

1 **Title Page**

2 **Title:** A Systematic Review of Interventions for Prevention and Treatment of Post-Traumatic
3 Stress Disorder Following Childbirth

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12
13 **Structured Abstract**

14
15 *Objective:* Postpartum women can develop post-traumatic stress disorder (PTSD) in response to
16 complicated, traumatic childbirth; prevalence of these events remains high in the U.S. Currently,
17 there is no recommended treatment approach in routine peripartum care for preventing maternal
18 childbirth-related PTSD (CB-PTSD) and lessening its severity. Here, we provide a systematic
19 review of available clinical trials testing interventions for the prevention and indication of CB-
20 PTSD.

21
22 *Data Sources:* We conducted a systematic review of PsycInfo, PsycArticles, PubMed
23 (MEDLINE), ClinicalTrials.gov, CINAHL, ProQuest, Sociological Abstracts, Google Scholar,
24 Embase, Web of Science, ScienceDirect, and Scopus through December 2022 to identify clinical
25 trials involving CB-PTSD prevention and treatment.

26
27 *Study Eligibility Criteria:* Trials were included if they were interventional, evaluated CB-PTSD
28 preventive strategies or treatments, and reported outcomes assessing CB-PTSD symptoms.
29 Duplicate studies, case reports, protocols, active clinical trials, and studies of CB-PTSD following
30 stillbirth were excluded.

31
32 *Study Appraisal and Synthesis Methods:* Two independent coders evaluated trials using a modified
33 Downs and Black methodological quality assessment checklist. Sample characteristics and related
34 intervention information were extracted via an Excel-based form.

35
36 *Results:* A total of 33 studies, including 25 randomized controlled trials (RCTs) and 8 non-RCTs,
37 were included. Trial quality ranged from Poor to Excellent. Trials tested psychological therapies
38 most often delivered as secondary prevention against CB-PTSD onset (n=21); some examined
39 primary (n=3) and tertiary (n=9) therapies. Positive treatment effects were found for early
40 interventions employing conventional trauma-focused therapies, psychological counseling, and
41 mother-infant dyadic focused strategies. Therapies' utility to aid women with severe acute
42 traumatic stress symptoms or reduce incidence of CB-PTSD diagnosis is unclear, as is whether
43 they are effective as tertiary intervention. Educational birth plan-focused interventions during
44 pregnancy may improve maternal health outcomes, but studies remain scarce.

45
46 *Conclusions:* An array of early psychological therapies delivered in response to traumatic
47 childbirth, rather than universally, in the first postpartum days and weeks, may potentially buffer
48 CB-PTSD development. Rather than one treatment being suitable for all, effective therapy should
49 consider individual-specific factors. As additional RCTs generate critical information and guide
50 recommendations for first-line preventive treatments for CB-PTSD, the psychiatric consequences
51 associated with traumatic childbirth could be lessened.
52

53 **Keywords:** Antepartum Education, Cesarean Section, Childbirth-related Post-Traumatic Stress
54 Disorder (CB-PTSD), Childbirth Trauma, Delivery, Eye Movement Desensitization and
55 Reprocessing (EMDR), Maternal-Infant Attachment, Maternal Morbidity, Maternal Near-Miss,
56 Obstetric Complications, Obstetrics, Postpartum Period, Post-traumatic Stress Disorder (PTSD),
57 Preterm, Psychological Counseling, Psychological Debriefing, Psychological Intervention, Skin
58 to Skin, Trauma-Focused Cognitive Behavioral Therapy, Trauma-Focused Expressive Writing.
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60

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62

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98 **Main Text**

99 **Introduction**

100 Childbirth is a profound experience often entailing extreme physical and psychological
101 stress. Among delivering women, an estimated 1/3 experience highly stressful and potentially
102 traumatic birth,¹⁻³ and ~60,000 women in the U.S. each year experience severe maternal morbidity
103 (SMM).⁴ SMM rates in the U.S. are among the highest in Western countries⁵⁻⁷ and steadily
104 continue to increase.^{5,8-10}

105 Complicated deliveries may undermine maternal psychological welfare. Post-traumatic
106 stress disorder (PTSD) is the formal psychiatric disorder resulting from exposure to an event
107 involving life-threat or physical harm and associated psychological symptoms that do not resolve
108 naturally over time.¹¹ Existing research supports the validity of PTSD following childbirth, or
109 childbirth-related PTSD (CB-PTSD).¹² The prevalence of this condition is estimated at 5-6% of
110 all postpartum women;^{3,13,14} this translates nationally to 240,000 affected American women each
111 year. In complicated deliveries, 18.5% to 41.2% of women¹⁴⁻¹⁶ report CB-PTSD symptoms. Black
112 and Latinx women are nearly three times more likely to endorse a childbirth-related traumatic
113 stress response.¹⁷

114 Although highly co-morbid with peripartum depression,¹⁸⁻²⁰ CB-PTSD is a distinct
115 condition largely consistent with the formal symptom constellation of PTSD.²¹ Exposure to a
116 traumatic childbirth can result in childbirth-related involuntary intrusion symptoms such as
117 flashbacks and nightmares; attempts to avoid reminders of childbirth; negative alterations in
118 cognitions and mood, and marked arousal and reactivity manifested in irritability, sleep and
119 concentration problems, hypervigilance, and other symptoms.²²⁻²⁴

120 When left untreated, CB-PTSD can impair maternal functioning during the important
121 postpartum period. Women with CB-PTSD may exhibit reduced maternal affection, bonding, and
122 sensitive behavior toward their infant,²⁵⁻²⁸ which may increase the risk for social and emotional
123 developmental problems in the infant.^{27,29} Available research suggests that maternal CB-PTSD
124 associates with infant behavioral problems, as well as sleep and feeding problems, including less
125 favorable breastfeeding outcomes.²⁹ Untreated CB-PTSD can also result in avoidance of partner
126 intimacy and disincentivize future pregnancies.³⁰⁻³²

127 CB-PTSD has unique attributes that support the potential for early intervention and even
128 prevention. PTSD symptoms begin after a specified external traumatic event (here, childbirth) and
129 appear in the first days following exposure,^{18,33,34} suggesting that CB-PTSD follows a clear onset.
130 Theoretical models of non-childbirth PTSD pathogenesis suggest that beyond pre-existing
131 vulnerabilities, biological and psychological mechanisms underlie an individual's immediate
132 response to a traumatic event that could be targeted by interventions to buffer and avert the PTSD
133 trajectory.³⁵⁻³⁸ Consequently, early interventions could produce favorable outcomes. Unlike other
134 forms of trauma, childbirth is a relatively time-defined event for which women often stay in the
135 hospital after parturition. This suggests an important opportunity to identify and treat women
136 before they develop the full traumatic stress syndrome.

