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Childbirth self-efficacy and birth related PTSD symptoms: an online childbirth education randomised controlled trial for mothers

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Abstract

Background This study evaluated an online childbirth education course on childbirth self-efficacy and, subsequent birth related posttraumatic stress disorder (PTSD) symptoms and mother-infant relationship quality.

Method Three group (intervention, passive control, active control) parallel randomised controlled trial. Groups were assigned using computer generated random allocation. For the passive control group participants were instructed to carry on with whatever they were currently undertaking with their pregnancy, while the active control group were asked to read a booklet comprised of twelve birth stories. The purpose of the active control was to check if the act of having an activity to complete would influence outcomes. For the online course group (intervention) participants were asked to complete the online version of a birthing course designed by She Births®. One hundred and twenty-five women residing in Australia between 12 and 24 weeks pregnant were recruited online. Participants were asked to complete their required activity between 24 and 36 weeks pregnant. Childbirth self-efficacy scores were tested pre and post intervention (time one and time 2), PTSD symptoms and mother-infant relationship quality were tested at six weeks and six months postnatal.

Results There was no significant interaction by group for childbirth self-efficacy scores. Mean difference scores at time one (pre-intervention) and time two (post-intervention) for each group indicated a trend in the online group towards higher childbirth self-efficacy compared with the two control groups. The main effect of group on birth related PTSD scores was not statically significant at six weeks postnatal or at six months postnatal. The main effect of group on mother-infant relationship scores was not statically significant at six weeks postnatal or six months postnatal.

Conclusions Trends showed childbirth self-efficacy scores to be higher in the intervention group compared with the two control groups, demonstrating effectiveness for the intervention. Paradoxically, PTSD scores were higher in the intervention group compared with the two control groups and therefore also reported poorer mother-infant relationship quality. External factors may be more important than childbirth self-efficacy highlighting the need for a holistic approach that addresses systemic and socio-political influences to improve communication, autonomy, and respectful maternity care.

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Trial Registration This trial was retrospectively registered with the Australian New Zealand Clinical Trials Registry number: ACTRN12624000241538 on March 11, 2024.

Keywords Birth trauma, PTSD, Childbirth self-efficacy, Childbirth education, Mother-infant relationship, Maternal mental health

Introduction

Evidence that women can develop Posttraumatic Stress Disorder (PTSD) in response to a difficult birth is now substantial. Around 3% of women are affected at diagnostic levels and 18.5% in high risk groups [1–3]. Around one third experience symptoms at subthreshold levels and up to as many as 48% of women describe their birth as traumatic [4–8]. Birth trauma can be defined as "The emergence of a baby from its mother in a way that involves events or care which cause deep distress or psychological disturbance, which may or may not involve physical injury, but resulting in psychological distress of an enduring nature." [9, p. 23]. This means that even in cases where neither the infant nor the mother sustains physical harm, women may still undergo intense emotional turmoil following a traumatic birth experience. In addition to the mother's distress, it has recently been established that there may also be relational consequences following traumatic birth with a recent systematic review finding birth related PTSD symptoms may also impair the quality of the mother-infant relationship [10].

Posttraumatic Stress Disorder (PTSD) stemming from childbirth is defined by the same PTSD criteria as listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) [3]. These symptoms are organized into four clusters: re-experiencing, avoidance and numbing, hyperarousal symptoms, and negative cognitions and mood. This may include intrusive thoughts or images associated with the birth, nightmares leading to sleep disturbances, heightened distress when reminded of the birth, intentional avoidance of such reminders, and negative changes in mood and cognition, such as self-blame and anhedonia [3]. The causes, risks and vulnerabilities about how and why birth is experienced as traumatic is thought to be multi-factorial. Research shows that individual, sociocultural and systemic issues can be involved [11–16]. Sociocultural and systemic factors, including demeaning treatment, instances of obstetric violence, and the erosion of dignity and autonomy during childbirth, are recognized as contributors to the perception of birth as traumatic and the subsequent emergence of PTSD symptoms in women [11–16]. Individual vulnerabilities are also thought to be important, those that frequently emerge in research include: antenatal depression; a history of trauma; negative subjective birth experiences (e.g., extreme pain, lack of support); medical intervention; birth mode; and, obstetric complications [17, 18]. Among these risk factors, the women's subjective evaluation of their childbirth experience has been identified as more important than the objective complications of the event [18]. Other research outcomes [e.g., 8, 17, 19–21] similarly suggest that, while obstetric complications and medical interventions (e.g., emergency caesarean, forceps birth) pose risks for birth-related PTSD, the significance of medical status appears to be outweighed by subjective factors like loss of control, perceived support, fear of birth, and intense pain.

