Psychosocial interventions on perinatal depression in China: A systematic review and meta-analysis

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*Keywords:*

Perinatal depression China

Psychosocial interventions Systematic review and meta-analysis

A B S T R A C T

*Background:* The prevalence of perinatal depression is 16.3% in China and has shown a rising trend in the last decade. However, few studies summarized psychosocial interventions for perinatal depression in this country. This study aimed at evaluating and characterizing psychosocial interventions for perinatal depression in Mainland China.

*Methods:* Ten major English and Chinese language electronic bibliographic databases were searched for RCTs examining the effect of psychosocial interventions for perinatal depressed women in Mainland China. Studies meeting eligibility criteria and published before 25th February 2019 were included, while those focusing on a very specific sub-population or reporting non-psychosocial interventions were excluded. Data was extracted by a standard form. Meta-analysis was conducted to obtain a summary measure of the effectiveness of the inter- ventions in reducing perinatal depressive symptoms. The theoretical underpinnings and implementation pro- cesses of the interventions were also characterised.

*Results:* A total of 6857 articles were identified in the initial database searching, of which, 26 studies were eligible for data analysis, representing a sample size of 4673. Meta-analysis indicated that psychosocial inter- ventions in China significantly reduced perinatal depressive symptoms (standard difference in means 0.81, 95% confidence intervals -1.03 to -0.58, *P* < 0.001). However, the overall evidence presented substantial hetero- geneity (I2 = 91.12%). Most interventions were implemented in hospitals in urban areas by non-specialist health care providers. Few studies reported details of implementation procedures or scale-up strategies.

*Limitations:* The evidence in this review is of moderate to low quality and therefore, should be interpreted with caution. Some of the trials were inadequately powered and tended to overestimate effect sizes.

*Conclusions:* Current psychosocial interventions in China are somewhat effective in reducing perinatal depres- sive symptoms. High quality RCTs on scale-up interventions are required, especially in rural areas.

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# Introduction

Perinatal depression is typically defined as major or mild depressive episodes, which occurs during pregnancy or within 12 months after delivery ([Gynecologists, 2018](#_bookmark40)). Associated with a number of cultural, social and economic stressors, pregnancy and the postpartum period put women at a greater risk of depressive disorder ([Biaggi](#_bookmark31) *[et al.](#_bookmark31)*[, 2016](#_bookmark31)).

The prevalence of perinatal depression has been estimated at between 10% to 15% in High-Income Countries (HIC) and 19–25% in Low- and Middle Income countries (LMIC) ([Gelaye](#_bookmark38) *[et al.](#_bookmark38)*[, 2016](#_bookmark38); [Woody *et al.*,](#_bookmark67) [2017](#_bookmark67)).

Untreated perinatal depression is reported to be associated with various adverse health outcomes for the mothers, including poor nu- trition, substance misuse, increased obstetric complications and suicide

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([Bauer *et al.*, 2016](#_bookmark29); [Evans *et al.*, 2001](#_bookmark35)). It has also been linked with impaired health of infants, including poor physical and mental devel- opment and increased risk for later common mental disorders in the off spring ([Gelaye](#_bookmark38) *[et al.](#_bookmark38)*[, 2016](#_bookmark38); [Herba *et al.*, 2016](#_bookmark41); [Weissman *et al.*, 2006](#_bookmark66)). Besides, perinatal depression causes a significant medical cost to the family and society. It is estimated that the total lifetime costs of peri- natal depression in UK were £75,728 per woman, aggregating to £6.6 billion ([Bauer *et al.*, 2016](#_bookmark29)).

China, the world's most populous country, has seen remarkable improvement in maternal and infant health indicators in recent decades ([Ministry of Foreign Affairs, P. R. C. July, 2015](#_bookmark57)). In contrast, the pre- valence of perinatal depression remains high (15–18%) and has in- creased during the last decades ([Nisar *et al.*, 2019](#_bookmark61)). The high prevalence of perinatal depression indicates an urgent need for interventions in China, particularly psychosocial interventions that are acceptable, feasible and affordable ([Richter *et al.*, 2017](#_bookmark63)). There has been some re- search exploring the management of perinatal depression in China. However, to our knowledge, there are no systematic reviews and meta- analyses providing a synthesis of psychological and psychosocial in- terventions in mainland China. This report aims to quantize evidence pertaining to effectiveness of psychological and psychosocial interven- tions for perinatal depression in China. In addition, we also want to summarize and critically evaluate the theoretical underpinnings of these interventions and their implementation processes.

# Methods

We documented the research process following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

* 1. *Search strategy and selection criteria*

A bilingual team of two researchers systematically searched the following ten English and Chinese language electronic bibliographic databases: Medline, EMBASE, Scopus, CINAHL, PsycINFO, Web of Science, Cochrane Central Register, the China National Knowledge Infrastructure, the VIP Database for Chinese Technical Periodicals, and the Wan Fang Database for Chinese Periodicals, using a pretested search strategy (Appendix [Table A1](#_bookmark17)). There was no restriction of publication date and all the studies available from the inception of the databases till 25th February, 2019 were incorporated. The inclusion criteria are as follows:

Participants: Studies focused on pregnant women or women within 12 months after delivery in Mainland China.

Intervention: Studies examining the effect of psychosocial inter- ventions on perinatal depression, either prevention or treatment. Control: Routine care or blank control.

Outcomes: Measurement and reporting of perinatal depression scores using a validated self-report scale (e.g., EPDS, SDS, PHQ-9) or clinician-administered measure.

Study design: Studies with randomized controlled trials (RCTs) or cluster RCTs design were included.

The exclusion criteria are: Studies with participants from a very specific sub-population (e.g., people with a specific disease or con- dition or epidemiological character); Studies with insufficient out- come data for meta-analysis. The protocol of this review can be found at <https://www.crd.york.ac.uk/prospero/#record> (CRD42018115934).

Duplicate articles were identified using EndNote, and the papers with more complete data were included for repeat publications. Two investigators worked independently screening the titles and abstracts for inclusion, followed by the full-text screening. Manual searching of the bibliography of all included articles was conducted lastly.

Consensus on papers to be included was reached after discussion and a third researcher was involved when necessary.

* 1. *Data extraction*

Two independent reviewers extracted the following information with a standard form based on Cochrane handbook: (1)General in- formation including study design, sample characteristics, geographical setting, details of intervention, type and training of delivery agent, outcome measures; (2)Data for meta-analysis including sample size, primary outcome, effect size; (3)Therapeutic techniques used in the intervention. Risk of bias of individual research was evaluated by two reviewers according to Cochrane risk of bias tool. Differences in data extraction and risk of bias were resolved by discussion between the reviewers and the principle author.

Besides the above information, the psychosocial interventions were thoroughly audited to identify the broader elements and techniques employed in them. For the phase of data extraction, taxonomy of ele- ments of psychosocial interventions employed in common mental pro- blems was adopted after discussion with two psychologists ([Singla *et al.*,](#_bookmark64) [2017](#_bookmark64)). The finalized taxonomy included 58 most commonly utilized treatment elements that could be treatment specific or nonspecific. Definitions of therapeutic elements employed in psychosocial inter- ventions are summarized in Appendix [Table A2](#_bookmark18).

* 1. *Meta-analyses*

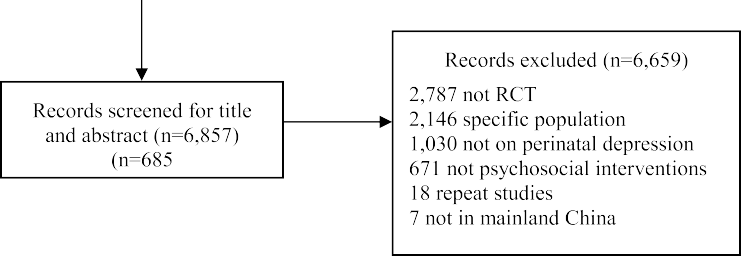
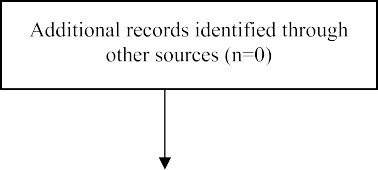
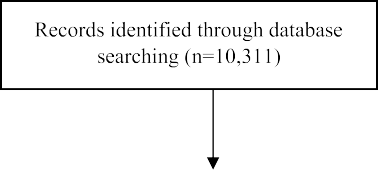
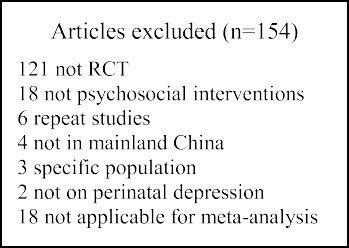
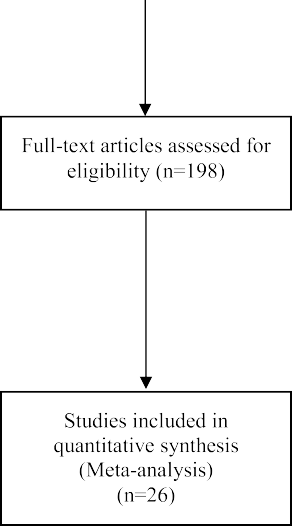
The effect sizes of individual study were listed by standard differ- ence in means and 95% confidence intervals (95% CIs) in a forest plot. A fixed-effect model was used if no statistical difference in hetero- geneity was found; otherwise, a random-effect model was adopted. The statistical heterogeneity was quantified by the I2 statistic and formally tested by Cochrane's Q statistic. Publication bias was visually judged by the symmetry of a funnel plot and the result of Egger's linear regression test. Post-hoc sensitivity analyses were performed (using leave-one-out analysis) to test the impact of exclusion of a single trial with a dis- proportionately large effect. Subgroup analyses were used to explore the sources of heterogeneity according to quality of the study, scale, theoretical orientation, specificity, scope of intervention and elements of interventions. Studies with two or less items ranked as high risk were classified as high quality, otherwise were classified as low quality ([Naveed, S. et al, 2019](#_bookmark58)). Scope of intervention was classified as treat- ment and prevention. Reference to justify perinatal depression had to be defined according to a diagnostic interview based on clinical criteria (CCMD-3, DSM-5 or ICD-10), or as a score above a cut-off on a self- rating depression scale (PHQ-9, SDS, HAMD, et al). Studies focusing on perinatal depressed mothers with a clear diagnosis of “perinatal de- pression” (based on ICD-10, CCMD-3 or DSM-5) was classified as “treatment”. Studies focusing on high risk mothers or mothers without perinatal depression (identified by screening with a validated scale, e.g., EPDS, SDS, PHQ-9, HAMD) was classified as “prevention”. Studies focusing on all mothers (without diagnosis or screening for perinatal depression) was classified as others. Statistical significance was set at P value < 0.05 (two-tailed test). All the analyses were carried out by the Comprehensive meta-analysis software (version 3, BIOSTATS, 2014).