137 Presently, there is a critical gap in knowledge to inform recommendations to prevent and
138 treat CB-PTSD. Early review studies on this topic used the limited number of available clinical
139 trials, preventing firm conclusions about the utility of psychological debriefing and individual
140 counseling therapies.³⁹⁻⁴¹ In recent years, 6 systematic reviews have been performed that focused
141 mostly on early interventions; they included 45 trials published up to 2022.⁴²⁻⁴⁷ The reviews
142 concluded that early-administered trauma-focused interventions that work through exposure and

143 reprocessing of the traumatic memory and related cognitions appear helpful for alleviating
144 symptoms of CB-PTSD in the short term, but that more studies were warranted to establish clinical
145 recommendations.

146 **Objectives**

147 We provide a comprehensive systematic review of randomized and non-randomized
148 controlled clinical trials for preventing CB-PTSD onset or reducing symptoms severity in affected
149 women. We used a quantitative rating system to evaluate the published trials' quality.⁴⁸ To the best
150 of our knowledge, this approach has not previously been implemented. We reviewed the potential
151 benefits of primary, secondary, and tertiary prevention approaches for CB-PTSD to provide insight
152 into which therapies are most promising, what the optimal timing for intervention may be, and
153 which populations will benefit most from these interventions. Publication dates range from
154 December 1998 to December 2022.

155

156 **Methods**

157 *a. Eligibility Criteria, Information Sources and Search Strategy*

158 To be included in this review, studies were independently evaluated based on the following
159 inclusion criteria: a) interventional study; b) indication of CB-PTSD prevention or treatment; and
160 c) inclusion of outcome measure(s) assessing CB-PTSD symptoms or diagnosis. Duplicate studies,
161 case reports, study protocols, active clinical trials, and studies involving mothers who exclusively
162 experienced stillbirth were excluded.

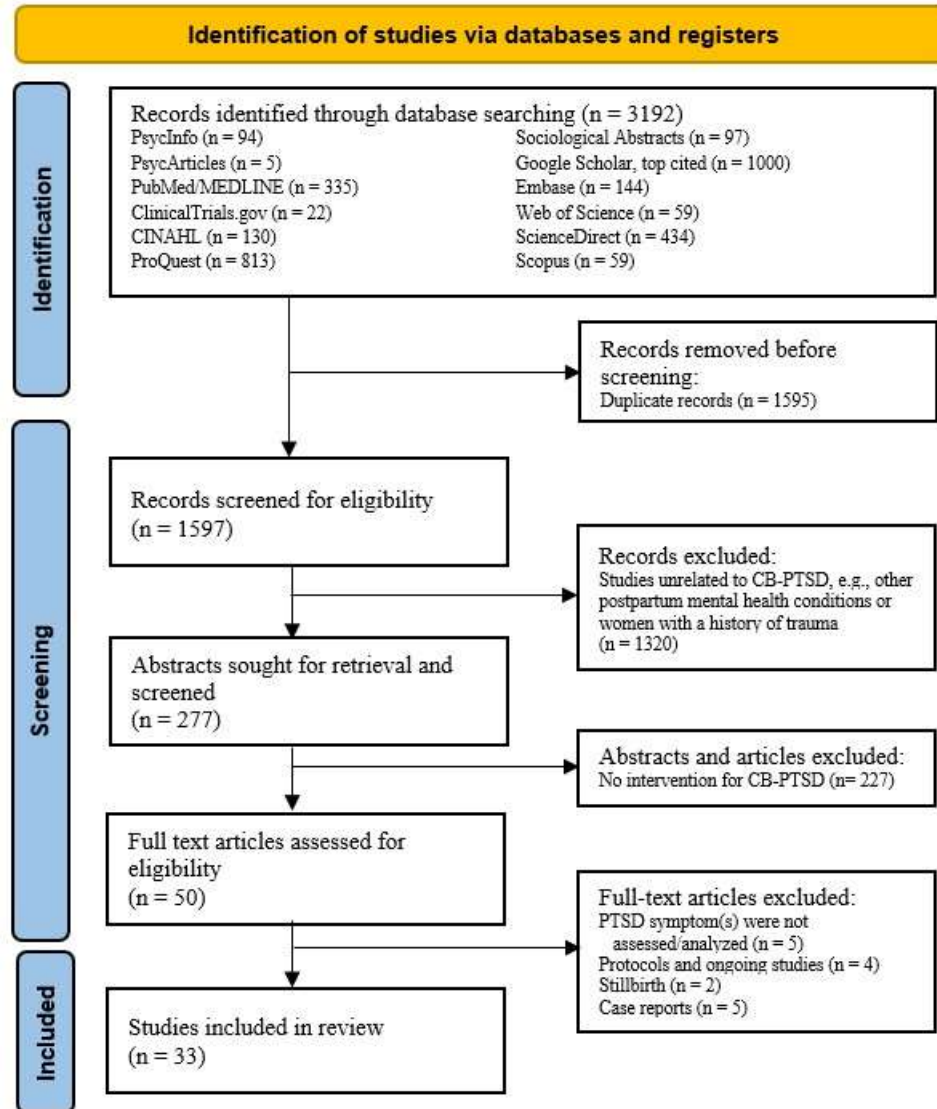
163 This systematic review was conducted according to PRISMA guidelines,⁴⁹ and our
164 protocol is registered on PROSPERO (CRD42020207086). Our search strategy targeted all
165 published studies measuring CB-PTSD or its symptoms as a primary treatment outcome. Articles

