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Title	Effectiveness of Psychological Interventions to Improve the Mental Well-Being of Parents Who Have Experienced Traumatic Childbirth: A Systematic Review and Meta-Analysis
Type	Article
URL	https://clock.uclan.ac.uk/id/eprint/40205/
DOI	https://doi.org/10.1177/15248380211060808
Date	2021
Citation	Shorey, Shefaly, Downe, Soo, Chua, Joelle Yan Xin, Byrne, Sofia O., Fobelets, Maaïke and Lalor, Joan Gabrielle (2021) Effectiveness of Psychological Interventions to Improve the Mental Well-Being of Parents Who Have Experienced Traumatic Childbirth: A Systematic Review and Meta-Analysis. Trauma, Violence and Abuse. ISSN 1524-8380
Creators	Shorey, Shefaly, Downe, Soo, Chua, Joelle Yan Xin, Byrne, Sofia O., Fobelets, Maaïke and Lalor, Joan Gabrielle

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<https://doi.org/10.1177/15248380211060808>

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Effectiveness of Psychological Interventions to Improve the Mental Well-Being of Parents Who Have Experienced Traumatic Childbirth: A Systematic Review and Meta-Analysis

Shefaly Shorey ¹, Soo Downe ², Joelle-Yan Joelle Yan Xin Xin Chua Chua¹, Sofia O. Byrne ³, Maaïke Fobelets^{4,5} and Jean-Joan Gabriëlle Lalor³

¹Alice Lee Centre for Nursing Studies, Yong Loo Lin School of Medicine, National University of Singapore, Level 2, Clinical Research Centre, Singapore

²School of Community Health and Midwifery, University of Central Lancashire, Preston, UK

³Trinity College Dublin, Dublin 2, Ireland

⁴Faculty of Medicine and Pharmacy, Department of Public Health Sciences, Biostatistics and Medical Informatics (BISI) Research Group, Vrije Universiteit Brussel, Brussels, Belgium

⁵Department Health Care, Knowledge Centre Brussels Integrated Care, Erasmus University College Brussels, Brussels, Belgium

Shefaly Shorey, PhD, RN, RM, Assistant Professor, Alice Lee Centre for Nursing Studies, Yong Loo Lin School of Medicine, National University of Singapore, Level 2, Clinical Research Centre, Block MD11 10 Medical Drive, 117597, Singapore. Email: nurssh@nus.edu.sg

Abstract

Considering the adverse impact that traumatic childbirth experiences can have on parental mental well-being, studies that have investigated the potential of providing postnatal psychological support for this group of parents require evaluation. This systematic review aimed to examine the effectiveness of psychological interventions at improving the mental well-being of parents who have experienced traumatic childbirth in terms of anxiety, depression, fear of childbirth, and post-traumatic stress disorder (PTSD) symptoms. Seven electronic databases were searched from their respective inception dates up to January 2021. Only quantitative studies that reported the effects of psychological interventions on anxiety, depression, fear of childbirth, and/or PTSD symptoms in selective (at risk of traumatic childbirth experience) or indicated (self-defined childbirth experience as traumatic for any reason) populations of parents (mothers and/or fathers) were included. Eight studies were included and meta-analyses were conducted using a random-effect model. All studies were conducted on mothers only, and one study had minimal father involvement. Results showed that psychological interventions were more effective in reducing fear of childbirth and improving PTSD symptoms compared to anxiety and depression. Greater improvement in depression was reported at 3–8 weeks' follow-up than at immediate post-intervention. Subgroup analyses showed that technology-based interventions were feasible, and indicated interventions were more effective than selective interventions. Conducting future interventions in more geographical regions, engaging and including fathers more actively, incorporating both personalized professional therapy and informal peer support, striving for flexibility and convenience, as well as addressing topics on self-doubt and coping skills can improve current interventions.

Keywords:

psychological, mental well-being, parent, trauma, childbirth, post-traumatic stress disorder, meta-analysis

Funding Information

Summary of Critical Findings

- Psychological interventions were more effective in reducing fear of childbirth and improving PTSD symptoms among mothers who have experienced traumatic childbirth as compared to anxiety and depression.
- Depression improved only around 3–8 weeks after the completion of psychological interventions and highlighted the need to support parents during this crucial period after traumatic childbirth.
- Technology-based interventions have successfully improved the mental well-being of mothers who experienced traumatic childbirth.
- Indicated interventions were more effective than selective interventions.

Summary of Implications for Future Research and Practice

- Future trials should be conducted in various geographical regions such as Asia, Africa, and America.
- Fathers need to be actively involved in future postnatal psychological interventions.
- Addressing issues of self-doubt and coping skills can help prevent depression and anxiety.
- A combination of group-based peer support as well as one-on-one personalized therapy may be more beneficial.
- Postnatal psychological support should prioritize flexibility and convenience.

Introduction

Background

Although most women perceive childbirth as a joyous occasion, some perceive their experience as negative. Studies have shown that about 30–43% of women perceived their childbirth experience as traumatic (Alcorn et al., 2010; DEVOTION CA18211, 2020) and 3.1–4% of postnatal women go on to develop post-traumatic stress disorder (PTSD) (DEVOTION CA18211, 2020; Grekin & O'Hara, 2014). The symptoms of postpartum PTSD include re-experiencing their birth experience in their own minds, avoiding medical settings that remind them of their traumatic birth experience, negative cognition and mood, and hyperarousal (Regier et al., 2013). Studies have found that operative birth methods (including emergency cesarean sections and instrumental vaginal deliveries via forceps or vacuum) (Eide et al., 2019; J. Söderquist et al., 2002), poor pain control (Grekin & O'Hara, 2014), and maternal complications such as preeclampsia or postpartum hemorrhage (Furuta et al., 2012; Grekin & O'Hara, 2014) contributed significantly to mothers' perception of their childbirth as traumatic. Interactions with healthcare professionals that are perceived as disrespectful, lacking in empathy for mothers and unsupportive of mothers' preferences for care during the perinatal period have also been associated with a negative/traumatic childbirth experience (Grekin & O'Hara, 2014; Shorey & Wong, 2020).

Women tend to develop more mental health complications such as postpartum anxiety (Leach et al., 2017), depression (Blom et al., 2010), fear of childbirth (Fairbrother et al., 2018), and PTSD (Grekin & O'Hara, 2014) after experiencing a traumatic childbirth (Johan Söderquist et al., 2006), and these can incur high medical and social costs (Bauer et al., 2014). Anxiety, depression, and PTSD have been established as multi-morbidities occurring among postnatal women (Agius et al., 2016; Dikmen-Yildiz et al., 2017). Moreover, anxiety and depression have been positively associated with fear of childbirth (tokophobia) (Storksen et al., 2012), and fear of childbirth, in particular, has been established as a powerful risk factor for the development of postpartum PTSD (Dikmen-Yildiz et al., 2018). In light of the close links among these mental health disorders, support provided to mothers after a traumatic childbirth should seek to address all these interrelated issues.