According to Ayers et al., [17] the diathesis-stress model offers an explanation of why subjective factors may be so important and how coping and stress related factors contribute the development of birth related PTSD, over and above objective medical events. The diathesis-stress model of PTSD suggests that while the traumatic event acts as the primary stressor triggering PTSD symptoms, pre-existing individual differences play a crucial role in the potential development of PTSD. This model contends that individuals with higher levels of relevant psychological vulnerabilities before the traumatic experience are more susceptible to developing PTSD compared to those with lower levels of these diatheses [22]. Consistent with the diathesis-stress model described by Ayers et al. [17, 23–26]. Women with high childbirth self-efficacy are described as having a greater capacity to cope with childbirth and to implement required behaviours (e.g., concentration; breathing; relaxation, emotion regulation; confidence) [27].

Interventions for birth related PTSD

There is a distinct lack of attention to evaluating interventions to prevent birth related PTSD despite numerous approaches to birth preparation on offer in the community. There are a small number of secondary interventions, to reduce the impact of disease or injury, that have been trialled and only one identified primary prevention to prevent disease or injury before it occurs [23, 28–30]. Furuta et al. and de Graaff et al. [28, 31] both systematically reviewed interventions aimed at addressing PTSD related to childbirth and traumatic birth experiences. Each study reviewed secondary interventions targeting symptoms of birth-related PTSD. Notably, de Graaff et al. highlighted the absence of research addressing the prevention of traumatic births. The sole primary prevention study identified employed a novel approach to preventing the onset of PTSD symptoms using the game Tetris. Women were asked to play at least ten minutes of Tetris post emergency caesarean section. Compared to the

control group women in the intervention group reported less intrusive symptoms, with a large effect sizes observed at one week and a smaller effect size at one month [30].

Other studies have focused on childbirth education as a possible intervention. Childbirth education aims to empower expectant mothers with knowledge and skills to navigate the process of pregnancy, labour, and birth, enabling them to make informed decisions and reduce anxiety. It also promotes a better understanding of the physiological and emotional aspects of childbirth, fostering a more positive and confident birthing experience. Isbir et al. [23] conducted an experimental study to test the effect of antenatal education classes on PTSD symptoms in a Turkish sample. Compared to the control group, they found the intervention group had greater childbirth self-efficacy and less PTSD symptoms. Classes specifically focused on psychoprophylaxis have also been shown to reduce rates of interventions and improve rates of vaginal births [32–34]. Bandura's theory of self-efficacy may explain this relationship [35, 36]. High self-efficacy is associated with persistence in the face of adversity and greater success in mastering new behaviours, which in turn influences affective responses to stressful situations. Conversely, other cross-sectional studies have shown birth education classes significantly predict PTSD symptoms and are associated with less positive childbirth experiences [37–39]. The picture is even less clear in Avignon et al.'s study where even though childbirth education significantly predicted PTSD symptoms, that group had less symptoms than in the no antenatal education group. The authors examined various sub-groups and concluded that the link between birth preparation and birth related PTSD symptoms is relatively complex to measure due to the number of variables involved [37]. For example, other studies show that birth education can reduce rates of interventions, including caesarean birth and epidural analgesia and increase rates of vaginal births [32, 33], as well as improve self-efficacy, and reduce maternal stress and fear of birth [40]. While the variables in these studies are important, it seems they do not necessarily translate to a non-traumatising experiencing. Further, most studies are not measuring antenatal interventions specifically targeted at reducing PTSD symptoms. The studies that did, showed reductions in either PTSD symptoms or rates of intervention [23, 32, 33].