166 published through December 2022 were included from the following databases: PsycInfo,
167 PsycArticles, PubMed (MEDLINE), ClinicalTrials.gov, CINAHL, ProQuest, Sociological
168 Abstracts, Google Scholar, Embase, Web of Science, ScienceDirect, and Scopus. The search
169 criteria employed any combination of these keywords: "Postpartum OR postnatal OR childbirth
170 PTSD" OR "traumatic childbirth" OR "childbirth induced post-traumatic stress" AND "treatment
171 OR intervention OR therapy OR prevention". Published reviews on CB-PTSD therapies served as
172 additional resources.

173 *b. Study Selection*

174 A total of 33 studies published from December 1998 to December 2022 met inclusion
175 criteria and were reviewed. This selection followed the PRISMA workflow process;⁴⁹ for more
176 information regarding study selection, see Figure 1.

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180 Figure 1. PRISMA flow diagram detailing the source selection process of both randomized and
 181 non-randomized clinical studies targeting childbirth-related post-traumatic stress disorder (CB-
 182 PTSD) in at-risk and universal samples.

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188 *c. Data Extraction*

189 Two reviewers (J.P. and R.N.) extracted data using an Excel-based form. For each study,
190 the reviewers collected: sample characteristics, treatment type (prevention/treatment) and
191 modality, intervention frequency/duration, primary outcome measures, and outcome time points
192 (immediate, moderate, and long-term). We report treatment effects on CB-PTSD symptoms and
193 related conditions. Details are presented in Table 1.

194

195 [Insert Table 1 here]

196 Table 1 is available as a separate figure.

197 Table 1. Descriptions of clinical trials for interventions to prevent or treat childbirth-related
198 maternal PTSD

199

200 *d. Assessment of Risk of Bias, and Quality Assessment*

201 We adopted the well-validated, commonly used Downs and Black checklist⁴⁸ that is
202 recommended for evaluating the quality of randomized and non-randomized healthcare
203 interventions. This 27-item checklist offers a quantitative rating scale that is a composite
204 measurement of external validity, internal validity/confounding bias, and statistical power.
205 Individual items are scored on an integer scale of 0 to 1, for a total score of 28 (with item 5 scored
206 0-2). A study's overall quality score is calculated using the checklist's assigned point system, with
207 higher score indicating higher study quality. In this review, to better identify high-quality trials,
208 items 20, 21, and 27 ("Were the main outcome measures used accurate?"; "Were the patients in
209 different intervention groups or were the cases and controls recruited from the same population?";
210 "Were study subjects randomized to intervention groups?", respectively) were scored on a 0-2 scale,

211 as done in previous studies,⁵⁰⁻⁵² with a maximum total score of 31. Modified quality score ranges
212 were specified as: Excellent (29-31); Good (22-28); Fair (17-21); Poor (≤ 16).

213 The two reviewers independently scored all 33 studies. Inter-rater reliability was high
214 (91%), and any discrepancy in scores was discussed until 100% agreement was achieved. The
215 quality scores and adopted checklist are presented in Table 1 and Appendix A, respectively.

216

217 **Results**

218 *a. Study Selection*

219 In this review of 33 studies, 25 were randomized controlled trials (RCTs) and 8 were non-
220 RCTs. Among all trials, 3 tested primary preventive interventions delivered during pregnancy; 19
221 tested secondary preventions in which treatment was provided after childbirth but not later than 1
222 month postpartum, i.e., before a DSM PTSD diagnosis can be confirmed;¹¹ and 11 trials involved
223 tertiary prevention delivered more than 1 month postpartum, in cases with confirmed or probable
224 CB-PTSD.

225 Of the 33 studies, 31 entailed psychologically oriented therapies. These included trauma-
226 focused structured and non-structured interventions (n=19), i.e., psychological debriefing, crisis
227 intervention, Trauma-Focused Cognitive Behavioral Therapy (TF-CBT), Eye Movement
228 Desensitization and Reprocessing (EMDR), and Trauma-Focused Expressive Writing (TF-EW);
229 mother-infant dyad therapies (n=3); psychological counseling (n=5); and other psychological
230 approaches, i.e., visual biofeedback (n=1) and visual spatial cognitive task (n=2). The remaining
231 3 trials were educational interventions (Table 1).

232 In most trials, treatment response was determined using validated patient self-administered
233 questionnaires to measure endorsement of CB-PTSD symptoms (n=30). Clinician evaluation to

234 determine CB-PTSD endorsement was performed in 3 trials. Assessment of sustained treatment
235 outcomes usually targeted the first months following the intervention (n=27, ≥ 1.5 months, ≤ 6
236 months); longer effects (≥ 12 months post-intervention) were measured in 6 trials.

237

238 *b. Study Characteristics and Risk of Bias Results*

239 Detailed information on the study characteristics and quality assessment results are
240 presented in Table 1.

241 *c. Synthesis of Results*

242 *Psychologically Oriented*

243 *Debriefing or Trauma-Focused Psychological Therapies (TFPT)*

244 Psychological debriefing in the postpartum is usually performed as an early intervention
245 via midwife-led dialogue involving delivery-related emotions.^{44,53,54} When treating CB-PTSD, the
246 stressful aspects of the childbirth experience are addressed. Debriefing was tested in 4 RCTs as
247 early secondary prevention and 1 NRCT as later (tertiary) prevention. Quality scores ranged from
248 Fair to Good (17-28).

