Abstract

How women perceive and experience abortion impacts their subsequent psychological well-being. This systematic review evaluated non-pharmacological interventions designed to support women undergoing abortion services and improve their psychological well-being and satisfaction with care. Searches were conducted in Medline, CINAHL, the Cochrane Library, PsycINFO, Sociological Abstracts, Social Services Abstracts and PTSD Pubs. All searches were limited to peer-reviewed articles published in English from January 2010 to February 2020. Two reviewers independently assessed study eligibility. Ten studies were included, involving four types of interventions: music therapy; social support; information support; and mandated waiting and counselling requirements on abortion access. Outcome measures were divided into four categories comprised of cognitive domains, emotional and psychological well-being, clinical symptoms, and satisfaction with care. However, there is limited evidence on intervention effects. Most studies report null or mixed intervention effects. Even though some positive effects on women's cognitive outcomes and satisfaction with care were seen, findings across studies were inconclusive. Findings also show that methodological limitations such as lack of theoretical basis, inadequate reporting and no power

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sample size calculation were apparent across studies. There is limited evidence about non-pharmacologic interventions designed to improve women's satisfaction with abortion services or psychological outcomes subsequent to accessing abortion services. Well-designed interventions that meet the needs of service-users should be developed and rigorously tested.

Keywords

Induced abortion, Psychotherapy, Health Services, Patient Satisfaction, Mental Health

1. Introduction

1.1 Abortion and psychological well-being

Across the world, approximately 56 million abortions occur each year (Sedgh et al., 2016). Even though abortion itself is considered as a generally safe medical procedure (WHO Department of Reproductive Health and Research & Johns Hopkins Bloomberg School of Public Health, 2018), the impact of abortion on women's psychological well-being is controversial. Abortion has been associated with psychological issues including depression, anxiety, internalised stigmatisation, alcohol dependence, and suicide in some studies (Coleman, 2011; Reardon, 2018). While other studies have reported no significant associations between abortion and women's psychological health (APA Task Force on Mental Health and Abortion, 2008; National Collaborating Centre for Mental Health, 2011). This inconsistency, along with the difference in social,

economic, religious, and cultural contexts worldwide, has contributed the different abortion-related practices across regions and countries (Ganatra et al., 2017).

A series of studies have been conducted to address the inconsistency in recent years.

Two systematic reviews found that abortion itself does not increase women's risk of adverse mental health outcomes, but an unintended pregnancy, in and of itself, was associated with an increased risk of mental health outcomes (APA Task Force on Mental Health and Abortion, 2008; National Collaborating Centre for Mental Health, 2011).

One review highlighted the difficulty of separating women's experience of abortion from their experience of unintended pregnancy (APA Task Force on Mental Health and Abortion, 2008). Women who access abortion are therefore considered a high-risk group who require support to promote psychological well-being.

1.2 Abortion services

Abortion services including medical procedures that undertake to accomplish termination and other complementary services (e.g. peri-abortion consultation, post-abortion care), are critical parts of women's abortion experience. When women access abortion services there is an opportunity to engage with them to identify and support their psychological health (WHO Department of Reproductive Health and Research & Johns Hopkins Bloomberg School of Public Health, 2018). However, abortion services can also be part of the problem. Previous studies have found more than one in four abortion facilities do not consider counselling for emotional issues to

be a part of their role. Additionally, around two-thirds of women reported they had experienced different levels of discrimination and stigmatization during their abortion process (Shellenberg & Tsui, 2012). Previous systemic reviews have established that a negative experience of abortion services is associated with women's poor psychological health (APA Task Force on Mental Health and Abortion, 2008; National Collaborating Centre for Mental Health, 2011). Other factors associated with poor mental health are being forced to have an abortion, an antiabortion attitude and low perceived social support (APA Task Force on Mental Health and Abortion, 2008; National Collaborating Centre for Mental Health, 2011). Therefore, well designed, non-judgmental, women-friendly abortion services are needed.

1.3 Non-pharmacological interventions

Non-pharmacological interventions generally refer to non-drug treatments (Hoffmann et al., 2013). In this review, non-pharmacological interventions are limited to evidence-based and non-invasive interventions, including psychotherapies, behavioral interventions, and educational programs. Different from conventional therapies like surgery, radiation therapy, or drug treatments, these interventions require more interpersonal, psychological and behavioral skills (Hoffmann et al., 2013).