After a traumatic childbirth experience, mothers may experience nightmares and flashbacks, bouts of rage, irritability, concentration difficulties, and disrupted sleep, resulting in sleep deprivation, reduced libido and they may begin to participate less in the care of their child/children (Beck, 2016; Blasio et al., 2009). In the long term, poor maternal mental health can negatively affect their child's physical, cognitive, and social development (D'Souza et al., 2019; Giallo et al., 2015; Glasheen et al., 2010). Fathers who witnessed their partners' suffering might also experience secondhand psychological distress (Inglis et al., 2016). Moreover, the lack of sexual intercourse and difficulties in

parenting have been reported to strain the relationship of many couples and end some marriages (Cava-Tadik et al., 2020; Shorey et al., 2019). In some cases of severe tokophobia, women suppressed their desire to have more children, which can also cause tension in the marital relationship (Shorey et al., 2018). As traumatic childbirth experience affects mothers and fathers, the mental well-being of both parents needs to be addressed.

Researchers and healthcare professionals have adopted both selective and indicated psychological interventions to help improve the mental well-being of parents who are susceptible to develop postpartum PTSD. Selective interventions are conducted for parents at risk of traumatic childbirth (Sheen & Slade, 2015) after undergoing operative birth procedures (emergency cesarean sections or instrumental vaginal deliveries using forceps or vacuum) (Eide et al., 2019; J. Söderquist et al., 2002), and/or labor-related complications (poor pain control, preeclampsia or postpartum hemorrhage) (Furuta et al., 2012; Grekin & O'Hara, 2014). On the other hand, indicated interventions are conducted for parents who self-defined their childbirth experience as traumatic for any reason (Sheen & Slade, 2015). A psychological intervention refers to any psychotherapeutic method aimed at changing one's cognition, perception, and/or behavior (Eccleston et al., 2015). Some methods that have been conducted with these parents include debriefing, counseling, cognitive behavioral therapy (CBT)-based program, mindfulness-based program, and engagement of visuospatial cognitive tasks (Asadzadeh et al., 2020; Ayers et al., 2006; Bavelier & Green, 2003; Holmes et al., 2009; Horsch et al., 2017; Meades et al., 2011; Pour-Edalati et al., 2018). They can be conducted either face-to-face in a group or one-on-one at the patient's home, healthcare institution, or online. Psychological interventions have been shown to help parents accept their negative childbirth experience, process their emotions and thoughts, and reframe their rumination on negative thoughts to focus on more productive and positive ones (Baer, 2003; Bryant, 2007; Meades et al., 2011). Hence, they can help parents improve multiple aspects of their mental health (anxiety, depression, fear of childbirth, and PTSD symptoms).

Current Literature

There is a lack of systematic reviews which focus on investigating the effectiveness of psychological interventions to improve the mental well-being of parents who have experienced traumatic childbirth. The review by Borg Cunen et al. (2014) only examined the effect of midwife-led interventions, while other reviews limited their focus to specific types of psychological interventions such as debriefing (Bastos et al., 2015), both debriefing and counseling (Gamble et al., 2002; Rowan et al., 2007; Sheen & Slade, 2015) and expressive writing (Qian et al., 2020). Although six previous reviews examined the effectiveness of all types of psychological interventions on maternal postnatal mental health (de Bruijn et al., 2020; de Graaff et al., 2018; Furuta et al., 2018; Lapp et al., 2010; Peeler et al., 2013; Slade, Molyneux, et al., 2020), only two reviews focused on mothers who experienced a traumatic childbirth (de Bruijn et al., 2020; Slade, Molyneux, et al., 2020). Neither of these reviews included fathers, and in both reviews, PTSD was the only outcome of interest (de Bruijn et al., 2020; Slade, Molyneux, et al., 2020). Hence, the effect of psychological interventions on the other important and interrelated postnatal mental health outcomes such as anxiety, depression, and fear of childbirth in both mothers and fathers who experienced traumatic childbirth have not been examined. Therefore, this meta-analysis seeks to evaluate the overall effect of psychological interventions to improve anxiety, depression, fear of childbirth, and PTSD symptoms in parents (mothers and fathers) who experienced traumatic childbirth (Egger & Smith, 1997).

Aim

This review aimed to determine the effectiveness of psychological interventions to reduce anxiety, depression, fear of childbirth, and PTSD symptoms at immediate post-intervention (primary outcomes) and any follow-up timepoint (secondary outcomes) in both mothers and fathers who have experienced traumatic childbirth.

Method

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher et al., 2009), and the PRISMA checklist can be found in [Online Appendix A](#). A protocol can be found on the PROSPERO website (CRD42021230450).

Eligibility Criteria

Population Selective and indicated populations of parents (mother and/or father) who delivered liveborn infant or infants (including twins) following a traumatic childbirth index pregnancy were included. This refers to parents who are at risk of perceiving their childbirth experience as traumatic following any of the aforementioned operative birth procedure and/or labor-related complications (selective), and parents who have self-defined their birth experience as traumatic (indicated). Parents who developed anxiety, depressive symptoms, fear of childbirth, PTSD symptoms, or other signs of psychological conditions only after a traumatic childbirth were also included. Conversely, parents with pre-existing mental illnesses and/or history of substance abuse before childbirth (before and/or during pregnancy), and those who experienced a stillbirth or miscarriage in the index pregnancy were excluded. In addition, parents with multiple births who suffered the loss of at least one child were excluded. Studies that exclusively recruited parents who had traumatic experiences specifically related to preterm babies, such as experience in the neonatal intensive care unit,

were excluded in order to focus on parents whose psychological distress was due to the traumatic birth experience rather than the subsequent poor infant outcomes.

Intervention Any selective or indicated psychological intervention delivered to either mother and/or father with the aim to improve their mental well-being at any timepoint after their traumatic childbirth experience, but before their next pregnancy.

Comparator Studies with control groups undergoing the standard postpartum care offered by their respective healthcare facility, or wait-list control were included. Any non-psychological or psychological intervention with an aim to improve parents' mental well-being was excluded.

Outcomes Included studies must measure any or all of the following: anxiety, depression, fear of childbirth or PTSD symptoms at pre- and post-intervention. Outcomes could be assessed by any method of measurement such as sweat test, skin conduction test, or self-reported by participants, and had to be reported in terms of mean and standard deviation (SD) or other forms that can be transformed into mean (SD) or where raw study data could be obtained from study authors. The immediate post-intervention values of the four outcomes were of primary focus, while follow-up measurements at other timepoints were viewed as secondary interests.

Study Design Only randomized controlled trials (RCTs), cluster RCTs and controlled clinical trials (CCTs) were included.

Language and Publication Status Only peer-reviewed journal articles and unpublished dissertations written in any language were included. Papers that conducted secondary re-analysis of data specific to review outcomes were also included.

Study Selection

The following electronic databases were searched from their respective date of inception to January 2021: PubMed, Embase, CINAHL, PsycINFO, Scopus, Web of Science, and ProQuest Dissertations & Theses Global. The reference lists of similar reviews and included studies were examined, and backward searching was done to identify other relevant trials. Upon encountering potentially relevant studies with unavailable full-text, request for a full-text was sent to the respective authors. Endnote Version X8 was used to organize the records according to their databases and remove duplicates. The eligibility criteria were used to screen all titles and abstracts of the records retrieved from the search. Potentially relevant studies were identified and had their full-texts scrutinized to determine their relevancy. Google translate was used to translate foreign language texts into English. Two independent reviewers (SS and CJYX) conducted this process and judgment discrepancies were resolved via discussions. A sample search strategy for Embase database is shown in [Online Appendix B](#).