249 Overall, although women generally consider debriefing of value, no evidence supports the
250 psychological benefit of midwife-led postpartum debriefing following healthy^{55,56} or
251 complicated^{57,58} deliveries. A single structured 15-60 minute debriefing session within 72 hours
252 post-delivery vs. treatment as usual (TAU) was not associated with reduction in traumatic stress,
253 depression,^{55,56} anxiety, or parenting distress,⁵⁵ nor the proportion of incidences meeting CB-PTSD
254 diagnosis.⁵⁶ A sub-group of women receiving debriefing who experienced more medical
255 interventions had *more* negative perceptions of childbirth than controls.⁵⁵ Similarly, no sustained

256 benefits were documented when debriefing was offered to women following complicated,
257 traumatic deliveries, compared with cognitive behavioral therapy (CBT) and/or TAU.^{57,58}

258 Debriefing offered as a later treatment for women possibly affected by CB-PTSD
259 symptoms is associated with positive outcomes; however, evidence is derived from a single NRCT.
260 Compared with TAU (no debriefing), a single (60-90 minutes) debriefing session delivered ~16
261 weeks postpartum upon maternal request/referral reduced CB-PTSD symptoms and negative
262 appraisals of childbirth, but not depression, in a sample of 80 women who met DSM Criterion A.⁵⁹

263

264 *Crisis Intervention*

265 Trauma-Focused (TF) crisis intervention entails providing information about the impact of
266 stress, identifying relevant resources, and learning relaxation techniques and coping strategies in
267 the aftermath of trauma.⁶⁰ A single NRCT tested TF intervention as secondary prevention for CB-
268 PTSD; quality score was Fair (19).⁶⁰

269 An early single-session TF crisis intervention performed in the neonatal intensive care unit
270 (NICU) in women experiencing premature delivery and therefore at elevated risk for CB-PTSD
271 showed short-term benefits.⁶⁰ The intervention was tested in an NRCT of 50 mothers of premature
272 infants and was coupled with brief psychological aid and intense support during critical times. At
273 time of hospital discharge, mothers receiving the intervention compared with TAU (can receive
274 hospital minister counseling) had fewer overall CB-PTSD symptoms and fewer intrusion,
275 avoidance, and hyperarousal symptoms.

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278

279 *Trauma-Focused Cognitive Behavioral Therapy*

280 Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) for CB-PTSD involves a
281 manualized protocol in which cognitive distortions regarding the traumatic childbirth and related
282 stressors are challenged to reorient adaptive thoughts and behaviors.^{23,42,61} TF-CBT was tested in
283 1 RCT and 1 NRCT as secondary prevention,⁶²⁻⁶⁴ and in 2 RCTs as tertiary prevention.^{65,66} Quality
284 scores ranged from Fair to Good (20-27).

285 Early TF-CBT delivered during premature infant's hospitalization in women at risk for
286 CB-PTSD shows benefits.^{62,63} The therapy involves cognitive restructuring, muscle relaxation,
287 construction of a narrative of the traumatic childbirth and NICU experience, psychoeducation, and
288 infant redefinition.^{62,63} Consecutive (6, ~50 minutes) TF-CBT one-on-one sessions delivered 1-2
289 weeks following childbirth, vs. standard care, in an RCT of 105 women with clinically significant
290 acute stress, yielded fewer CB-PTSD and postpartum depression (PPD) symptoms; positive
291 treatment effects were sustained 6 months after childbirth.^{62,63} Similarly, consecutive (6, 90
292 minutes) TF-CBT group sessions in the NICU in 19 women (no controls) was associated with
293 improved PPD, CB-PTSD, and anxiety symptoms, at 6 weeks and 6 months post-intervention,
294 respectively.⁶⁴

295 Findings are mixed for TF-CBT sessions focused on exposure and cognitive restructuring
296 delivered in the months and years postpartum to affected women.^{65,66} A series of 6-8 consecutive
297 TF-CBT internet sessions delivered 2-4 months following medically complicated delivery was not
298 associated with better long-term outcomes vs. TAU (conventional support) in an RCT (N = 266).⁶⁵
299 Improvement in CB-PTSD and PPD symptoms, and reported quality of life, assessed 1-year post-
300 treatment were observed in both study conditions. In contrast, consecutive (8 weekly) sessions
301 delivered ~2.8 years postpartum in women with provisional CB-PTSD⁶⁶ were associated with

302 improvement in CB-PTSD symptoms and reported quality of life compared with delayed (post 5
303 months) treatment in an RCT of 56 women, although improvement in anxiety and PPD symptoms
304 was observed in both treatment conditions.

305

306 *Eye Movement Desensitization and Reprocessing (EMDR)*

307 Trauma-Focused Eye Movement Desensitization and Reprocessing (TF-EMDR) for CB-
308 PTSD involves a standardized protocol in which women are instructed to focus briefly on their
309 traumatic memories of childbirth while receiving bilateral eye stimulation to reprocess and
310 alleviate childbirth-related traumatic stress.⁴⁴ EMDR was tested in 1 RCT as secondary
311 prevention⁶⁷ and 2 NRCTs as tertiary prevention.^{68,69} Quality scores ranged from Poor to Good
312 (13-25).

313 An early TF-EMDR intervention delivered during maternity hospitalization stay can
314 reduce CB-PTSD symptoms in postpartum women at high risk for CB-PTSD, endorsing acute
315 traumatic stress. A single (90-minute) session delivered within 72 hours post-delivery vs. TAU
316 (standard psychological supportive therapy) in women with childbirth-related traumatic stress (N
317 = 37) yielded significant reduction of CB-PTSD symptoms and subjective distress regarding recent
318 and future deliveries, assessed 6 weeks and 3 months later.⁶⁷ However, no group differences were
319 found in the prevalence of CB-PTSD diagnosis post-treatment, and improvement in mother-infant
320 bonding and PPD symptoms was noted in both conditions. In consecutive EMDR sessions in the
321 months and years following childbirth in affected women endorsing CB-PTSD, positive outcomes
322 are reported;^{68,69} it should be noted that the findings are derived from two NRCTs without control
323 groups.