# Results

A total of 10,311 articles were found through database searching and 3454 duplications were removed. After title and abstract screening, 198 articles were identified eligible for full text screen, and 26 studies were finally included in the data analysis. Study selection process is illustrated as a PRISMA flowchart in [Fig. 1](#_bookmark9).

A total of 26 trials of psychosocial interventions representing a sample size of 4673 perinatal women were included. The age of peri- natal women included in the studies ranged from 17 to 45 years old

**Fig. 1.** Study selection process for psychosocial interventions of perinatal depression in women in China.



(29.37 ± 1.87). For the study design, 25 studies ([Cheng *et al.*, 2016](#_bookmark32); [Dou, 2018](#_bookmark34); [Gao *et al.*, 2010](#_bookmark36); [Gao *et al.*, 2015](#_bookmark37); [Guan *et al.*, 2015](#_bookmark39); [Ho *et al.*,](#_bookmark42) [2009](#_bookmark42); [Huang *et al.*, 2015](#_bookmark43); [Jia *et al.*, 2017](#_bookmark44); [Jiang *et al.*, 2014](#_bookmark45); [Leung *et al.*,](#_bookmark47) [2016](#_bookmark47); [Leung and Lam, 2012](#_bookmark48); [Li, 2018](#_bookmark49); [Liu *et al.*, 2012](#_bookmark51); [Liu *et al.*, 2018](#_bookmark53); [Lu and Fan, 2017](#_bookmark54); [Lu *et al.*, 2016](#_bookmark55); [Mao *et al.*, 2012](#_bookmark56); [Ngai *et al.*, 2015](#_bookmark60); [Sun](#_bookmark65) [*et al.*, 2011](#_bookmark65); [Wu, 2018](#_bookmark68); [Wu, 2017](#_bookmark69); [Yang *et al.*, 2019](#_bookmark70); [Zhang *et al.*, 2018](#_bookmark71); [Zhang *et al.*, 2016](#_bookmark72); [Zhao, 2018](#_bookmark73)) were RCTs and one ([Ngai *et al.*, 2009](#_bookmark59)) reported cluster RCT. Nineteen studies focused on postnatal depression, three on prenatal depression and two on both prenatal and postnatal depression. The most commonly used psychometric scales for assess- ment of perinatal depression were the Edinburgh Postnatal Depression Scale (14 studies), followed by Zung Self-Rating Depression Scale (six studies), Hamilton depression scale (three studies) and Patient Health Questionnaire-9 (three studies). The primary time point of outcome assessment varied from after intervention to four-month post inter- vention, with ten studies reported follow-up data. Details can be found in [Table 1](#_bookmark10) and Appendix [Table A3](#_bookmark19).

Regarding to the intervention delivery, 22 studies were conducted in

urban areas, two in semi-urban areas, and two did not indicate the re- search region. All studies delivered the interventions in hospitals or health care centers. The interventions were mostly provided by non-specialist health care workers, with six by nurses, four by midwives, and eight by multidiscipline health care workers (seven studies did not report the

delivery agent). As for the type of interventions, 17 studies focused on preventive interventions while the rest on treatment. The duration of overall intervention program varied from one day to eight weeks. Nineteen out of the 26 studies had more than one intervention sessions. Two studies delivered brief interventions-a one-session education pro- gram before discharge with a follow-up session ([Gao *et al.*, 2015](#_bookmark37); [Ho *et al.*,](#_bookmark42) [2009](#_bookmark42)). Five studies did not report detailed information regarding to the duration or the number of sessions of the whole program. The interven- tions were delivered in a variety of ways. The most commonly used format was face-to-face or group. Two studies delivered the intervention by talking with women on the telephone ([Cheng *et al.*, 2016](#_bookmark32)),([Ngai *et al.*,](#_bookmark60) [2015](#_bookmark60)). [Yang 2019](#_bookmark70) ([Yang *et al.*, 2019](#_bookmark70)) and [Zhao 2018](#_bookmark73) ([Zhao, 2018](#_bookmark73)) con- ducted the intervention on a popular Chinese smartphone APP named WeChat, with all sessions recorded and uploaded to the platform. Half of the studies integrated interventions into an existing health education program or routine care. With respect to the fidelity of implementation, only two studies ([Leung and Lam, 2012](#_bookmark48); [Ngai *et al.*, 2015](#_bookmark60)) reported de- tailed information regarding supervision of the intervention, with inter- vention sessions videotaped and reviewed ([Leung and Lam, 2012](#_bookmark48); [Ngai](#_bookmark60) [*et al.*, 2015](#_bookmark60)). Detailed information is listed in [Table 2](#_bookmark11).

The most commonly employed therapeutic approaches included

cognitive behavioral (CBT, seven studies), psychoeducation (PE, seven studies), interpersonal therapy (IPT, three studies), mindfulness (two

**Table 1**

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Summary of the included articles (*n* = 26).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Author, year | Study design | Theoretical basis | Sample size | Intervention | Delivery agent | Control | Outcome |
| [Dou, 2018](#_bookmark34) | Prevention RCT | CBT | 100 | Cognitive behavior treatment consisted of 30- min | NA | Routine care: antepartum health education | Postnatal depressive symptoms: 1, |
|  |  |  |  | sessions twice a week from inclusion until 6 weeks |  |  | 1.5, 3 and 6 months postpartum |
|  |  |  |  | postpartum. |  |  | using SDS |
| [Huang, 2015](#_bookmark43) | Prevention RCT | CBT | 186 | Emotional management based on CBT, delivered | Obstetrician | Routine prenatal care and education on nutrition | Postnatal depressive symptoms: |
|  |  |  |  | during pregnancy. | psychiatrist | and health knowledge during pregnancy; various | after intervention, 7 and 42 days |
|  |  |  |  |  |  | modes of delivery; breastfeeding benefits | postpartum using PHQ-9 |
| [Leung, 2016](#_bookmark47) | Treatment RCT | CBT | 164 | Six-session group intervention aimed to change | NA | A booklet that contained comprehensive | Postnatal depressive symptoms: 3 |
|  |  |  |  | cognitions and subsequently reinforce coping skills |  | information and education material about | and 6 months after intervention |
|  |  |  |  | to enhance psychological resources and responses, |  | perinatal depression and a list of community | using EPDS |
|  |  |  |  | delivered during postpartum. |  | resources |  |
| [Li, 2018](#_bookmark49) | Treatment RCT | CBT | 88 | Empathy in nursing, identifying the auto-thoughts, | Nurse | Routine nursing care | Postnatal depressive symptoms: |
|  |  |  |  | discuss the unhealthy thoughts, change the way of |  |  | after intervention using HAMD |
|  |  |  |  | thinking, assigning homework, delivered during |  |  |  |
|  |  |  |  | postpartum. |  |  |  |
| [Lu, 2017](#_bookmark54) | Treatment RCT | CBT | 88 | Acceptance and commitment therapy consisted of | Researcher, Nurse, | Routine care and education | Postnatal depressive symptoms: 6 |
|  |  |  |  | 90 min session per week for 6 weeks, delivered | Psychiatrist |  | weeks after intervention using |
|  |  |  |  | during postpartum. |  |  | HAMD-24 |
| [Mao, 2012](#_bookmark56) | Prevention RCT | CBT | 240 | Emotional self-manage group training program | Nurses | Standard antenatal education focusing on | Postnatal depressive symptoms: |
|  |  |  |  | consisted of four weekly group sessions and one |  | childbirth consisted of four 90-min sessions. | after intervention using EPDS and 6 |
|  |  |  |  | individual counseling session, delivered from 32 |  |  | weeks postpartum using PHQ-9 |
|  |  |  |  | weeks of pregnancy. |  |  |  |
| [Ngai, 2015](#_bookmark60) | Treatment RCT | CBT | 397 | Telephone-Based Cognitive-Behavioral Therapy | Midwives | 6-week postpartum follow-up at public hospitals | Postnatal depressive symptoms: 6 |
|  |  |  |  | involved 5-week telephone-administered CBT |  | and maternal and child health centers, | weeks and 6 months postpartum |
|  |  |  |  | delivered weekly from 1 to 5 weeks postpartum. |  | respectively. | using EPDS |
| [Ho, 2009](#_bookmark42) | Prevention RCT | Psychoeducation | 175 | A discharge education program: postpartum | Nurses | General postpartum education | Postnatal depressive symptoms: 6 |
|  |  |  |  | depression informational booklet plus discussion |  |  | weeks and 3 months postpartum |
|  |  |  |  | with primary care nurses on the second day after |  |  | using EPDS |
|  |  |  |  | delivery. |  |  |  |
| [Jia, 2017](#_bookmark44) | Treatment RCT | Psychoeducation | 94 | Recall positive feelings; build up positive thinking; | Nurse | Routine care: antepartum health education | Postnatal depressive symptoms: 3 |
|  |  |  |  | social support, delivered during postpartum. |  |  | days after intervention using EPDS |
| [Lu, 2016](#_bookmark55) | Treatment RCT | Psychoeducation | 78 | Health education on postpartum depression, exercise | Nurses Doctors | Routine care: answering the questions | Postnatal depressive symptoms: 8 |
|  |  |  |  | consisted of 60 min sessions for 8 weeks, delivered |  |  | weeks after intervention using |
|  |  |  |  | during postpartum |  |  | EPDS |
| [Sun, 2011](#_bookmark65) | Prevention RCT | Psychoeducation | 194 | Health education based on the principles of | Nurse | Routine care: antepartum health education | Postnatal depressive symptoms: 6 |
|  |  |  |  | interpersonal psychotherapy, consisted of two |  |  | weeks and 3 months postpartum |
|  |  |  |  | 90 min antenatal class during late pregnancy and |  |  | using EPDS |
|  |  |  |  | atelephone follow-up within two weeks after |  |  |  |
|  |  |  |  | delivery. |  |  |  |
| [Wu, 2017](#_bookmark69) | Treatment RCT | Psychoeducation | 110 | Follow up education on recovery, newborn nursing, | Doctors Nurses | Routine care: postpartum health education | Postnatal depressive symptoms: |
|  |  |  |  | and breastfeeding through telephone call, peer group |  |  | after intervention using SDS |
|  |  |  |  | discussion, delivered during postpartum. |  |  |  |
| [Zhao, 2018](#_bookmark73) | Treatment RCT | Psychoeducation | 296 | Follow-up education on perinatal depression, diet, | NA | Routine care | Postnatal depressive symptoms: |
|  |  |  |  | emotion management by WeChat APP, delivered |  |  | after intervention using SDS |
|  |  |  |  | during pregnancy until postpartum. |  |  |  |
| [Ngai, 2009](#_bookmark59) | Prevention | Psychoeducation | 184 | Childbirth psychoeducation program focused on | Midwives | Routine childbirth education programs consisted | Prenatal and postnatal depressive |
|  | Cluster RCT |  |  | cognitive restructuring, problem-solving and efficacy |  | of 6-weekly 2 h sessions focusing on prenatal | symptoms: after intervention, 6 |
|  |  |  |  | enhancement, consisted of three 1 h sessions, |  | care, labor, pain relief, breastfeeding, postnatal | weeks and 6 months postpartum |
|  |  |  |  | delivered during pregnancy. |  | and infant care. | using EPDS |
| [Gao, 2010](#_bookmark36) | Prevention RCT | Interpersonal | 194 | Interpersonal-psychotherapy-oriented childbirth | Midwives | Routine antenatal education in the study venue, | Postnatal depressive symptoms: 6 |
|  |  |  |  | education program consisted of two 2 h group |  | which consisted of two 90-min sessions | weeks postpartum using EPDS |
|  |  |  |  | sessions during pregnancy and one telephone follow- |  | conducted by midwives. |  |
|  |  |  |  | up in the postpartum period. |  |  |  |
| [Gao, 2015](#_bookmark37) | Prevention RCT | Interpersonal | 180 | Interpersonal-psychotherapy-oriented postnatal | Midwives |  | Postnatal depressive symptoms: 6 |
|  |  |  |  | psychoeducation program consisted of a 1 h |  |  | weeks postpartum using EPDS |

