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Efficacy of Nurse-led Telepsychological Intervention for Patients with Postpartum Depression: A Systematic Review and Meta-analysis

ABSTRACT

Objective: The aim of the study was to systematically evaluate the therapeutic effect of nurse-led telepsychological intervention on patients with postpartum depression.

Methods: PubMed, Embase, CINAHL, Web of Science, the Cochrane Library, Chinese Biomedical Literature Database, China National Knowledge Infrastructure, Wanfang Database, and China VIP database were searched for articles on the effectiveness of remote psychological intervention in improving postpartum depression. The search time was limited from the establishment of the database to December 2023. The literature was screened, and data were extracted. The Cochrane risk of bias assessment tool was used to evaluate the quality of randomized controlled trials that met standards, and RevMan5.4 was used for meta-analysis.

Results: A total of 14 studies involving 1765 patients from 9 countries were included. Meta-analysis results showed that compared with routine care, telepsychological intervention can alleviate maternal depression (Standard Mean Difference [SMD] = −0.60, 95% CI [−0.91, −0.29], $I^2 = 88\%$, $P < .01$). Sensitivity and subgroup analyses revealed that 3 studies using the Edinburgh Postpartum Depression Scale evaluation tool were the source of heterogeneity in the meta-analysis.

Conclusion: Telepsychological postpartum depression intervention can effectively improve postpartum depression, indicating that it has a certain clinical application value.

Keywords: Postpartum depression, psychological intervention, telepsychological care, meta-analysis, internet intervention

Introduction

Postpartum depression is a postpartum mental disorder that occurs within 12 weeks of pregnancy and is a common mental syndrome during pregnancy and childbirth.[1] This disease is characterized by mental depression and low mood that appear after pregnancy. These common abnormal psychological behaviors (e.g., depression and anxiety) are extremely harmful to physical and mental health. Severe cases affect the infant's personality, cognitive abilities, emotions, and behaviors and cause a serious sense of crisis in the patient's family and people other than their family members.[2] Physiological factors mainly include physical, endocrine, and genetic factors. Studies have shown that after pregnancy and childbirth, hormone levels in the mother's body change dramatically; this situation is considered to be the physiological basis for postpartum depression.[3] Postmenopausal women have low progesterone and estrogen indices and do not experience cyclic changes. Therefore, scientists theorize that cyclical changes in estrogen may explain the above differences in depression prevalence.[4]

An analysis of the causative factors of psychological factors has revealed that most scholars believe that maternal personality, self-esteem, introversion, perfectionism, excessive expectations, and emotional instability are likely to cause adverse emotions.[5] This group of people is prone to adverse psychological symptoms, such as anxiety, tension, and depression, that

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can lead to a series of physiological and pathological reactions, such as prolonged labor, increased bleeding and assisted delivery rates, postpartum depression, and decreased milk secretion.[6] Given that the current situation of home rehabilitation for patients with postpartum depression is pessimistic, the treatment of postpartum depression requires not only drugs but also comprehensive and thoughtful overall care. Continuing care is an extension of a patient's care from hospital to home and is an integral part of overall care. Research.[7] believes that continuous care can enable discharged patients to receive continuous nursing intervention during the recovery period after hospitalization, promote their physical recovery and maintain their mental health.

With the progress of society, the limitations of traditional medical methods have become increasingly discernible, and our country is facing a rapid increase in chronic diseases, the uneven distribution of medical resources and the shortage of nursing resources.[8] Therefore, telemedicine, which integrates various information technologies and medical technologies, emerged at the times required. Telemedicine relies on computer technology, remote sensing, telemetry, and remote control technology. Services include telemedicine consultation, telemedicine education, remote bed monitoring, and telemedicine information services. Telemedicine is gaining increasing attention in the nursing field and is an effective form of continuation of care.[9] The "National Nursing Development Plan (2016–2020)" points out the direction for nursing development.[10] Therefore, using remote nursing to intervene with patients after discharge is a requirement of the current era. However, relevant domestic clinical reports on the effect of at-home remote nursing intervention on the physical and mental condition of patients with postpartum depression were scarce. This study used meta-analysis to evaluate the effects of nurse-led home-based telenursing intervention on the physical and mental conditions of patients with postpartum depression. This work aims to improve the physical and mental conditions and quality of life of patients with postpartum depression. It also aims to promote disease recovery and provide a basis for remote nursing.

Material and Methods

Inclusion and Exclusion Criteria for Literature

Inclusion Criteria: (a) Research subjects: age ≥ 18 years, met the diagnostic criteria for a depressive mental disorder, or met the diagnostic criteria of the depression rating scale and voluntarily participated in the study. (b) Intervention measures: The experimental group received nurse-led telepsychological intervention, and the control group received routine nursing. (c) The study is a randomized controlled trial (RCT). d) Outcome indicators: depression score and unlimited depression assessment scale type. (d) Taking antidepressant medication within 3 months before the start of the study.