Non-pharmacological interventions have various forms, like digital health programs to make healthcare information more accessible, or supportive services to complement and potentiate the effects of conventional therapies (Boutron et al., 2017). An increasing number of non-pharmacological interventions, such as psychotherapies (Fallah et al.,

2011) or educational programs (Fenwick et al., 2015), have been used to enhance women's well-being. These interventions have shown promising outcomes in many circumstances including leading to a more positive childbirth experiences (Fenwick et al., 2015), reducing women's anxiety during pregnancy (Evans et al., 2018), and increasing happiness and life satisfaction for women surviving from breast cancer (Jimenez et al., 2018). It is therefore likely that non-pharmacological interventions to support women undergoing an abortion have the potential to improve their psychological well-being and satisfaction with care.

1.4 The current review

Recent systemic reviews and meta-analyses have examined the effect of non-pharmacological interventions on increasing levels of access to safe abortion (Sarkar et al., 2015), and post-abortion family planning outcomes (e.g. contraceptive knowledge, behavior or repeat unintended pregnancy) (Pazol et al., 2015; Zapata, Tregear, Curtis, et al., 2015; Zapata, Tregear, Tiller, et al., 2015). However, the effects of non-pharmacological interventions on women's satisfaction with abortion services, and subsequent psychological well-being, have not been evaluated.

This systematic review aims to: 1) describe the type of non-pharmacological interventions designed to improve women's abortion experience; and 2) determine the efficacy of non-pharmacological interventions in terms of women's satisfaction with care and psychological outcomes during and subsequent to abortion

2. Methods

The review was informed using the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) statement and checklist (Moher et al., 2009). The review protocol was registered on the International Prospective Register of Systematic Reviews (PROSPERO) database (ID: CRD42020170947) to ensure methods transparency and avoid study duplication.

2.1 Identification, selection and quality assessment of studies

An electronic database search of Medline, CINAHL, the Cochrane Library, PsycINFO, Sociological Abstracts, Social Services Abstracts and PTSD pubs was conducted. The search combined a list of terms that described nonpharmacological, nonsurgical interventions associated with abortion (specific searching strategies by each database can be found in supplementary materials). All searches were limited to English peer-reviewed papers published from January 2010 to February 2020.

Studies were included if they: 1) tested non-pharmacological interventions, such as psychotherapies or educational programs that aimed to improve women's satisfaction with care or psychological well-being; 2) compared the intervention to no intervention or other intervention, or, used a pre-post intervention design; 3) reported outcomes of women as a separate group; and 4) were randomized controlled trials, case-control studies, cohort studies, or quasi-experimental studies. Studies were excluded if they: 1) tested pharmacological or other conventional therapies; 2) present secondary or tertiary

forms of research (e.g. reviews or a review of reviews), and 3) were grey literature or quality improvement activities.

The lead author performed all electronic database searches. Results of preliminary searches were stored using EndNote reference manager software (Version X9.2, Clarivate Analytics). The lead and second author independently conducted the screening process. Title and abstract screening using software Rayyan QCRI were conducted first. When article inclusion could not be determined on title and abstract alone, full-text screening was performed. The reference lists of the included studies were hand-searched to identify any studies that may have been missed in the database search. Discrepancies along the process were highlighted and discussed between the two reviewers and adjudicated by a third reviewer.

The quality of the remaining studies after the final screening was assessed using the CONSORT checklist extension for non-pharmacological treatments (Boutron et al., 2017) and the STROBE checklist for cohort studies (Von Elm et al., 2014). These checklists comprise a set of detailed guidelines for identifying the strengths and weaknesses of the designs of clinical trials and observational studies and have been used by previously published systematic reviews (King et al., 2011; King et al., 2017). The lead author firstly gathered and categorized information related to each checklist item from each included paper (checking method involved full-text reading and keyword searching). The review team then made assessment decisions based on the extracted

information. A three-level grading system used in previous studies (King et al., 2011; King et al., 2017) was adopted: one item was assessed as '0' if it was not present at all, '1' if it was reported but with some aspects missing or unclear, and '2' if the item was reported with adequate details (King et al., 2011; King et al., 2017). Decisions regarding each item were discussed among the review team until consensus for each item was reached.

2.2 Data extraction and analysis

Data were extracted onto a template that included: 1) study characteristics (publication details, author names, year of publication, and country where the research was undertaken); 2) study details (aim(s), design, and tool(s) used to collect data); and 3) study context (setting and sample characteristics including sample size, age distribution, specific sociodemographic).