324

325 *Trauma-Focused Expressive Writing*

326 Trauma-Focused Expressive Writing (TF-EW) for CB-PTSD involves constructing a
327 narrative about childbirth through writing with a focus on describing related thoughts and
328 feelings.^{42,70} This is intended to facilitate reprocessing of the birth experience and enhance
329 meaning making.⁷¹ TF-EW was tested in a total of 6 RCTs including 4 trials as secondary
330 prevention and 2 trials as tertiary prevention. Quality scores ranged from Fair to Good (20-27).

331 TF-EW delivered in the very first days following uncomplicated pregnancies shows
332 benefits. A single (10-15 minute) EW session about childbirth, compared with no writing,
333 performed 48 hours postpartum in samples of 64⁽⁷²⁾ and 242⁽⁷³⁾ women, was associated with fewer
334 hyperarousal and avoidance symptoms post-intervention. Sustained positive treatment effects (for
335 hyperarousal) were observed at 2 months^{72,73} and 1 year⁷³ following childbirth. Likewise, a single
336 (~20 minute) TF-EW session about childbirth, compared with writing about daily events,
337 performed ~96 hours post-delivery (N = 176), was associated at 3 months post-treatment with
338 positive effects in reducing depressive and PTSD (hyperarousal and avoidance) symptoms.⁷⁴
339 Immediate treatment effects were observed for depression.

340 Consecutive TF-EW sessions can benefit postpartum women who are at risk of CB-PTSD.
341 In a non-selective sample of 113 women, early TF-EW (2 sessions in a single day) about childbirth
342 delivered in the first postpartum days, compared with neutral writing, produced greater reduction
343 in CB-PTSD (avoidance and hyperarousal) symptoms, and depressive symptoms 3 months later,
344 especially for women with relatively higher stress at baseline.⁷⁵ Likewise, in a high-risk sample of
345 67 women, TF-EW (3, 15-minute sessions) in the months following prematurity, focused on the
346 childbirth and infant's hospitalization, had positive outcomes. Compared with TAU (standard
347 postpartum care), EW was associated with improvements in post-traumatic stress and depressive

348 symptoms, and overall mental health status, 1 month following intervention. Treatment effects (for
349 depression) were sustained 3 months later.⁷⁶ Similarly, TF-EW (4, 30-minute sessions) post-
350 discharge vs. waiting-list, in a sample of 38 postpartum women following premature delivery, was
351 associated with improvement in post-traumatic stress 1 month post-intervention.⁷⁷

352

353 *Psychological Counseling*

354 Psychological counseling for CB-PTSD in postpartum women usually entails semi-
355 structured midwife-led intervention emphasizing the therapeutic relationship, acceptance of
356 childbirth experiences, expression of emotions, social support, problem solving,^{39,78,79} and
357 discussion of baby care-related issues.⁸⁰ Psychological counseling was tested in 4 RCTs as
358 secondary prevention, and 1 RCT as tertiary prevention. Quality scores ranged from Fair to Good
359 (18-26).

360 One-on-one midwife-led psychological counseling in which the core intervention is
361 conducted as a single session in the postpartum unit for women who experience traumatic
362 childbirth shows positive effects.^{81,82} Two studies of 90 and 103 postpartum women, respectively,
363 who experienced birth trauma and thus met DSM Criterion A, tested a single (40-60 minutes)
364 counseling session within 72 hours post-delivery coupled with a phone session (40-60 minutes) 4-
365 6 weeks postpartum vs. TAU.^{81,82} Counseling was associated with reduction in CB-PTSD and PPD
366 symptoms,^{81,82} less self-blame, and greater confidence about future pregnancies 3 months later,⁸²
367 although not reducing incidences of CB-PTSD diagnosis.⁸²

368 A more intense early counseling therapy entailing consecutive sessions delivered in the
369 postpartum unit and subsequently during postpartum weeks to women who experienced traumatic
370 childbirth also showed benefits.^{80,83} A single one-on-one (45-60 minutes) counseling session

371 delivered 24-48 hours post-delivery followed by a 45-90-minute session during postpartum care
372 visit at 10-15 days, and a brief (15-20 minutes) counseling session via phone 4-6 weeks after
373 delivery vs. TAU (routine post-partum care), were tested in a sample of 166 postpartum women
374 meeting PTSD DSM Criterion A.⁸⁰ Counseling sessions were associated with reduced CB-PTSD
375 and PPD symptoms, and improved maternal-infant bonding at 2 months postpartum.⁸⁰ Likewise,
376 consecutive (2, 45-60 minutes) counseling sessions about the implications and consequences of an
377 emergency Cesarean section, delivered before hospital discharge, and 2 additional sessions
378 performed 2-3 weeks postpartum vs. TAU were tested in 99 postpartum women.⁸³ Counseling was
379 associated with fewer CB-PTSD symptoms, less general mental distress, and more positive
380 appraisals of recent childbirth at 1 month postpartum, with effects sustained 6 months postpartum.
381 However, the treatment was insufficient for women with substantial post-traumatic stress reactions
382 or general distress.⁸³

383 In contrast, intervention of later postpartum counseling group-format intervention sessions
384 in months following traumatic childbirth does not appear promising. Consecutive (2, 60 minutes)
385 sessions vs. TAU in 162 women who had emergency Cesarean section did not reduce level of fear
386 of childbirth, nor CB-PTSD or PPD symptoms, at 6 months postpartum.⁸⁴

387

388 *Mother-Infant-Focused Interventions*

389 Mother-infant dyad interventions target the maternal-infant interaction through various modalities
390 including skin-to-skin contact and play sessions. Improvement in the mother-infant interaction is
391 thought to promote maternal mental health.⁸⁵⁻⁸⁷ Dyad interventions were tested in 3 RCTs
392 including 1 secondary prevention and 2 tertiary preventions.⁸⁸⁻⁹⁰ Study quality scores were Good
393 (23-26).

