Review Article

Efficacy of psychosocial interventions for psychological distress among women undergoing termination of pregnancy for fetal anomaly: a systematic review

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Background: Accumulating evidence shows that women experience serious psychological distress after terminating their pregnancy for fetal anomaly (TOPFA). Although the number of studies on psychosocial interventions (PSIs) for TOPFA women has increased, access to evidence-based support for medical staff who provide care to TOPFA women remains limited. A systematic review was conducted to provide an overview of available PSIs.

Methods: Nine major electronic databases in available in English and Chinese languages were searched to identify articles published from the databases' inception to November 2021. Our participants were TOPFA women; interventions were PSIs; the comparison was no limits; outcomes were psychological distress including depression, anxiety, and post-traumatic stress (PTSD); and study designs were experimental studies including randomized controlled trials (RCTs) and quasi-experimental studies. The Joanna Briggs Institute Critical Appraisal Checklist for RCTs and quasi-experimental studies was used to assess the quality of evidence. Subsequently, synthesis without meta-analysis of the findings was completed.

Results: A total of 1,730 studies were identified from the initial database, 37 of which were included in this research. The interventions tested included cognitive therapy, mindfulness, sandplay therapy, psychological counseling, family support, peer support, empathy nursing, bereavement care, solution-focused psychological nursing, and staged psychological nursing. Four of these studies were RCTs. Most interventions were implemented in hospitals in China by nurses. However, few studies reported details on implementation procedures, and the studies presented substantial heterogeneity. Most of the included studies were judged to be of high risk of bias.

Discussion: Although this review was limited by search strategies and most of the included studies were of low quality, it still provided some tentative support for PSIs for the treatment of TOPFA women. Further research is warranted to investigate the effects of specific components on TOPFA women by using randomized controlled designs and reporting intervention manuals based on psychotherapeutic theory.

Keywords: Congenital malformation; psychosocial interventions (PSIs); depression; anxiety; post-traumatic stress disorders (PTSD)

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Introduction

Fetal anomalies, also known as birth defects, refer to structural or chromosome abnormalities that occur while the fetus is developing in the womb. The incidence of fetal anomalies ranges from 2% to 4% (1-3), and about 47–97% of women who are diagnosed with fetal malformation choose to terminate their pregnancy (4,5). Termination of pregnancy for fetal anomaly (TOPFA) is a bereavement experience for women that lead to feelings of sadness, guilt, stigma, doubt, anxiety, and grief (6,7). Women who have undergone TOPFA are at risk for serious, prolonged psychological distress, including depression, anxiety, and post-traumatic stress (PTSD) (8). The prevalence of depressive symptoms in TOPFA women is up to 65.6% (9). Korenromp *et al.* (10) reported that 44% of TOPFA women experienced high levels of PTSD, which was 10 times higher than that of women who had given birth via normal delivery. Moreover, their grief and PTSD symptoms persisted for 2 to 7 years after TOPFA (11).

Psychological distress is reportedly associated with various adverse health outcomes for women, including labor pain, increased obstetric complications, and postpartum involution of the uterus (12). Prolonged psychological distress also cause adverse psychological influence to the next pregnancy (11), and it is linked to high rates of maternal and fetal complications, such as spontaneous abortion, preeclampsia, and low birth weight/small-for-gestational-age infants (13,14). Moreover, untreated maternal psychological distress has a negative effect on the women's family (15-17). Mothers with a high perinatal distress have over twice the odds of developmental delay, and this condition is related to behavioral problems in infants (15). Furthermore, the medical cost for the treatment of psychological distress poses a huge financial burden to the family. A systematic review estimated that the value of total lifetime costs of perinatal depression (anxiety) is £75,728 (£34,811) per woman with this condition (17). Therefore, effective interventions are imperative to reduce the psychological distress among TOPFA women (18).

Psychosocial intervention (PSI) is defined as physical, cognitive, or social activities aimed at improving people's psychological health and emotional and social well-being (19). It includes all psychological interventions and social interventions, including counseling, cognitive behavioral therapy, family support, or peer support. Several studies on the effects of PSIs on TOPFA women have been recently conducted, but the intervention programs they implemented were different and their results were controversial (20-22). A systematic review showed that PSIs are somewhat effective in reducing perinatal depressive symptoms (23), but the effects of PSIs on TOPFA women remain inconclusive. To the best of our knowledge, no systematic review that summarized the effects of the characteristics of PSIs on TOPFA women has been performed yet. Therefore, the purpose of this review is to (I) identify studies that have explored the effects of PSIs on TOPFA women and (II) summarize the characteristics of these PSIs. This study will provide evidence to support clinical health providers in delivering effective PSIs for TOPFA women. Moreover, it will contribute to the improvement of the quality of future research on PSIs for women with TOPFA. We present the following article in accordance with the PRISMA reporting checklist (available at https://apm.amegroups.com/article/view/10.21037/apm-21-2415/rc).

Methods

This was a systematic review without meta-analysis. The review protocol was registered with the PROSPERO database (registration number CRD42020186181).

Eligibility criteria

Participants

The participants to this study were women who decided to terminate their pregnancy because of fetal anomaly or had experienced pregnancy termination following a fetal anomaly diagnosis.

Interventions

Interventions included any PSI, including psychotherapy, counseling, psychoeducation, various support, or any combination of these interventions.

❖ The interventions were conducted via face-to-face

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consultations (individual or group), over telephone calls, or online.
- ❖ The providers of the interventions were nurses, doctors, psychiatrists, psychologists, social workers, family supporters, or other allied health caregivers.
- ❖ The duration, length, or frequency of the interventions had no limit.

Comparisons

Comparisons included blank control, standard/usual care, or other nonpharmacological interventions.

Outcomes

The outcomes included any of the following psychological outcomes as measured by a validated measurement tool (as follows) or evaluated through interviews.
- ❖ Depression [e.g., Edinburgh Postnatal Depression Scale (EPDS), Beck Depression Inventory (BDI), Hamilton Depression Rating Scale (HAMD), and Self-Rating Depression Scale (SDS)];
- ❖ Anxiety [e.g., State-Trait Anxiety Inventory (STAI) and Self-Rating Anxiety Scale (SAS)];
- ❖ PTSD [e.g., Impact of Event Scale-Revised (IES-R) and Clinician-Administered PTSD Scale (CAPS)].

Study design

Randomized controlled trials (RCTs) and quasi-experimental studies were included herein. Quasi-experimental study was defined as experimental studies without random allocation, which may or may not have comparison groups, including one-group pretest—post-test design, interrupted time series design, static-group comparison design, difference-in-differences design, and regression discontinuity design (24).

Study selection

Nine electronic databases (five international online databases and four local online databases) were searched: PubMed, Embase, Cochrane Library, PsycINFO, EBSCO (including CINAHL, APA PsycARTICLES, and Psychology and Behavioral Sciences Collection), China National Knowledge Infrastructure (CNKI), Chinese Scientific Journal Database (VIP Database), Chinese Biomedical Literature Database (CBM), and Wan Fang Database for Chinese Technical Periodicals. The initial literature search was performed in February 2020, and the search was updated in July 2020 and November 2021. The search terms consisted of four parts: fetal anomaly, pregnancy termination, PSIs, and psychological outcomes. The search strategy implemented here had a little difference according to the different databases (see the detailed search strategy in Appendix 1).

Studies that met our eligibility criteria and published in English or Chinese were included. Studies with repeated publication data and conference abstracts were excluded.

The studies identified from each database were imported to Endnote X9 and duplicates were removed. Two reviewers (JX and HP) independently screened the titles and abstracts to identify relevant studies. Subsequently, they assessed the full texts of these studies to determine their inclusion for eligibility. Finally, the reference lists of eligible studies were scanned for relevant articles. A third reviewer (CH) resolved disagreements during this process.

Assessment of methodological quality

Two critical appraisal tools (25,26) were used to assess the quality of the included studies. The Joanna Briggs Institute (JBI) Critical Appraisal Checklist was used for RCTs, and the JBI Critical Appraisal Checklist for Quasi-Experimental Studies (2017) was utilized for quasi-experimental studies. The checklist for RCTs included 13 critical appraisal questions, whereas the checklist for quasi-experimental studies included 9 questions. Each question was followed by an in-depth explanation and was judged by "Yes", "No", "Unclear", or "Not Applicable." Both tools were developed for literature quality assessment in systematic reviews and had been confirmed as reliable and valid tools (27). The quality of eligible studies was critically appraised by two independent reviewers (SH and TO). Any disagreement was resolved by a third reviewer (JL). The critical appraisal results are reported in tables (see Appendix 2).

Data extraction

The following data were extracted by two independent reviewers (JX and TO): country, design, participants, interventions, duration and frequency of treatment, provider, modes, final follow-up, outcome measures, and description of main results. Discrepancies in the data extraction phase were resolved through discussion until a consensus was reached.

Data synthesis

A meta-analysis was not conducted because of substantial

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heterogeneity between the included studies. Therefore, synthesis without meta-analysis (SWiM) (28,29) was performed to summarize the included studies, which primarily relied on texts and tables to summarize and explain our findings.