The Template for Intervention Description and Replication (TIDieR) checklist (Hoffmann et al., 2014) was used to describe the design of interventions including 1) brief name and theoretical basis of the intervention (why); 2) intervention components (what); 3) intervention delivery (how, where, when, how much, and by whom); and 4) tailoring and modification of interventions, adherence, and fidelity. Due to the heterogeneity of included studies, a meta-analysis was not performed. However, a textual narrative synthesis of interventions was undertaken based on the aims of the review.

A meta-analysis was not able to be conducted because no more than two included studies were homogeneous enough to be compared across interventions, study designs, and outcomes measures. Instead, we performed textual narrative synthesis, guided by the synthesis approach on the effectiveness of interventions (Popay et al., 2006). First, two researchers grouped and textually described the studies by intervention type, target group, study design, and outcomes using the TIDieR checklist (Hoffmann et al., 2014). Second, the researchers explored relationships within and between studies by summarizing the impact of each intervention on each outcome. Lastly, the review team discussed until consensus for each section was reached to guarantee robust synthesis.

3. Results

A total of 599 articles were identified which, after removing duplicates, we screened by title and abstract. Full texts of 11 of these papers were read after which nine papers remained for inclusion. We also identified one additional paper from reviewing the reference lists of included papers. In total, 10 studies were included (see Figure 1. PRISMA Flow Diagram).

Insert Figure 1 about here

3.1 Characteristics of included studies

Table 1 presents a summary of characteristics of included studies. The ten trials included a total of 2221 women, with sample sizes ranging from 26 to 500. Most studies were conducted in the U.S. (n=6), and remaining studies were carried out in Canada

(n=1), China (n=1), Indonesia (n=1), and South Africa (n=1). Eight out of ten trials were carried out in abortion or family planning specialist facilities, and the other two were remote (smartphone-based) programs (Constant et al., 2014; Gerdts et al., 2020). Eight studies were randomized controlled trials, including two pilot studies (Sonalkar et al., 2017; Wu et al., 2012). Two studies used prospective cohort designs (Roberts et al., 2017; Veiga et al., 2011). Half of the trials recruited women undergoing surgical abortion (Chor et al., 2015; Guerrero et al., 2012; Veiga et al., 2011; Wilson et al., 2017; Wu et al., 2012), while other trials either included women having a medical abortion (Constant et al., 2014; Gerdts et al., 2020) or did not limit inclusion on type of abortion (Roberts et al., 2017; Sonalkar et al., 2017; Yu et al., 2010).

Insert Table 1 about here

3.2 Methodology assessment

Table 2 summarizes the results of the methodology assessment. Most studies presented adequate information regarding the research background, participants' eligibility criteria, randomization, baseline data, and statistical analysis. However, only four out of ten included studies (Chor et al., 2015; Constant et al., 2014; Gerdts et al., 2020; Wilson et al., 2017) clearly defined the primary and secondary outcome measures. And among eight included RCTs, only four (Chor et al., 2015; Constant et al., 2014; Gerdts et al., 2020; Guerrero et al., 2012) presented a power analysis to determine the adequate sample size for detecting a significant effect of interventions. Three RCTs (Gerdts et al., 2020; Guerrero et al., 2012; Yu et al., 2010) and one cohort study (Veiga et al., 2011)

did not provide any information related to blinding or other attempts to limit bias.

Moreover, only one trial (Guerrero et al., 2012) reported information on the unintended effects of the intervention.

Insert Table 2 about here

3.3 Intervention summary

The ten interventions differed regarding the type, health focus, design, and outcome measures. **Table 3** provides a detailed description of the included interventions based on the TIDieR checklist.

3.3.1 Intervention types and health focus

Interventions were categorized into four groups: a) music therapy, b) social support, c) information support, and d) implementation of mandatory policies. Music therapy was defined as using music as adjunctive therapy during the abortion process (Guerrero et al., 2012; Wu et al., 2012). Social support interventions were identified as social interactions that are intended to be supportive during the intervention either in person or online. Information intervention were defined as providing information or education related to abortion management (Constant et al., 2014; Gerds et al., 2020), reproductive health skills or other health issues regarding abortion (Yu et al., 2010); specific strategies included messages by computer or telephone (Constant et al., 2014; Gerds et al., 2020), and using printed materials and role-play/group discussion (Yu et al., 2010). Mandatory policies were defined as mandated waiting or counselling requirements for

women seeking abortion (Roberts et al., 2017; Sonalkar et al., 2017).