Exclusion Criteria: (a) Research wherein the experimental group was treated with 2 or more psychological intervention methods in combination. (b) Research for which the full text cannot be obtained. (c) Research wherein the design was unreasonable, information was incomplete, or data were unavailable. (d) The article was published repeatedly or had duplicate data.

Literature Search Strategy

Computer searches were conducted on PubMed, Embase, CINAHL, Web of Science, the Cochrane Library, Chinese Biomedical Literature Database China National Knowledge Infrastructure, Wanfang Database, and China VIP Database. The search time limit was from the establishment of the database to December 2023. The search terms were "WeChat/internet/mobile phone/telepsychological/psychotherapy/psychoeducation/psychotherapy/cognitive behavioural therapy/cognitive behavioural therapy/cognitive therapy/mindfulness training/mindfulness therapy/mindfulness cognitive therapy/interpersonal psychology/behavioural activation/music therapy; postpartum depression/postpartum depression; randomized/randomized trial". We used subject words, free words and Boolean logical operators to search jointly and conducted a second expanded search to ensure the comprehensiveness of the search. And the search expression was "internet AND nurse-led OR mobile phone AND nurse-led OR telepsychological AND nurse-led OR psychoeducation AND nurse-led OR cognitive behavioral therapy AND nurse-led OR cognitive therapy AND nurse-led OR interpersonal psychology AND nurse-led OR behavioral activation AND nurse-led OR music therapy AND nurse-led; postpartum depression OR postpartum depression." In addition, the references of the involved articles were manually searched. Unpublished academic literature and monograph chapters were also searched to include unindexed literature.

Literature Screening and Data Extraction

Two researchers reviewed each eligible article in accordance with the exclusion and inclusion criteria of literature screening, obtained data and conducted quality assessment and cross-checking. The following pieces of information were extracted: title, authors, publication year, study design, subject number, intervention for each group, intervention duration, assessment tools, outcome indicators and study quality. Two reviewers performed screening on the basis of the inclusion criteria, and any disagreements were resolved through discussion between the 2 reviewers. When necessary, a third party intervened and expert opinions were solicited. A unified form was used for data extraction.

Literature Quality Assessment

The quality of the included literature was assessed by using Cochrane's risk of bias assessment tool in RevMan5.4 software (The Nordic Cochrane Centre, Copenhagen, Denmark). The evaluation included random sequence generation, allocation concealment, blinding, data integrity, selective reporting and other bias sources. We judged the quality of the literature on the basis of the above criteria. If the included study fully met the above criteria, the possibility of bias in its results is minimal and its quality grade is A. If it partially met

MAIN POINTS

- *Telepsychological intervention improved the convenience of depression-related health services for pregnant women.*
- *Telepsychological intervention was the main way to prevent and treat postpartum depression and improve the treatment participation rate of patients with postpartum depression.*
- *Telepsychological intervention for postpartum depression can effectively improve postpartum depression*

the above criteria, its possibility of bias is moderate and its quality grade is B. Complete failure to meet the criteria resulted in the highest likelihood of bias and a quality grade of C. Additionally, assessments were expressed as low, high, or unclear risk on the basis of the methodological description of each study.

Statistical Anaysis

RevMan5.4 software (The Nordic Cochrane Centre, Copenhagen, Denmark) software was used for statistical analysis. Evaluation indicators were presented by using weighted mean difference and 95% CI. χ^2 test and corresponding methods were applied to analyze the heterogeneity of the included research data. Differences were statistically significant if P value < .05 and not statistically significant otherwise. I^2 was used to represent heterogeneity. I^2 > 50% indicates the presence of statistical heterogeneity between studies, and a random effects model was used for analysis. I^2 < 50% represents the absence of statistical heterogeneity between studies. In the presence of heterogeneity, subgroup, and sensitivity analyses were used to explore the source of heterogeneity.

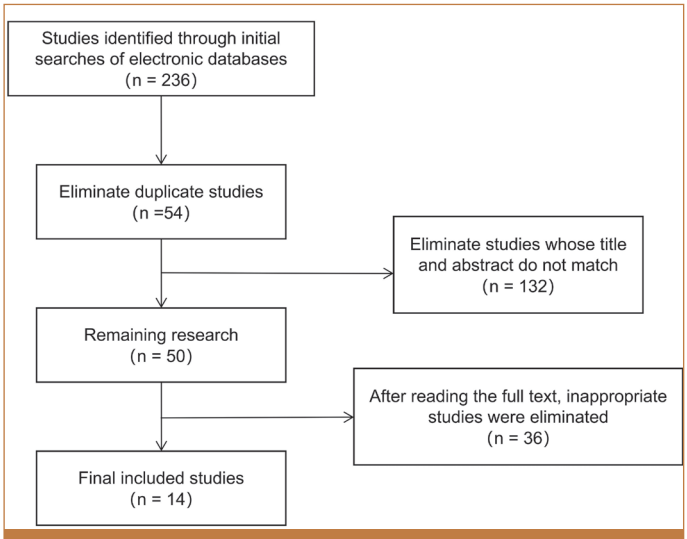

Figure 1. Flowchart of literature screening.