Results

Study selection

A total of 1,730 studies were retrieved from the databases (PubMed =315; Embase =416; Cochrane library =16; PsycINFO =203; EBSCO =125; CNKI =192; VIP Database =46; CBM =173; Wan Fang Database =239; identified from the reference lists of the included articles =5). Following the removal of duplicate studies (n=352), 1,372 unique studies were identified. Furthermore, 1,263 were excluded after reviewing their titles and abstracts, leaving 109 potentially relevant articles for full-text review. After the full-text review, we included 37 articles according to our eligibility criteria, representing 37 unique intervention studies (*Figure 1*).

Methodological quality

The results of quality assessment are presented in Appendix 2. Only 4 of the 37 included studies (20-22,30) were RCTs, but there were high risk of bias in these RCTs, such as high randomization risk of bias (1 study), inadequate information on allocation concealment, which may cause selection bias (1 study); no blinding among participants, researchers, and outcome assessors probably causing performance bias (4 studies); and no intention-to-treat analysis potentially leading to follow-up bias (2 studies). Thirty-three studies were identified to be quasi-experimental studies. The defects among quasi-experimental design in the studies reviewed herein were no control group (3 studies), no pre-measurements (2 studies), and no training of measurers (29 studies).

Interventions and study characteristics

A total of 37 trials of PSIs representing a sample size of 3,168 TOPFA women were included. Of these studies, 33 were conducted in China, and the remaining were conducted in Germany, Portugal, England, and Australia. All the interventions were delivered during hospitalization, and 7 studies (20,22,31-35) offered continuous intervention after discharge. In 29 of 37 studies, the interventions were provided by nonspecialist mental health workers who were general nurses, doctors and midwiferies without specialist mental health training. In other 8 studies, the interventions were delivered by psychotherapists or certified researchers (who have relevant certification in psychotherapy). Various ways were used for the delivering of interventions such as face-to-face, online (20,34) or combined online and face-to-face modes (22,33,34). The duration of interventions ranged from approximately 5 days to 6 weeks. The follow-up time was inconsistent, ranging from after intervention to 20 months after intervention. The most commonly used measurements for depression were SDS (19 studies), followed by EPDS (7 studies), BDI (2 studies), Symptom Checklist-90 (SCL-90) (3 studies), and HAMD (1 study); for anxiety, the most commonly adopted measurements were SAS (23 studies), SCL-90 (3 studies), and STAI (1 study); for PTSD symptoms, the most commonly utilized measurements were IES-R (7 studies) and CAPS (1 study). The details of the PSIs and the studies' characteristics are presented in *Tables 1*,*2*, respectively. The interventions employed widely varied but had substantial overlap. We classified these PSIs to 10 groups base on their intervention programs: (I) cognitive therapy, (II) mindfulness, (III) sandplay therapy, (IV) psychological counseling, (V) family support, (VI) peer support, (VII) empathy nursing, (VIII) bereavement care, (IX) solution-focused psychological nursing, and (X) staged psychological nursing and health education (the number of studies are shown in *Figure 2*). And then, three categories were extracted: psychotherapy, social support, and clinical psychological care (*Table 2*). The quantitative details of study findings are summarized in *Table 3*.

Psychotherapy

In this review, psychotherapy was defined as interventions guided by psychological theories aimed to help patients deal with psychological problem or promote mental health. Three studies (20,21,30) directed the intervention by using cognitive theory, two used mindfulness (32,36), one used sandplay therapy, and the remaining two studies conducted psychological counseling by a psychotherapist (31,37).

Cognitive therapy

Kersting *et al.* (20,38,39) completed a well-designed RCT that resulted in three seminal publications. The study recruited 228 parents after prenatal loss (92% in women) in Germany. They implemented a five-week Web-based intervention that comprised of structured written disclosure

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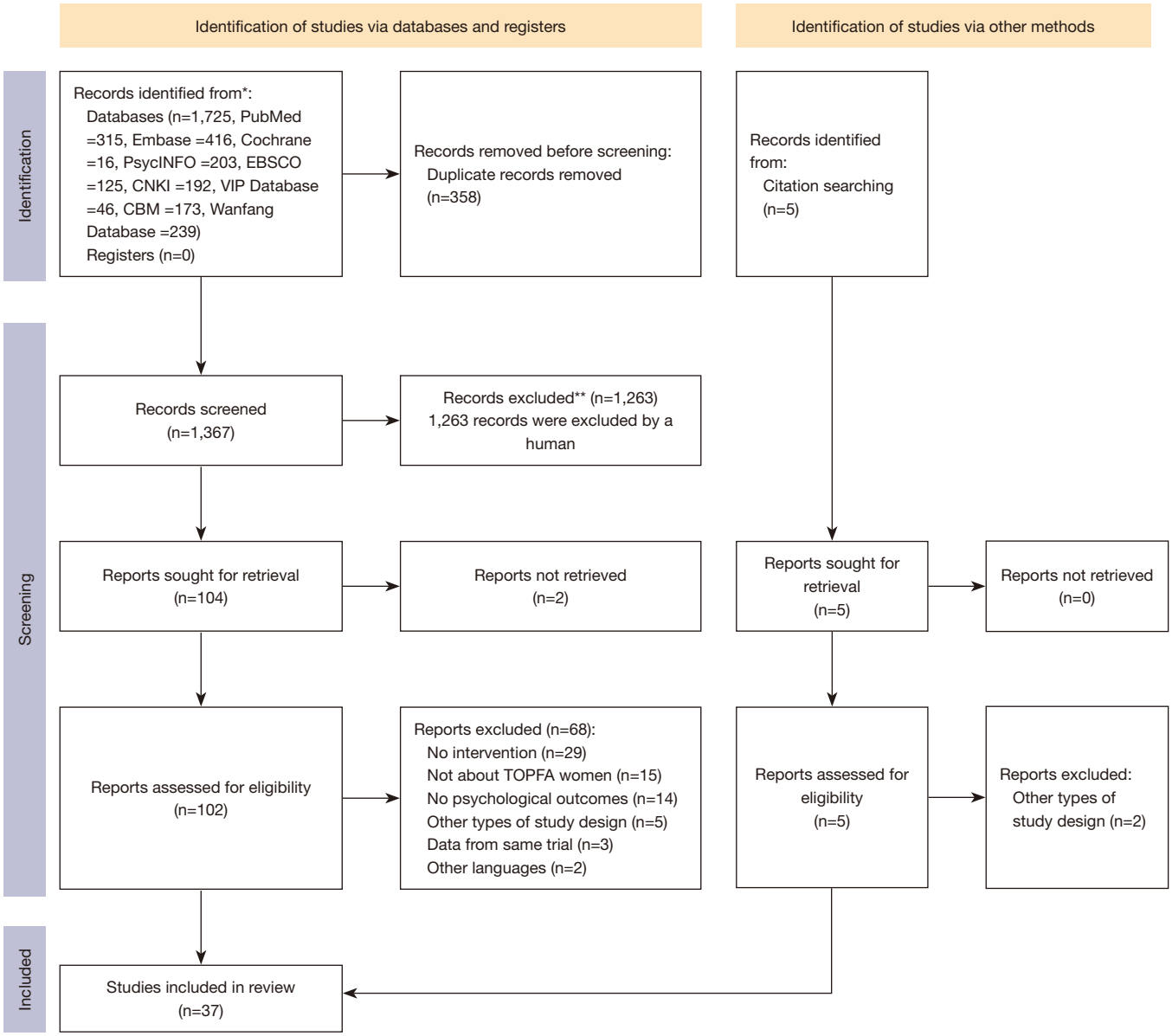

Figure 1 PRISMA flow diagram of the search and study selection process. *, consider, if feasible to do so, reporting the number of records identified from each database or register searched (rather than the total number across all databases/registers); **, if automation tools were used, indicate how many records were excluded by a human and how many were excluded by automation tools. From: Page MJ, McKenzie JE, Bossuyt PM, *et al.* The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. For more information, visit: (http://www.prisma-statement.org/). TOPFA, termination of pregnancy for fetal anomaly.