Each group of interventions had a distinct health focus and target population. For example, the two music therapy interventions and three social support interventions were designed for surgical abortion patients to improve women's emotion status during abortion procedure. Among the three information interventions, two targeted women seeking medical abortion and tested the effects of information support (via text message or smartphone app) on women's self-management through the abortion process (Constant et al., 2014; Gerdtts et al., 2020). The other one was an integrated reproductive skill-based education intervention, focusing on promoting women's self-esteem and ability to cope with stress after an abortion (abortion type not limited) (Yu et al., 2010). The remaining two interventions did not specify abortion type and explored the impact of local abortion policies (e.g. mandated waiting and counselling requirements) on women's psychological well-being.

3.3.2 Intervention design

Table 3 summarizes the designs of each intervention based on the TIDieR checklist. Information regarding intervention components, intervention rationale and theoretical basis, delivery of the intervention, and tailoring and modification strategies have been reported.

Most trials presented the rationale for their intervention design (Table 3). Only one intervention was based on a theoretical model (Yu et al., 2010). All the interventions

only had one active component. Most interventions were delivered individually either face to face or via smartphone. Only one intervention, the post-abortion integrated reproductive skill-based education and realistic training (Yu et al., 2010), was delivered in groups. Most interventions were conducted within family planning facilities when women accessed abortion services. Personnel delivering the intervention included support people (doulas or personal companion), clinicians, researchers or researcher assistants.

Five out of ten interventions involved certain degrees of custom-tailored design (Constant et al., 2014; Gerdtts et al., 2020; Guerrero et al., 2012; Wu et al., 2012; Yu et al., 2010). For example, in the skill-based health education program (Yu et al., 2010), the decision to offer a third session depended on whether participants needed consolidation after the first two sessions (the article did not clarify if this was based on women's request or determined by researchers). Only one trial reported modifications during the study (Wu et al., 2012). Regarding intervention adherence, the retention rate across studies ranged from 81% (Gerdtts et al., 2020) to 100% (Sonalkar et al., 2017). However, one study reported that even though some participants in the intervention group wore the provided headphone device (Guerrero et al., 2012), they chose not to listen to music. Strategies or tools to maintain fidelity varied across studies. For example, doulas underwent standard training before providing support (Chor et al., 2015; Wilson et al., 2017) and supportive messages were sent in strict chronological order at specified times (Constant et al., 2014).

Insert Table 3 about here

3.4 Outcomes

Table 4 presents the report outcomes and effects of each trial.

3.4.1 Outcome measures

The reported outcomes can be divided into four categories comprised of cognitive outcomes (e.g., perceived social support, perceived accompaniment, and perceived ability to cope etc.); emotional and psychological outcomes (e.g., anxiety, emotional state, perceived social stigma and self-esteem etc.); clinical symptoms (i.e., pain, heart rate, and blood pressure); and satisfaction with care (e.g., acceptability and satisfaction rate). Measures varied widely across studies. These include well-recognized scales (e.g. the State-Trait Anxiety Inventory (Guerrero et al., 2012; Veiga et al., 2011; Wu et al., 2012), the Rosenberg Self-esteem Scale (Yu et al., 2010), and the Impact of Event Scale-Revised (Constant et al., 2014)), visual analogue scales (e.g. anxiety, pain, and the satisfaction of abortion experience) (Chor et al., 2015; Guerrero et al., 2012; Wilson et al., 2017), and study-specific items (e.g. preparedness for side-effects (Constant et al., 2014), feelings of support (Veiga et al., 2011; Wilson et al., 2017), and satisfaction with care (Chor et al., 2015; Guerrero et al., 2012; Wilson et al., 2017). The follow-up time point of each trial ranged from immediately after the abortion procedure (Chor et al., 2015; Wu et al., 2012) to 6-8 weeks post-abortion (Yu et al., 2010).

3.4.2 Effectiveness

Heterogeneity of intervention design and outcomes precluded a quantitative synthesis, so information from data tabulation and narrative analysis will be presented.

Some interventions reported positive effects on women's cognitive outcomes (e.g. perceived coping ability (Wu et al., 2012), feeling of being accompanied (Veiga et al., 2011), and perceived preparedness (Constant et al., 2014) etc.) and psychological outcomes (e.g. anxiety (Constant et al., 2014; Veiga et al., 2011) and psychosocial competence (Yu et al., 2010). However, these effects were inconsistent across studies. For example, one study (Veiga et al., 2011) reported a significant decrease in pre- to post-operative anxiety in women who were accompanied during the abortion procedure compared to those who were not. Yet the other study found doula support made no difference on women's anxiety levels compared to no social support (Chor et al., 2015). Similarly, one information intervention reported text messages along women's medical abortion process increased women's perceived preparedness of abortion (Constant et al., 2014), while the other information intervention developed based on the same rationale failed to improve women's preparedness (Gerdtz et al., 2020).