(*continued on next page*)

**Table 1** (*continued*)

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|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Author, year | Study design | Theoretical basis | Sample size | Intervention | Delivery agent | Control | Outcome |
|  |  |  |  | education session before discharge and one |  | A brief visit from a nurse to give them a |  |
|  |  |  |  | telephone follow-up session after delivery. |  | pamphlet on sources of assistance for mothers on |  |
|  |  |  |  |  |  | discharge from hospital |  |
| [Leung, 2012](#_bookmark48) | Treatment RCT | Interpersonal | 156 | Interpersonal psychotherapy oriented group | First author | Routine antenatal care including a brief | Prenatal and postnatal depressive |
|  |  |  |  | intervention targeted interpersonal issues consisted | Interventionist | individual interview with a midwife during | symptoms: after intervention and |
|  |  |  |  | of 4 weekly group sessions lasting 1.5 h per session, |  | which participants could raise any health or | 6-8 weeks postpartum using EPDS |
|  |  |  |  | delivered during pregnancy. |  | pregnancy related questions or concerns. |  |
| [Yang, 2019](#_bookmark70) | Prevention RCT | Mindfulness | 123 | 8-weeks online mindfulness intervention based on | Nurses midwife | Routine care: antepartum health education | Prenatal depressive symptoms: |
|  |  |  |  | WeChat APP focusing on attention monitoring and |  | related to childbirth, breastfeeding, nutrition, | after intervention using PHQ-9 |
|  |  |  |  | acceptance, delivered during pregnancy. |  | and parenting. |  |
| [Zhang, 2018](#_bookmark71) | Prevention RCT | Mindfulness | 63 | Mindfulness-based stress reduction program | Psychologist | Routine care: Prenatal care knowledge | Prenatal depressive symptoms: |
|  |  |  |  | consisted of weekly 90 min sessions for 8 weeks, |  |  | after intervention using SDS |
|  |  |  |  | delivered during pregnancy. |  |  |  |
| [Jiang, 2014](#_bookmark45) | Treatment RCT | Counseling | 729 | Mailing postpartum depression prevention and | NA | Conventional methods | Postnatal depressive symptoms: 6 |
|  |  |  |  | treatment knowledge manual, face-to-face |  |  | months postpartum using EPDS |
|  |  |  |  | counseling, and telephone psychological counseling |  |  |  |
|  |  |  |  | interventions, delivered during postpartum. |  |  |  |
| [Guan, 2015](#_bookmark39) | Treatment RCT | Traditional Chinese | 60 | Massage acupoint “thirteen ghost points”, once daily | NA | Routine nursing care | Postnatal depressive symptoms: |
|  |  | medicine |  | for 2 weeks, delivered during postpartum. |  |  | after intervention using HAMD |
| [Liu, 2018](#_bookmark53) | Prevention RCT | Traditional Chinese | 112 | Relaxation, acupoint massage, psychological hint, | NA | Routine care: antepartum health education | Prenatal depressive symptoms: |
|  |  | medicine |  | 15 min per time, 3 times per day for 4 weeks, |  |  | after intervention using SDS |
|  |  |  |  | delivered during pregnancy. |  |  |  |
| [Wu, 2018](#_bookmark68) | Treatment RCT | Traditional Chinese | 106 | Diet guidance, music therapy and massage acupoint | NA | Routine nursing care | Postnatal depressive symptoms: |
|  |  | medicine |  | based on traditional Chinese medicine theory, |  |  | after intervention using EPDS |
|  |  |  |  | delivered during postpartum. |  |  |  |
| [Zhang, 2016](#_bookmark72) | Prevention RCT | Music therapy; | 100 | Music therapy and relaxation therapy consisted of | Psychiatrist; Nurse | Routine care | Postnatal depressive symptoms: |
|  |  | Relaxation therapy |  | 30 min session, twice a day, delivered during |  |  | discharged from hospital using SDS |
|  |  |  |  | postpartum. |  |  |  |
| [Liu, 2012](#_bookmark51) | Prevention RCT | Exercise therapy | 326 | Exercise under the guidance of specialist for 40 min, | Nurses; Doctors; | NA | Postnatal depressive symptoms: 7, |
|  |  | Psychoeducation |  | 3 times a week from pregnancy until delivery. | Specialist |  | 42 days and 3 months postpartum |
|  |  |  |  | Education on healthcare, nutrition, delivery and |  |  | using EPDS |
|  |  |  |  | baby-caring. |  |  |  |
| [Cheng, 2016](#_bookmark32) | Prevention RCT | Social support | 130 | Mobile application program communicating with | Nurses | No intervention | Postnatal depressive symptoms: 1 |
|  |  |  |  | postpartum women and providing information and |  |  | months postpartum using EPDS |
|  |  |  |  | emotional social support twice a week for about |  |  |  |
|  |  |  |  | 10–15 min each time, delivered from 4 weeks after |  |  |  |
|  |  |  |  | delivery. |  |  |  |

Note: NA, not available; RCT, Random controlled trial; EPDS, Edinburgh Postnatal Depression Scale; PHQ-9, Patient Health Questionnaire-9; CBT, cognitive behavior treatment; SDS, Zung Self-Rating Depression Scale; HAMD, Hamilton depression scale.

**Table 2**

Information of intervention delivery and delivery agent (*n* = 26).