Childbirth self-efficacy

Self-efficacy refers to an individual's beliefs about their ability to deal with prospective situations and whether an individual can cope in the face of obstacles and aversive experiences [35, 36]. High self-efficacy is associated with persistence in the face of adversity and greater success in mastering new behaviours, which in turn influences affective responses to stressful situations. Childbirth self-efficacy relates to how confident a mother is about her ability to cope with labour and birth [27]. High self-efficacy is thought to result in greater capability to cope with childbirth and to perform required behaviours [27]. Evidence suggests that mothers who are high in self-efficacy are more confident and make internal attributions of success, while mothers low in self-efficacy tend to give up more quickly and have internalised expectations of failure [41]. There are a number of studies that have demonstrated high self-efficacy is related to personal agency in mothers (not specifically childbirth) [42] and lower levels of postnatal depression [e.g., 41, 43, 44], while childbirth self-efficacy is related to a number of factors including: pain experience [45–48], obstetric factors [49–52], fear of childbirth [51, 53, 54], prenatal anxiety [55–57], and perinatal depression [43]. Greater childbirth self-efficacy has also been associated with less birth related PTSD symptoms [23–25, 58], although this research is largely correlational and not well established.

Aim and hypotheses

Birth related PTSD is unique, in that unlike many other PTSD events, we have an opportunity to intervene prior to the potentially traumatic event. Consistent with the diathesis-stress model and evidence from previous research, this study also aimed to test the effect of an online psychoprophylactic childbirth education course on childbirth self-efficacy, thereby aiming to improve a woman's ability to cope with birth and reduce distress and/or trauma. It was anticipated that those in the online course group (intervention) would have greater childbirth self-efficacy (Hypothesis 1), less birth related PTSD symptoms (Hypothesis 2), and better mother-infant relationship quality (Hypothesis 3) compared with the two control groups (active and passive control).

To enable triangulation and a broader, more comprehensive understanding of birth experiences, the study also incorporated a whole sample qualitative exploration of women's perspectives about what they thought could have been better or different about the way their birth was experienced.

Method

Design

This study employed a three group (intervention, passive control, active control) parallel randomised controlled trial design (Australian New Zealand Clinical Trials Registry number: ACTRN12624000241538 March 11, 2024). Groups were assigned using Qualtrics computer generated random allocation, see Fig. 1 for outline of study design. The trial was conducted in accordance with the CONSORT statement (http://www.consort-statement.org).