One music therapy study detected adverse effects on both women's anxiety and pain level (Guerrero et al., 2012). The other music intervention reported no impact on anxiety and pain. Among the four trials that reported women's satisfaction of service, none detected differences between groups (Constant et al., 2014; Guerrero et al., 2012; Wilson et al., 2017; Wu et al., 2012).

Two trials assessed the impact of mandated waiting or counseling on women's

well-being. One trial reported women allocated to mandatory counseling had lower self-stigma compare to the control group (Sonalkar et al., 2017). The other trial demonstrated that a mandatory information visit and 72-hour waiting period did not influence women's decision to proceed with abortion (Roberts et al., 2017)

Insert Table 4 about here

4. Discussion

This review summarised the existing evidence on the effects of non-pharmacological interventions for women accessing abortion services to improve their satisfaction and psychological well-being. Overall, there was significant heterogeneity among studies attributable to the study design, intervention components, and outcome variables. Most studies (RCTs and non-RCTs) had some methodological limitations, such as inadequate reporting, small sample sizes, and weak linkages to theoretical frameworks. Most included interventions showed null or mixed effects, and effects across interventions were conflicting. Based on the present results, high quality evidence regarding non-pharmacological interventions to improve the satisfaction and psychological well-being of women accessing abortion services is limited. In the following section, methodological limitations, specific findings, strengths and limitations of this review, and recommendations for future work will be discussed.

4.1 Methodological limitations

Methodological limitations were evident in the included studies. Based on reporting guidelines (e.g. the CONSORT statement (Schulz et al., 2010), the STROBE checklist (Von Elm et al., 2014), and the TIDieR checklist (Hoffmann et al., 2014)), a significant amount of information was not reported in several papers. Only a small proportion of studies defined primary and secondary outcomes; provided adequate justification for sample size; assessed intervention adherence and fidelity; or reported unintended effects. Moreover, in the current review, two pilot studies with sample sizes of 26 (Wu et al., 2012) and 46 (Sonalkar et al., 2017) investigated the effectiveness of a particular intervention. Without a powered sample calculation, their results, as well as those from other studies with relatively small samples, should be interpreted cautiously (Craig et al., 2008). In general, methodological limitations of included studies indicate a need for greater consistency and standardisation in study design and sample size.

4.2 Intervention summary

Four types of intervention were identified (i.e. music therapy, social support, information support, and implementation of mandatory policies). The interventions were oriented towards four different health areas (e.g. improving women's satisfaction of a surgical abortion procedure, helping women managing medical abortion, and promoting women's self-esteem and coping after abortion). More than ten different outcomes were reported across studies. This level of diversity reflects a lack of consensus on what women need along the abortion trajectory and identification of their

unmet needs. Additionally, the interventions lacked a theoretical basis to inform propositions about women's satisfaction with abortion care and its determinations, which contributed to a diversity of overarching intervention components and outcome variables (Craig et al., 2008; Hardeman et al., 2005).

4.3 Outcomes

Null or mixed outcomes were seen among most interventions. Moreover, several outcomes were contrary to expectations in interventions like music therapy and mandatory policy implementation. For example, one trial reported women exposed to mandated abortion counselling that contained information on fetus development contributed to lower perceived stigma (Sonalkar et al., 2017). This is inconsistent with previous studies that concluded attributing personhood to the fetus (Norris et al., 2011), and legal restrictions on abortion access (Hanschmidt et al., 2016) can contribute to additional abortion stigma.

One possible explanation of the mixed and counter-intuitive effects may relate to the evaluation itself. Most included trials used measures that were not designed specifically for women experiencing abortion, which could contribute to misleading outcomes (Heale & Twycross, 2015). Meanwhile, the timing of data collection may have also affected results. In most cases, the evaluation happened immediately or a short time after the intervention. However, changes in psychological well-being might take longer to emerge. For example, one previous study indicated that most women need at least 4-6

weeks to respond to their childbirth experience psychologically (Alcorn et al., 2010).

This may equally apply to women undergoing an abortion experience.

Another critical consideration may be that the intended interventions did not match women's specific needs or challenges. According to previous psychosocial studies, interventions that matched individuals' needs and were perceived as a useful resource, contributed to improved outcomes (Priem & Solomon, 2015). For example, music therapy has demonstrated favorable effects on anxiety under many circumstances, such as among gynecologic patients (Sin & Chow, 2015), and patients undergoing medical procedures in the outpatient setting (Daniel, 2016). During the abortion procedure, however, musical interventions did not appear to be effective in reducing women's anxiety (Guerrero et al., 2012; Wu et al., 2012). Other research has found that most women perceived staff presence and patient-provider communication as the most important factors influencing their abortion experience (Tilles et al., 2016; Wu et al., 2012). It could be that listening to music during the procedure impeded their communication with providers.