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Author, year | Intervention delivery Integration | Technology | Location | Format | Duration | Fidelity | Delivery agent Profession | Qualification | Training | Supervision |
| [Gao, 2010](#_bookmark36) | Integrated into hospital | Face-to-face | hospital | Group | 6 weeks | NA | Midwives | NA | Yes | Yes |
|  | routine childbirth education | Telephone |  |  |  |  |  |  |  |  |
|  | sessions |  |  |  |  |  |  |  |  |  |
| [Gao, 2015](#_bookmark37) | Integrated into hospital | Face-to-face | hospital | Individual | 2 weeks | NA | Midwives | NA | NA | NA |
|  | discharge education | Telephone |  |  |  |  |  |  |  |  |
| [Guan, 2015](#_bookmark39) | Integrated into routine care. | Face-to-face | hospital | Individual | 2 weeks | NA | NA | NA | NA | NA |
| [Ho, 2009](#_bookmark42) | Integrated into hospital | Face-to-face | hospital | Individual | 1 day | NA | Nurses | NA | NA | NA |
|  | discharge education |  |  |  |  |  |  |  |  |  |
| [Huang, 2015](#_bookmark43) | Integrated into routine | Face-to-face | hospital | NA | 6 weeks | NA | Obstetrician | NA | NA | NA |
|  | prenatal care and education |  |  |  |  |  | psychiatrist |  |  |  |
| [Jia, 2017](#_bookmark44) | Integrated into routine care. | Face-to-face | hospital | Group | NA | NA | Nurse | NA | NA | NA |
| [Jiang, 2014](#_bookmark45) | Integrated into hospital visits | Mail | Home visits | Individual | NA | NA | NA | NA | NA | NA |
|  |  | Face-to-face |  |  |  |  |  |  |  |  |
|  |  | Telephone |  |  |  |  |  |  |  |  |
| [Leung, 2012](#_bookmark48) | Integrated into a group | Face-to-face | Maternal and Child | Group | 4 weeks | Yes | First author, | Yes | Yes | NA |
|  | community-based family |  | Health Center |  |  |  | Interventionist |  |  |  |
|  | centered parenting program |  |  |  |  |  |  |  |  |  |
| [Li, 2018](#_bookmark49) | Integrated into routine care. | Face-to-face | hospital | Individual | NA | NA | Nurse | NA | NA | NA |
| [Mao, 2012](#_bookmark56) | Integrated into hospital visits | Face-to-face | hospital | Group | 4 weeks | NA | Nurses | NA | Yes | NA |
| [Wu, 2018](#_bookmark68) | Integrated into routine care. | Face-to-face | hospital | Individual | NA | NA | NA | NA | NA | NA |
| [Zhang, 2016](#_bookmark72) | Integrated into routine care. | Face-to-face | hospital | Individual | NA | NA | Psychiatrist, Nurse | NA | NA | NA |
| [Ngai, 2009](#_bookmark59) | Integrated into routine | Face-to-face | hospital | NA | 3 weeks | NA | Midwives | NA | Yes | NA |
|  | childbirth education program |  |  |  |  |  |  |  |  |  |
| [Cheng, 2016](#_bookmark32) | NA | Telephone | hospital | Individual | 4 weeks | NA | Nurses | NA | Yes | NA |
| [Dou, 2018](#_bookmark34) | NA | Face-to-face | Community health | Individual | NA | NA | NA | NA | NA | NA |
|  |  |  | care center |  |  |  |  |  |  |  |
| [Leung, 2016](#_bookmark47) | NA | Face-to-face | hospital | Group | 6 weeks | NA | NA | NA | NA | NA |
| [Liu, 2012](#_bookmark51) | NA | Face-to-face | hospital | Individual | NA | NA | Nurses; Doctors; | NA | NA | NA |
|  |  |  |  |  |  |  | Specialist |  |  |  |
| [Liu, 2018](#_bookmark53) | NA | Face-to-face | hospital | Individual | NA | NA | NA | NA | NA | NA |
| [Lu, 2016](#_bookmark55) | NA | Face-to-face | hospital | Individual | 8 weeks | NA | Nurses Doctors | NA | NA | NA |
| [Lu, 2017](#_bookmark54) | NA | Face-to-face | hospital | NA | 6 weeks | NA | Researcher, Nurse, | Yes | Yes | NA |
|  |  |  |  |  |  |  | Psychiatrist |  |  |  |
| [Ngai, 2015](#_bookmark60) | NA | Telephone | hospital | Individual | 5 weeks | Yes | Midwives | Yes | Yes | Yes |
| [Sun, 2011](#_bookmark65) | NA | Face-to-face | hospital | Group | NA | NA | Nurse | NA | NA | NA |
|  |  | Telephone |  |  |  |  |  |  |  |  |
| [Wu, 2017](#_bookmark69) | NA | Face-to-face | hospital | Individual | NA | NA | Doctors Nurses | NA | NA | NA |
|  |  | Telephone |  |  |  |  |  |  |  |  |
| [Yang, 2019](#_bookmark70) | NA | Mobile APP | hospital | Individual | 8 weeks | NA | Nurses midwife | NA | Yes | NA |
| [Zhang, 2018](#_bookmark71) | NA | Face-to-face | hospital | Group | 8 weeks | NA | Psychologist | NA | NA | NA |
| [Zhao, 2018](#_bookmark73) | NA | Mobile APP | hospital | Individual | NA | NA | NA | NA | NA | NA |

Note: NA, not available.

studies) and person-centered counseling (one study, combined coun- seling with education). Among cognitive strategies, the commonest elements were identifying thoughts, behaviors, and cognitive re- structuring. Among behavioral theory-based interventions, the pre- dominant elements included problem solving, relaxation techniques and emotional regulation. Interpersonal strategies included commu- nication skills and inciting social support. Caregiver coping was the most frequently reported element among parental skills-based strate- gies and birth procedures were most common psychoeducational component. The therapeutic elements comprising these interventions were heterogeneous and overlapped across different interventions. Other strategies not based on any established psychological theories included traditional Chinese practices ([Liu (2018)](#_bookmark53): acupoint massage, education and emotion release therapy; [Wu (2018)](#_bookmark68): acupoint massage, music therapy and diet nursing; [Guan (2015)](#_bookmark39): acupoint massage, music therapy and education), social support (one study), music therapy (one study, combined exercise with relaxation therapy) and exercise (one study, combined exercise with psychoeducation). The strategies in- cluded many non-specific elements such as prompting social support, involvement of family, active listening, involvement of significant others and so on. The most commonly used traditional Chinese practice was acupoint massage. Description of principles and rationale behind these interventions has been detailed in [Fig. 2](#_bookmark12) and Appendix [Table A4](#_bookmark20). The summary measure corresponded to a strong overall effect size of

0.81 (95% CI: −1.03 to −0.58, *P* < 0.001), with five individual studies showing no significant difference in the effect size ([Fig. 3](#_bookmark13)). The overall evidence, however, presented substantial heterogeneity (I2 = 91.12%, *P* < 0.001, Q = 282.36). Sensitivity analysis did not reveal any changes in the pooled effect size when individual study was removed from the meta-analysis. The effectiveness of these interventions (*n* = 10) remained significant (effect size: −0.87, 95% CI: −1.49 to

−2.73, I2 = 97.45%) at follow-up (from 7 days to 6 months).

A series of subgroup analyses were conducted to ascertain differ- ences in effect sizes among a priori defined groups of interventions (Appendix [Table A5](#_bookmark21)). High quality studies ([Gao *et al.*, 2010](#_bookmark36); [Gao *et al.*,](#_bookmark37) [2015](#_bookmark37); [Leung and Lam, 2012](#_bookmark48); [Mao *et al.*, 2012](#_bookmark56); [Ngai *et al.*, 2009](#_bookmark59); [Ngai](#_bookmark60) [*et al.*, 2015](#_bookmark60); [Yang *et al.*, 2019](#_bookmark70)) yielded weaker effect sizes and per- formed better on heterogeneity measures than their counterparts. There was a significant difference in the effect sizes of different theoretical orientations, with exercise (*n* = 1) showing the largest (−2.49, 95%CI:

−3.26 to −1.71) and interpersonal therapy (*n* = 3) the smallest (−0.22, 95%CI: −0.48 to 0.03). Though the size effect of treatment studies was higher than that of prevention studies, no statistical dif- ference was found (χ2 = 1.65, *p* = 0.2). And no difference of effect size was found between interventions delivered by specialists and non- specialists. Multivariate meta-regression was used to assess differences in effect sizes of subgroups of studies with different theoretical or- ientations, while accounting for quality of the studies, and employing



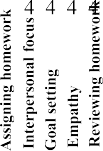
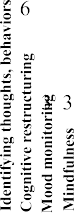
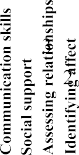
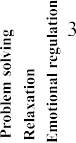






**Fig. 2.** (a). Specific therapeutic ingredients of the included studies. (b). Non-specific therapeutic ingredients of the included studies.

exercise-based therapy as a reference group. It yielded a significant model (*P* < 0.001) that explained 69% of variation in heterogeneity in the effect size of studies, where exercise-based therapy yielded the highest effect size, followed by traditional Chinese practice, counseling, music therapy, social support, psychoeducation, cognitive behavioral therapy, mindfulness and interpersonal therapy. Details were shown in Appendix [Fig. A1](#_bookmark15) & Appendix [Table A6](#_bookmark24). When the analysis was re- stricted to psychotherapies including CBT, IPT, PE and mindfulness, no significant differences in effect sizes were noted (*P* > 0.05) (Appendix [Fig. A1](#_bookmark15) & Appendix [Table A7](#_bookmark25)). Maternal age did not account for var- iation in heterogeneity and effect sizes among the included trials (β = 0.06; *P* = 0.35).



The result demonstrated that most RCT studies (73.1%) included in the meta-analysis are of low quality. Visualization of funnel plot ([Fig. 4](#_bookmark14)) and assessment of Egger's regression statistic (*P* = 0.98) did not reveal any significant publication bias. The highest proportion of unclear risk of bias was exhibited in blinding of participants and personnel (24 studies). While five studies were rated as having a high risk of bias in reporting of incomplete outcome data. Detailed ratings of risk of bias have been presented in Appendix [Fig. A2](#_bookmark16).

# Disscussion

To the best of our knowledge, this is the first systematic review to

provide an overview of psychosocial interventions, including tradi- tional Chinese practices, for perinatal depression in China. The studies included in this review varied in the form, duration, theoretical or- ientation and delivery-agent of the interventions. Despite the diversity, it can be concluded that psychosocial interventions are relatively ef- fective in reducing perinatal depressive symptoms. This result is con- sistent with the findings of other recent global reviews of evidence in the area ([Dennis and Dowswell, 2013](#_bookmark33)).

The analyses exhibited the highest effect size for exercise-based intervention, followed by psychological therapies embedded in tradi- tional Chinese practices. This may indicate a cultural preference for interventions based on physical activity rather than conventional ‘talking therapies’. However, these analyses may not present a true picture of the real treatment effects of these interventions, which may be a reflection of the quality and numbers of studies. There was only one intervention pertaining to exercise ([Liu *et al.*, 2012](#_bookmark51)) and three to traditional Chinese practices ([Guan *et al.*, 2015](#_bookmark39); [Liu *et al.*, 2018](#_bookmark53); [Wu, 2018](#_bookmark68)). Besides, all the four above-mentioned studies were poorly designed according to the Cochrane risk of bias tool. Though classified as exercise-based intervention, the study ([Liu *et al.*, 2012](#_bookmark51)) actually combined psychoeducation, which surely will exaggerate the size effect of exercise. In comparison, CBT ([Mao *et al.*, 2012](#_bookmark56); [Ngai *et al.*, 2015](#_bookmark60)) and IPT based ([Gao *et al.*, 2010](#_bookmark36); [Gao *et al.*, 2015](#_bookmark37); [Leung and Lam, 2012](#_bookmark48)) studies showed low risk of bias and thus giving more precise estimates









**Fig. 3.** Meta-analysis of psychosocial interventions of perinatal depression in women in China Note: \* represents no significance was found (*p* < 0.1).