Results

Literature search results

After the initial inspection, 236 relevant articles were obtained, 54 duplicates were eliminated, 132 articles were eliminated by reading the titles and abstracts, 36 reports were eliminated after further reading the full text and 14 documents were finally included. Literature screening is illustrated in Figure 1.

Basic Characteristics of the Included Studies

A total of 14 studies were included. They involved 1765 patients from 9 countries: China, the UK, Australia, Iran, Singapore, the United States, the Netherlands, Canada, and Portugal. Three studies used the Beck Depression Inventory (BDI) to evaluate efficacy; 10 studies used the Edinburgh Postnatal Depression Scale (EPDS) to evaluate efficacy; and 1 study used the Health Questionnaire Depressive Symptoms Scale (PHQ-9) to evaluate efficacy. The basic characteristics of the included studies are shown in Table 1.

Results of literature quality assessment

Of the 14 included articles, 2 were grade A in quality and the remaining were grade B in quality. Twelve articles reported specific methods for generating random sequences. These methods mainly included computer randomization, block randomization and random number table. Eight articles clearly stated allocation concealment, and 6 articles used blinding. All literature outcome data are complete. The evaluation of specific risk bias is shown in Figures 2 and 3.

Analysis of the Effect of Remote Psychological Intervention on Improving Depression

The results of meta-analysis used the random effects model revealed the presence of large heterogeneity (I^2 = 88%, P < .01). Given the inconsistency of the treatment courses and assessment times for postpartum depression intervention in various research networks, Standard Mean Difference (SMD) was used to combine effect sizes. The results revealed a statistically significant difference between the experimental group (telepsychological intervention

Table 1. General Data Characteristics of the Included Literature

		Sample Size (Cases)		Interventions			
Included literature	Nation	Control Group	Experimental Group	Control Group	Experimental Group	Intervention Time	Evaluation Tools
Hua et al. 2018[11]	China	52	90	Conventional care	Telecare	–	(b)
Yan 2012[12]	China	89	90	Conventional care	Telecare	18 weeks	(b)
Dennis et al. 2020[13]	Canada	100	104	Conventional care	Telecare	12 weeks	(b)
Duffecy et al. 2019[14]	United States	7	17	Conventional care	Telecare	8 weeks	(c)
Heller et al. 2020[15]	Netherlands	80	79	Conventional care	Telecare	5 weeks	(b)
Fonseca et al. 2020[16]	Portugal	82	65	Conventional care	Telecare	–	(b)
O'Mahen et al. 2014[17]	UK	42	41	Conventional care	Telecare	15 weeks	(b)
Jiao et al. 2019[18]	Singapore	68	68	Conventional care	Telecare	4 weeks	(b)
O'Mahen et al. 2013[19]	UK	25	30	Conventional care	Telecare	11 weeks	(a)
Milgrom et al. 2016[20]	Australia	22	21	Conventional care	Telecare	6 weeks	(a)
Loughnan et al. 2019[21]	Australia	42	37	Conventional care	Telecare	6 weeks	(b)
Jannati et al. 2020[22]	Iran	37	38	Conventional care	Telecare	8 weeks	(b)
Van Lieshout et al. 2021[23]	Canada	201	202	Conventional care	Telecare	12 weeks	(b)
Milgrom et al. 2021[24]	Australia	38	39	Conventional care	Telecare	9 weeks	(a)

(a) Beck Depression Inventory (BDI); (b) Edinburgh Postpartum Depression Scale (EPDS); (c) Patient Health Questionnaire-9 (PHQ-9).