Data Extraction

A data extraction form was used to extract key details of included studies such as sample size, study design, outcomes measured, intervention content, duration and method of delivery, and attrition rate. The mean and SD values of the review's outcomes were also extracted and relevant formulas were used to transform the data to obtain these specific values when necessary ([Higgins & Green, 2011](#)). Data transformation of the mean and interquartile values in one of the included studies ([Ryding et al., 1998](#)) was performed by using other relevant formulas ([Luo et al., 2018](#); [Shi et al., 2020](#)). Discussions were held to resolve any disagreements between the two independent reviewers (SS and CJYX).

Quality Appraisal

The Cochrane Risk of Bias tool was used to assess five types of biases for all included studies: selection bias, performance bias, detection bias, attrition bias, and reporting bias ([Higgins & Green, 2011](#)). The overall bias rating for each study was decided by the worst score it received for any domain ([Kempster et al., 2016](#)). Publication bias was not examined as no forest plot contained at least 10 trials to produce a meaningful funnel plot ([Sterne et al., 2011](#)).

The Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) approach assessed the quality of evidence at the outcome level. The quality rating depended on five factors: risk of bias of individual studies, inconsistency, directness of evidence, precision of effect estimates, and publication bias ([Higgins & Green, 2011](#)). The online GRADEpro software rated each outcome separately ([GRADEpro, 2015](#)). Quality appraisal was conducted by two independent reviewers (SS and CJYX) and disagreements were discussed until consensus was met.

Data Synthesis

Characteristics of the included studies and interventions were summarized narratively. Data of the same outcomes were pooled using meta-analyses under the random-effect model. Since the included studies used different scales to report outcomes using continuous data, the Review Manager software 5.4 was used to calculate the standardized mean differences (SMD) and 95% confidence intervals (CI) under the inverse-variance method ([Higgins & Green, 2011](#)).

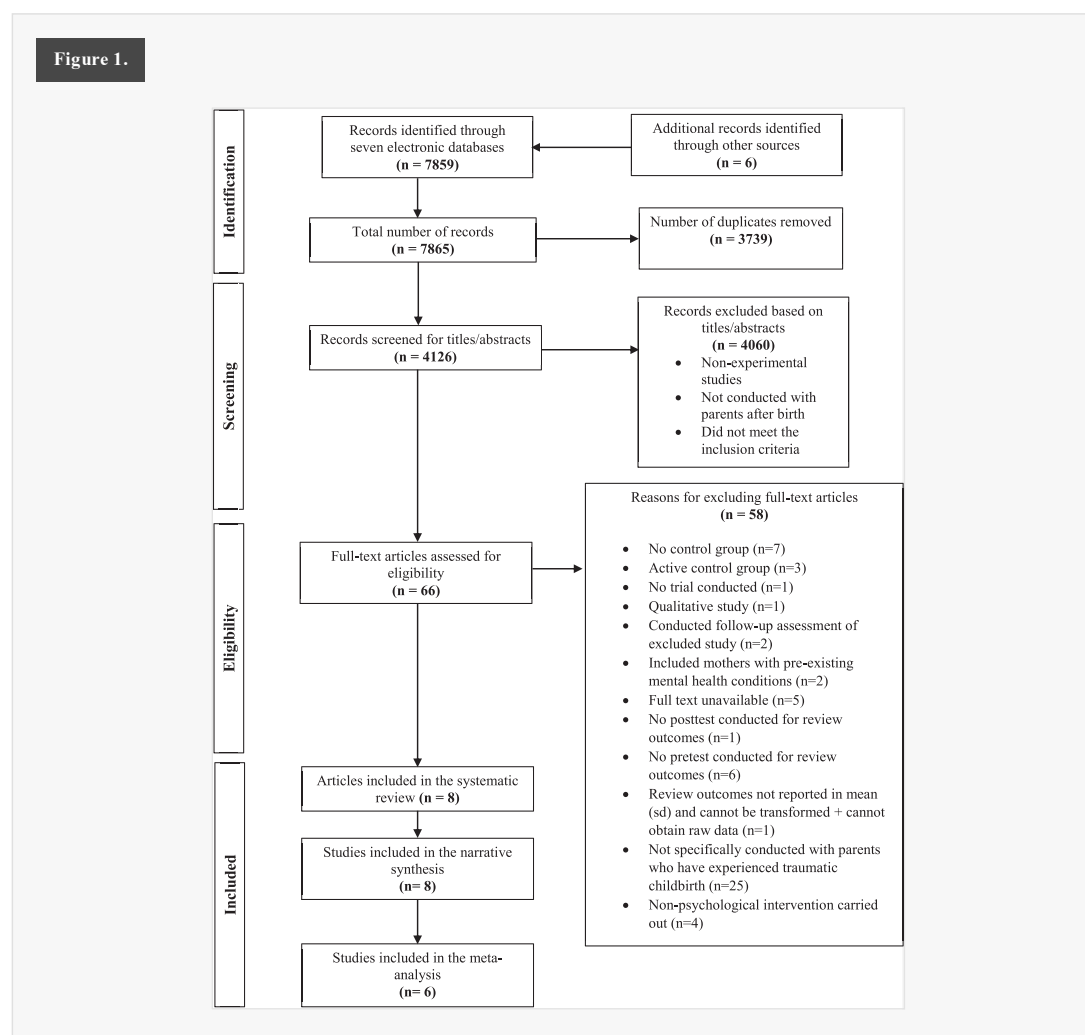
Effect sizes were interpreted as very small (0.1), small (0.2), medium (0.5), large (0.8), very large (1.2), and huge (2.0) (Sawilowsky, 2009). As one study used two scales to measure PTSD symptoms in mothers, only the Impact of Event Scale—Reversed scores were included in this review as the scale assesses a more general measure of PTSD symptoms and is similar to the Acute Stress Disorder Scale, Impact of Event Scale and Post-traumatic Stress Disorder Checklist-5, which were used by the other studies; on the other hand, the Traumatic Event Scale is different and was excluded (Nieminen et al., 2016). As significant baseline differences between the intervention and control groups were reported for the fear of childbirth in Pour-Edalati et al., (2018), and depression and PTSD symptoms in Meades et al., (2011), these two studies were excluded from the meta-analyses and had their results synthesized narratively.

Heterogeneity of results were assessed using the I^2 statistic and Cochran Q chi-squared test. I^2 values were categorized as low importance ($\leq 40\%$), moderate (30–60%), substantial (50–90%), and considerable (75–100%). Statistically significant heterogeneity of the chi-squared test was identified when its corresponding p-value was less than 0.10 (Higgins & Green, 2011). Abdollahpour et al. (2018) compared two different interventions (one CBT and one debriefing) with one control group hence the number of participants in the control group was randomly split during meta-analysis to avoid unit-of-analysis error (Higgins & Green, 2011). Subgroup analyses were conducted to reduce heterogeneity levels and examine the effect certain variables have on the review outcomes (Higgins & Green, 2011; Sedgwick, 2013). The variables examined were technology-based intervention versus non-technology-based intervention, psychological intervention type, and selective intervention versus indicated intervention. As the pre-specified subgroup analyses variables listed in the protocol submitted to PROSPERO were changed during the course of this study, the current subgroup analyses were hence conducted with the purpose of generating hypotheses.