**Fig. 4.** Funnel plot.

of treatment effects. Furthermore, interventions classified as traditional Chinese practices also combined other non-specific elements such as support and relaxation. Therefore, it is difficult to identify the sole ef- fectiveness of these traditional Chinese practices. However, traditional Chinese practices in the management of perinatal depression should be an area of interest. For example, acupuncture, a traditional Chinese treatment, has been shown to significantly reduce postpartum depres- sive symptoms ([Li *et al.*, 2019](#_bookmark50)). Thus, the role of traditional medicine as an adjunct to conventional approaches should be explored further and could be an important area for future research. Though classified as counseling and music therapy, [Jiang (2014)](#_bookmark45) and [Zhang (2016)](#_bookmark72) actually used multiple interventions in their studies. This may exaggerate the size effect and lead a bias to the result.

In the subgroup analyses, high quality studies yielded a weaker ef- fect size than their low quality counterparts. A large proportion of studies included in this review were rated as low quality and tended to overestimate treatment effect sizes. Small-scale trials lacking proper randomization procedures contribute to selection bias and systematic differences between the intervention and placebo arms. Similar biases are associated with poor or no allocation concealment because alloca- tion to intervention and control groups can be related to prognosis and responsiveness to treatment ([Kunz *et al.*, 2007](#_bookmark46)). Future trials should focus on removing these potential sources of biases. The subgroup analyses also demonstrated that the effect of interventions delivered by non-specialists was comparable to that by specialists, which is con- sistent with other literature reports ([Liu *et al.*, 2017](#_bookmark52)). No significant difference was found between the size effect of treatment and preven- tion studies. However, the result should be interpreted with caution. Participants undergoing treatment interventions have higher scores on depression screening instruments at baseline than the counterparts in preventive interventions. Thus, the former group experiences a larger decrease in their scale scores post-intervention, reflecting higher effect size estimates. In this review, several studies employed only screening instruments such as the EPDS to classify intervention recipients as having depression. The process of diagnoses should be done using di- agnostic interviews based on DSM/ICD criteria for diagnosis or SCID. The use of screening instruments for diagnosis without employing a diagnostic interview can add potential bias in the meta-analysis.

It is notable that almost all studies in this review delivered their

interventions in hospitals in urban areas of China. However, perinatal depression is more prevalent in underdeveloped regions and associated with poor socioeconomic and living conditions ([Nisar *et al.*, 2019](#_bookmark61)). This result indicated that more research should be done on how to bridge the urgent need of mental health care in rural areas and the shortage of medical human resource. It has been proven that mental health inter- ventions delivered by non-specialist under supervision are more bene- ficial than routine care and can reduce the disease burden of perinatal depression ([Liu *et al.*, 2017](#_bookmark52)). Though half studies in this review reported integrating their interventions into existing services, few reported the process, cost and scale-up strategies. Studies in other LMICs proved that maternal mental health interventions can be added to existing health care services at little additional cost ([Richter *et al.*, 2017](#_bookmark63)). Based on the above evidence, task shifting from mental health specialists to the community healthcare system, which was successfully demonstrated in many studies from LMICs ([Rahman *et al.*, 2013](#_bookmark62)), could be a potential way forward in integration of mental health interventions and services into existing healthcare system in China.

The application of technology could be another way to improve access to mental health care. According to a recent systematic review ([Ashford](#_bookmark30) [*et al.*, 2016](#_bookmark30)), computer- or web- based interventions could be a promising approach for accessing treatment for perinatal depression. In this review, two studies ([Yang *et al.*, 2019](#_bookmark70); [Zhao, 2018](#_bookmark73)) delivered mindfulness

interventions through a popular Chinese mobile application named We- Chat and both reported a significant positive result. However, adherence to intervention and quality control could limit the effectiveness of com- puter- or web-based interventions. Also, given that perinatal depression is more prevalent in under-developed regions, technological solutions must ensure equity for those who do not have access to this technology.

# Limitation

There are some limitations in this review. Firstly, the evidence in this review is of moderate to low quality and therefore, should be interpreted with caution. The majority of the trials had high risk of bias with poor randomization and allocation concealment procedures. Secondly, some of the trials were inadequately powered and tended to overestimate effect sizes as demonstrated by a wide confidence interval for standard mean differences for those ten follow-up data. Thirdly, the implications of this review is limited in China as we only include psychosocial interventions on perinatal depression in China. Lastly, we did not find any statistical heterogeneity based on different assessment tools for assessment of de- pressive symptoms among the intervention recipients in different studies. Nonetheless, use of different psychometric instruments with different psychometric properties introduces methodological heterogeneity in meta-analysis. Therefore, these results should be interpreted with caution.

# Conclusion

This review indicates that psychosocial interventions, particularly those involving psychoeducational and cognitive behavioral elements, are effective in reducing perinatal depressive symptoms. Traditional Chinese practices and exercise may add to the effectiveness of inter- ventions. However, future high quality RCTs are required to supple- ment the evidence. Concurrently, strategies to scale-up effective inter- ventions should be further developed and evaluated in a range of settings to reduce the treatment gap for perinatal depression.

# Contributors

Juan Yin, Atif Rahman and Xiaomei Li conceived and designed the study; Anum Nisar and Juan Yin searched, screened and did the data extraction of the English studies; Yan Guo and Wenli Qi searched, screened and did the data extraction of the Chinese studies; Ahmed Waqas and Duolao Wang did the meta-analysis; Juan Yin first draft the paper and all the authors revised and approved it.

# Funding

This study was supported by the Chinese Nursing Association (ZHKY201809). The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

# Declaration of Competing Interest

None.

# Acknowledgement

We would like to thank the Chinese Nursing Association for sup- porting our research.

# Appendix

[Figs. A1 and A2](#_bookmark15).

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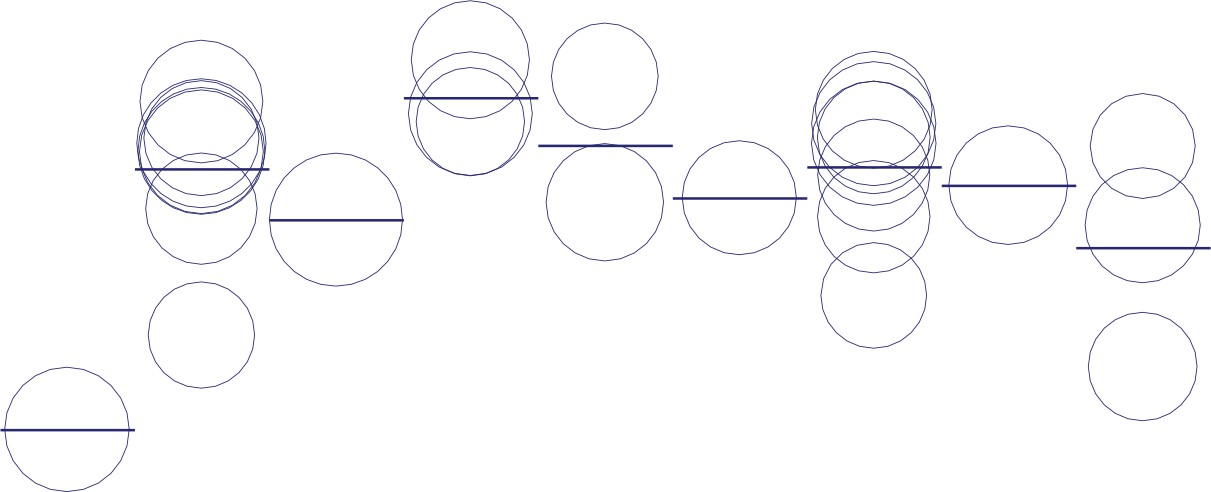
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Exercise CBT Counseling IPT Mindfulness Music therapy PE Social support TCM

**Theoretical orientation**

**Fig. A1.** Meta-regression analysis for theoretical orientation.



Random sequence generation (selection bias)

Allocation concealment (selection bias) Blinding of participants and personnel (performance bias)

Blinding of outcome assessment (detection bias) Incomplete outcome data (attrition bias) Selective reporting (reporting bias)

Other bias

Low risk of bias DUnclear risk of bias ■High risk of bias

0% 25% 50% 75%

1. Review authors' judgements about each risk of bias item presented as percentages across all included studies.

|  |  |  |
| --- | --- | --- |
| "a '  a | \_g !  "a ' "a '  oo m |  |
|  | * .., | Random sequence generation (selection bias) |
|  | * ..., | Allocation concealment (selection bias) |
| ,..., | •..,1 •.J | Blinding of participants and personnel (performance bias) |
|  | •., •..., | Blinding of outcome assessment (detection bias) |
|  |  | Incomplete outcome data (attrition bias) |
|  | * .., | Selective reporting (reporting bias) |
|  |  | Other bias |

1. Risk of bias items for each included study.

**Fig. A2.** Risk of bias.

[Tables A1](#_bookmark15),[A2](#_bookmark16),[A3](#_bookmark19),[A4](#_bookmark20),[A5](#_bookmark21),[A6](#_bookmark24),[A7](#_bookmark25),[A8](#_bookmark26),[A9](#_bookmark27),[A10](#_bookmark28).

**Table A1**

Search strategy.