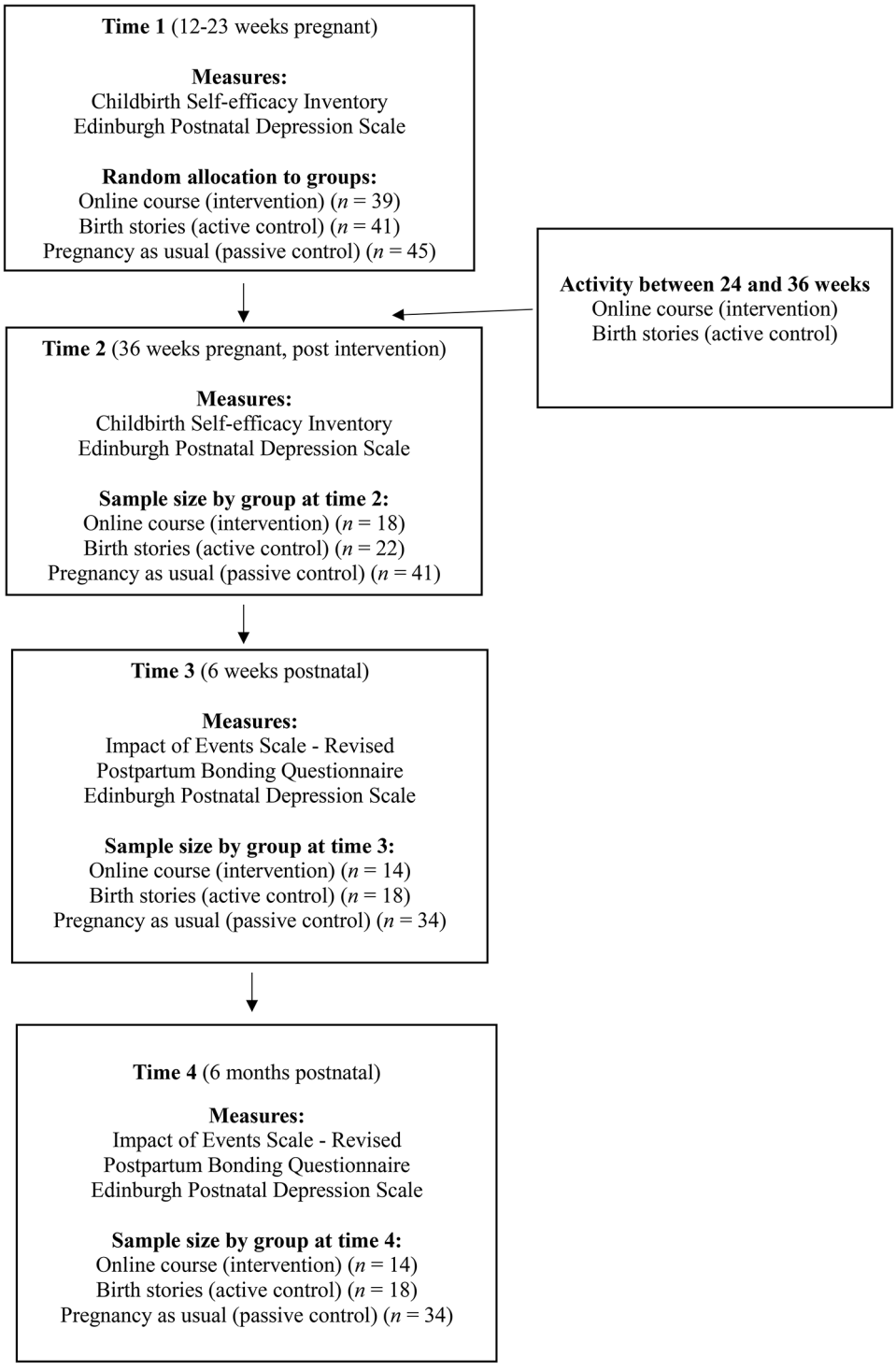

Fig. 1 Flowchart of study design and sample size of groups by phase

Groups

Passive control group

Participants in this group were instructed to carry on with their pregnancy as usual (PAU), including taking antenatal education or birthing classes if they planned to. Rates of birth class attendance can be seen in Table 2.

Active control group

This group were asked to read a booklet comprised of twelve birth stories with a range of birth types including unassisted vaginal birth, water birth, home birth, instrumental birth and caesarean birth. They were asked to read the booklet between 24 and 36 weeks pregnant. The

Table 1 Sample characteristics

Sample characteristics	*n*	%
Ethnic background		
White European	56	69.1
Indian	2	2.5
Asian	4	4.9
Middle Eastern	3	3.7
South American	1	1.2
North American	1	1.2
Mixed race	5	6.2
Other	8	9.9
Prefer not to say	1	1.2
Geographical location		
Urban/City	54	66.7
Rural	26	32.1
Remote	1	1.2
In a relationship		
Yes	77	95.1
No	4	4.9
Same sex relationship	1	1.2
Education		
No formal qualifications	5	6.2
Completed high school	8	9.9
TAFE certificate/diploma	14	17.3
University degree	54	66.7
Total	81	

Table 2 Birthing characteristics

Birthing characteristics	*n*	%
Antenatal		
Parity		
Nulliparous	44	54.3
Multiparous	37	45.7
Birth education classes (in addition to any included as part of the study)		
Yes	42	51.9
No	39	48.1
Type of care		
Midwife group practice (usually same midwife)	24	29.6
Community midwifery (usually see different midwife)	17	21.0
Private obstetrician	17	21.0
GP shared care	15	18.5
Private practice midwife care	6	7.4
No specific care	2	2.5
Planned location		
Public Hospital	56	69.1
Private Hospital	16	19.8
Home environment - assisted	6	7.4
Private birthing centre	2	2.5
Home environment - unassisted	1	1.2
Doula		
Yes	6	92.6
No	75	7.4
Total	81	
Postnatal		
Type of birth		
Vaginal birth	41	62.1
Assisted vaginal birth	8	12.1
Caesarean section – emergency	17	25.8
Birth consistent with preferences		
Yes, completely	19	28.8
Yes, mostly	17	25.8
No	30	45.6
Breastfeeding (at 6 weeks)		
Yes	57	86.4
Initially now ceased	9	13.6
No	0	0
Total	66	

purpose of the active control was to check if the act of having an activity to complete would influence outcomes.