394 Immediate postpartum mother-infant skin-to-skin contact can have positive effects in
395 reducing CB-PTSD symptoms following traumatic childbirth.⁹¹ Skin-to-skin during the ‘magical’
396 first postpartum hour vs. TAU (routine postpartum skin-to-skin) in 84 women meeting DSM PTSD
397 Criterion A was associated with fewer CB-PTSD symptoms 2 weeks and 3 months post-
398 intervention.⁸⁸

399 Brief therapist-led one-on-one consecutive dyad observational and play intervention
400 sessions following prematurity and performed at a later postpartum time point show positive
401 outcomes in improving maternal sensitivity and post-traumatic stress symptoms. A 3-phase (33
402 and 42 weeks post-conception, and infant age 4 months) intervention of ~5 observational and free
403 play sessions (several hours in total) of mothers and their premature infants improved the quality
404 of interactions in comparison with TAU (preterm without intervention) in a randomized sub-
405 sample of 26 pairs.⁸⁹ The treatment was associated with increase in maternal sensitivity and infant
406 cooperation, decrease in infant difficulty, and significant decrease in CB-PTSD symptoms from
407 time of intervention up to 12 months postpartum.⁸⁹ In contrast, an earlier dyad-focused intervention
408 initiated ~33 days postpartum and during infant NICU hospitalization stay was not associated with
409 improved outcomes. A series of 6 sessions (5 in NICU and the last at home at 2-4 weeks post-
410 discharge) focused on reading infants’ cues and responding was not found more helpful than TAU
411 (standard care) in 121 women with very low birth weight infants.⁹⁰

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417 *Other Psychologically Oriented Interventions*

418 Other psychological interventions for CB-PTSD include biofeedback tested as primary
419 prevention in an NRCT;⁹² and a cognitive visuospatial task tested as secondary and tertiary
420 preventions in an RCT and NRCT, respectively.^{93,94} Study quality score ranged from Fair to Good
421 (18-26).

422 Visual biofeedback ultrasound during the second stage of labor, involving the physician
423 conveying a visual representation for the future mother of her pushing efforts and fetus movement
424 in real time, shows benefits in reducing CB-PTSD risk. In an NRCT of 95 nulliparous women,⁹²
425 ~5 minutes of biofeedback vs. TAU (standard obstetrical coaching) increased maternal-newborn
426 connectedness in the immediate postpartum, which in turn was associated with reduced acute stress
427 in initial postpartum days and subsequently reduced CB-PTSD symptoms at 1 month.⁹² There were
428 no direct effects of the treatment on CB-PTSD symptoms.

429 A brief visuospatial cognitive task procedure performed in the immediate postpartum
430 following emergency Cesarean delivery shows short-term positive effects.⁹³ This therapy is
431 thought to interfere with consolidation of the traumatic visual memory, making the memory less
432 perceptual and less intrusive.⁹⁵⁻⁹⁷ A single 15-minute computer game Tetris session within 6 hours
433 postpartum vs. TAU in a randomized sample of 56 women was found acceptable by subjects and
434 was associated with fewer intrusive traumatic memories of childbirth 1 week post-delivery.⁹³
435 However, no significant treatment effects were observed for CB-PTSD, anxiety, or depression
436 symptoms at 1 month postpartum.⁹³ Likewise, in a pilot NRCT of 18 women (without control
437 group) with severe childbirth-related re-experiencing symptoms ~2 years postpartum,
438 administered a single 20-minute Tetris session during childbirth recollection for the purpose of
439 traumatic memory blockage,⁹⁴ the majority reported fewer intrusive memories 1-2 weeks and 5-6

440 weeks post-intervention. For subjects who met CB-PTSD diagnosis, none met diagnosis at 1 month
441 post-intervention.

442

443 *Educational Interventions*

444 Antenatal education aims to help expecting mothers via strategies for managing pregnancy,
445 childbirth, and parenthood, and may also include postpartum interventions.⁹⁸⁻¹⁰⁰ Education
446 interventions are provided by midwives and nurses. This review included 1 RCT¹⁰¹ and 1 NRCT¹⁰²
447 primary educational prevention and 1 RCT secondary educational prevention.¹⁰³ Study quality
448 scores ranged from Good to Excellent (22-31).

449 Antenatal educational consecutive group sessions show benefit in non-high-risk women.¹⁰²
450 Consecutive (4, 240 minutes) sessions focused on psychological and physiological adaption vs.
451 TAU in a non-randomized sample of 90 second- and third-trimester pregnant women were
452 associated with less fear of childbirth in pregnancy and more expected self-efficacy, and later at
453 6-8 weeks postpartum, with less fear of childbirth and fewer CB-PTSD symptoms.¹⁰² Likewise,
454 consecutive one-on-one sessions focused on developing a birth plan vs. TAU in a randomized
455 sample of 106 non-high-risk third-trimester women were associated with less fear of childbirth,
456 improved childbirth experience, and fewer CB-PTSD and PPD symptoms 4-6 weeks post-
457 delivery.¹⁰¹

458 In contrast, an early postpartum educational intervention utilizing self-help materials for
459 women who had traumatic childbirth and were at risk for CB-PTSD without professional support
460 was insufficient to reduce CB-PTSD symptoms. In an RCT of 678 women meeting PTSD DSM-
461 IV Criterion A, subjects receiving self-help materials on how to manage early psychological

462 responses during postpartum visit plus usual care, vs. TAU, did not show reduction in incidence
463 of CB-PTSD diagnosis or sub-diagnosis assessed 6-12 weeks postpartum.¹⁰³

