPD was somewhat higher among women in developing countries than among women in developed countries. In our earlier study (Mu et al., 2019), the incidence of postpartum depression may be associated with regional economic development levels and the higher the economic status, the lower the prevalence of postpartum depression. Therefore, the least developed countries should pay more attention to the postpartum screening of mental health and learn from new methods of Internet-based interventions for PPD used in the most developed countries to construct an Internet-based intervention strategy for PPD that is suitable for national conditions.

7.7 | Strengths and limitations

Several limitations of the current study have been described in this paper. First, although we conducted an extensive search using all possible search terms, it is possible that some eligible articles may have been missed. Second, since there are only a few studies included in this review, it is not possible to detect publication bias properly. Third, this meta-analysis was a retrospective study and therefore does not prove causation, making this approach limited by any methodological deficiencies in the studies included. Despite these limitations, this study also has some strengths. First, we used subgroup analyses to control for heterogeneity in our study. Second, this review also produced a simple summary of reports on protocols that can be used to understand the development trend of PPD Internet interventions and this showed that greater attention should be paid to female mental health and information technology support in least developed countries, for which these interventions may be more meaningful than for least developed countries. Overall, this meta-analysis investigated the efficacy of Internet-based interventions for PPD and the results suggest that PPD can be improved through Internet-based interventions.

8 | CONCLUSIONS

This meta-analysis supports the notion that Internet-based interventions can effectively improve symptoms of PPD. In addition, for network PPD interventions, the intervention effect gradually weakened, and the network intervention loss rate increased as the follow-up duration increased. Healthcare providers (medical practitioners, nurses and midwives) can integrate the Internet to manage the mental health of pregnant women and form a multidisciplinary team to jointly carry out Internet-based screening and intervention for women at high risk of PPD. Future studies should control the attrition rates and strengthen management. Meanwhile, future studies should establish effective components,

formats and approaches of Internet-based interventions for PPD. A suitable number of sessions of appropriate durations during the postpartum period using available functionality, interactivity, multimedia and communication modes are important to maximize the long-term impact of Internet-based interventions in postpartum women. It is also hoped that least developed countries will also carry out an increasing number of Internet-based interventions for PPD.

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CONFLICT OF INTEREST

The authors declare that they have no competing interests.

AUTHOR'S CONTRIBUTIONS

Authors Ting-Yu Mu and Ri-Xiang Xu designed the study and assessed the quality of the studies and wrote the first draft of the manuscript. Authors Cui-Zhen Shen, Jun Chen and Yu-Hong Li monitored article quality and language polish. Authors Ting-Yu Mu, Ri-Xiang Xu, Jun Chen and Ya-Ya Wang managed the literature searches and analyses. Authors Ting-Yu Mu, Ri-Xiang Xu and Ya-Ya Wang undertook the statistical analysis. All authors contributed to and have approved the final manuscript.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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