Results

Search Outcomes

The search from the seven listed electronic databases, and relevant reviews and articles retrieved 7865 articles. After the deletion of 3739 duplicates and the exclusion of 4060 articles based on their titles and abstracts, 66 articles were left for full-text screening. Examination of full-texts excluded another 58 articles due to reasons such as lack of a control group or interventions were conducted on parents who did not experience traumatic childbirth hence there were eight peer-reviewed primary studies included in this review (Abdollahpour et al., 2018; Asadzadeh et al., 2020; Horsch et al., 2017; Kershaw et al., 2005; Meades et al., 2011; Nieminen et al., 2016; Pour-Edalati et al., 2018; Ryding et al., 1998). As one study reported two trials that conducted two different interventions (one CBT and one debriefing) (Abdollahpour et al., 2018), the eight studies reported nine trials in total. The search outcomes and reasons for exclusion of studies are shown as a PRISMA flow diagram in Figure 1.



Characteristics of the Included Studies

Out of the eight included studies, there were seven RCTs and one CCT (Meades et al., 2011). They were conducted in four different countries: Iran ($n = 3$), Switzerland ($n = 1$), Sweden ($n = 2$), and England ($n = 2$). Three included studies conducted selective interventions as they recruited women at risk for traumatic childbirths after undergoing operative birth methods (Kershaw et al., 2005) or emergency caesarean sections (Horsch et al., 2017; Ryding et al., 1998), while the rest conducted indicated interventions by targeting women pre-screened for self-defined traumatic childbirths (Abdollahpour et al., 2018; Asadzadeh et al., 2020; Meades et al., 2011; Nieminen et al., 2016) or significant fear of childbirth caused by previous traumatic birth experience (Pour-Edalati et al., 2018). The types of psychological interventions included debriefing (Abdollahpour et al., 2018; Kershaw et al., 2005; Meades et al., 2011), counseling (Asadzadeh et al., 2020; Ryding et al., 1998), CBT-based (Abdollahpour et al., 2018; Nieminen et al., 2016), mindfulness-based (Pour-Edalati et al., 2018), and a visuospatial cognitive task ("Tetris" game) to reduce participants' intrusive traumatic memories (Horsch et al., 2017). Only Pour-Edalati et al. (2018) conducted a group-based intervention while the other studies conducted one-on-one interventions. Seven studies conducted interventions in-person; one had an additional telephone counseling session (Asadzadeh et al., 2020). The last study developed an online intervention with homework assignments for participants to complete independently at home (Nieminen et al., 2016). All studies only engaged mothers except for Ryding et al. (1998) which allowed fathers to ask questions after the last counseling session. The summarized characteristics and more detailed characteristics of the included studies can be found in Table 1 and Online Appendix C, respectively.

Table 1.

 The table layout displayed in this section is not how it will appear in the final version. The representation below is solely purposed for providing corrections to the table. To preview the actual presentation of the table, please view the Proof.

Summary of included studies.

Study (Country)	Research Design/Arms	Participants Number and Type of Traumatic Birth	Intervention Duration (Follow-Up)/Father Involvement	Review outcomes: 1.Anxiety 2.Depression 3.Fear of childbirth 4.PTSD Symptoms
Abdollahpour et al., 2018 (Iran)	3 arm RCT 1.Debriefing 2.Brief CBT 3.Standard care	193 women screened for traumatic birth (met criterion A of DSM-5 for PTSD)	1 session lasting 40–60min within 48hrs postpartum (1–1.5 months) No father involvement	1.No 2.Yes 3.No 4.No
Asadzadeh et al., 2020 (Iran)	2 arm RCT 1.Counseling 2.Standard care	90 women screened for traumatic birth (met criterion A of DSM-5 for PTSD)	1 session within 72hrs after birth + Telephone session 4–6 weeks postpartum Each session lasts 40–60min (1–1.5 months) No father involvement	1.Yes 2.Yes 3.No 4.Yes
Horsch et al., 2017 (Switzerland)	2 arm RCT 1.Visuospatial cognitive task (Tetris game) 2.Standard care	56 women who have just given birth by emergency caesarean (did not use criterion A of DSM-5 for PTSD to screen for participants)	1 session (at least 10min) within 6hrs postpartum (3 weeks) No father involvement	1.Yes 2.Yes 3.No 4.Yes
Kershaw et al., 2005 (England)	2 arm RCT 1.Community debriefing 2.Standard care	319 women who delivered first child by operative birth methods (forceps, vacuum, emergency caesarean) (did not use criterion A of DSM-5 for PTSD to screen for participants)	2 sessions 10 weeks apart (10 weeks) No father involvement	1.No 2.No 3.Yes 4.Yes
Meades et al.,	2 arm CCT	80 women screened for traumatic birth (met criterion A	1–1.5hr session	1.No

2011 (England)	1.Postnatal debrief 2.Standard care	for PTSD)	(No follow-up) No father involvement	2.Yes 3.No 4.Yes
Nieminen et al., 2016 (Sweden)	2 arm RCT 1.Trauma- focused ICBT program 2.Wait-list control	56 women screened for traumatic birth (TES $\geq$ 30) (did not use criterion A of DSM-5 for PTSD to screen for participants)	8 weekly modules (No follow-up) No father involvement	1.Yes 2.Yes 3.No 4.Yes
Pour-Edalati et al., 2018 (Iran)	2 arm RCT 1.MBSR training 2.Control	48 single-child women with history of normal birth methods who had not become pregnant again after at least 6 years due to fear of childbirth (did not use criterion A of DSM-5 for PTSD to screen for participants)	8 × 90min twice a week (No follow-up) No father involvement	1.No 2.No 3.Yes 4.No
Ryding et al., 1998 (Sweden)	2 arm RCT 1.Counseling 2.Standard care	105 women who have just given birth by emergency caesarean (did not use criterion A of DSM-5 for PTSD to screen for participants)	1hr session + 3 X 45 min sessions in 3 weeks (5 months) Father invited to ask questions after last session	1.No 2.No 3.Yes 4.Yes

Note. CBT: Cognitive behavioral therapy; CCT: Controlled Clinical Trial; DSM: Diagnostic and Statistical Manual; ICBT: Internet-based cognitive behavioral therapy; PTSD: Post-traumatic Stress Disorder; RCT: Randomized Controlled Trial; TES: Traumatic Event Scale.