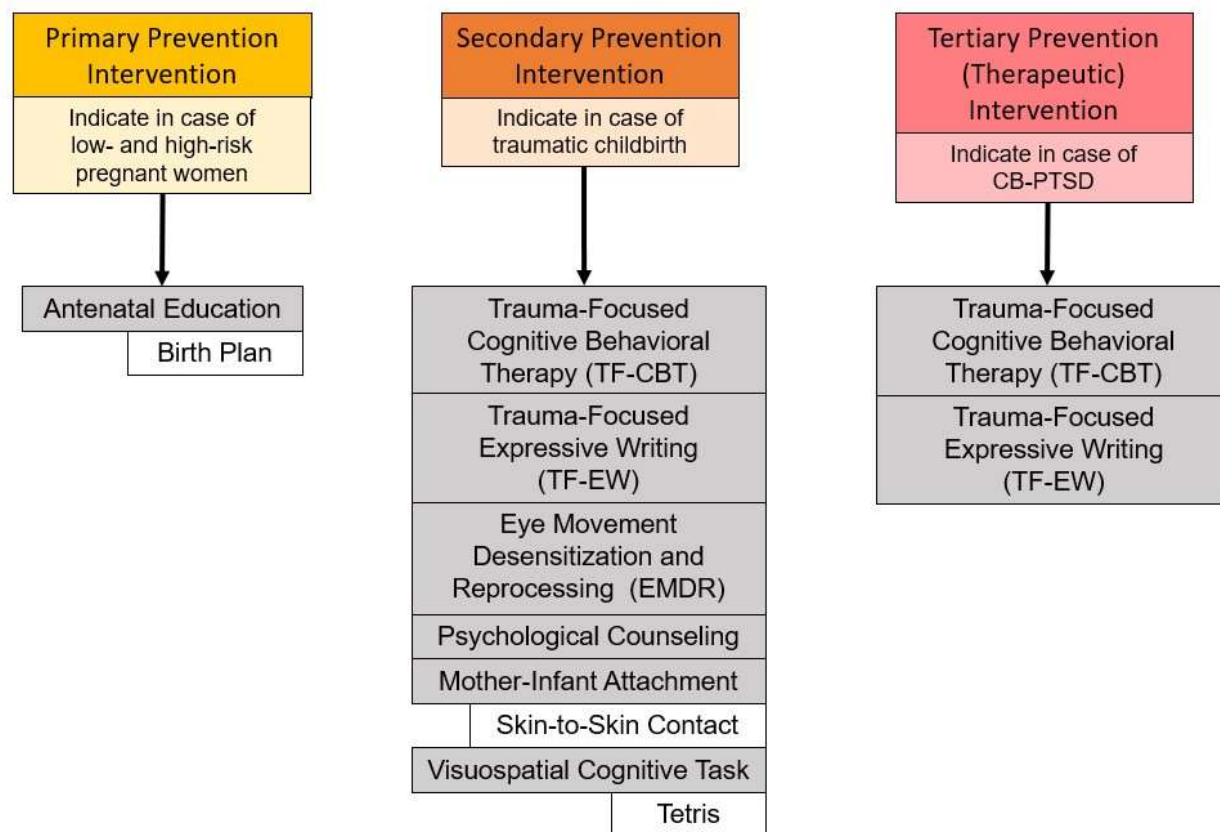
464

465 **Comment**

466 *a. Principal Findings*

467 This systematic review provides insight derived from published randomized and non-
468 randomized clinical trials of interventions tested in pregnant and postpartum women to inform
469 evidence-based recommendations for primary and secondary prevention of CB-PTSD, and
470 guidance for determining treatment approaches. Available studies (N=33) reviewed here range in
471 quality between Poor and Excellent. They demonstrate that structured trauma-focused therapies
472 and semi-structured midwife-led psychological counseling strategies are promising treatments
473 (Figure 2). Other treatments to consider are traumatic memory blockage, mother-infant dyadic
474 focused, and educational interventions (Figure 2). As additional RCTs are conducted, stronger
475 evidence to support the efficacy of treatments for primary, secondary, or tertiary approaches will
476 become available.

477



478

479

480 Figure 2. Recommended primary, secondary, and tertiary (i.e., therapeutic) interventions to
481 mitigate or prevent the development of childbirth-related post-traumatic stress disorder (CB-
482 PTSD). Recommendations are based on 16 studies employing randomized controlled clinical trials
483 (RCTs) and reporting positive results. Grey boxes indicate categories of therapy strategy, and
484 white boxes indicate specific implementations of those strategies. Trauma-Focused Expressive
485 Writing (TF-EW) for secondary prevention was tested in universal samples.
486

487 An array of brief postpartum psychological interventions are safe, acceptable, and feasible
488 to implement as early treatment, often before CB-PTSD presents as a clinically diagnosable
489 disorder, thus minimizing serious consequences. A total of 16 RCTs reveal positive outcomes
490 (Figure 2). Among them, the secondary preventions appear promising for reducing CB-PTSD
491 symptoms compared with usual care in women exposed to traumatic childbirth. Evidence also
492 supports the potential positive sustained effects of brief therapies (1-4 sessions) performed within

493 48-96 hours postpartum and during maternity hospitalization stay. This “in-house” approach could
494 greatly facilitate access to postpartum care. Although psychological debriefing following
495 childbirth trauma may not be helpful,^{40,53} the few available RCTs suggest the effectiveness of
496 EMDR⁶⁷ and Trauma-Focused Expressive Writing (TF-EW),⁷²⁻⁷⁵ which largely target fear
497 extinction through reprocessing of the trauma memory; one or few sessions of psychological
498 counseling led by a midwife near bedside;⁸⁰⁻⁸³ and interventions focused on the mother-infant dyad
499 (and skin-to-skin contact)⁸⁸⁻⁹⁰ during the “sensitive period” following childbirth. This latter
500 approach suggests a second therapeutic target. What remains unclear is whether useful
501 interventions delivered in the early postpartum have efficacy as standalone treatments for women
502 with acute clinically significant traumatic stress and whether they can reduce CB-PTSD diagnosis
503 incidence.

504 Antepartum educational interventions delivered universally to pregnant women before
505 childbirth may promote positive mental outcomes during pregnancy and following childbirth.^{101,102}
506 The limited available evidence, based on two studies, suggests that universal interventions focused
507 on birth plan and preparation are helpful, regardless of potential for exposure to traumatic
508 childbirth. Postpartum educational interventions targeting women experiencing traumatic
509 childbirth do not appear sufficient for reducing CB-PTSD incidence,¹⁰³ underscoring the
510 importance of the timing of educational interventions.