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Table 1 Intervention characteristics

Study	Country	Interventions		Duration and frequency of treatment	Provider	Modes
		TG	CG			
Kersting, 2013	Germany	Internet-based cognitive behavioral intervention	WLC	Two weekly 45 min writing assignments for over five weeks	Psychotherapist	Online
Rocha, 2018	Portugal	Cognitive narrative therapy	Routine care	Four weekly sessions of 60 min each during hospitalization (one week)	Psychotherapist	Face to face
Zeng, 2017	China	Mindfulness training intervention	Routine health education + community routine postpartum visit	Four sessions for 1.5 to 2 h each during hospitalization; self-practice at home every day for three weeks after discharge	Trained and certified researchers	Face to face
Yi, 2019	China	Group activities of mindfulness and decompression; one-to-one nondirective psychological counseling	Routine care and perioperative health guidance	During hospitalization, but frequency was not mentioned	Psychotherapist and nurses	Face to face
Lilford, 1994	England	Routine counseling	Selective counseling	Six times on average; duration and frequency were not mentioned	Psychotherapist	Face to face
Langer, 1989	Austria	Prospective counseling	WLC	Diagnostic phase: 1.5 h; termination of pregnancy duration: 0.5 h upon admission; in-patient phase duration: 20 min daily, 1 h on the last day; follow-up duration: 2 appointments, 1 h each (1–2 and 8–10 weeks after abortion)	Psychotherapist	Face to face
Sun, 2018	China	Family support program care	Routine care	During hospitalization and after discharge, but frequency was not mentioned	A multidisciplinary team	Face to face combined with online follow-up
Deng, 2019	China	Health education; online information support and peer support	Routine care	During hospitalization and after discharge, but frequency was not mentioned	Nurses and families	Face to face combined with online follow-up
Wei, 2018	China	Family support program care	Routine care	During hospitalization, but frequency was not mentioned	Nurses and families	Face to face
Zhang, 2018	China	Internet-based peer support program	Routine care	During hospitalization and after discharge, but frequency was not mentioned	Nurses and peers	Online
Song, 2017	China	Face to face peer support	Routine care	Three times per week, 0.5 h each time, and on the last week of hospitalization	Nurses and Peers	Face to face
Yuan, 2018	China	Empathy nursing	Routine care	During hospitalization, but frequency was not mentioned	A multidisciplinary team	Face to face
Liang, 2020	China	Bereavement care: farewell ceremony based on the palliative care concept	Routine care	During hospitalization, and the farewell ceremony lasted for 30–60 min	Nurses	Face to face

Table 1 (*continued*)

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Table 1 (*continued*)

Study	Country	Interventions		Duration and frequency of treatment	Provider	Modes
		TG	CG			
Wu, 2015	China	Clinical support service program	Routine care	During hospitalization, but frequency was not mentioned	A multidisciplinary team	Face to face
Huang, 2013	China	Bereavement care	Normal delivery group with routine nursing	During hospitalization and after discharge, but frequency was not mentioned	Nurses	Face to face
Lan, 2012	China	Bereavement care	No	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Yu, 2011	China	Solution-focused psychological nursing	No	Intervention was conducted 1–6 times, with an average of 2.59±1.05 times, 15–60 min, with an average of 39.54±16.32 min during hospitalization	Nurses	Face to face
Wang, 2012	China	Solution-focused psychological nursing	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Xu, 2012	China	Staged psychological nursing and health education	The objectives' score of HAMD ranged from 15 to 17, routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Ying, 2009	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Gao, 2017	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Chu, 2019	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Duan, 2018	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Wen, 2016	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Yuan, 2017	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Zhang, 2016	China	Staged psychological nursing and health education	Routine care	Not mentioned	Nurses	Face to face
Zhou, 2018	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face

Table 1 (*continued*)

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Table 1 (*continued*)

Study	Country	Interventions		Duration and frequency of treatment	Provider	Modes
		TG	CG			
Zhang, 2015	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Guo, 2014	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Li, 2019	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Gao, 2017	China	Staged psychological nursing and health education	No	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Qian, 2021	China	EW	Usual care	A 15-min session was conducted on the day of admission, and on the first and second days after delivery (three sessions in total)	Researchers who received training in the application of EW	Face to face
Guo, 2021	China	Sandplay therapy	Routine nursing	A 60-min session (including a 30-min evaluation and information collection) was conducted within 3 days after admission, within 3 days after induced labor, and 42 days after induced labor	Trained and certified researchers	Face to face
Shi, 2021	China	Bereavement care	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Zhang, 2020	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Zhu, 2020	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face
Zhang, 2020	China	Staged psychological nursing and health education	Routine care	During hospitalization, but frequency was not mentioned	Nurses	Face to face

TG, treatment group; CG, control group; WLC, wait-list control; HAMD, Hamilton Depression Rating Scale; EW, expressive writing.

and cognitive behavioral therapy. The topics included self-confrontation, cognitive reappraisal, and social sharing. The treatment group showed remarkably reduced PTSD symptoms, prolonged grief, depression, and anxiety relative to the wait-list control (WLC). Furthermore, reductions in symptoms at the post-treatment time point were maintained at the 3- and 12-month follow-up periods (20). Qian *et al.* (30) conducted an open RCT with a parallel-group design. Expressive writing was used, and the writing topics were similar to those used by Kersting *et al.* (20,38,39). The difference was that the intervention frequency of Qian *et al.* (30) was three 15-min writing sessions during hospitalization. They notably improved PTSD symptoms after the intervention compared with the control group, but they did not observe a remarkable difference in the 1-month follow-up period. Moreover, they noted a considerable improvement in post-traumatic growth, but the effects of resilience were not substantial. Rocha *et al.* (21)

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Table 2 Elements of PSIs

Type	Theory model	Elements
Psychotherapy		
Cognitive therapy (including expressive writing)	Based on exposure techniques and cognitive behavioral therapy	Self-confrontation
		Cognitive reappraisal
		Social sharing
	Based on cognitive narrative therapy and the Ottawa decision framework	Decision
		Subjectivation
		Metaphorization
		Projecting
Mindfulness	Based on mindfulness/ meditation	Recognizing the inertia of thinking
		Living at present
		Mindfulness: body scanning exercises, 8-min breathing and body meditation, 3-min breathing space practice, and mindfulness yoga
		Goal setting
Sandplay therapy	Psychodynamic theories of play therapy	Before intervention: psychological assessment and information collection
		Intervention: meditation for 5 min to relax; explaining the sandplay, and completing the sandplay works in 10 min; sharing the feelings and the representative significance of the sandplay works; analyzing the connotation of their sandplay works
		After intervention: naming the sandplay works and taking a photograph
Psychological counseling	Routine counseling: based on grief counseling and grief therapy by Worden [1983]	Four overlapping stages: • To accept the reality of the loss • To experience the pain of grief • To adjust to an environment in which the lost person is missing • To withdraw emotional energy and reinvest it in another relationship
	Prospective counseling: based on crisis intervention, systemic therapy, and behavioral therapy	Diagnostic phase: contact as early as possible, offer continuous counselling, activate social support systems
		Termination of pregnancy: continuous, reliable, supportive care; explain medical procedures, especially abortion versus birth
		In-patient phase: see and touch baby (healthy versus sick) final session before discharge from the ward
		Follow-up: recollection of phantasies and reality, couple relationship
Social support		
Family support	Based on psychological stress theory and social exchange theory	First stage: information support package; education in family support (including emotional support, information support, instrument support, listening skills, and creating a detailed family-support plan)
		Second stage: postpartum guidance
		Third stage: online real-time guidance and communication; follow-up and consultation

Table 2 (*continued*)

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Table 2 (*continued*)

Type	Theory model	Elements
Peer support	According to the three core characteristics of peer support, namely, information support, emotional support, and evaluation support	Information support: give relevant suggestions based on the peer's experience
		Emotional support: encourage to express emotions and listen patiently; give care and encouragement; help seek support resources; organize activities
		Evaluation support: evaluate emotional state; guide positive emotions; share experience and convey positive beliefs
Clinical psychological nursing		
Empathy nursing	Not mentioned	Active listening, transposition thinking, empathy, information arrangement, information feedback, and empathy experience
Bereavement care	Not mentioned	Obstetric treatment and eugenics consultation
		Farewell and mourning ceremony: encourage couples to say goodbye to the fetus
		Bereavement care and family education: listen actively; encourage to express their sadness; communicate patiently; implement psychological counseling; meet the psychological needs of the mother and families
Solution-focused psychological nursing	Not mentioned	Describe the problem
		Construct the target
		Explore serendipitous benefits
		Give positive feedback to the patients and their families
		Evaluate the progress
Staged psychological nursing and health education	Not mentioned	Care before labor induction: assess psychological problems; devise a nursing plan; communicate, listen, and support actively; encourage expression; meet the reasonable demand; strengthen their psychological support system
		Care during labor induction: assess mental state and needs; allow family members to accompany; comfort and encourage puerpera to cooperate; relaxation
		Care after induced labor: tell them about fetal malformations and explain the impact; visit the fetus if necessary; arrange women to live in a non-mother and baby room; observe the intensity of uterine contraction and vaginal bleeding; guide them to eugenic outpatients
		Psychoeducation: conduct personalized health education, including successful cases, precautions of inducing labor, and knowledge of eugenic education

PSIs, psychosocial interventions.

evaluated a psychological intervention based on cognitive narrative therapy and the Ottawa decision framework. The intervention consisted of four sessions provided by a clinical psychologist and focused on decision, subjectivation, metaphorization, and projection. They reported that these interventions effectively reduced symptoms of anxiety and depression. Although the differences between groups were not remarkable for perinatal grief, the participants rated the intervention as highly satisfactory.