Online course group

The online course group (intervention) were asked to complete the online version of a psychoprophylactic centered birthing course designed by She Births®. She Births® is an Australian designed course that has previously be shown to reduce interventions such as caesareans and epidurals during birth [33]. The course focuses on birth as a natural physiological process using active birthing strategies, including, yoga, massage, acupressure, breathing, and relaxation techniques to manage pain and facilitate labour progression. It covers four modules: (1) Learning to trust the body; (2) Discovering practical tools; (3) Labour stages and strategies; and (4) Breastfeeding and early parenting. The course takes approximately a 10-hour commitment to complete. Details can be found about the course at shebirths.com.

Participants

Sample size was calculated based on a between-groups ANCOVA for testing the main hypothesis. A power analysis conducted on Power and Precision software created by Jacob Cohen, using $p<.05$, a hypothesized medium effect size of $d=0.50$ as recommended by Cohen [59] when no similar studies have provided guiding information about likely effects sizes, a covariate with a correlation of 0.60 with the dependent variable, and a between-groups ANCOVA research design, indicated that the study needed 37 participants per group. As such, the study aimed to recruit a minimum of one hundred and twenty participants.

Participants were recruited between May 2021 and July 2021 on dedicated Facebook and Instagram pages titled "Birthing in Australia". The university logo was featured clearly on the pages and advertising was in line with the university's ethics requirements. Participants were invited to participate in a four-stage study about pregnancy, birth and early parenting. The information statement outlined the activity and commitment for each

group and advised that they would be randomised into one of the three groups. Participants were offered entry in a draw for a gift voucher as an incentive to participate. Informed consent was obtained before proceeding with the survey. Participants were required to be English speaking, residing in Australia with a low-risk pregnancy (as defined by their healthcare provider) between 12 and 23 weeks pregnant and planning a vaginal birth. A total of 279 potential participants clicked on the survey information, 125 signed up and completed the first survey.

At the end of the first survey (i.e., Time 1) each participant was randomly allocated into one of the three groups using Qualtrics random allocation. By the end of Time 2, 42 participants had dropped out. Twelve of those participants notified the researcher they could no longer participate with various reasons including pregnancy loss and too busy. The remaining participants ($n=30$) were each sent two follow up emails and did not respond. The final sample was 81 participants aged between 19 and 39 years, $M=29.19$, $SD=4.33$. Figure 1 shows sample size by time and the study design. The final sample was comprised of mostly white European university educated urban women who were partnered. Most of the women were planning a hospital birth and were receiving a mix of care, with midwife group practice the most common type of care. Six women reported they were using a doula and one woman reported that she was planning an unassisted homebirth, see Tables 1, 2 and 3 for demographic and birthing characteristics. All birthing and breastfeeding data was collected via self-report within the surveys.

Measures

Childbirth self-efficacy The short version of the Childbirth Self-Efficacy Inventory (CBSEI-32) was used to measure childbirth self-efficacy and childbirth expectations, indicating a women's self-confidence and coping ability for childbirth [60]. The scale consists of two subscales, outcome expectancy and efficacy expectancy, that comprise 16 questions each. It is scored on a 10-point rating scale from 1 (not at all helpful) to 10 (very helpful) for the outcome expectancy subscale and from 1 (not at all sure) to 10 (very sure) for the efficacy expectancy subscale. This study used a total score by summing the two scales, giving a maximum score of 320. Higher scores indicate that pregnant women have high levels of childbirth self-efficacy related to labour. The scale has been found to have good internal consistency (α=0.91) and the same found in the present study (α=0.91) [40].