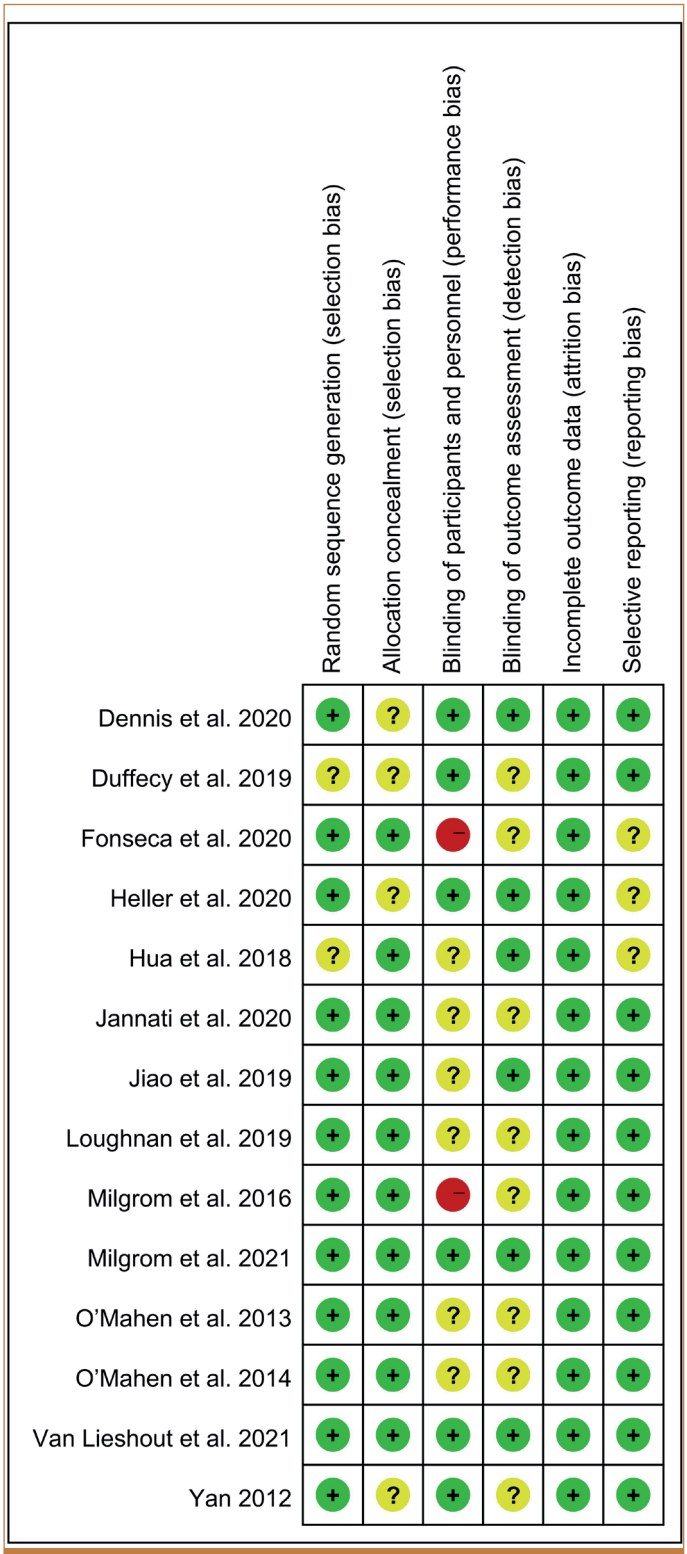

Figure 2. Risk of bias assessment.

treatment group) and the control group (routine nursing treatment group) in the treatment of postpartum depression. The improvement in depression in the experimental group was better than that in the control group (SMD = −0.60, 95% CI [−0.91, −0.29], $P < .01$]) (Figure 4).

Subgroup Analysis of Different Evaluation Indicators

Beck Depression Inventory Subgroup Analysis: We grouped the included literature in accordance with evaluation tools and divided them into the BDI group (3 articles) and the EPDS group (10 articles) to identify the source of heterogeneity in the meta-analysis. We excluded 1 study from the analysis because it used the PHQ-9 assessment tool. The analysis results of the BDI group (Figure 5) showed that 3 studies lacked heterogeneity ($I^2 = 0.0\%$, $P = .77$) and were not the source of heterogeneity in the meta-analysis.

Edinburgh Postpartum Depression Scale Subgroup Analysis

A subgroup analysis was performed on 10 studies in the EPDS group. The results showed that some of these studies were sources of heterogeneity in the meta-analysis and the difference between groups was statistically significant ($I^2 = 89.1\%$, $P < .01$) (Figure 6). Therefore, we performed sensitivity analysis by excluding studies one by one. The results of the subgroup analysis showed (Figure 7) that the heterogeneity was 0.0% ($P = .55$) after excluding 3 studies.[18,21,22] This finding signified that these 3 studies were the source of heterogeneity in the meta-analysis.

Discussion

Inclusion in Literature Quality Analysis

The 14 studies included in this study were all RCTs. The Cochrane Risk of Bias assessment tool was used to evaluate their literature quality. The evaluation results showed that items with a high risk of bias focused on 'whether the researchers and subjects were blinded' and 'whether the result evaluators were blinded'. However, due to the nature of the study, blinding the subjects was difficult. Given that the intervention measures in the experimental group were telepsychological nursing intervention and those in the control group were routine care, the possibility of mutual influence between the 2 was considered small. In addition, the outcome indicators were measured by using objective measurement methods. Therefore, the lack of blinding was believed to have little effect on bias in the results. The included literature differed in terms of assessment time and tools. This difference accounted for the source of heterogeneity.