Mindfulness

Two studies (32,36) tested interventions that incorporated mindfulness to improve the psychological outcomes of TOPFA women. These studies were quasi-experimental studies that involved a total of 245 women who had experienced TOPFA. The intervention content of Zeng *et al.* (32) included recognizing the inertia of thinking, living at present, mindfulness, and goal setting. Yi *et al.* (36) reported insufficient information on intervention details. Their results suggested that mindfulness-based interventions can alleviate the symptoms of depression and anxiety in TOPFA women in the short term. Additionally, a study (32) reported that mindfulness-

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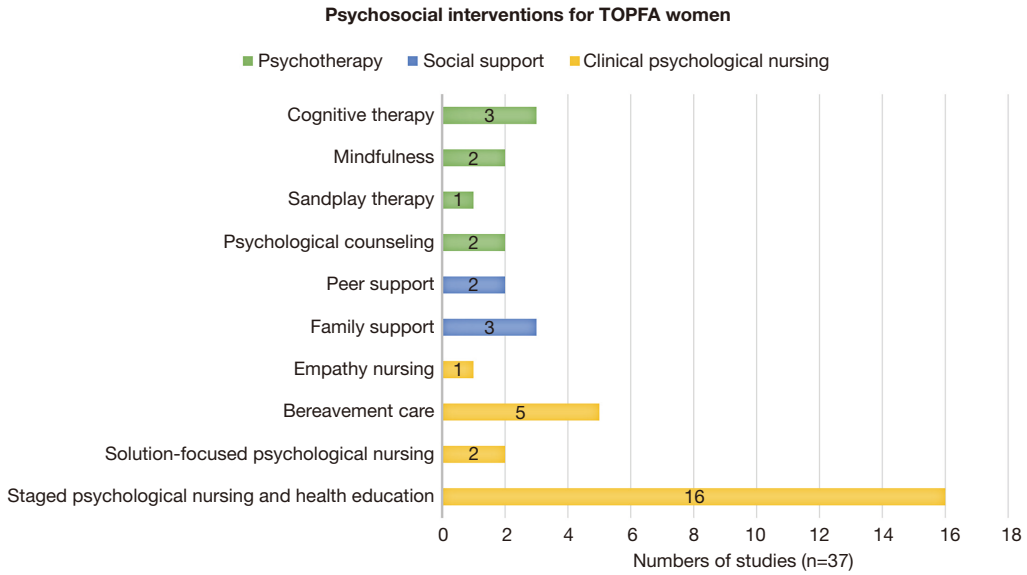

Figure 2 PSIs for TOPFA women implemented by the studies included in this review. TOPFA, termination of pregnancy for fetal anomaly; PSIs, psychosocial interventions.

based interventions improved the mindfulness level of TOPFA women, but their effects on labor pain did not reach a statistically significant level. Zeng *et al.* (32) involved 101 TOPFA women, but only 89 cases completed the intervention, and the attrition rate of the test group was 18%, which was three times higher than that of the control group (5.9%). Another study (36) that conducted group-based mindfulness decompression activities during hospitalization had a low dropout rate. Furthermore, both studies measured the effects of the interventions before and after implementing them without long-term follow-up. Thus, the long-term effects of the mindfulness-based interventions were unknown.

Sandplay therapy

Guo *et al.* (40) evaluated the effects of sandplay therapy on the negative emotions of TOPFA women. Sandplay therapy is a psychotherapeutic method especially applied to persons who have experienced trauma, distress, and migration issues, and it is grounded on the theoretical background of the psychodynamic theories of play therapy (41). The intervention plan of Guo *et al.* (40) was formulated on the basis of the women's educational level, personality characteristics, and gestational history. A 60-min session (including 30-min assessment and information collection time) was conducted within 3 days after registration, within 3 days after induced labor, and 42 days after induced labor. The content of each session mainly included meditation, completing sandplay works, and analyzing the connotation of the sandplay works, all of which were completed by trained certified researchers. Eighty-one women received sandplay therapy, and 76 received routine care. Results showed remarkable improvements in the symptoms of PTSD and depression in the intervention group.

Psychological counseling

Lilford *et al.* (37) conducted a trial of routine versus selective counseling to evaluate the effects of routine counseling on psychological well-being after bereavement for fetal abnormality. The counseling was conducted in accordance with the instruction manual of Wodern [1983], which is composed of four overlapping stages: to accept the reality of the loss, to experience the pain of grief, to adjust to an environment in which the lost person is missing, and to withdraw emotional energy and reinvest it in another relationship. This counseling provided continued support until the next pregnancy. The number of consultations differed from less than 3 to 50, but the mean number of appointments was six. After 16 to 26 months, the counseled group scored slightly lower on depression and reported better adjustment in the interview, but no statistical differences were noted compared with the women in the control group. Langer and Ringler (31) did not devise a rigorous experimental design but conducted a post-test study with a waiting list condition. It mainly presented a prospective counseling model for parents who have

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Table 3 Study findings

Study	Design	Participants, n, total (TG/CG)	Final follow-up	Outcome measures	Description of the main results
Kersting, 2013	RCT	210 (108/102)	12-month follow-up	IES-R, ICG, BSI	Substantial improvement in all symptoms of PTSD and prolonged grief was found. Treatment effects were d =0.84 and 1.02 for PTSD and prolonged grief, respectively
Rocha, 2018	RCT	91 (24/67)	6 months after TOP	BDI, SAS, PGS	Levels of anxiety and depression were markedly lower in treatment groups, with effect sizes on the follow-up of 0.54 for depression, 0.41 for anxiety, and 0.23 for perinatal grief
Zeng, 2017	Pre/post study with control group	101 (50/51)	After intervention	MAAS, SAS, SDS and VAS	Remarkable improvement in anxiety, depression, and mindfulness levels was found. No notable differences in labor pain at post-test were found between experimental and control groups*
Yi, 2019	Pre/post study with control group	144 (72/72)	After intervention	SAS and SDS	The levels of anxiety and depression of the treatment group markedly improved
Lilford, 1994	Pre/post-test study with control group	57 (35/22)	16 to 20 months after the loss	Modified Expanded Texas Inventory of Grief, IDA scale, and structured psychological interview	No difference between the treatment and control groups*. Within the treatment group, women who attended counselling had a considerably better outcome than women who defaulted from counselling
Langer, 1989	Post-test study with control group	16 (13/3)	8–10 weeks after the abortion	Interview	Talks with parents and the family, naming the baby anticipatorily, accompanied full-time by their partners, seeing and touching their baby made the women felt strengthened
Sun, 2018	RCT	124 (62/62)	42 days after termination = after intervention	EPDS, IES-R, Family APGAR	Remarkable improvement in depression, PTSD symptoms, and family function was observed. No notable improvements in the domains of adaptation, partnership, growth, and affection were observed in the intervention participants*
Deng, 2019	Pre/post study with control group	86 (43/43)	42 days after termination = after intervention	SAS, SDS, and FACES II-CV	Anxiety and depression levels substantially improved. Family intimacy and family adaptability were further strengthened
Wei, 2018	Pre/post study with control group	85 (42/43)	After intervention	SAS, CAPS and FACES	Anxiety, PTSD symptoms, and family functioning substantially improved
Zhang, 2018	Pre/post study with control group	100 (50/50)	42 days after termination = after intervention	EPDS, IES-R, and platform usage questionnaire	The depression levels and PTSD symptoms in the experimental group substantially improved compared with those in the control group
Song, 2017	Pre/post study with control group	24 (12/12)	3 weeks after intervention	STAI, BDI, and self-nursing knowledge assessment questionnaire	Compared with the control group, the anxiety and self-nursing knowledge levels in the treatment group remarkably improved, but no notable difference in the score of depression was observed*

Table 3 (*continued*)

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Table 3 (*continued*)

Study	Design	Participants, n, total (TG/CG)	Final follow-up	Outcome measures	Description of the main results
Yuan, 2018	Pre/post study with control group	78 (39/39)	After intervention	SAS, SDS, VRS-5, and the Nursing Service Satisfaction Scale	Anxiety, depression, labor pain, and satisfaction substantially improved in the observation group compared with those in the control group
Liang, 2020	Pre/post study with control group	62 (30/32)	30 days after the termination	SAS, SDS, and EPDS	Levels of anxiety and depression in the treatment group were considerably lower than those in the control group
Wu, 2015	Pre/post study with control group	109 (52/57)	30 days after discharge	SAS, SDS, and EPDS	Anxiety and depression levels substantially improved in the experimental group
Huang, 2013	Pre/post study with normal delivery group	300 (150/150)	42 days after termination = after intervention	EPDS	On the 1st and 6th days after delivery, the incidence of depression in the treatment group was markedly higher than that in the control group, but no difference was noted at 42 days after delivery
Lan, 2012	Pre/post study without control group	100	After intervention	SAS and SDS	After the intervention, the incidence of anxiety and depression in substantially decreased
Yu, 2011	Pre/post study without control group	22	After intervention	IES-R and TAS, including emotion, cognition, and behavior	After the intervention, the symptoms of PTSD and the emotion, cognition, and behavior of TOPFA women remarkably improved
Wang, 2012	Pre/post study with control group	40 (20/20)	After intervention	SCL-90	After the intervention, the level of anxiety, depression, and interpersonal relationship in the treatment group considerably improved compared with those in the control group
Xu, 2012	Pre/post study with control group	64 (32/32)	After intervention	HAMD	After the intervention, depression level substantially improved
Ying, 2009	Pre/post study with control group	62 (30/32)	After intervention	SAS and VAS	After the intervention, the level of anxiety and pain markedly improved
Gao, 2017	Pre/post study with control group	90 (45/45)	After intervention	SAS and SDS	After the intervention, the levels of depression and anxiety notably improved
Chu, 2019	Pre/post study with control group	58 (29/29)	After intervention	SAS and SDS	After the intervention, the levels of depression and anxiety considerably improved
Duan, 2018	Pre/post study with control group	60 (30/30)	After intervention	SAS, SDS and satisfaction questionnaire	After the intervention, the levels of anxiety and depression markedly improved, and the level of satisfaction was higher in the treatment group than that in the control group
Wen, 2016	Pre/post study with control group	94 (47/47)	After intervention	SAS and SDS	The levels of anxiety and depression in the treatment group were considerably lower than those in the control group