Search strategy in English databases Search strategy in Chinese databases

(Perinatal[ti/ab] OR maternal[ti/ab] OR mother\*[ti/ab] OR pregnancy[ti/ab] OR pregnant[ti/ab] OR intrapartum[ti/ab] OR postpartum[ti/ab] OR prenatal[ti/ab] OR postnatal[ti/ab] OR antenatal[ti/ab] OR antepartum [ti/ab]) AND (depression[ti/ab] OR depressive[ti/ab] OR depress\*[ti/ab] OR “mental health”[ti/ab]) AND (China OR Chinese OR Guangxi OR "inner Mongolia" OR Ningxia OR Tibet OR Xizang OR Xinjiang OR Heilongjiang OR Jilin OR Liaoning OR Hebei OR Shanxi OR Shandong OR Shaanxi OR Gansu OR Qinghai OR Sichuan OR Hubei OR Hunan OR Henan OR Anhui OR Zhejiang OR Jiangsu OR Guangdong OR Jiangxi OR Fujiang OR Guizhou OR Yunnan OR Hainan OR Han OR Hui OR Mongolia OR Zhuang) AND (trial[ti/ab] OR RCT[ti/ab] OR randomized-controlled[ti/ab] OR intervention[ti/ab] OR controlled-trial[ti/ab] OR effectiveness[ti/ab] OR efficacy[ti/ab])

1. China National Knowledge Infrastructure (CNKI)

(TI=围产期 OR TI=产妇 OR TI=妊娠 OR TI=孕妇 OR TI=孕期 OR TI=产前 OR TI=产后 OR TI=分娩前 OR TI=分娩后 OR TI=产褥期) AND (TI=抑郁 OR TI=精神 OR TI=心理) AND (AB=试验 OR AB=RCT OR AB=随机对照 OR AB=干预 OR AB=对照 OR AB=效果)

1. China National Knowledge Infrastructure (CNKI)

(TI=围产期 OR TI=产妇 OR TI=妊娠 OR TI=孕妇 OR TI=孕期 OR TI=产前 OR TI=产后 OR TI=分娩前 OR TI=分娩后 OR TI=产褥期) AND (TI=抑郁 OR TI=精神 OR TI=心理) AND (AB=试验 OR AB=RCT OR AB=随机对照 OR AB=干预 OR AB=对照OR AB=效果)

1. VIP Database for Chinese Technical Periodicals

(M=围产期 OR M=产妇OR M=妊娠 OR M=孕妇 OR M=孕期 OR M=产前 OR M=产后 OR M=分娩前 OR M=分娩后 OR M=产褥期) AND (M=抑郁 OR M=精神OR M=心理) AND (M=试验 OR M=RCT OR M=随机对照 OR M=干预 OR M=对照 OR M=效果)

1. Wan Fang Database

Title or Key words:((围产期 OR 产妇OR 妊娠 OR 孕妇 OR 孕期 OR 产前 OR 产后 OR 分娩前 OR分娩后 OR 产褥期) AND (抑郁 OR 精神OR 心理) AND (试验 OR RCT OR 随机对照 OR 干预 OR对照 OR 效果))

**Table A2**

Definitions of therapeutic techniques employed in psychosocial interventions.

Name of Skill Definition of skill

1. Involvement of family The family members are involved in the intervention.
2. Involvement of significant other The significant other or spouse is involved in the intervention.
3. Active listening The skillful listens to the speaker with full concentration to understand what is being said [1].
4. Collaboration Working with others
5. Inciting social support Providing insight of how others can provide help or support [2].
6. Case management Planning, facilitating and coordination of different options regarding the patient [3].
7. Normalization To communicate that the person's experiences also happen to other people [4].
8. eliciting commitment Motivating the client to take active part in intervention.
9. Discussing advantages Identifying advantages to take the intervention.
10. Discussing barriers Identifying difficulties to take the intervention.
11. Identifying affect Identifying feeling or emotion [5].
12. identifying and eliciting social support Providing consideration of how others could change their behavior to offer the person help or support [6].
13. Communication skills These are set of skills which improve the dissemination, reception and exchange of information, opinions or ideas

making sure that the intended message is completely understood by those involved [7].

1. Assertiveness training To train people for effective communication without being passive or aggressive.
2. Assessing relationships To assess the relationships with people around.
3. Problem solving To solve a problem by carefully defining problem and weighing different options to solve the problem.
4. Relaxation To apply various techniques for relaxation.
5. Awarding positive behavior Applying different methods to encourage recurrence of a positive behavior [8].
6. Exposure Confronting previously avoided objects, situations, unwanted thoughts or feelings while not avoiding or escaping from it [9].
7. Emotional regulation Tendency to manage and responding to emotional experience [10].
8. Stress management May involve a variety of techniques that do not target a specific behavior but seek to reduce anxiety and stress [6].
9. Decision making Process of making choices by identifying decision, gathering information, and assessing alternative resolutions [11].
10. self-monitoring The person keeps a record of one's own behavior [6].
11. Delay awards A process of deferring initial reward for a better reward later [12].
12. Caregiver coping (e.g., management skills for the parents of children)
13. Parent-child Interaction Coaching (e.g., positive 1-on-1, attending to children modeling, etc)

Mechanism through which the caregiver manages the stress [13].

The parent applies a new skill with the child and the therapist provides immediate feedback [14].

1. Birth procedures Knowledge about different ways of giving birth [15].
2. Specific health areas of children (e.g., nutrition, breastfeeding, SRH, etc)

If the intervention targeted the specific dimensions of health areas in children.

1. Nutrition Education regarding recommended nutrition practices.
2. Breastfeeding Education regarding recommended breastfeeding practices.
3. Sexual behavior Avoidance of risky sexual behaviors.
4. Identifying thoughts, behaviors, and their links (e.g., identifying negative thoughts, thought diary, etc.)
5. Cognitive restructuring (e.g., reattribution, weighing evidence, logical questioning, etc.)

Realizing what thoughts cross one's mind by number of ways [16]. Identifying and disputing maladaptive thoughts [2].

1. Distraction Paying attention to some other stimuli rather than the unhelpful thoughts [17].
2. Self-talk Use of self-instruction and self-encouragement to support action [6].
3. Self-praise To boast one's self esteem by expressing approval or admiration [18].
4. Mood monitoring Paying attention toward one's mood states by means of different methods [19].
5. Mindfulness Paying attention towards experiences in the present moment within body and mind and accepting the happenings [20].
6. Self-awareness Conscious awareness of becoming the object of one's own awareness [21].
7. Aerobics Aerobic exercise also known as "cardio" exercises include running, swimming, walking, hiking, aerobics classes, dancing, cross country skiing, and kickboxing.

(*continued on next page*)

**Table A2** (*continued*)

Name of Skill Definition of skill

1. Non-aerobic exercise Anaerobic ("without oxygen") exercise is any physical activity that causes you to be quickly out of breath, like sprinting

or lifting a heavy weight.

1. Motivational enhancement To increase internal motivation in order to make long lasting change [22].
2. Praise Praising for positive behavior or accomplishment.
3. Role play Performing role of a person in a situation [23].
4. Behavioral contracting Agreement of a contract specifying behavior to be performed so that there is a written record of the person's resolution

witnessed by another [6].

1. Assigning homework Assigning tasks pertaining to interventions, to be performed at home.
2. Interpersonal focus Focus on maintaining relationships with other people [24].
3. Behavioral experiments To test out the negative thoughts and re-evaluate underlying beliefs by performing an action [25].
4. Motivational interviewing Prompting the person to provide self-motivating statements and evaluation of their own behavior to minimize

resistance [6].

1. Direct suggestions Providing directions of how to act, behave or handle a situation [26, 27].
2. Goal setting Identifying an aim or goal to achieve in a session or therapy [28].
3. Giving sick role Assigning role of a sick person to the participant, to understand the circumstances, particular rights and responsibilities of those who are ill.
4. Empathy To understand and share other's feeling or situation [29].
5. Macronutrients Food groups needed in large amounts [30].
6. Micronutrient Food groups needed in small amounts [30].
7. Eating behaviors The food choices and eating practices [31],
8. Alcohol use Education about minimal use and harms of alcohol misuse.
9. Substance misuse Harmful use of substances for non-medical purposes [32].