Model and Function of Nurse-led Telepsychological Intervention

The types of network technical support included in the studies on postpartum depression–based intervention methods were mainly websites, followed by telephone and email. Service terminals were mainly computers and mobile phones. Intervention content was mainly psychological support therapy and presented in various forms, such as audio, video, and pictures. The application of the above technologies improved the convenience of depression-related health services for pregnant women and enabled pregnant women to freely arrange their study time, thus enabling them to make full use of their fragmented time for healthy learning and learn repeatedly. Remote psychological intervention has a certain degree of concealment that can increase the participation rate in postpartum depression treatment. In addition, technicians can perform tracking through background data management to improve follow-up rates and service quality.

Remote Psychological Intervention can Reduce Postpartum Depression in Pregnant Women

Postpartum depression, one of the most common mental disorders in women, is extremely harmful to mothers and their babies.

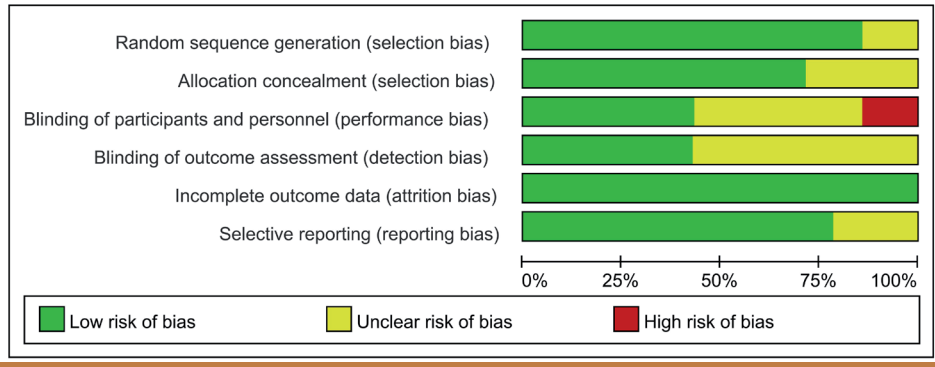

Figure 3. Chart of the risk of bias assessment results of the included studies.

Study	Experimental Total	Experimental Mean	Experimental SD	Control Total	Control Mean	Control SD	SMD	95%-CI	Weight (common)	Weight (random)
Hua et al. 2018	90	8.28	1.8150	52	9.08	1.9780	-0.42	[-0.77; -0.08]	8.0%	7.6%
Yan 2012	90	6.20	3.7100	89	7.30	4.1200	-0.28	[-0.57; 0.01]	11.0%	7.8%
Dennis et al. 2020	104	5.61	3.3300	100	6.87	3.9700	-0.34	[-0.62; -0.07]	12.4%	7.9%
Duffecy et al. 2019	17	5.80	4.3000	7	4.40	3.7000	0.33	[-0.56; 1.21]	1.2%	5.0%
Heller et al. 2020	79	8.00	5.2000	80	8.70	5.9000	-0.13	[-0.44; 0.19]	9.8%	7.8%
Fonseca et al. 2020	65	6.91	3.6300	82	6.87	3.7100	0.01	[-0.31; 0.34]	9.0%	7.7%
O'Mahen et al. 2014	37	11.05	4.7100	34	14.26	5.1100	-0.65	[-1.13; -0.17]	4.2%	7.0%
Jiao et al. 2019	56	2.51	9.0100	60	5.14	10.5500	-0.27	[-0.63; 0.10]	7.1%	7.5%
O'Mahen et al. 2013	30	10.94	5.5700	25	14.28	6.6300	-0.54	[-1.08; -0.00]	3.2%	6.7%
Milgrom et al. 2016	21	14.50	12.2000	22	23.00	7.5000	-0.83	[-1.45; -0.20]	2.4%	6.3%
Loughnan et al. 2019	32	20.02	5.4500	38	22.98	5.7400	-0.52	[-1.00; -0.04]	4.1%	7.0%
Jannati et al. 2020	38	3.60	3.2000	37	13.20	5.8000	-2.04	[-2.60; -1.47]	3.0%	6.6%
Van Lieshout et al. 2021	202	6.90	4.1000	201	13.70	6.5000	-1.25	[-1.46; -1.04]	20.8%	8.1%
Milgrom et al. 2021	39	6.04	3.0400	38	10.37	2.8600	-1.45	[-1.96; -0.95]	3.7%	6.9%
Common effect model	**900**			**865**			**-0.60**	**[-0.69; -0.50]**	**100.0%**	**--**
Random effects model							**-0.60**	**[-0.91; -0.29]**	**--**	**100.0%**