Table 3 Birth type by group (%)

Group	Passive Control	Active Control	Online Course
Vaginal birth	21 (61.8)	12 (66.7)	8 (57.1)
Assisted vaginal birth	4 (11.8)	1 (5.6)	3 (21.4)
Caesarean section – emergency	9 (26.5)	5 (27.8)	3 (21.4)

Antenatal and postnatal depression Depression was measured using the Edinburgh Postnatal Depression Scale (EDPS) [61]. The EDPS is a 10-item self-report questionnaire that measures symptoms of depression and anxiety on a 4-point Likert scale with two variations of response options: ranging either from 0 (no, never) to 3 (yes, most of the time) or from 0 (as much as I ever did) to 3 (hardly at all). Three items are reverse scored. Total scores range from 0 to 30 with higher scores indicating higher levels of distress. The EDPS has been found to be valid for screening antenatal and postnatal depression [62, 63]. The EPDS has established reliability and validity [64] including reliability in pregnancy (α=0.82 to 0.84) [63] and in the present study 0.88.

Birth related PTSD stress symptoms Trauma symptoms following childbirth were assessed using the Impact of Events Scale–Revised (IES-R) [65]. The IES-R consists of 22 items on a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely), total scores range from 0 to 88 with higher scores indicating greater trauma symptoms. The IES-R provides an assessment of posttraumatic stress disorder symptoms consistent with the criteria in the Diagnostic and Statistical Manual for Mental Disorders – fourth edition (DSM-IV) [66]. Although the PTSD diagnostic criteria has since been revised in the DSM-5-TR with the new criteria separating the avoidance and numbing criteria and increasing the number of associated symptoms, the revision does not alter the fundamental characteristics of PTSD, and the IES-R remains valid for screening PTSD symptoms [67, 68]. Participants were asked to answer all questions in relation to their experiences of childbirth. The IES-R has good reliability in women who have recently given birth (α=0.91) [23]. The IES-R has high internal consistency (α=0.96) [69]. Cronbach's alpha for the present study was 0.95.

Mother-infant relationship quality The Postpartum Bonding Questionnaire (PBQ) [70, 71] was used to measure the quality of the parent–baby bond by assessing the mother's feelings or attitudes toward her baby. The PBQ consists of 25 items rated on a 6-point scale ranging from 0 (always) to 5 (never) total scores range from 0 to 125, with higher scores indicating poorer bonding. Seventeen items are reverse scored. The PBQ has been shown to have acceptable reliability, high internal consistency ($r=.84$ to 0.85) and good construct validity [72]. Cronbach's alpha for the present study was 0.88.

Procedure

Ethical approval was obtained from the University's Human Research Ethics Committee (HE20-227, 13 January 2021). Individuals were recruited via social media to participate in an online survey and offered entry into a draw for a gift voucher as an incentive.

At Time 1, after which each participant completed the survey, they were sent an email with their randomly allocated group and instructions for that group. The active control (birth stories) and online course group (intervention group) were asked to complete their activity between 24 and 36 weeks. All participants were sent an instruction and reminder email again at 24 weeks as a prompt to begin their activity (or go on as usual). All participants were sent an engagement email at 30 weeks. At 36 weeks participants were sent a link to the Time 2 survey. Each participant was sent two reminder emails a week apart if they did not complete the second survey initially. This reminder process was followed for surveys at times 3 and 4, see Fig. 1 for more detail.

Statistical analysis

Quantitative analysis

All statistical analyses were conducted using IBM SPSS Statistics version 27 for Windows [73] and data uploaded to figshare [74]. Prevalence rates for posttraumatic stress disorder were calculated based on recommended cut-off scores for the Impact of Events Scale-Revised [65]. A repeated measure analysis of variance (ANOVA), time (1, 2, 3, and 4).

by group (intervention, birth stories, and pregnancy as usual), was conducted to compare the effect of the intervention on childbirth self-efficacy across the three groups in the study. An ANCOVA, group (intervention, birth stories, and pregnancy as usual), was conducted to examine the effects of the intervention on birth related PTSD symptom scores at six weeks and six months postnatal. Another ANCOVA, group (intervention, birth stories, and pregnancy as usual), was performed to examine the difference between groups levels of birth related PTSD symptom on the quality of the mother-infant relationship. Both ANCOVA's included depression as a covariate due to the strength of its relationship with birth related PTSD symptoms.