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**Table A3**

Demographic characteristics of participants in the researches included.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Author, year | Age of mothers Mean age (SD) (years) | Principle of intervention | Geographical scope | Study Settings | Outcome | Outcome measures |
| [Gao, 2010](#_bookmark36) | 28.47 (2.8) | Prevention | NA | hospital | Postnatal depression | EPDS |
| [Gao, 2015](#_bookmark37) | 28.49 (2.7) | Prevention | NA | hospital | Postnatal depression | EPDS |
| [Ho, 2009](#_bookmark42) | intervention group: 29.2 (3.4) control group:29.4 (3.2) | Prevention | urban | hospital | Postnatal depression | EPDS |
| [Jiang, 2014](#_bookmark45) | 27.9 (4.36) | Treatment | urban | Home visits | Postnatal depression | EPDS |
| [Mao, 2012](#_bookmark56) | intervention group: 28.5 (2.4) control group:28.8 (2.5) | Prevention | urban | hospital | Postnatal depression | EPDS, PHQ-9 |
| [Cheng, 2016](#_bookmark32) | intervention group: 33.48 (4.12) control group: 32.82 (4.93) | Prevention | urban | hospital | Postnatal depression | EPDS |
| [Huang, 2015](#_bookmark43) | intervention group: 28.5 (2.4) control group: 28.8 (2.5) | Prevention | urban | hospital | Postnatal depression | PHQ-9 |
| [Leung, 2016](#_bookmark47) | 21 to 45 | Treatment | urban | hospital | Postnatal depression | EPDS |
| [Leung, 2012](#_bookmark48) | intervention group: 31.3 (4.02) control group: 31.15 (4.12) | Treatment | urban | Maternal and Child Health Centers | Prenatal and postnatal depression | EPDS |
| [Ngai, 2009](#_bookmark59) | intervention group: 32.1 (3.7) control group: 30.5 (3.7) | Prevention | urban | hospital | Prenatal and postnatal depression | EPDS |
| [Ngai, 2015](#_bookmark60) | intervention group: 31.1 (3.8) control group:30.4 (4.4) | Treatment | urban | hospital | Postnatal depression | EPDS |
| [Yang, 2019](#_bookmark70) | intervention group: 31.31(4.97) control group: 30.38 (3.91) | Prevention | urban | hospital | Prenatal depression | PHQ-9 |
| [Zhang, 2018](#_bookmark71) | intervention group: 25.7 (2.79) control group: 25.58 (2.33) | Prevention | urban | hospital | Prenatal depression | SDS |
| [Lu, 2016](#_bookmark55) | 20–38 | Treatment | urban | hospital | Postnatal depression | EPDS |
| [Sun, 2011](#_bookmark65) | intervention group: 28.38 (2.73) control group: 28.55 (2.82) | Prevention | urban | hospital | Postnatal depression | EPDS |
| [Liu, 2018](#_bookmark53) | 20–44 | Prevention | urban | hospital | Prenatal depression | SDS |
| [Wu, 2017](#_bookmark69) | 21–39 | Treatment | urban | hospital | Postnatal depression | SDS |
| [Li, 2018](#_bookmark49) | 22–38 | Treatment | urban | hospital | Postnatal depression | HAMD |
| [Jia, 2017](#_bookmark44) | intervention group: 27.62 (3.15) control group: 27.94 (3.28) | Treatment | urban | hospital | Postnatal depression | EPDS |
| [Dou, 2018](#_bookmark34) | intervention group: 28.81 (4.25) control group: 29.04 (4.61) | Prevention | semi-urban | Community health care center | Postnatal depression | SDS |
| [Zhao, 2018](#_bookmark73) | 20–42 | Treatment | urban | hospital | Postnatal depression | SDS |
| [Lu, 2017](#_bookmark54) | intervention group: 28.5 (4.7) control group:28.9 (4.6) | Treatment | urban | hospital | Postnatal depression | HAMD; |
| [Zhang, 2016](#_bookmark72) | 24–39 | Prevention | urban | hospital | Postnatal depression | SDS |
| [Guan, 2015](#_bookmark39) | intervention group: 28.8 (15.8) control group: 29.6 (16.1) | Treatment | semi-urban | hospital | Postnatal depression | HAMD |
| [Wu, 2018](#_bookmark68) | 20–40 | Treatment | urban | hospital | Postnatal depression | EPDS |
| [Liu, 2012](#_bookmark51) | intervention group: 28 (5) control group: 27 (6) | Prevention | urban | hospital | Postnatal depression | EPDS |

Note: NA, not available; EPDS, Edinburgh Postnatal Depression Scale; PHQ-9, Patient Health Questionnaire-9; SDS, Zung Self-Rating Depression Scale; HAMD, Hamilton depression scale.

**Table A4**

Scope and taxonomy of interventions.

|  |  |  |  |
| --- | --- | --- | --- |
| Author year | Type | Major elements | Elements |
| [Gao, 2010](#_bookmark36) | Prevention | Engagement | Active listening, inciting social support |
|  |  | Interpersonal skills | Identifying and eliciting social support, communication skill, assessing relationships |
|  |  | Behavior coping | Problem solving, stress management |
|  |  | Parenting skill | Caregiver coping, parent-child interaction coaching |
|  |  | Psychoeducation | Birth procedure, nutrition, breastfeeding, sexual behavior |
|  |  | Techniques used by delivery agent | Motivational enhancement, role play, interpersonal focus, direct suggestion, goal setting |
| [Gao, 2015](#_bookmark37) | Prevention | Engagement | Active listening, inciting social support |
|  |  | Interpersonal skill | Identifying affect, identifying and eliciting social support, Communication skill, assessing relationships |
|  |  | Behavior coping | Problem solving |
|  |  | Parenting skill | Parent-child interaction coaching |
|  |  | Psychoeducation | Breastfeeding |
|  |  | Techniques used by delivery agent | Interpersonal focus |
| [Ho, 2009](#_bookmark42) | Prevention | Cognitive coping | Mood monitoring, self-awareness |
| [Mao, 2012](#_bookmark56) | Prevention | Engagement | Involvement of significant others, inciting social support |
|  |  | Interpersonal skill | Communication skill |
|  |  | Behavior coping | Problem solving, relaxation, self-monitoring |
|  |  | Psychoeducation | Birth procedure |
|  |  | Cognitive coping | Identifying thoughts, cognitive restructuring, self-talk, self-praise, mood monitoring, self-awareness |
|  |  | Techniques used by delivery agent | Role paly, assigning homework, interpersonal focus, reviewing homework |
| [Jiang, 2014](#_bookmark45) | Treatment | – | – |
| [Cheng, 2016](#_bookmark32) | Prevention | Engagement | Empathy |
|  |  | Interpersonal skills | Identifying and eliciting social support |
|  |  | Psychoeducation | Birth procedure, breast feeding |
|  |  | Techniques used by delivery agent | Empathy |
| [Huang, 2015](#_bookmark43) | Prevention | Engagement | Involvement of family, inciting social support |
|  |  | Interpersonal skills | Identifying and eliciting social support |
|  |  | Behavior coping | Relaxation, exposure, emotional regulation, eliciting social support |
|  |  | Psychoeducation | Birth procedure |
|  |  | Cognitive coping | Cognitive restructuring |
| [Leung, 2016](#_bookmark47) | Treatment | Cognitive coping | Identifying thoughts, cognitive restructuring, distraction |
|  |  | techniques used by delivery agent | Assigning homework |
| [Leung, 2012](#_bookmark48) | Treatment | Interpersonal skills | Communication skills, assertiveness training, assessing relationship |
|  |  | techniques used by delivery agent | Role play, assigning homework, interpersonal focus, reviewing homework, goal setting |
| [Ngai, 2009](#_bookmark59) | Prevention | Behavior coping | Problem solving, stress management, decision making |
|  |  | Reinforcement | Awarding positive behavior |
|  |  | Parenting skill | Caregiver coping |
|  |  | Cognitive coping | Cognitive restructuring |
|  |  | Techniques used by delivery agent | Goal setting |
| [Ngai, 2015](#_bookmark60) | Treatment | Interpersonal skills | Communication skills |
|  |  | Behavior coping | Problem solving, exposure, stress management, decision making |
|  |  | Reinforcement | Awarding positive behavior |
|  |  | Parenting skill | Caregiver coping |
|  |  | Cognitive coping | Identifying thoughts, cognitive restructuring |
|  |  | Techniques used by delivery agent | Goal setting |
| [Yang, 2019](#_bookmark70) | Prevention | Engagement | Discussing barriers to treatment |
|  |  | Interpersonal skills | Identifying affect |
|  |  | Behavior coping | Relaxation, stress management |
|  |  | Cognitive coping | Identifying thoughts, mood monitoring, mindfulness |
|  |  | Techniques used by delivery agent | Assigning homework, reviewing homework |
| [Zhang, 2018](#_bookmark71) | Prevention | Engagement | Discussing barriers to treatment |
|  |  | Cognitive coping | Mindfulness |
|  |  | Exercise | Aerobics |
|  |  | Techniques used by delivery agent | Assigning homework, reviewing homework |
| [Lu, 2016](#_bookmark55) | Treatment | Engagement | Involvement of family, active listening, empathy |
|  |  | Exercise | Others |
|  |  | Techniques used by delivery agent | Empathy |
| [Sun, 2011](#_bookmark65) | Prevention | Engagement | Inciting social support |
|  |  | Interpersonal skills | Identifying and eliciting social support, communication skills |
|  |  | Behavior coping | Stress management |
|  |  | Parenting skill | Caregiver coping |
| [Liu, 2018](#_bookmark53) | Prevention | – | – |
| [Wu, 2017](#_bookmark69) | Treatment | Parenting skill | Caregiver coping |
|  |  | Psychoeducation | Birth procedure, breast feeding |
| [Li, 2018](#_bookmark49) | Treatment | Engagement | Active listening, empathy |
|  |  | Cognitive coping | Identifying thoughts, cognitive restructuring |
|  |  | Techniques used by delivery agent | Assigning homework, empathy |
| [Jia, 2017](#_bookmark44) | Treatment | Engagement | Involvement of family, involvement of significant others |
|  |  | Behavior coping | Emotional regulation |
|  |  | Psychoeducation | Birth procedure |
|  |  | Cognitive coping | Identifying thoughts |
| [Dou, 2018](#_bookmark34) | Prevention | Engagement | Inciting social support |
|  |  | Behavior coping | Relaxation |
|  |  | Cognitive coping | Identifying thoughts |
| [Zhao, 2018](#_bookmark73) | Treatment | Engagement | Involvement of family |