Heterogeneity: I^2 = 88%, τ^2 = 0.2939, p < 0.01

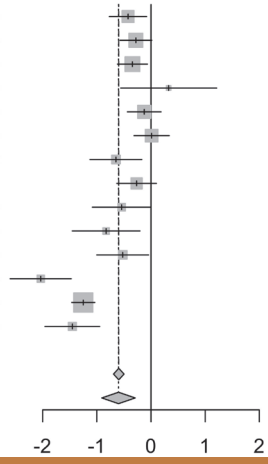

Figure 4. Forest plot of the effect of online intervention on postpartum depression. SD, Standard Deviation; SMD, Standard Mean Difference.

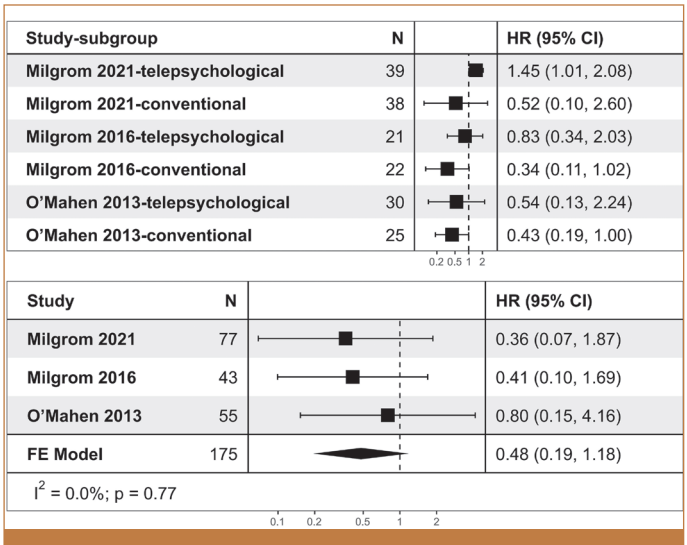

Figure 5. Results of BDI subgroup analysis. HR, Hazard Rate.

Postpartum depression prevention focuses on regular screening and early detection and treatment. Postpartum depression treatment is mainly divided into drug and psychological interventions. Research has found that psychological disparity is the main reason women suffer from postpartum depression.[25] Considering that drugs have a certain effect on breastfeeding women, psychological intervention is the main way to prevent and treat postpartum depression. The effectiveness of psychological interventions, such as cognitive behavioral therapy, mindfulness therapy, and psychoeducation, in treating postpartum depression has been confirmed. However, some studies have shown that less than 10% of patients with postpartum depression receive adequate treatment.[26] This situation may be related to factors, such as an insufficient understanding of postpartum depression by pregnant women, time constraints, and inconvenient transportation.[27,28] Telepsychological intervention uses network technology (such as establishing a network platform) to provide information support (such as maternal and infant health care information), emotional support, online consultation guidance and self-evaluation during pregnancy and the postpartum period to prevent and treat postpartum depression. In contrast to traditional face-to-face intervention methods, remote psychological intervention mainly uses audio or video as a medium to disseminate intervention content, making the intervention content vivid, specific and easy to understand. Moreover, because telepsychological intervention has a certain degree of concealment, it can provide a new treatment option to pregnant women who are unwilling to receive face-to-face