Another explanation may relate to the timing and presentation of the interventions. For example, one psycho-education intervention used 13- automated text messages scheduled to address women's potential problems throughout the abortion trajectory, while another intervention study provided similar information in one message via a smartphone app. The multiple-time text messaging showed more promising effects in

helping women cope with a medical abortion than the App. This is consistent with results from other researches, which suggest participants benefit more when they receive information support addressing their present and priority concerns (Back et al., 2019; Hargraves et al., 2016).

4.4 Strengths and limitations

There are several strengths to this systematic review. Firstly, to our knowledge, this is the first systematic review to address non-pharmacologic interventions designed to improve women's psychological well-being and satisfaction with care. Secondly, ten interventions conducted in five different countries, with a variety of study designs were identified, which enhanced the generalizability of the conclusions. Thirdly, this review used a standard template (TIDieR) to guide the description of included interventions, which improved the completeness of intervention reporting and made the information easier to use for practitioners and future researchers.

There are also limitations. Even though we used a systematic search approach in consultation with a health librarian team, some studies may have been missed. A search for the grey literature was not conducted, and only peer-reviewed articles written in English were included. Furthermore, two pilot RCTs and two prospective cohort studies that met the eligibility criteria were included in this review, which might impact the evidence level of findings. Quantitative synthesis of intervention effects was not conducted because of the heterogeneity of included studies, making it impossible to

elucidate which intervention features elicit optimal health outcomes. Lastly, most of the included studies were conducted in western countries which must be considered when generalising findings to non-western contexts.

4.5 Implications for future research

4.5.1 Intervention development

Abortion happens in a wide social, cultural, and political context (APA Task Force on Mental Health and Abortion, 2008). Context differences will impact women's needs when accessing abortion services meaning that women may perceive and respond to the same intervention differently. Ultimately, interventions are more likely to have a worthwhile effect if they are aligned with the needs of target audiences. Primary qualitative research, including interviews with women or other stakeholders, should be conducted to better understand their personal, social, economic, and political contexts and concerns. We recommend future research to adapt user-focused approaches like patient engagement techniques (WHO, 2016) and co-design frameworks (Dietrich et al., 2017; Donetto et al., 2015) to make sure the intervention is delivered with a high level of fidelity, and intervention content is coherent with personal, organisational and cultural values.

4.5.2 Intervention evaluation

Potential ways to improve intervention evaluation involves closer links to theoretical frameworks; more advanced sample size estimations; clear and complete reporting and

using mixed methods for capturing a more holistic picture of intervention effects. Due to the very nature of abortion, legislation, cultural acceptability, past practice, practitioners' attitudes, or commercial interests may all have a significant impact on how interventions can be modified or the choice of suitable evaluation design. To address the methodological limitations in intervention design and evaluation that were common to the included studies, we recommend future research uses well-tested guidelines in the intervention evaluation process. For example, the TIDieR guideline (Hoffmann et al., 2014) assists with systematic and transparent study reporting. The United Kingdom's Medical Research Council (MRC) Framework on intervention development and evaluation (Craig et al., 2008), can potentially support researchers to identify appropriate theory to inform intervention design, and achieve definitive evaluation with a reliable sample size calculation.

4.6 Implications for practice

The heterogeneity of the included studies impedes us from recommending an intervention for wide-spread implementation. However, several essential messages can be generated from the existing evidence to improve real-life practice.

- There is no "one-size-fits-all" approach regarding supporting women during their abortion seeking journey. A sound understanding of women's socio-demographic circumstances may help tailor services.

- Women's priority needs at each stage of the abortion process should be fully considered to ensure that supports offered are appropriate.
- Timing and presentation of health service information messages are essential, as varying them could result in different outcomes. Patient engagement can be potentially encouraged by making sure the service messages are delivered at the right time, in proper content order, and with appropriate word choices.

5. Conclusions

The available evidence for non-pharmacological interventions to improve the psychological well-being of women accessing abortion services and their satisfaction with care is limited. Included studies in this review had considerable heterogeneity and different degrees of methodological limitations that contributed to conflicting results. A better understanding of target audiences, closer links to theoretical frameworks, more advanced sample size estimations, and appropriate measurement are recommended for further research.