Table 3 (*continued*)

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Table 3 (*continued*)

Study	Design	Participants, n, total (TG/CG)	Final follow-up	Outcome measures	Description of the main results
Yuan, 2017	Pre/post study with control group	120 (60/60)	After intervention	SAS and SDS	After the intervention, the levels of anxiety and depression in the treatment group substantially improved
Zhang, 2016	Pre/post study with control group	78 (39/39)	After intervention	SAS and SDS	After the intervention, the levels of anxiety, depression, and total negative mood were considerably lower in the treatment group than those in the control group
Zhou, 2018	Pre/post study with control group	42 (21/21)	After intervention	SAS and satisfaction and compliance questionnaire	After the intervention, the level of anxiety in the treatment group was better than that in the control group, and the compliance and satisfaction were higher in the former than those in the latter
Zhang, 2015	Pre/post study with control group	61 (30/31)	After intervention	SAS, SDS, and Nursing Service Satisfaction Questionnaire	After the intervention, the levels of anxiety and depression substantially improved in the treatment group compared with those in the control group. Total nursing satisfaction in the observation group was 90.3%, which was considerably higher than that in the control group (76.7%)
Guo, 2014	Pre/post study with control group	24 (12/12)	After intervention	SAS, SDS, MAP, and HR	The levels of anxiety and depression in the treatment group were considerably better than those in the control group. The level of MAP and HR in the experimental group only slightly changed compared with the baseline, whereas that in the control group markedly increased and was statistically different from that in the experimental group
Li, 2019	Pre/post study with control group	54 (27/27)	After intervention	SAS, SDS, and Questionnaire on Knowledge of Induced Labor by Malformed Fetus	Compared with the control group, the levels of anxiety and depression in the treatment group after the intervention substantially improved; the participants in the treatment group had a higher level of knowledge on fetal malformations and induction of labor after the intervention than the control group, and the difference was statistically significant
Gao, 2017	Pre/post study without control group	53	After intervention	SCL-90	After the intervention, the incidence of bad mood remarkably decreased
Qian, 2021	RCT	100 (50/50)	30 days after intervention	IES-R, C-PTGI, and CD-RISC-10	After the intervention, PTSD symptoms in the treatment group substantially improved compared with that in the control group, but no notable difference was observed after 1-month follow-up period*. Moreover, post-traumatic growth considerably improved in the treatment group compared with the control group. However, no remarkable effects on resilience were observed in both groups*
Guo, 2021	Pre/post study with control group	157 (81/76)	42 days after termination = after intervention	IES-R and EPDS	After the intervention, substantial improvements in PTSD symptoms and considerable reduction in depression level were observed
Shi, 2021	Pre/post study with control group	210 (105/105)	After intervention	EPDS	After the intervention, remarkable reduction in depression level was observed

Table 3 (*continued*)

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Table 3 (*continued*)

Study	Design	Participants, n, total (TG/CG)	Final follow-up	Outcome measures	Description of the main results
Zhang, 2020	Pre/post study with control group	94 (48/46)	After intervention	SAS, SDS, and VAS	After the intervention, notable reduction in depression and anxiety levels and remarkable improvement in pain were observed
Zhu, 2020	Pre/post study with control group	100 (50/50)	After intervention	SAS, SDS, and SCL-90	After the intervention, a remarkable reduction in depression and anxiety levels and considerable reduction in SCL-90 total scores were observed
Zhang, 2020	Pre/post study with control group	48 (24/24)	After intervention	SAS and SDS	After the intervention, remarkable reduction in depression and anxiety levels were observed

*, no significance testing performed. TG, treatment group; CG, control group; RCT, randomized controlled trial; IES-R, Impact of Event Scale-Revised; ICG, Inventory of Complicated Grief; BSI, Brief Symptom Inventory; PTSD, post-traumatic stress disorder; TOP, termination of pregnancy; BDI, Beck Depression Inventory; SAS, Self-Rating Anxiety Scale; PGS, Perinatal Grief Scale; MAAS, Mindful Attention Awareness Scale; SDS, Self-Rating Depression Scale; VAS, Visual Analogue Scale; IDA scale, Irritability Depression and Anxiety scale; EPDS, Edinburgh Postnatal Depression Scale; Family APGAR, Family Adaptation Partnership Growth Affection and Resolve Index; FACES II-CV, family adaptability and cohesion evaluation scales II (Chinese version); CAPS, Clinician Administered PTSD Scale (Chinese version); FACES, family adaptability and cohesion evaluation scales; STAI, State-Trait Anxiety Inventory; VRS-5, Verbal Rating Scale; TAS, the Triage Assessment System; TOPFA, termination of pregnancy for fetal anomaly; SCL-90, Symptom checklist-90; HAMD, Hamilton Depression Rating Scale; MAP, mean arterial pressure; HR, heart rate; C-PTGI, the Chinese version of the Post-traumatic Growth Inventory; CD-RISC-10, the 10-item Connor-Davidson Resilience Scale.

experienced TOPFA. The intervention combined elements of crisis intervention, systemic therapy, and behavioral therapy and included four topics: activating social support systems; explaining medical procedures; seeing and touching baby; and recollection of phantasies, reality, and couple relationship. The outcome was evaluated through interviews after the intervention rather than by psychological scales. The participants thought the interventions, such as talking with parents and the family, naming the baby, accompanying them by their partners in the ward throughout the period of labor and parturition, and seeing and touching their baby, were useful.

Social support

Social support comes from friends and other people, including family, and it provides a buffer against adverse life events and enhances the quality of life. Five studies involved social support, including family support (22,33,42) and peer support (34,43).

Family support

Three studies investigated family-support program interventions to improve psychological outcomes and family function in TOPFA women (22,33,42). Sun *et al.* (22) conducted a family-support program for 124 participants in their RCT. Compared with the patients who received routine care, the TOPFA women who completed the three stages of the family support program (the details are reported in *Table 3*) had substantially lower depression and PTSD symptoms and had a marked improvement in family function 42 days after induced labor. However, they found no remarkable difference between the two groups in the intrusion domain of PTSD. Although the mean scores for the domains of adaptation, partnership, growth, and affection were higher in the treatment group than those in the control group, the differences were not considerable in the domain of family function. Other non-RCTs also supported family support programs. Wei *et al.* (42) and Deng *et al.* (33) conducted pre- and post-test studies with control groups. Both of them involved a family support team to deliver family support but used different FACES versions to evaluate family functions. Two studies (22,33) used a combination of online and offline methods to provide support to TOPFA women and their families. Compared with routine nursing, the family support programs improved the pregnant women's family function with fetal abnormalities and relieved their depression and PTSD. However, the three studies (22,33,42) only examined the immediate effects of the intervention and did not measure

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the long-term efficacy of this intervention type.

Peer support

Two quasi-experimental studies evaluated the effects of peer support programs on the psychological outcome of pregnant women with fetal malformation. One study (34) included 100 women who had experienced TOPFA, 92 of which completed the study. Compared with 45 patients in the control group, 47 patients in the treatment group who received Web-based peer support had notably improved PTSD and depression symptoms. Nevertheless, only 45% of the pregnant women used the platform every day, indicating that about half of pregnant women do not fully use support systems and do not harness peer support as the primary form of support. In another study (43), 12 peer educators were recruited to conduct one-to-one peer support interviews with 12 patients in the treatment group. Results showed that after the intervention, the participants in both the treatment and control groups improved their knowledge of anxiety, depression, and self-care, but the improvement in depression in the treatment group was not notable compared with that in the control group.

Clinical psychological nursing

Clinical psychological nursing, which is mostly delivered by nurses, primarily provides necessary psychological supports and interventions that address psychological states that appear in patients to eliminate or ease their psychological burden (44). Twenty studies evaluated the effectiveness of clinical psychological nursing on TOPFA women. The intervention included bereavement care, empathy nursing, psychological nursing with a solution-focused approach, staged psychological nursing, and health education.

Bereavement care

Five quasi-experimental studies assessed the effectiveness of bereavement care delivered by a team on psychological problems among TOPFA women (35,45-48). They reported that bereavement care has potential benefits. Liang *et al.* (46), Wu *et al.* (47), and Shi *et al.* (48) conducted pre- and post-test studies with a control group. They demonstrated that bereavement care can effectively lower the level of anxiety and depression symptoms of TOPFA women. One study (46) emphasized the effectiveness of the farewell ceremony based on the palliative care concept. Another study (47) stressed that clinical support service programs, including psychological evaluation, obstetric treatment, grief mourning ceremony, bereavement support, and family education and eugenics consultation, can help in alleviating the anxiety and depression of TOPFA women. A pre- and post-test study (45) without a control group involving 100 cases showed that bereavement care, which included active listening, encouraging expression, health education, encouraging couples to say goodbye to the fetus, and psychological counseling, substantially decreased the incidence of negative emotions in TOPFA women. However, this study did not have a control group. Thus, the conclusion that the intervention caused the result could not be proved. Huang *et al.* (35) enrolled 150 women who had experienced TOPFA and 150 pregnant women who underwent normal delivery. Results showed that the implementation of similar bereavement care gradually improved the degree of depression among TOPFA until their condition was finally close to that of normal parturient women.