511 Interventions for the indication of CB-PTSD (tertiary prevention) with the goals of
512 preventing worsening symptoms and improving functioning for women who endorse symptoms
513 or have a diagnosis may have substantial benefits for the developing child. This review identified
514 5 RCT-tested interventions supporting the potential benefits of trauma-focused therapies
515 (expressive writing and TF-CBT).

516 *b. Comparison with Existing Literature*

517 A large body of literature addresses treatment approaches for PTSD in non-postpartum
518 individuals.¹⁰⁴⁻¹⁰⁶ Although trauma-focused interventions are the gold standard, they suffer from
519 high dropout rate,¹⁰⁷⁻¹⁰⁹ and some individuals with PTSD will remain treatment resistant.¹¹⁰⁻¹¹²
520 This underscores the importance of intervening effectively in the aftermath of trauma to buffer the
521 development of persistent symptoms.

522 Currently, limited data are available on effective interventions to prevent PTSD.⁴⁵⁻⁴⁷
523 Childbirth, however, provides a unique opportunity to test early post-birth therapies for PTSD
524 stemming from traumatic childbirth, facilitated by immediate access to postpartum patients. This
525 review provides new insight on promising secondary preventive approaches for CB-PTSD,
526 including the benefits of intervening in the very first post-trauma exposure days, which, with more
527 replicated and high-quality studies, could inform clinical recommendations. This review expands
528 the emerging literature on CB-PTSD therapies by covering trials published through December
529 2022. The available data favor targeted rather than universal approaches to treat postpartum
530 women.

531 *c. Strengths and Limitations*

532 This review adopts a comprehensive approach to evaluate available data on preventive
533 interventions and treatments for CB-PTSD via quality assessment of all clinical trials published to
534 date, not limited to a specific treatment modality, treatment time period, or maternal population.
535 Hence, we provide insight into all three types of potential interventions, what the optimal timing
536 for intervention may be, and which populations will benefit most. We use a well-validated
537 standardized quantitative approach based on the PRISMA guidelines⁴⁹ for study selection and data
538 extraction, and assess external validity, internal validity, and power, to evaluate the published

539 trials' quality. While the primary outcome is CB-PTSD, we also consider co-morbid conditions,
540 such as postpartum depression. Nevertheless, several limitations are worth noting. This review's
541 quality assessment was performed for each treatment modality separately, and grouping RCTs and
542 non-RCTs studies into the relevant category. The main limitation in this approach is the small
543 number of trials in some categories, which may limit the interpretation of the quality score range.
544 Some studies lacked information about sample characteristics, degree of pre-treatment CB-PTSD
545 severity, and clear time point of treatment outcome assessment, and these characteristics are only
546 partly reflected in the assessment scale. Likewise, the definition of high-risk women exposed to
547 childbirth trauma varied among studies and may have affected the ability to detect treatment
548 effects. We did not intend to perform meta-analyses, which may have provided additional
549 information. Finally, the number of published trials per prevention type is limited, which may
550 prevent drawing strong conclusions.

551

552 *d. Conclusions and Implications*

553 Maternal psychiatric morbidities are a leading complication of childbirth¹¹³⁻¹¹⁵ and involve
554 heavy public health costs.¹¹⁶⁻¹¹⁸ Substantial evidence shows that a significant portion of women
555 experiencing traumatic childbirth develop persistent symptoms of childbirth-related PTSD (CB-
556 PTSD),^{3,12,13,119} which cause functional impairment.²⁴ Standards are lacking regarding what type
557 of psychological therapy should be routinely delivered in postpartum care for the prevention or
558 indication of this disorder, and this can have adverse consequences far beyond the directly affected
559 postpartum woman. The available studies covered in this review suggest that intervening early in
560 the postpartum period, and as soon as feasible, may reduce trauma reactions and in turn prevent
561 CB-PTSD diagnosis. As a first step, this would require accurate identification of high-risk women

562 who have experienced complicated, traumatic childbirth and may also show clinically significant
563 acute stress.¹²⁰ Early therapy delivered to high-risk women, rather than universally in the maternal
564 population, would allocate available resources to those most in need and lower medical costs. A
565 second critical step is ensuring treatment uptake during postpartum care. As presented in this
566 review, manualized brief therapies delivered during maternity hospitalization stay offer a
567 promising time window for effective therapy that also has the advantage of improving equity in
568 care. A primary preventive approach in high-risk women may involve interventions focused on
569 preparation for forthcoming childbirth delivered to pregnant women when they are already in
570 frequent contact with health providers and during a time of motivation for self-care.

571 Important areas for future research include replicating the reported studies using adequate
572 sample sizes, assessing long-term outcomes in RCT designs, shifting from exclusive patient self-
573 report to also including mechanistic biomarkers, and identifying the golden hours following
574 childbirth to maximize treatment response and uptake. Additionally, testing adjunctive or
575 alternative non-trauma-focused intervention approaches that appear promising in individuals with
576 general PTSD (e.g., mindfulness,¹²¹ yoga,¹²² metacognitive therapy (MCT)),¹²³ and regarding
577 resilience and psychological growth,¹²⁴ therapies to enhance those traits, as well as the use of safe
578 drug therapies (e.g., intra-nasal oxytocin),¹²⁵ will expand available treatment options.

579 Ultimately, a personalized treatment approach incorporating therapeutic acceptability to
580 the pregnant or postpartum woman and considering degree of symptom severity rather than a “one
581 size fits all” strategy is likely to maximize treatment effectiveness. Based on the current state of
582 knowledge, perinatal and mental health providers are strongly encouraged to consider on a case-
583 by-case basis promising treatment options to prevent post-traumatic stress in the wake of childbirth
584 trauma.

585 **Appendix A:** Modified Downs and Black Checklist used in this systematic review.

586

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