Supplementary information

Additional file 1: searching strategies by databases

Author Contributions

Study design: NW, JG, DC

Data collection: NW, JA

Data analysis: NW, JA, DC

Manuscript writing: NW, JG, JA, DC

Reference

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Table 1 Characteristics of included studies in order of publication year

A uthor and year	C ountry	Stu dy Design	Interv ention	Interventi on intent	Part icipants	Age in year (Mean, SD) or proporti on	S ample size	Settin gs
Yu, et al. 2010	China	RCT	Skill-based health education	Improve self-esteem, coping ability and control ability for life event	Women seeking abortion	20.88, N/S	385	Three metropol itan maternity hospitals
Veiga, et al. 2011	Canada	Prospect ive Cohort Study	Allow support person in recovery room	Decrease anxiety; increase perceived social support and accompaniment	Women seeking surgical abortion	27.1, 6.4	114	One abortion & reproducti ve education clinic
Gerrero , et al. 2012	U.S.	RCT	Music	Decrease pain and anxiety	Women seeking surgical abortion	25.1, 6.7	101	The abortion clinic of Columbia University
Wu, et al. 2012,	U.S.	Pilot RCT	Music	Decrease pain and anxiety; improve perceived coping ability	Women seeking surgical abortion	25.1, N/S	26	One urban family planning clinic in New Jersey
Constant , et al. 2014	South Africa	RCT	Text messages	Decrease anxiety, emotional discomfort and stress; Increase preparedness	Women seeking medical abortion	25.8, 5.5	469	Two NGOs and two primary care clinics in Cape Town
Chor, et al. 2015	U.S.	RCT	Doula support	Decrease pain and anxiety	Women seeking surgical abortion	24.4, 4.98	214	One county hospital in Chicago
R	U.S.	Prospect	Two-visit	Detect impact	Women	25.6,	500	Four local

oberts, et al. 2017			ive Cohort Study	and 72-hour waiting period requirement s	on decision certainty	seeking abortion	5.64		family planning facilities in Utah
S onalkar , et al. 2017	U.S.		Pilot RCT	Mandated abortion counselling requirement	Detect impact on Individual Level Stigma	Women seeking their first abortion	91.3%: 18-39; 8.7%: ≥40 †	46	One hospital-ba sed abortion clinic in
W ilson, et al. 2017	U.S.		RCT	Doula support	Decrease emotional discomfort; Improve perceived sense of empowerment and coping ability	Women seeking surgical abortion	29.7, N/S	70	The Family Planning and Pregnancy Loss Center of Pennsylva nia
G erds, et al. 2020	Indone sia		RCT	Information al smartphone application	Improve perceived support, preparedness and confidence	Women called Samsara hotline for medicatio n abortion informati on	90.7%: 18-34; 9.3%: ≥35 †	300	Remote smartphon e-based program

Note: RCT Randomized controlled trial; N/R not reported; NGOs non-governmental organizations; †age proportion

Table 2 Evaluation of included studies using CONSORT and STROBE checklists

T	CONSOR	Background	Trial design	Eligibility criteria	Interventions	Method-outcomes	Sample size	Randomization	Blinding	Statistics	Participant flow	Recruitment	Baseline data	Numbers analysis	Results-outcomes	Unintended effects	Ancillary analyses	Limitation	Generalizability	Interpretation
et al.	Yu, et al.	1	1	1	0	1	0	0	0	1	0	0	0	1	1	1	0	1	1	1
	Wu, et al.	1	1	2	2	1	0	2	1	1	2	1	1	2	1	0	0	0	1	0
	Guerrero, et al.	1	2	2	2	1	2	2	0	2	2	1	2	2	1	0	2	1	1	0
	Constant, et al.	2	2	2	2	2	2	2	1	2	1	2	2	2	2	0	0	1	2	1
	Chor, et al.	2	2	2	1	2	2	2	1	2	2	1	2	2	2	0	0	1	2	1
	Sonalkar, et al.	2	1	2	2	1	0	2	1	1	2	1	2	2	1	0	0	0	1	0
	Wilson, et al.	2	2	2	2	2	0	2	1	2	2	1	2	2	2	0	0	1	2	0
	Gerdts, et al.	1	2	2	1	2	2	2	0	2	2	1	2	2	2	0	0	1	2	0
STROBE	Introduction	Study design	Setting	Eligibility	Variables	Study size	Measurement	Bias	Statistics	Participants	Descriptive data	Outcomes data	Main results	Ancillary analyses	Key results	Limitation	Generalizability	Interpretation		
al.	Veiga, et	2	1	2	2	1	1	2	0	2	1	1	2	1	0	2	1	1	1	
et al.	Roberts,	2	2	2	2	1	1	1	1	2	2	1	2	2	0	2	1	1	0	