(*continued on next page*)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Table A4** (*continued*) | | | | | | |
| Author year | Type | Major elements | Elements | | | |
|  |  | Behavior coping | Emotional regulation | | | |
|  |  | Psychoeducation | Nutrition | | | |
| [Lu, 2017](#_bookmark54) | Treatment | Engagement | Empathy, normalization, eliciting commitment | | | |
|  |  | Cognitive coping | Identifying thoughts, mindfulness | | | |
|  |  | Techniques used by delivery agent | Empathy | | | |
| [Zhang, 2016](#_bookmark72) | Prevention | Behavior coping | Relaxation | | | |
| [Guan, 2015](#_bookmark39) | Treatment | – | – | | | |
| [Wu, 2018](#_bookmark68) | Treatment | Psychoeducation | Nutrition | | | |
| [Liu, 2012](#_bookmark51) | Prevention | Engagement | Involvement of family | | | |
|  |  | Psychoeducation | Birth procedure, nutrition | | | |
|  |  | Exercise | Aerobics | | | |
| **Table A5**  Subgroup analysis of the psychosocial interventions. | | | | | | |
| Moderators | No• of studies | | Point estimate (95% CI) I2 χ2 (Q statistic) P | | | |
| Quality | |  |  |  |  |  |
| High | | 7 | -0.45 (-0.85 to -0.05) | 61.83% | 4.13 | 0.04 |
| Low | | 19 | -0.94 (-1.19 to -0.69) | 91.78% |  |  |
| Scale | |  |  |  |  |  |
| EPDS | | 14 | -0.83 (-1.19 to -0.48) | 94.67% | 1.32 | 0.73 |
| SDS | | 6 | -0.66 (-0.93 to -0.38) | 60.28% |  |  |
| HAMD | | 3 | -1.13 (-1.84 to -0.41) | 84.67% |  |  |
| PHQ-9 | | 3 | -0.68 (-0.87 to -0.48) | 23.81% |  |  |
| Theoretical orientation | |  |  |  | 29.17 | <0.001 |
| CBT | | 7 | -0.72 (-1.00 to -0.43) | 81.30% |  |  |
| Psychoeducation | | 7 | -0.70 (-0.98 to -0.42) | 73.72% |  |  |
| TCM | | 3 | -1.24 (-2.05 to -0.40) | 89.38% |  |  |
| Interpersonal treatment | | 3 | -0.22 (-0.48 to 0.03) | 31.46% |  |  |
| Mindfulness | | 2 | -0.53 (-1.37 to 0.31) | 86.43% |  |  |
| Counseling | | 1 | -1.06 (-1.79 to -0.32) | 0% |  |  |
| Exercise | | 1 | -2.49 (-3.26 to -1.71) | 0% |  |  |
| Social support | | 1 | -0.82 (-1.62 to -0.02) | 0% |  |  |
| Music Therapy | | 1 | -0.90 (-1.73 to -0.08) | 0% |  |  |
| Specificity | |  |  |  | 0.11 | 0.74 |
| Non-specificity | | 7 | -0.87 (-1.14 to -0.60) | 74.66% |  |  |
| specificity | | 19 | -0.78 (-1.08 to -0.49) | 92.85% |  |  |
| Scope of intervention | |  |  |  | 1.65 | 0.20 |
| Treatment | | 12 | -0.97(-1.31 to -0.63) | 92.97% |  |  |
| Prevention | | 14 | -0.67(-0.98 to -0.36) | 87.59% |  |  |
| Elements of interventions | |  |  |  |  |  |
| Engagement | |  |  |  | 0.78 | 0.38 |
| No | | 11 | -0.69 (-0.98 to -0.40) | 88.89% |  |  |
| Yes | | 15 | -0.90 (-0.99 to -0.55) | 92.74% |  |  |
| Interpersonal skills | |  |  |  | 3.78 | 0.05 |
| No | | 17 | -0.96 (-1.29 to -0.64) | 92.65% |  |  |
| Yes | | 9 | -0.53 (-0.69 to -0.37) | 57.52% |  |  |
| Behavioral coping | |  |  |  | 2.47 | 0.12 |
| No | | 14 | -0.97 (-1.37 to -0.57) | 94.26% |  |  |
| Yes | | 12 | -0.60 (-0.71 to -0.48) | 31.24% |  |  |
| Reinforcement | |  |  |  | 0.77 | 0.39 |
| No | | 24 | -0.84 (-1.08 to -0.59) | 91.43% |  |  |
| Yes | | 2 | -0.49 (-0.67 to -0.31) | 0% |  |  |
| Parenting skills | |  |  |  | 0.10 | 0.76 |
| No | | 19 | -0.83 (-1.04 to -0.61) | 85.23% |  |  |
| Yes | | 7 | -0.75 (-1.35 to -0.15) | 96.26% |  |  |
| Psychoeducation | |  |  |  | 1.05 | 0.31 |
| No | | 16 | -0.71 (-0.93 to -0.49) | 85.02% |  |  |
| Yes | | 10 | -0.96 (-1.44 to -0.47) | 94.73% |  |  |
| Cognitive coping | |  |  |  | 1.44 | 0.23 |
| No | | 14 | -0.93 (-1.30 to -0.57) | 93.61% |  |  |
| Yes | | 12 | -0.65 (-0.86 to -0.44) | 76.85% |  |  |
| Delivery agents | |  |  |  | 0.41 | 0.52 |
| Non-specialist[\*](#_bookmark22) | | 15 | -0.89(-1.23 to -.56) | 93.26% |  |  |
| Specialist[^](#_bookmark23) | | 5 | -0.67(-1.26 to -0.08) | 90.45% |  |  |

Note: EPDS, Edinburgh Postnatal Depression Scale; HAMD, Hamilton depression scale; PHQ-9, Patient Health Questionnaire-9; SDS, Zung Self-Rating Depression Scale; CBT, Cognitive behavior treatment; TCM, Traditional Chinese medicine.

⁎ includes multidisciplinary teams with no specialists

^ includes multidisciplinary teams with at least one specialist

**Table A6**

Meta-regression analyses for theoretical orientation of psychosocial therapies.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Covariate | Coefficient | S•E | 95% CI  Lower | Upper | Z-value | *p* |
| Intercept | -2.37 | 0.39 | −3.13 | −1.60 | −6.05 | 0 |
| Quality | -0.12 | 0.19 | −0.49 | 0.26 | −0.62 | 0.53 |
| CBT | 1.74 | 0.37 | 1.01 | 2.47 | 4.67 | <0.001 |
| Counseling | 1.43 | 0.47 | 0.51 | 2.34 | 3.06 | <0.001 |
| IPT | 2.17 | 0.42 | 1.35 | 3.00 | 5.14 | <0.001 |
| Mindfulness | 1.87 | 0.45 | 0.10 | 2.74 | 4.19 | <0.01 |
| Music therapy | 1.58 | 0.51 | 0.59 | 2.57 | 3.12 | <0.01 |
| Psychoeducation | 1.77 | 0.37 | 1.04 | 2.49 | 4.79 | <0.001 |
| Social support | 1.66 | 0.49 | 0.69 | 2.63 | 3.36 | <0.001 |
| TCM | 1.24 | 0.41 | 0.44 | 2.04 | 3.04 | <0.01 |

Q = 31.20, df = 8, p = 0.0001; R2 = 69%; n = 26 studies

**Table A7**

Meta−regression analyses for psychotherapies only.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Covariate | Beta | Standard Error | 95% CI  Lower | Upper | Z-value | 2-sided P-value |
| Intercept | −0.71 | 0.14 | −0.99 | −0.44 | −5.11 | 0 |
| Interpersonal | 0.49 | 0.26 | −0.02 | 0.99 | 1.88 | 0.06 |
| therapy |  |  |  |  |  |  |
| Mindfulness | 0.16 | 0.31 | −0.44 | 0.77 | 0.53 | 0.60 |
| Psychoeducation | 0.01 | 0.20 | −0.38 | 0.41 | 0.07 | 0.95 |

Q = 4.08, df = 3, *p* = 0.2529; *R*2 = 24%

**Table A8**

Inter−coder agreement of the taxonomy of interventions.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | N | Range | Minimum | Maximum | Mean | Std. Deviation |
| Elements | 61 | 0.35 | 0.65 | 1.00 | 0.9924 | 0.04706 |
| Valid N (listwise) | 61 |  |  |  |  |  |

**Table A9**

Inter-coder agreement of risk of bias.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | N | Range | Minimum | Maximum | Mean | Std. Deviation |
| bias | 7 | 0.16 | 0.84 | 1.00 | 0.9504 | 0.06591 |
| Valid N (listwise) | 7 |  |  |  |  |  |

**Table A10**

PRISMA 2009 check list.

|  |  |  |
| --- | --- | --- |
| Section/topic | # | Checklist item |
| *Title* |  |  |
| Title | 1 | Identify the report as a systematic review, meta-analysis, or both. |
| *Abstract* |  |  |
| Structured summary | 2 | Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and |
|  |  | interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review |
|  |  | registration number. |
| Introduction |  |  |
| Rationale | 3 | Describe the rationale for the review in the context of what is already known. |
| Objectives | 4 | Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and |
|  |  | study design (PICOS). |
| *Methods* |  |  |
| Protocol and registration | 5 | Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information |
|  |  | including registration number. |
| Eligibility criteria | 6 | Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication |
|  |  | status) used as criteria for eligibility, giving rationale. |
| Information sources | 7 | Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the |
|  |  | search and date last searched. |
| Search | 8 | Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated. |
| Study selection | 9 | State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta- |
|  |  | analysis). |

(*continued on next page*)

**Table A10** (*continued*)

|  |  |  |
| --- | --- | --- |
| Section/topic | # | Checklist item |
| Data collection process | 10 | Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and |
|  |  | confirming data from investigators. |
| Data items | 11 | List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made. |
| Risk of bias in individual studies | 12 | Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or |
|  |  | outcome level), and how this information is to be used in any data synthesis. |
| Summary measures | 13 | State the principal summary measures (e.g., risk ratio, difference in means). |
| Synthesis of results | 14 | Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I2) for each |
|  |  | meta-analysis. |
| Risk of bias across studies | 15 | Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies). |
| Additional analyses | 16 | Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre- |
|  |  | specified. |
| *Results* |  |  |
| Study selection | 17 | Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally |
|  |  | with a flow diagram. |
| Study characteristics | 18 | For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations. |
| Risk of bias within studies | 19 | Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12). |
| Results of individual studies | 20 | For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect |
|  |  | estimates and confidence intervals, ideally with a forest plot. |
| Synthesis of results | 21 | Present results of each meta-analysis done, including confidence intervals and measures of consistency. |
| Risk of bias across studies | 22 | Present results of any assessment of risk of bias across studies (see Item 15). |
| Additional analysis | 23 | Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]). |
| *Discussion* |  |  |
| Summary of evidence | 24 | Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., |
|  |  | healthcare providers, users, and policy makers). |
| Limitations | 25 | Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, |
|  |  | reporting bias). |
| Conclusions | 26 | Provide a general interpretation of the results in the context of other evidence, and implications for future research. |
| *Funding* |  |  |
| Funding | 27 | Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review. |

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