Empathy nursing

A study supported the positive effects of empathy nursing on TOPFA patients (49). It used a convenient sampling method to select 78 TOPFA women and randomly divided them into a control group (n=39) and an experimental group (n=39). Empathy nursing included active listening, transposition thinking, information arrangement, information feedback, and empathy. This type of care was administered by a team (four nurse-midwives and an obstetrician) who received training on empathy nursing and cognitive theory based on routine nursing. The patients in the treatment group reported lower depression, anxiety, and pain scores than those in the control group, and they reported higher nursing satisfaction. However, this study did not involve baseline assessment of Verbal Rating Scale (VRS-5) before the intervention was implemented. Thus, the inherent differences between the two groups might be the reason for the discrepancy in the findings. Moreover, it did not mention the duration and frequency of the intervention. More importantly, it did not fully describe the construction of intervention methods.

Solution-focused psychological nursing

Two studies adopted a solution-focused approach to provide psychological nursing to TOPFA women. This approach involved a comprehensive evaluation of the patients' psychological problems and offered specific solutions to these problems through a psychological nursing plan. One (50) had a control group, and it used SCL-90 to evaluate the psychological problems of the participants. The anxiety and depression scores and the interpersonal relationships in the treatment group were notably lower than those in the control group. Another (51) conducted a pre- and post-test study without a control

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group. It employed IES-R and the Triage Assessment System (TAS) (52) to evaluate PTSD symptoms and the influence of TOPFA on women's emotions, cognition, and behavior. After one to six interventions, the women's PTSD symptoms and their emotion, cognition, and behavior considerably improved.

Staged psychological nursing and health education

Sixteen studies evaluated the effectiveness of staged psychological nursing and health education to TOPFA women. Fifteen studies (53-67) conducted pre- and post-test studies with a control group, and one (68) performed a pre- and post-test study without a control group. All of these studies were conducted in China, and nurses delivered the intervention in the hospital. This intervention was divided into pre-termination, during termination, and post-termination nursing intervention. The nursing intervention involved different contents at different stages, such as active listening, accompanying, encouragement, comfort, relaxation, and health education. These studies confirmed that staged psychological nursing can notably improve anxiety and depression. However, the intervention manuals and the intervention dose or frequency of these studies were unknown.

Discussion

This systematic review identified 37 studies that designed and tested the effects of PSIs among TOPFA women. In this review, the PSIs were broadly grouped into three categories: psychotherapy (including cognitive therapy, mindfulness, sandplay therapy, psychological counseling), social support (including family support, peer support), and clinical psychological nursing (including empathy nursing, bereavement care, solution-focused psychological nursing, staged psychological nursing, and health education). However, the data of these studies could not be used to conduct a meta-analysis to compare the effectiveness of different interventions because of their heterogeneity in study designs, intervention content, delivery formats, measurement tools, and follow-up times. Therefore, drawing definitive conclusions is difficult. Nevertheless, several preliminary inferences can be drawn from the available evidence.

PSI is beneficial to the psychological distress of TOPFA women. In this review, 28 of the 30 (93.3%) studies reported that the PSIs substantially improved depression. Moreover, 25 (96.1%) studies reported that the PSIs considerably improved anxiety. Seven studies evaluated the effects of these PSIs on PTSD symptoms. All of them showed that the PSIs remarkably improved PTSD symptoms compared with the control group. A study (37) that compared routine counseling with selective counseling found no statistical difference in depression and anxiety among the TOPFA women. This result indicated that the effects of selective counseling on TOPFA women were not different from those of routine counseling, although positive results were obtained from the interviews after counseling. The aforementioned studies validated that the PSIs had a notable effect on the symptoms of anxiety, depression, and PTSD among TOPFA women. These findings on managing the psychological problems of TOPFA women are encouraging.

Collectively, the reviews illustrated that research on interventions to address the psychological problems of TOPFA women is still replete with challenges. First, with the exception of three studies, most of the studies included herein were quasi-experimental studies. A possible reason is that the number of participants available in the same period for randomized design was insufficient. Nevertheless, a few studies were RCTs. Therefore, more RCTs should be conducted in the future to improve the quality of research on PSI. Second, the PSIs implemented for TOPFA women had marked regional differences (*Table 3* shows that studies were conducted in China, Germany, Portugal, and the UK). The regional differences may be related to limitations in language during retrieval. Furthermore, most of the studies (27/31) were conducted in China. This trend could be attributed to the increase in the number of TOPFA women in China after the two-child policy was implemented (2), a unique state policy that has attracted the attention of researchers in this field. Many studies with an international focus reported on the experience, needs, and coping strategies among TOPFA women, but few of them focused on the psychological problems of this population. In addition, not all TOPFA women have mental health problems and not all are in need of PSIs, but there are no studies excluded participants who had no mental health problems. Therefore, more interventional research should be conducted for TOPFA women who experienced psychological problems in different countries. Third, various types of PSIs had been implemented to meet the needs of TOPFA women, but the number of studies for each intervention is limited. Fourth, most studies did not clearly report the details of the intervention programs they implemented, such as the duration, frequency, content, and process. Finally, the follow-up time was generally short. Thus, confirming the long-term effects of these

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PSIs is difficult because most of the studies evaluated their effectiveness shortly after the intervention only. Therefore, more high-quality studies that explore PSIs and address the aforementioned gaps and limitations should be conducted.

Implications for future research

Future studies should pay more attention to activating social support systems for TOPFA women because much of the stigma comes from communities and societies (7). Social support is an important factor that serves as a buffer for depression and PTSD symptoms among TOPFA women (9,69). Previous studies focused on social support systems, such as family or peer support (9,22,32-34,36,42,43), but they largely ignored the support of community or nongovernmental organizations. While screening the literature for inclusion in this review, we found two articles (70,71) on the support that social organizations provide to this population. However, we did not include them in this review because they were only introductions to models and contents of organizations that offer social support and did not indicate any experimental design. Therefore, the effects of interventions provided by community or social organizations should be considered to generate new ideas for PSIs. This endeavor will allow the continuation of psychological care in nonmedical settings and help eliminate women's perception of stigma from communities and societies. Moreover, PSIs delivered by nonspecialist health workers have been proved to be effective (72-74). Therefore, educating social providers and activating the support that they can provide are key aspects of intervention programs in the future.

Future research is warranted to develop and test framework-based interventions and describe them clearly. Clinical psychological nursing was the primary intervention program implemented by the studies included in our review. Compared with family members and peers without medical education, nurses working on the front line are crucial to detecting psychological distress and providing support to TOPFA women. However, the quality of most of these nurse-led intervention programs included herein was mostly uncertain. Most of them mixed multiple elements, such as comfort, active listening or relaxation, and detailed processes, which were unclear and lacked the guidance of a theory or a conceptual framework. A theoretical background or a conceptual framework can provide information that will be useful in developing intervention programs and analyzing why interventions are effective or ineffective; thus, they can help researchers understand the mechanisms by which PSIs effect change (75,76). Most of the interventions were conducted in four stages: diagnostic phase, termination of pregnancy, in-patient phase, and follow-up period (*Table 2*). Although the elements of the intervention measures provided in each phase are different, they generally include emotional support, information support, psychological support, and activating social support (20-22,31,32,34,37). These elements should provide us a framework that will guide future interventions program for TOPFA women.

Interventions that integrate information technology have also attracted increased attention. In this review, two studies (22,33) delivered information to support and during the follow-up period through the Chinese mobile application WeChat; two studies (20,34) delivered interventions via the Internet. All of these studies reported that the PSIs delivered online had a remarkable positive effect on TOPFA women. The effectiveness of Internet-based interventions in perinatal mental health has also been confirmed (77-80). Moreover, Internet-based interventions are more convenient and have some advantages over offline interventions, such as the fact that it saves on labor, time, and costs (20,81). However, studies on Internet-based delivery of PSIs reported that patients have poor adherence to this modality (34,79). A possible reason is that patients lack an understanding of the intervention and doubt its effectiveness (32,34). Therefore, future research can integrate patient education into Internet-based interventions, strengthen process supervision, and develop personalized Internet-based intervention programs to improve adherence for this population.

Limitations

To the best of our knowledge, this review was the first to characterize different PSIs for TOPFA women. However, this review has several limitations. First, the level of evidence was mixed because the studies included herein had different study designs, and their quality varied in each evidence level. Although a few high-quality studies were included, most of the studies were of moderate to low quality. Therefore, the evidence in this review should be interpreted with caution. Second, synthesizing results across studies was difficult using meta-analysis because of the heterogeneity of the interventions and study designs. Thus, estimates of the effects of each intervention may be imprecise. Finally, although the search approach was thorough, research published in other languages might

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have been overlooked because of language barriers. Thus, this review might have suffered from a potential risk of publication bias.