Quality Appraisal

The Cochrane risk of bias tool was used to assess all included studies. Two studies were rated as low overall bias ([Abdollahpour et al., 2018](#); [Asadzadeh et al., 2020](#)), one study was rated as having unclear overall bias ([Nieminen et al., 2016](#)), and the remaining studies had high overall bias. The two independent reviewers had an inter-rater agreement of approximately 97% and a Cohen's kappa value of 0.95. The risk of bias summary is presented in [Figure 2](#). Quality appraisal at the outcome level, conducted using the GRADE approach, rated the outcomes of anxiety, depression, and PTSD symptoms as very low quality while the fear of childbirth outcome was rated as low quality. More details about the GRADE ratings are presented in [Online Appendix D](#).

Figure 2.

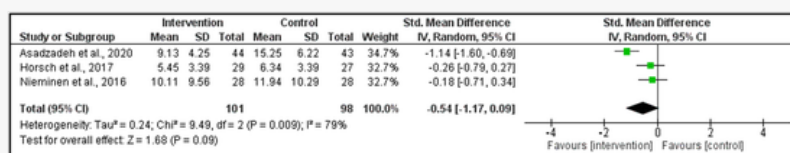
	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias	Overall bias
Abdollahpour et al., 2018	+	+	+	+	+	+	+	+
Asadzadeh et al., 2020	+	+	+	+	+	+	+	+
Horsch et al., 2017	+	+	+	+	+	-	+	-
Kershaw et al., 2005	+	+	+	+	-	?	-	-
Meades et al., 2011	-	-	+	+	+	+	-	-
Nieminen et al., 2016	+	+	+	+	+	?	+	?
Pour-Edalati et al., 2018	+	-	+	+	+	+	-	-
Ryding et al., 1998	+	-	+	+	+	+	-	-

Risk of bias summary.

Anxiety

The meta-analysis conducted for the three studies that assessed anxiety at immediate post-intervention (Asadzadeh et al., 2020; Horsch et al., 2017; Nieminen et al., 2016) showed a statistically non-significant medium effect favoring the intervention group (SMD = -0.54, 95% CI: -1.17 to 0.09, $Z = 1.68$, $p = 0.09$) (Figure 3).

Figure 3.



Forest plot of anxiety at post-intervention in three included studies.

The subgroup analysis of technology-based intervention versus non-technology-based intervention showed statistically significant substantial subgroup differences ($I^2 = 89.4\%$, $p = 0.002$). The technology-based subgroup reported a statistically non-significant small effect with low heterogeneity ($I^2 = 0\%$, $p = 0.84$) while the non-technology-based subgroup consisting of one study reported a statistically significant large effect (Online Appendix E.1).

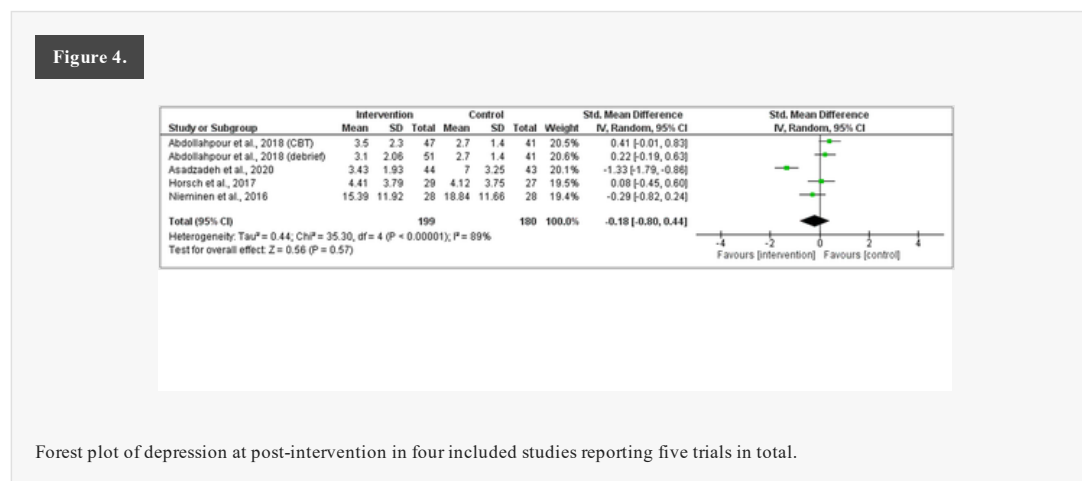
The subgroup analysis of psychological intervention type showed statistically significant substantial subgroup differences ($I^2 = 78.9\%$, $p = 0.009$). The debriefing/counseling, CBT and visuospatial cognitive task subgroups only had one study each that reported a statistically significant large effect, a statistically non-significant very small effect and a statistically non-significant small effect, respectively (Online Appendix E.2).

The subgroup analysis of selective intervention versus indicated intervention showed statistically non-significant subgroup differences ($I^2 = 0\%$, $p = 0.45$). The selective intervention subgroup reported a statistically non-significant small effect while the indicated intervention subgroup reported a statistically non-significant medium effect ([Online Appendix E.3](#)).

The meta-analysis conducted for the two studies that assessed anxiety at follow-up duration ranging from 3 to 8 weeks ([Asadzadeh et al., 2020](#); [Horsch et al., 2017](#)) showed a statistically non-significant medium effect favoring the intervention group (SMD = -0.59 , 95% CI: -1.45 to 0.27 , $Z = 1.35$, $p = 0.18$), with substantial statistical heterogeneity ($I^2 = 84\%$, $p = 0.01$) ([Online Appendix F](#)).

Depression

The meta-analysis conducted for the four studies reporting on five trials which assessed depression at immediate post-intervention ([Abdollahpour et al., 2018](#); [Asadzadeh et al., 2020](#); [Horsch et al., 2017](#); [Nieminen et al., 2016](#)) showed a statistically non-significant very small effect favoring the intervention group (SMD = -0.18 , 95% CI: -0.80 to 0.44 , $Z = 0.56$, $p = 0.57$), with substantial statistical heterogeneity ($I^2 = 89\%$, $p < 0.00001$) ([Figure 4](#)).



The subgroup analysis of technology-based intervention versus non-technology-based intervention showed statistically non-significant subgroup differences ($I^2 = 0\%$, $p = 0.83$). The technology-based subgroup reported a statistically non-significant very small effect while the non-technology-based subgroup reported a statistically non-significant small effect ([Online Appendix G.1](#)).

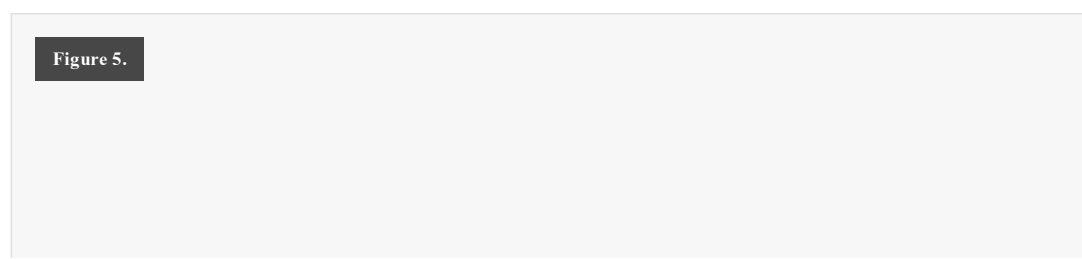
The subgroup analysis of psychological intervention type showed statistically non-significant subgroup differences ($I^2 = 0\%$, $p = 0.74$). The debriefing/counseling subgroup reported a statistically non-significant medium effect while both the CBT and visuospatial cognitive task subgroups reported statistically non-significant negligible effect favoring the control group ([Online Appendix G.2](#)).