Note: 0 not present; 1 present without detail explanation or with limited details; 2 present with clear detail description

Table 3 Intervention description based on TiDieR checklist

Intervention type	Author	Components and materials	Rationale or theory bases	Delivery	Tailoring	Modification	Adherence & fidelity	
c	Musi	Guerrero, et al.	What: routine care +listen to music; A digital music device with 25 songs	Why: musical therapies showed favorable effects on pain, anxiety among patients in many gynecologic perioperative settings	Who: a research assistant How: via headphone; Individually Where: the surgical room When and how much: through the surgical abortion process	Participants can control song selection and volume during the process	N/R	Some women in the intervention group reported not listening to music even with headsets on
		Wu, et al.	What: usual care +listen to music; A portable media player with preloaded tracks	Why: music has been associated with lower anxiety levels during other procedures	Who: a research assistant How: via earphone, individually Where: the surgical room When and how much: during the procedure	Women can select music based on their preference	Replaced validated coping scales to a verbal numerical scale due to time-consuming concerns	N/R
Support person	Veiga, et al.	What: allow support person in the post-anesthesia recovery	Why: social support in post-abortion recovery room	Who: support person How: face to face, individually Where: the recovery room When and how	N/R	N/R	N/R	

		room	may decrease anxiety and increase perceived accompaniment				
			much: during the recovery phase				
Chor, et al.		What: usual care + doula's support and accompaniment	Why: doulas' support during labor and delivery is associated with more positive labor experience	Who: experienced doulas	N/R	N/R	Standard doula training before the intervention
			How: face to face, individually				
			Where: the surgical room and recovery room				
			When and how much: during the procedure				
Wilson, et al.		What: usual care + doula's support including physical support and verbal support	Why: doulas showed promising effects on improving postpartum outcomes and women's labor experience	Who: 3 volunteers (white, female, and <40 years of age) after training	N/R	N/R	Standard doula training before the intervention
			How: face to face; Individually				
			Where: the surgical room and recovery room				
			When and how much: through the procedure and the recovery phase				
Infor	Const	What: 13	Why:	Who/how/where	The	N/R	Massage

national interventi on	ant, et al.	tired, automated text messages including reminders to take medicatio n and informatio n on managing side effects	text message s on mobile phones to assist women with informati onal needs have been successf ul in a wide range of settings	: a mobile-based program When and how much: from clinic visits for mifepristone till 2 to 3 weeks after administration; 13 texts	messages were available in 3 local languages		s were sent automatically in strict chronological order
	Gerdtz , et al.	What: a supportive app providing step-by-step information about medical abortion+ standard of care	Why: placing informati on and support directly in women's hand may increase women's prepared ness and feelings of support	Who: "Ms. Miso", the App's fictitious feature How/where: mobile phone-based When and how much: since women called the hotline to 24 days after enrollment; unlimited access to the App	Informatio n was provided based on users' self-report intentions, gestational age, and contraindic ations	N/R	N/R
Man dated waiting or counsellin g	Rober ts, et al.	What: A 72 hours waiting periods and two-visit requireme nts before	Why: longer waiting periods and mandate d counsell	Who: family planning facility staff How: face to face, individually Where: in the family planning	N/R	N/R	N/R

		request abortion	ng assertors believe women need more time to make abortion decision	facilities When and how much: N/A			
	Sonal kar, et al.	What: A mandated abortion counsellin g video that contains informatio n from Pennsylv nia Abortion Control Act	Why: Pennsylv ania abortion law, which contains informati on about fetal develop ment and abortion alternati ves may affect the self-stig ma level of women requestin g abortion	Who: an obstetrician-gyne cologist in the video How: women watch the video individually Where: in the clinic When and how much: prior to interacting with health providers; once	N/R	N/R	N/R
Educ ational interventi on	Yu, et al.	What: Skill-base d training and printed materials coving: pregnancy, reproducti	Why: the Interacti ve and Participa tory Model	Who: N/R How: face to face; in group Where: in the clinic When and how much: 1st activity: 1-2 week after	A third	N/R	N/R
					training activity was provided for consolidati ng if necessary		

ve health	abortion; 2nd:
skills; and	1-2 months after
psychosoc	abortion; 3rd:
ial	flexible;
abilities	60-90mins each
	time

Note: N/A not applicable; N/R not reported

[illegible]

Figure 1 PRISMA Flow Diagram