Conclusions

This review of RCTs and quasi-experimental studies provided some tentative support for the effectiveness of PSIs in TOPFA women. However, the studies were heterogeneous, and the studies of low risk of bias was limited. Owing to this heterogeneity, drawing definitive conclusions on the effectiveness of PSIs is difficult. These findings demonstrated the need for more high-quality RCTs that will design and evaluate the effects of innovative specific PSI programs for TOPFA women.

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Footnote

Reporting Checklist: The authors have completed the PRISMA reporting checklist. Available at https://apm.amegroups.com/article/view/10.21037/apm-21-2415/rc

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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Supplementary

Appendix 1 Search strategies

PubMed

((((("Congenital Abnormalities"[Mesh]) OR "Fetal Diseases"[Mesh]) OR "Genetic Diseases, Inborn"[Mesh])) OR (((fetal[Title/Abstract] OR foetal[Title/Abstract] OR congenital[Title/Abstract] OR fetus[Title/Abstract])) AND (malformation*[Title/Abstract] OR anomal*[Title/Abstract] OR abnormalit*[Title/Abstract]))

AND

((("Abortion, Induced"[Mesh]) OR "Labor, Induced"[Mesh])) OR (((((abortion[Title/Abstract] OR labor[Title/Abstract] OR(terminat*[Title/Abstract] OR end[Title/Abstract] OR interrupt*[Title/Abstract]) AND pregnancy[Title/Abstract])))))

AND

((((("Psychotherapy"[Mesh]) OR "Mental Health Services"[Mesh]) OR "Psychosocial Support Systems"[Mesh])) OR ((((psychosocial[Title/Abstract] OR psychological[Title/Abstract] OR mental[Title/Abstract] OR emotional[Title/Abstract])) AND (intervention*[Title/Abstract] OR counsel*[Title/Abstract] OR therapy[Title/Abstract] OR treatment[Title/Abstract] OR support*[Title/Abstract] OR care[Title/Abstract] OR caring[Title/Abstract] OR nursing[Title/Abstract] OR implementation[Title/Abstract])) OR psychotherapy[Title/Abstract])

AND

((((((((("Depression"[Mesh]) OR "Stress, Psychological"[Mesh]) OR "Mental Disorders"[Mesh]) OR "Anxiety"[Mesh]) OR "Grief"[Mesh]) OR "Stress Disorders, Post-Traumatic"[Mesh]) OR "Psychological Distress"[Mesh]) OR "Guilt"[Mesh]) OR "Sadness"[Mesh])) OR ((((disorder*[Title/Abstract] OR disease*[Title/Abstract] OR illness[Title/Abstract])) AND(psychological[Title/Abstract] OR mental[Title/Abstract] OR emotion*[Title/Abstract])) OR(depression[Title/Abstract] OR anxiet*[Title/Abstract] OR grief[Title/Abstract] OR distress[Title/Abstract] OR posttraumatic stress disorder[Title/Abstract] OR ptsd[Title/Abstract] OR stress[Title/Abstract]))

Hits: 294 (10/6/2020)

Send to - Citation manager - All results - create file - pubmed-Congenital-set-294

Hits: 21 (2020 to 2021-11-20)

Embase

#1 ('fetus malformation'/exp OR 'congenital malformation'/exp OR 'fetus disease'/exp OR 'genetic disorder'/exp OR (('fetal':ti,ab,kw OR 'foetal abnormalit*':ti,ab,kw OR 'fetus':ti,ab,kw OR 'congenital':ti,ab,kw) AND ('abnormalit*':ti,ab,kw OR 'malformation*':ti,ab,kw OR 'anomal*':ti,ab,kw)))

AND

#2 ('induced abortion'/exp OR 'labor induction'/exp OR 'pregnancy termination'/exp OR (('abortion':ti,ab,kw OR 'labor':ti,ab,kw OR 'termint*':ti,ab,kw OR 'interrupt*':ti,ab,kw OR 'end':ti,ab,kw) AND 'pregnancy':ti,ab,kw))

AND

#3 ('psychotherapy'/exp OR 'psychosocial care'/exp OR 'mental health care'/exp OR(('psychotherapy':ti,ab,kw OR 'psychosocial':ti,ab,kw OR 'psychological':ti,ab,kw OR 'mental':ti,ab,kw OR 'emotional':ti,ab,kw) AND ('psychotherapy':ti,ab,kw OR 'intervention*':ti,ab,kw OR 'counsel*':ti,ab,kw OR 'therapy':ti,ab,kw OR 'treatment':ti,ab,kw OR 'support*':ti,ab,kw OR 'care':ti,ab,kw OR 'caring':ti,ab,kw OR 'nursing':ti,ab,kw OR 'implementation':ti,ab,kw)))

AND

#4 ('mental disease'/exp OR (('psychological':ti,ab,kw OR 'mental':ti,ab,kw OR 'emotional':ti,ab,kw) AND ('disease':ti,ab,kw OR 'disorders':ti,ab,kw OR 'illness':ti,ab,kw)) OR 'depression':ti,ab,kw OR 'anxiet*':ti,ab,kw OR 'grief':ti,ab,kw OR 'posttraumatic stress disorder':ti,ab,kw OR 'ptsd':ti,ab,kw OR 'distress':ti,ab,kw OR 'stress':ti,ab,kw)

#5 (#1 AND #2 AND #3 AND #4)

Hits: 379 (10/6/2020)

Export - RIS format (Mendeley, EndNote)

Hits: 37 (10/6/2020-20/11/2021)

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The Cochrane library

ID Search Hits

#1 MeSH descriptor: [Congenital Abnormalities] explode all trees

#2 MeSH descriptor: [Genetic Diseases, Inborn] explode all trees

#3 MeSH descriptor: [Fetal Diseases] explode all trees

#4 ("fetus malformation*" OR "f$etal anomal*" OR "f$etal abnormalit*" OR "f$etal malformation*" OR "congenital anomal*" OR "congenital abnormalit*" OR "congenital malformation*"):ti,ab,kw

#5 #1 OR #2 OR #3 OR #4 18632

#6 MeSH descriptor: [Abortion, Induced] explode all trees

#7 MeSH descriptor: [Labor, Induced] explode all trees

#8 ("abortion" OR "labor" OR ("termint*" OR "interrupt*" OR "end") AND "pregnancy"):ti,ab,kw

#9 #6 OR #7 OR #8 25295

#10 MeSH descriptor: [Mental Health Services] explode all trees

#11 MeSH descriptor: [Psychotherapy] explode all trees

#12 MeSH descriptor: [Psychology, Social] explode all trees

#13 ("psychosocial" OR "psychological" OR "mental" OR "emotional"):ti,ab,kw

#14 ("intervention*" OR "counsel*" OR "therapy" OR "treatment" OR "support*" OR "care" OR "caring" OR "nursing" OR "implementation"):ti,ab,kw

#15 #11 AND #12 OR "paychotherapy":ti,ab,kw

#16 #8 OR #9 OR #10 OR #13112022

#17 MeSH descriptor: [Depression] explode all trees

#18 MeSH descriptor: [Stress, Psychological] explode all trees

#19 MeSH descriptor: [Emotions] explode all trees

#20 MeSH descriptor: [Mental Disorders] explode all trees

#21 ("depression" OR "anxiet*" OR "grief" OR "distress" OR "posttraumatic stress disorder" OR "ptsd" OR "stress" OR ("psychological" OR "mental" OR "emotion*") AND ("disorder*" OR "disease*" OR "illness")):ti,ab,kw

#22 #14 OR #15 OR #16 OR #17 OR #18 224167

#23 #5AND #9 AND #16 AND #22 16

Hits 16 (10/06/2020)

Search Name: TOPFA psychosocial interventions-2

Last Saved: 10/06/2020 11:16:28

Hits 0 (10/06/2020-20/11/2020)

PsycINFO

(fetal OR foetal OR fetus OR congenital) AND (malformation* OR abnormalit* OR anomal*) AND (abortion OR labor OR termint* OR interrupt*) AND (depression OR anxiet* OR grief OR distress OR posttraumatic stress disorder* OR ptsd OR stress OR (psychological OR mental OR emotion*) AND (disorder* OR disease* OR illness))

Limits: All fields but not in full text

Hits 200 (10/06/2020)

Hits 3 (01/06/2020-20/11/2021)

EBSCO (CINAHL, APA PsycArticles, Psychology and Behavioral Sciences Collection)

S1 ((MH "Abortion, Induced+") OR (MH "Labor, Induced")) OR AB (abortion OR labor OR ((termint* OR interrupt* OR end) AND pregnancy)) OR TI (abortion OR labor OR odinopoeia OR ((termint* OR interrupt* OR end) AND pregnancy))

S2 ((MH "Hereditary Diseases+") OR (MH "Fetal Diseases+") OR (MH "Abnormalities+")) OR AB ((fetus OR fetal OR foetal OR congenital) AND (malformation* OR anomal* OR abnormalit*)) OR TI ((fetus OR fetal OR foetal OR congenital) AND (malformation* OR anomal* OR abnormalit*))

S3 ((MH "Rehabilitation, Psychosocial+") OR (MH "Psychotherapy+")) OR AB (psychotherapy OR (psychosocial OR