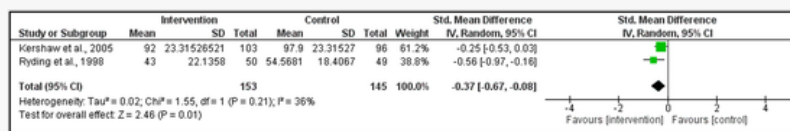
The subgroup analysis of selective intervention versus indicated intervention showed statistically non-significant subgroup differences ($I^2 = 0\%$, $p = 0.50$). The selective intervention subgroup reported a statistically non-significant negligible effect favoring the control group while the indicated intervention subgroup reported a statistically non-significant small effect ([Online Appendix G.3](#)).

The meta-analysis conducted for the three studies reporting on four trials which assessed depression at follow-up between 3 and 8 weeks ([Abdollahpour et al., 2018](#); [Asadzadeh et al., 2020](#); [Horsch et al., 2017](#)), showed a statistically non-significant medium effect favoring the intervention group (SMD = -0.73 , 95% CI: -1.51 to 0.05 , $Z = 1.83$, $p = 0.07$), with considerable statistical heterogeneity ($I^2 = 91\%$, $p < 0.00001$) ([Online Appendix H](#)).

Fear of Childbirth

The meta-analysis conducted for the two studies that assessed fear of childbirth at immediate post-intervention ([Kershaw et al., 2005](#); [Ryding et al., 1998](#)) showed a statistically significant small effect favoring the intervention group (SMD = -0.37 , 95% CI: -0.67 to -0.08 , $Z = 2.46$, $p = 0.01$), with low statistical heterogeneity ($I^2 = 36\%$, $p = 0.21$) ([Figure 5](#)). Subgroup analysis was not performed as both studies conducted non-technology-based, debriefing/counseling and selective interventions.





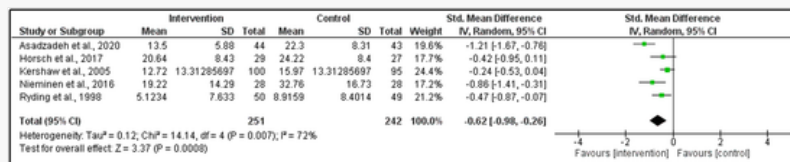
Forest plot of fear of childbirth at post-intervention in two included studies.

The meta-analysis conducted for the two studies that assessed fear of childbirth at follow-up between 2.5 and 5 months (Kershaw et al., 2005; Ryding et al., 1998) showed a statistically significant small effect favoring the intervention group (SMD = -0.38 , 95% CI: -0.61 to -0.15 , $Z = 3.23$, $p = 0.001$), with low statistical heterogeneity ($I^2 = 0\%$, $p = 0.40$) (Online Appendix I).

PTSD Symptoms

The meta-analysis conducted for the five studies that assessed PTSD symptoms at immediate post-intervention (Asadzadeh et al., 2020; Horsch et al., 2017; Kershaw et al., 2005; Nieminen et al., 2016; Ryding et al., 1998) showed a statistically significant medium effect favoring the intervention group (SMD = -0.62 , 95% CI: -0.98 to -0.26 , $Z = 3.37$, $p = 0.0008$), with substantial statistical heterogeneity ($I^2 = 72\%$, $p = 0.007$) (Figure 6).

Figure 6.



Forest plot of PTSD symptoms at post-intervention in five included studies.

The subgroup analysis of technology-based intervention versus non-technology-based intervention showed statistically non-significant subgroup differences ($I^2 = 0\%$, $p = 0.97$). Both the technology-based and the non-technology-based subgroups reported a statistically significant medium effect (Online Appendix J.1).

The subgroup analysis of psychological intervention type showed statistically non-significant subgroup differences ($I^2 = 0\%$, $p = 0.53$). The debriefing/counseling subgroup reported a statistically significant medium effect while the CBT subgroup reported a statistically significant large effect; the visuospatial cognitive task subgroup reported a statistically non-significant small effect (Online Appendix J.2).

The subgroup analysis of selective intervention versus indicated intervention showed statistically significant considerable subgroup differences ($I^2 = 91.8\%$, $p = 0.0005$). The selective intervention subgroup reported a statistically significant small effect with low heterogeneity ($I^2 = 0\%$, $p = 0.63$) while the indicated intervention subgroup reported a statistically significant large effect with low heterogeneity ($I^2 = 0\%$, $p = 0.33$) (Online Appendix J.3).

Subgroup analysis of follow-up duration conducted for the four studies that assessed PTSD symptoms at various follow-up timepoints (Asadzadeh et al., 2020; Horsch et al., 2017; Kershaw et al., 2005; Ryding et al., 1998), showed statistically non-significant subgroup differences ($I^2 = 0\%$, $p = 0.48$). The “up to two months” subgroup reported a statistically non-significant medium effect, while the “more than two months” subgroup reported a statistically non-significant small effect (Online Appendix K).

Narrative Synthesis

Fear of childbirth assessed by Pour-Edalati et al. (2018) at pre-intervention showed significant differences between the intervention and control groups (p -value < 0.05) and was hence excluded from meta-analysis. The mindfulness-based intervention group reported a statistically significant decrease in fear of childbirth scores at immediate post-intervention compared to baseline, whereas the control group did not (Pour-Edalati et al., 2018). No follow-up assessments were conducted.

Depression and PTSD symptoms assessed by Meades et al., (2011) at pre-intervention showed significant differences between the intervention and control groups (p -value < 0.05) and were hence excluded from meta-analysis. The debriefing group reported a statistically significant decrease in PTSD symptoms at immediate post-intervention compared to baseline, whereas the control group receiving standard care did not. Conversely, mothers in both groups reported similar reduction in depression scores at immediate post-intervention when compared to baseline (Meades et al., 2011). No follow-up assessments were conducted.

Discussion

This review examined the effectiveness of psychological interventions aimed at improving the mental well-being (anxiety, depression, fear of childbirth, and PTSD symptoms) of parents who have experienced traumatic childbirth. However, as none of the studies actively engaged and included fathers, this review's findings can only be applied to mothers. Although mothers are more prone to psychological distress after a traumatic childbirth experience, a recent study reported that 7.2% of fathers showed signs of probable PTSD at 1-month postpartum, highlighting the need for postnatal psychological interventions to target both mothers and fathers (Horsch et al., 2020). Moreover, fathers have expressed their desire to receive postnatal psychological support (Inglis et al., 2016; Poh et al., 2014; Shorey & Wong, 2020) and future trials should make an effort to do so. Furthermore, as included studies only represented mothers from Europe and the Middle East, future trials conducted in more diverse geographical regions would be needed to have a global understanding of parents who have experienced traumatic childbirth.