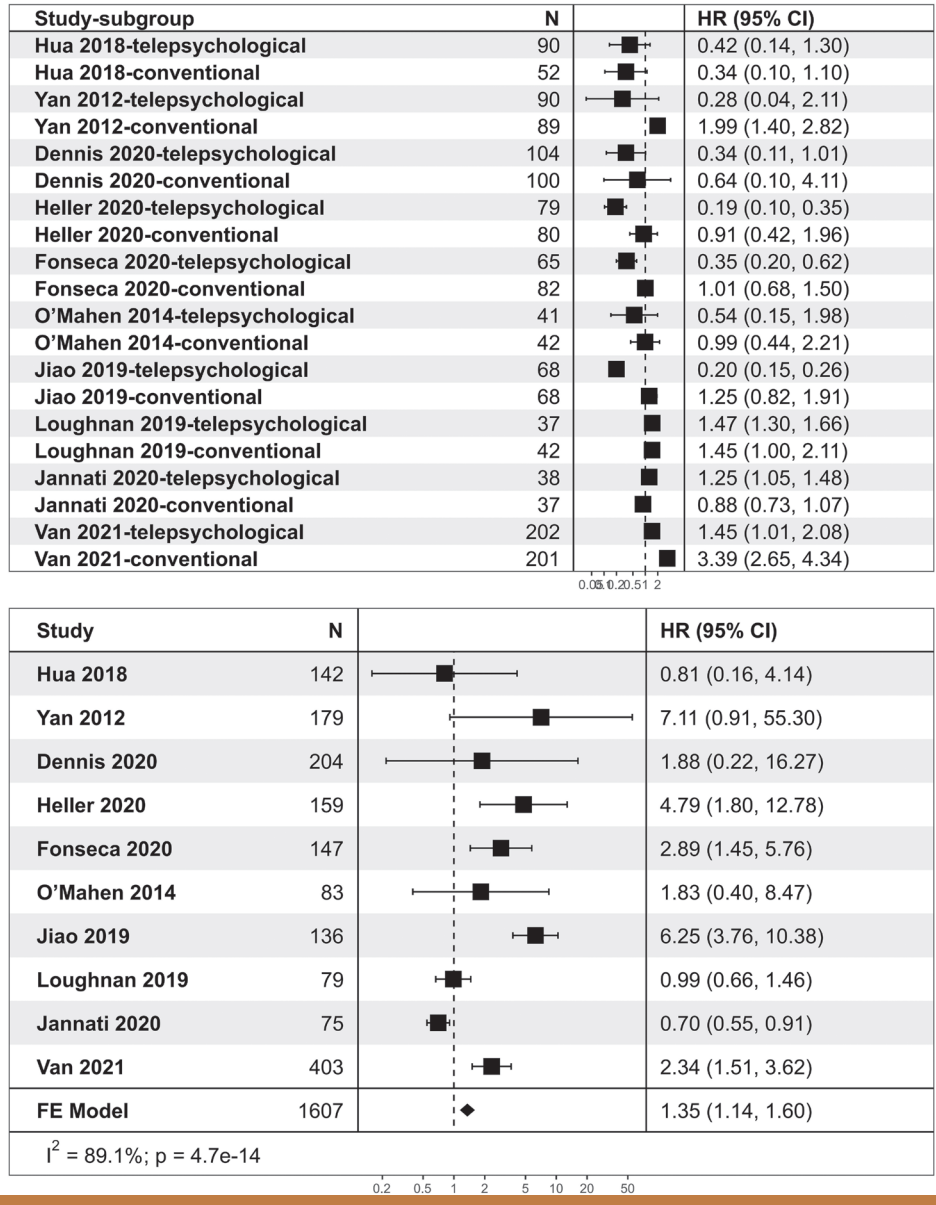

Figure 6. Results of Edinburgh Postpartum Depression Scale subgroup analysis.

treatment due to stigma and increase the treatment participation rate of people with postpartum depression.

Although the prevention and treatment of postpartum depression are mainly conducted face-to-face and interventions based on remote psychological intervention are uncommon, the effectiveness, feasibility, and acceptability of remote psychological intervention have been confirmed.[29,20] The development of China's Internet technology and popularity of smartphones provide technical support for remote psychological intervention for postpartum depression. Therefore, Chinese researchers can further develop a telepsychological intervention platform suitable for pregnant women in China based on the results of foreign telepsychological intervention research. At the same time, remote psychological intervention is unrestricted by time and space. This characteristic expands the scope of services, thereby benefiting additional pregnant women. In addition, remote psychological intervention can promptly update, customize and adjust intervention content by the opinions of the target population, maximizing the applicability of intervention measures.

Study Limitations

Firstly, the included articles, except for 2 studies with grade A quality, were of grade B quality. Some did not mention blinding and allocation concealment. This situation may lead to implementation and measurement biases. The conclusion of this work still needs further verification through high-quality RCTs due to the low methodological quality of the included studies. Secondly, some of the included original studies on psychological intervention were limited in number. For example, 1 study used the PHQ-9 as the evaluation tool, and the included studies had a small sample size may lead to low test efficiency. Moreover, the intervention time and evaluation scales of the included studies differed. Although the included research subjects were all patients with postpartum depression, different countries, regions and hospitals have different medical levels and intervention