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psychological OR mental OR emotional) AND (intervention* OR counsel* OR therapy OR treatment OR support* OR care OR caring OR nursing OR implementation)) OR TI (psychotherapy OR (psychosocial OR psychological OR mental OR emotional) AND (intervention* OR counsel* OR therapy OR treatment OR support* OR care OR caring OR nursing OR implementation))

S4 ((MH "Emotions+") OR (MH "Behavioral and Mental Disorders+")) OR AB (depression OR distress OR anxiet* OR posttraumatic stress disorder OR PTSD OR grief OR stress OR (psychological OR mental OR emotional) AND (disorder* OR disease* OR illness)) OR TI (depression OR distress OR anxiet* OR posttraumatic stress disorder OR PTSD OR grief OR stress OR (psychological OR mental OR emotional) AND (disorder* OR disease* OR illness))

S5 S1 AND S2 AND S3 AND S4

Hits: 110 (10/06/2020)

Hits: 15 (06/2020-11/2021)

China Biology Medicine Database (CBM)

Subject search

1) (("先天畸形"[不加权:扩展]) OR "遗传性疾病, 先天性"[不加权:扩展]) OR "胎儿疾病"[不加权:扩展]274831 2020-06-10 16:42:06.0
2) ("引产"[不加权:扩展]) OR "流产, 人工"[不加权:扩展] 54984 2020-06-10 16:43:11.0
3) (("心理护理"[不加权:扩展]) OR "心理疗法"[不加权:扩展]) OR "社会支持"[不加权:扩展] 125960 2020-06-10 16:44:01.0
4) (((("抑郁"[不加权:扩展])) OR "应激障碍, 创伤后"[不加权:扩展]) OR "焦虑"[不加权:扩展]) OR "悲痛"[不加权:扩展] 110693 2020-06-10 16:44:53.0

Advanced search

5) ("胎儿畸形"[常用字段:智能] OR "先天异常"[常用字段:智能] OR "畸胎"[常用字段:智能] OR "胎儿异常"[常用字段:智能] OR "先天畸形"[常用字段:智能]) 198668 2020-06-10 16:45:47.0
6) ("引产"[常用字段:智能] OR "终止妊娠"[常用字段:智能]) 33093 2020-06-10 16:46:29.0
7) ("干预"[常用字段:智能] OR "治疗"[常用字段:智能] OR "护理"[常用字段:智能] OR "支持"[常用字段:智能] OR "疏导"[常用字段:智能] OR "调适"[常用字段:智能]) 5647396 2020-06-10 16:46:44.0
8) ("心理"[常用字段:智能] OR "社会"[常用字段:智能] OR "抑郁"[常用字段:智能] OR "焦虑"[常用字段:智能] OR "创伤后应激"[常用字段:智能] OR "PTSD"[常用字段:智能] OR "悲伤"[常用字段:智能] OR "痛苦"[常用字段:智能]) 794674 2020-06-10 16:47:05.0
9) (#5) OR (#1) 289527 2020-06-10 16:47:41.0
10) (#6) OR (#2) 64828 2020-06-10 16:48:27.0
11) (#7) OR (#3) 5652397 2020-06-10 16:51:23.0
12) (#8) OR (#4) 794674 2020-06-10 16:51:44.0
13) (#12) AND (#11) AND (#10) AND (#9) 157 2020-06-10 16:51:59.0

Hits: 157（2020-06-10）

Hits: 16 (2020 to 2021-11-20)

China National Knowledge Infrastructure (CNKI)

(篇关摘%胎儿畸形 + 胎儿异常 + 胎儿畸形 + 先天畸形 + 畸胎 + 先天异常) AND (篇关摘%引产 + 终止妊娠) AND ((篇关摘%心理 + 社会 + 抑郁 + 焦虑 + 创伤后应激 + PTSD + 悲伤 + 痛苦) AND (篇关摘%干预 + 护理 + 支持 + 治疗 + 疏导 + 调适)

Hits: 183 (2020-06-10)

Hits: 9 (2020-06-10 to 2021-11-20)

Wan Fang Database

Search scope: journals, degrees, conferences

Retrieve Expression (subject word extension): 主题: (胎儿畸形 OR 先天异常 OR 畸胎 OR 胎儿异常 OR 先天畸形)*主题: (引产 OR 终止妊娠)*主题: (心理 OR 社会 OR 抑郁 OR 焦虑 OR 创伤后应激 OR PTSD OR 悲伤 OR 痛苦) *主题: (干预

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OR 支持 OR 治疗 OR 护理 OR 疏导 OR 调适)

Hits: 218（2020-06-10）

Hits: 21 (2020 to 2021-11-20)

China Science and Technology Journal Database (VIP Database)

M= (先天性畸形 OR 胎儿畸形 OR 先天畸形 OR 胎儿异常 OR 畸胎 OR 先天异常) AND M= (引产 OR 终止妊娠) AND M= (心理 OR 社会 OR 抑郁 OR 焦虑 OR 创伤后应激 OR PTSD OR 悲伤 OR 痛苦) AND M= (干预 OR 治疗 OR 护理 OR 支持 OR 疏导 OR 调适)

Hits: 42 (2020-06-10)

Hits: 4 (2020 to 2021-11-20)

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Appendix 2 Studies quality assessments

Table S1 Randomized controlled trial

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
Kersting 2013	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y
Rocha 2018	N	N	Y	N	N	N	Y	Y	N	Y	Y	Y	Y
Sun 2018	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	Y
Qian 2021	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y

Q1: Was true randomization used for assignment of participants to treatment? Q2: Was allocation to treatment groups concealed? Q3: Were treatment groups similar at the baseline? Q4: Were participants blind to treatment assignment? Q5: Were those delivering treatment blind to treatment assignment? Q6: Were outcomes assessors blind to treatment assignment? Q7: Were treatment groups treated identically other than the intervention of interest? Q8: Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed? Q9: Were participants analyzed in the groups to which they were randomized? Q10: Were outcomes measured in the same way for treatment groups? Q11: Were outcomes measured in a reliable way? Q12: Was appropriate statistical analysis used? Q13: Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?

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Table S2 Quasi-experimental study

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Zeng 2017	Y	Y	Y	Y	Y	Y	Y	Y	Y
Yi 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lilford 1994	Y	NA	Y	Y	N	Y	Y	U	Y
Langer 1989	Y	NA	U	Y	N	U	N	N	Y
Deng 2019	Y	Y	Y	Y	Y	Y	Y	U	Y
Wei 2018	Y	Y	Y	Y	Y	Y	Y	Y	Y
Zhang 2018	Y	Y	Y	Y	Y	Y	Y	U	Y
Song 2017	Y	U	Y	Y	Y	Y	Y	N	Y
Yuan 2018	Y	Y	Y	Y	Y	Y	Y	U	Y
Liang 2020	Y	Y	Y	Y	Y	Y	Y	U	Y
Wu 2015	Y	Y	Y	Y	Y	Y	Y	U	Y
Huang 2013	Y	NA	Y	Y	Y	Y	Y	U	Y
Lan 2012	Y	NA	NA	N	Y	Y	Y	U	Y
Yu 2011a	Y	NA	NA	N	Y	Y	Y	Y	N
Wang 2012	Y	Y	Y	Y	Y	Y	Y	U	Y
Xu 2012	Y	N	Y	Y	Y	Y	Y	N	N
Ying 2009	Y	U	Y	Y	Y	Y	Y	U	Y
Gao 2017	Y	Y	Y	Y	Y	Y	Y	U	Y
Chu 2019	Y	Y	Y	Y	Y	Y	Y	U	Y
Duan 2018	Y	Y	Y	Y	Y	Y	Y	U	Y
Wen 2016	Y	Y	Y	Y	Y	Y	Y	U	Y
Yuan 2017	Y	Y	Y	Y	Y	Y	Y	U	Y
Zhang 2016	Y	Y	Y	Y	Y	Y	Y	U	Y
Zhou 2018	Y	Y	Y	Y	Y	Y	Y	N	N
Zhang 2015	Y	Y	Y	Y	Y	Y	Y	U	Y
Guo 2014	Y	Y	Y	Y	Y	Y	Y	U	Y
Li 2019	Y	Y	Y	Y	Y	Y	Y	U	Y
Gao 2017	Y	NA	NA	N	Y	Y	Y	U	N
Guo 2021	Y	Y	Y	Y	Y	Y	Y	U	Y
Shi 2021	Y	Y	Y	Y	Y	Y	Y	U	Y
Zhang 2020	Y	Y	Y	Y	Y	Y	Y	U	Y
Zhu 2020	Y	Y	Y	Y	Y	Y	Y	U	Y
Zhang 2020	Y	Y	Y	Y	Y	Y	Y	U	Y

Q1: Is it clear in the study what is the 'cause' and what is the 'effect' (i.e., there is no confusion about which variable comes first)? Q2: Were the participants included in any comparisons similar? Q3: Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest? Q4: Was there a control group? Q5: Were there multiple measurements of the outcome both pre and post the intervention/exposure? Q6: Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed? Q7: Were the outcomes of participants included in any comparisons measured in the same way? Q8: Were outcomes measured in a reliable way? Q9: Was appropriate statistical analysis used?

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