Immediate post-intervention results from meta-analyses showed that psychological interventions were more effective in decreasing PTSD symptoms and fear of childbirth among women who have experienced traumatic childbirth since statistically significant medium and small effects were observed, respectively, compared to anxiety and depression which showed statistically non-significant medium and very small effects, respectively. The two studies that were narratively summarized also reported a reduction in fear of childbirth (Pour-Edalati et al., 2018) and an improvement in PTSD symptoms (Meades et al., 2011), but not for depression (Meades et al., 2011). Similar improvements in PTSD symptoms have been reported in previous reviews (Bastos et al., 2015; de Bruijn et al., 2020; de Graaff et al., 2018; Furuta et al., 2018; Sheen & Slade, 2015) whereas no improvements were reported for anxiety, fear of childbirth (Bastos et al., 2015), and depression (Sheen & Slade, 2015) at post-intervention. The greater improvement found in PTSD symptoms and fear of childbirth compared to anxiety and depression could be attributed to their different treatment modalities. PTSD resolves once the distress related to the specific traumatic event has been adequately addressed, and symptoms will not usually reoccur unless one encounters another traumatic event (Hollon, 2019). Fear of childbirth after a traumatic birth experience is a predictor of PTSD and therefore will reduce after an improvement in PTSD symptoms (Dikmen-Yildiz et al., 2018). On the other hand, depression and anxiety have been associated with self-doubt, making them notoriously difficult to treat successfully as any general setbacks in life can trigger a relapse (Buckman et al., 2018; Hollon, 2019; Rubin, 2020). Future interventions should address issues related to self-doubt, as well as support mothers to find ways to effectively manage life's stressors in order to alleviate anxiety and depression.

Anxiety and fear of childbirth showed similar improvements at 3–8 weeks follow-up and 2.5–5 months follow-up, respectively, compared to their immediate post-intervention scores. On the other hand, depression reported greater improvement at 3–8 weeks follow-up compared to their immediate post-intervention scores. PTSD symptoms reported less improvement at follow-up of longer than 2 months than below 2 months. As the longest follow-up duration was 5 months post-intervention, conducted by Ryding et al. (1998), future trials would need to extend the follow-up duration to examine the sustainability of intervention effect on postnatal mother's mental well-being in the long run. The larger improvement in depression reported at follow-up suggests that postnatal mothers may require more time to improve their depression. Previous reviews have reported similar findings of a lack of improvement in depression at post-intervention (Sheen & Slade, 2015) but observed improvement at 2–5 months follow-up (Bastos et al., 2015). During the first few weeks after birth, mothers face numerous challenges while caring for their newborn, which could potentially challenge their self-worth and trigger depression (Hollon, 2019). Hence, more noticeable improvement at follow-up can be attributed to women harboring less self-doubt as they become more confident after months of motherhood.

Lesser improvements in PTSD symptoms over time could be due to some participants developing delayed-onset PTSD. A longitudinal study reported that 5.8% of women who have experienced traumatic childbirth showed recovery at 4–6 weeks postpartum (did not meet the criteria for PTSD) but then proceeded to develop worse symptoms over time and met the criteria for PTSD at 6 months postpartum (Dikmen-Yildiz et al., 2018). Therefore, postnatal psychological support should be made available for at least 6 months postpartum in order to appropriately support mothers who have experienced traumatic childbirth as they are at risk of developing PTSD until then. Collaboration between various stakeholders such as policy makers, researchers, and healthcare institutions would be required to implement extensive and extended support for these vulnerable women.

Evidence suggests that psychological interventions delivered with or without the use of technology are able to improve the mental well-being of mothers after a traumatic birth experience. The technology used by the studies in this review include playing "Tetris" game on the Nintendo DS hand-held gaming console (Horsch et al., 2017) and online trauma-focused CBT modules (Nieminen et al., 2016). Technology provides participants the flexibility to choose when they would like to participate in the intervention, although Horsch et al. (2017) stipulated that they should play the game within the first 6 hours after birth. In Nieminen et al. (2016), mothers could attend the online courses at their convenience. Although most women found the intervention beneficial, a few preferred to consult a therapist (Nieminen et al., 2016), hence future trials could consider arranging online private therapy sessions for mothers upon request.

Considering that mothers would be busy caring for their newborn, postnatal psychological interventions should promote flexibility and convenience (Slade, West, et al., 2020). Besides online interventions, other methods that could be considered include home visits (Kershaw et al., 2005) and organizing interventions on the dates of their follow-up appointments at the hospital or clinic.

All the three types of psychological interventions included in the meta-analysis (debriefing/counseling, CBT, and visuospatial cognitive task) demonstrated the potential to improve anxiety and PTSD symptoms in mothers who have experienced traumatic childbirth. However, only the debriefing/counseling subgroup reported improvement in depression but not the CBT and visuospatial cognitive task subgroups. This could be due to depression requiring more time to improve as a larger decrease at follow-up compared to immediate post-intervention was reported. On the other hand, fear of childbirth showed improvement via the use of debriefing/counseling methods (from meta-analyses) and mindfulness-based therapy (narrative synthesis); no data were available for other methods. However, as this review's subgroup analyses according to the type of psychological intervention were limited by the lack of studies in each subgroup (only one of two in some subgroups), the comparative effectiveness of each psychological intervention type on anxiety, depression, fear of childbirth, and PTSD symptoms could not be determined using the current evidence—a sentiment echoed by previous reviews (de Bruijn et al., 2020; de Graaff et al., 2018; Slade, Molyneux, et al., 2020). Furthermore, other promising types of psychological intervention for postnatal mothers such as expressive writing (Qian et al., 2020), and eye movement desensitization and reprocessing treatment (Sandstrom et al., 2008; Stramrood et al., 2012), which were not examined in this review should be explored in future trials to examine their effects in women who have experienced traumatic childbirth.

Evidence from subgroup analysis suggests that indicated interventions are better than selective interventions at improving the mental well-being of women who have experienced traumatic childbirth. Previous reviews have reported that indicated interventions can alleviate psychological distress more effectively (Sheen & Slade, 2015) and reduce medical costs (de Graaff et al., 2018; Lapp et al., 2010). According to the PTSD guidelines by the National Institute for Health and Clinical Excellence, conducting programs for adults pre-screened for PTSD symptoms is recommended instead of delivering programs to anyone who had undergone a specific traumatic event (National Collaborating Centre for Mental Health, 2005). This recommendation bears merit as everyone perceives trauma differently; some women reported in the study by Kershaw et al. (2005) did not attend the offered intervention because they were not traumatized by their childbirth experience even though undergoing operative birth methods is a risk factor for traumatic birth. Therefore, in order to examine the effect of psychological interventions on the mental well-being of women who have experienced traumatic childbirth more accurately, future trials should pre-screen all postnatal women for post-traumatic symptoms before recruiting them since any type of birth method can be perceived as traumatic (de Graaff et al., 2018). Pre-screening can be conducted using a standard scale such as the criterion A of the Diagnostic and Statistical Manual-5 for PTSD to ensure consistency.