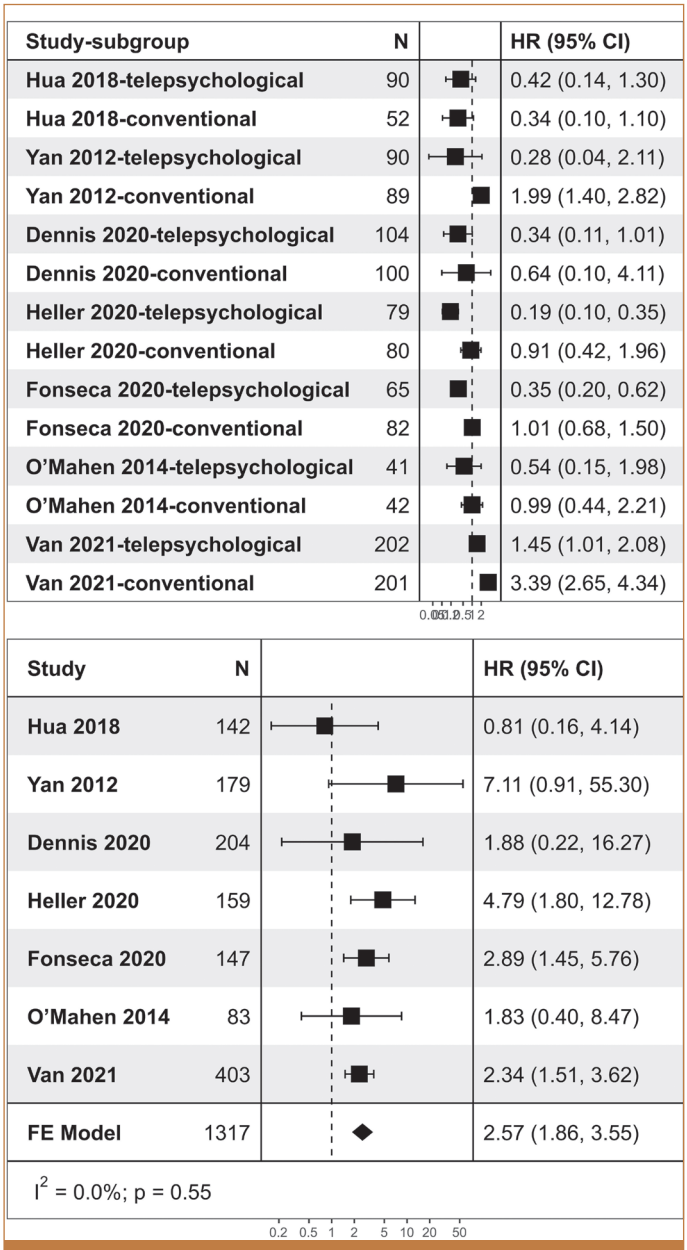

Figure 7. Results of Edinburgh Postpartum Depression Scale subgroup analysis after excluding 3 studies.

plans, this variation leads to heterogeneity in the results. However, we eliminated 3 studies and conducted subgroup analysis and found that the heterogeneity was reduced, thereby improving the reliability of the meta-analysis results for each group. In addition, due to certain differences between studies, this study also lacks the characteristics of the included studies and the characteristics of telemedicine interventions. It is recommended that future researchers conduct RCT studies with higher quality, larger samples, and longer follow-up times to improve the objectivity and authenticity of the conclusions.

Conclusion

Telepsychological intervention–based methods for postpartum depression could effectively improve postpartum depression. The accessibility and convenience of the Internet confer postpartum telepsychological intervention methods with a certain clinical application value.

Peer-review: *Externally peer-reviewed.*

Author Contributions: *Concept – T.L., Z.Z.; Design – Y.L., Z.Z., J.L.; Supervision – T.L., W.X.; Resources – Y.Z., Q.J.; Materials – Z.Z., Y.L.; Data Collection and/or Processing – Y.L., Z.Z., L.Z.; Analysis and/or Interpretation – T.L., Q.J.; Literature Search – W.X., Y.Z.; Writing – Y.L., Z.Z., L.Z.; Critical Review – Z.Z.,Y.L.*

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Supplementary Material

Search formulas for CINAHL, Web of Science, and The Cochrane Library: 'WeChat/internet/mobile phone/telepsychological/psychotherapy/psychoeducation/psychotherapy/cognitive behavioural therapy/cognitive behavioural therapy/cognitive therapy/mindfulness training/mindfulness therapy/mindfulness cognitive therapy/interpersonal psychology/behavioural activation/music therapy; postpartum depression / postpartum depression; randomized/randomized trial.'

Search formulas for Embase (Emtree terms): "internet AND nurse-led OR mobile phone AND nurse-led OR telepsychological AND nurse-led OR psychoeducation AND nurse-led OR cognitive behavioral therapy AND nurse-led OR cognitive therapy AND nurse-led OR interpersonal psychology AND nurse-led OR behavioral activation AND nurse-led OR music therapy AND nurse-led; postpartum depression OR postpartum depression".

Search formulas for PubMed (MeSH terms): "internet, nurse-led," "mobile phone," "telepsychological/psychoeducation and nurse-led," "cognitive behavioral therapy / cognitive therapy," "nurse-led/interpersonal psychology," "nurse-led / behavioral activation," "nurse-led/music therapy" "postpartum depression/psychoeducation and nurse-led."

Search formulas for Chinese Biomedical Literature Database China National Knowledge Infrastructure, Wanfang Database and China VIP Database: "SU=internet + mobile phone + telepsychological and FT=psychoeducation + cognitive behavioral therapy + interpersonal psychology + cognitive therapy + music therapy + behavioral activation"