Only one included study conducted group-based intervention (Pour-Edalati et al., 2018), while the remaining studies conducted one-on-one interventions. One-on-one interventions allowed mothers to receive personalized support which they found desirable (Slade, Molyneux, et al., 2020). On the other hand, group-based interventions helped mothers to incorporate new knowledge more effectively and allowed them to share common experiences with their peers (Dennis, 2010; Teaford et al., 2018). Therefore, future trials could incorporate a mixture of both components for postnatal women to benefit from various sources of support.

Implications for Future Research and Practice

Future trials should be conducted in other geographical regions such as Asia, Africa, and America to understand the mental well-being of parents from other cultures who have experienced traumatic childbirth; cultural factors have been shown to affect one's childbirth experience (Jungari & Paswan, 2020; Nomaguchi & House, 2013). Moreover, future trials should actively engage and include fathers in postnatal psychological support by conducting joint sessions for parents and/or planning specialized sessions for fathers. Future interventions should also focus on helping mothers to manage their self-doubt and equip them with the necessary skills to face future adversities with the right mindset to prevent anxiety and depression. To promote flexibility and convenience for busy mothers of newborns, the use of technology, home visits, and planning interventions at postnatal follow-up appointments could be considered. As postnatal women can benefit from personalized professional support and through sharing experiences and advice with peers, future interventions could incorporate both elements. Since a previous study reported that peer support from mothers who recovered from postpartum depression can improve the emotional well-being of mothers who are at risk of postpartum depression (Shorey & Ng, 2019), similar interventions could be planned for mothers who have experienced traumatic childbirth. To determine the comparative effectiveness of each type of psychological intervention on the various outcomes, future CCTs and RCTs should aim to examine anxiety, depression, fear of childbirth, and PTSD symptoms concurrently; no included study in this review assessed all the four outcomes. Longer term follow-up of participants beyond 5 months needs to be conducted to investigate the sustainability of the intervention effect on maternal mental well-being in the long run. Moreover, future trials should pre-screen all postnatal women for post-traumatic symptoms in order to more accurately identify those who have experienced traumatic childbirth so that

indicated psychological interventions can be conducted for them. Due to the possibility of some women developing delayed-onset PTSD, and presenting few symptoms at 4–6 weeks postpartum that progress to significant symptoms at 6 months postpartum, extended support for mothers who have experienced traumatic childbirth could be implemented through collaboration among stakeholders and healthcare institutions. Lastly, as compounding factors such as intimate partner violence and experience of childhood sexual abuse have been associated with future traumatic birth experience (Oliveira et al., 2017), future studies could examine the presence of these factors among their participants to isolate the impact of prior trauma on childbirth trauma.

Limitations

The following limitations may affect the accuracy of this review's findings. Relevant studies may have been missed out due to unclear titles or abstracts and poor indexing. Review outcomes were analyzed by studies using the self-report method thus it may have contributed to social desirability bias. As the extraction of only end-point data was performed for meta-analysis, disparities between the baseline scores of both intervention and control groups were not considered. Due to the limited number of overall included studies (only eight included studies and six included in meta-analysis) and a number of studies which did not assess outcomes for anxiety, depression, fear of childbirth, and PTSD symptoms, some subgroup analysis had only one or two studies in each subgroup and this could have affected the results' reliability and validity. Since the small number of studies ultimately included in this review only focused on European and Middle Eastern regions, the findings could not be generalized to other parts of the world. More notably, this review's findings have a lack of relevance to North American cultures, as well as their various subcultural and socioeconomic groups. Furthermore, the included studies also failed to consider prior trauma that these women may have experienced such as intimate partner violence and childhood sexual abuse that could contribute to their development of PTSD after childbirth. Lastly, as review outcomes were rated as either low or very low quality via the GRADE approach, there is a limited to very little confidence in the effect size estimated (Higgins & Green, 2011) in this review.

Conclusion

This review found that psychological interventions were more effective in decreasing fear of childbirth and improving PTSD symptoms compared to anxiety and depression among mothers who have experienced traumatic childbirth. Depression showed greater improvement at 3–8 weeks follow-up compared to immediate post-intervention. Improving anxiety and depression is challenging, hence interventions should educate mothers to face setbacks with the right mindset to prevent relapse. Future trials should involve fathers, deliver personalized treatment and group-based support to mothers, and prioritize on developing flexible and convenient interventions. Indicated interventions should be advocated and closer examination of all the available promising psychological interventions is needed to assess each type's comparative effectiveness. Longer follow-up durations would also be needed to examine the long-term sustainability of intervention effect. Due to the phenomenon of delayed-onset PTSD, stakeholders and healthcare institutions could work together to provide relevant and extensive psychological support for mothers who have experienced traumatic childbirth. Lastly, considering the very low to low quality of evidence using the GRADE approach in this review, future research is needed to validate current findings.

Acknowledgments

~~JL is Action Chair, SD is management committee member MK and SS are members of the network.~~ Shefaly Shorey and Maaïke Fobelets are members of working group 3.3. Soo Downe is a management committee member and Joan Lalor is the Action Chair of the EU COST Action 18211: DEVoTION: Perinatal Mental Health and Birth-Related Trauma: Maximising best practice and optimal outcomes supported by COST (European Cooperation in Science and Technology). The authors would like to thank the National University Health System, Research Support Unit, for assistance in the language editing of this manuscript.

ORCID iDs

Shefaly Shorey <https://orcid.org/0000-0001-5583-2814>

Soo Downe <https://orcid.org/0000-0003-2848-2550>

Sofia O Byrne <https://orcid.org/0000-0002-5197-0467>

Author Biographies

Shefaly Shorey, PhD, is an assistant professor at Alice Lee Centre for Nursing Studies, National University of Singapore. Her research interests lie in maternal and children health.

Soo Downe, PhD, is a professor of Midwifery studies at University of Central Lancashire. Her research interests lie in maternity care and childbirth.

Joelle Yan Chua Xin, BSc. (Hons), is a research assistant in the Alice Lee Centre for Nursing Studies at National University of Singapore. Her research focuses on the general improvement of mental well-being.

Sofia O Byrne is a PhD candidate at Trinity College Dublin. Her research interests lie in maternal health and maternity care.

Maaïke Fobelets, PhD, is a post-doctoral researcher at Faculty of Medicine and Pharmacy, Department of Public Health Sciences, Biostatistics and Medical Informatics (BISI) Research Group, Vrije Universiteit Brussel. Her research interests lie in midwifery, childbirth, and maternity care.

Joan Lalor, PhD, is a professor in Midwifery, School of Nursing & Midwifery, Trinity College Dublin. Her research interests lie in maternity care and women's health.

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Notes

Text Footnotes

Declaration of	The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or
Conflicting	publication of this article.
Interests	
Funding	The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was from the EU funded COST action CA18211: DEVoTION: Perinatal Mental Health and Birth-Related Trauma: Maximizing best practice and optimal outcomes.
Supplemental	Supplemental material for this article is available online.
Material	

Supplemental Material

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sj-pdf-1-tva-10.1177_15248380211060808 – Supplemental Material for Effectiveness of Psychological Interventions to Improve the Mental Well-Being of Parents Who Have Experienced Traumatic Childbirth: A Systematic Review and Meta-Analysis

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