Qualitative analysis

Questions about the intervention and active control were assessed to qualitatively understand participants' experience of each activity, including aspects that were helpful or unhelpful. The remaining qualitative data was analyzed with all three groups responses together using a content analysis approach as described by Stemler [75] to examine trends and patterns within the two qualitative questions, (1) "Is there anything that could have improved your birth experience?" and (2) "Are there any aspects of your birth that you would prefer to have been different?". This method was selected due to the brief survey design of study. Data were searched inductively for patterns of differences and similarities to derive categories. Category development and coding was performed by the first author and reviewed by all authors.

Results

Manipulation checks

As anticipated, the comments between the intervention group and the active control indicate that the intervention was experienced as an active process, while women did not find the passive act of just doing something (reading a booklet) helpful to their birth experience.

For the online course group (intervention) and birth stories group (active control), each participant was asked how much of the activity they completed from 1 'none, not much' to 4 'all of it'. Thirteen of the fourteen online course group participants reported they did all or most of the course, while one completed half. All eighteen of the birth stories group completed all or most of the booklet.

Participants were also asked questions about their experiences with the two activities. Responses to the question "Do you have any comments about whether the course was helpful or unhelpful to your birth experience?" indicated all fourteen participants found the course to be helpful in some way.

Examples of comments below:

> *Very useful course - loved it. Helped to prepare for my VBAC, and I actually used strategies from it to cope with the pain.*

> *It made me feel more relaxed knowing what to expect and breathing exercises.*

> *It was really helpful to learn and use the techniques provided in the she births course during labour.*

> *The online course provided a fantastic overview for what to expect and tools I could use to help the birthing process. Unfortunately, I had a complicated birth and could not use many of the birthing exercises. I believe my experience would have been far worse without the course.*

When asked, "What parts, if any, of the online course did you find helpful?", overwhelmingly the women reported the techniques to be helpful, with some specifying the techniques of breathing, meditation and massage. Examples are below:

Breathing techniques and massage/acupressure for labour.

Strategies to cope with pain. In particular, I used breathing, and massage techniques to get through active labour.

I found the meditation and explanation of pain helpful.

Of the fourteen participants nine made suggestions about improvements when asked "What things, if any, could be improved in the online course?". These suggestions were around website issues, length of the course and coverage of the course, indicating it may not cover enough of other birth types or potential scenarios. Examples below:

Course somewhat lengthy and repetitive.

Found the layout of the website slightly difficult to navigate, but this was a mild inconvenience.

Focus should also be on arming mum's and dad's for the realities of attempting natural birth in a hospital environment.

As a further manipulation check women in the active control were asked: "Do you have any comments about whether the booklet was helpful or unhelpful to your birth experience?". Women reported that they enjoyed the booklet but responded neutrally as to whether they thought it was impactful on their birth experience. Examples below:

"I don't think it had an impact."

"Neither helpful or unhelpful but a good read as a first time mum."

"It was good to read but wouldn't say they were helpful for my birth experience."

Table 4 Means (SD) for birth related PTSD symptoms across time, group and whole sample (higher scores indicate greater PTSD symptoms)

Postnatal	Passive Control	Active Control	Online Course	Sample
6 weeks	8.59 (12.15)	10.22 (15.18)	13.64 (12.54)	10.11 (13.06)
6 months	7.62 (12.66)	10.44 (16.75)	14.07 (15.53)	9.76 (14.47)

Descriptive statistics

Prevalence of posttraumatic stress disorder symptoms

Using the recommended cut-off scores on the IES-R of ≥33 for probable PTSD and ≥24 for clinically significant symptoms [65], at 6 weeks postnatal 3% ($n=2$)of women reported IES-R scores consistent with probable PTSD in relation to their birth and 9.1% reported clinically significant symptoms. At 6 months postnatal 9.1% ($n=6$) of women reported IES-R scores consistent with probable PTSD in relation to their birth and 15.2% ($n=10$) reported clinically significant symptoms. Means and standard deviations are presented in Table 4; Fig. 2.

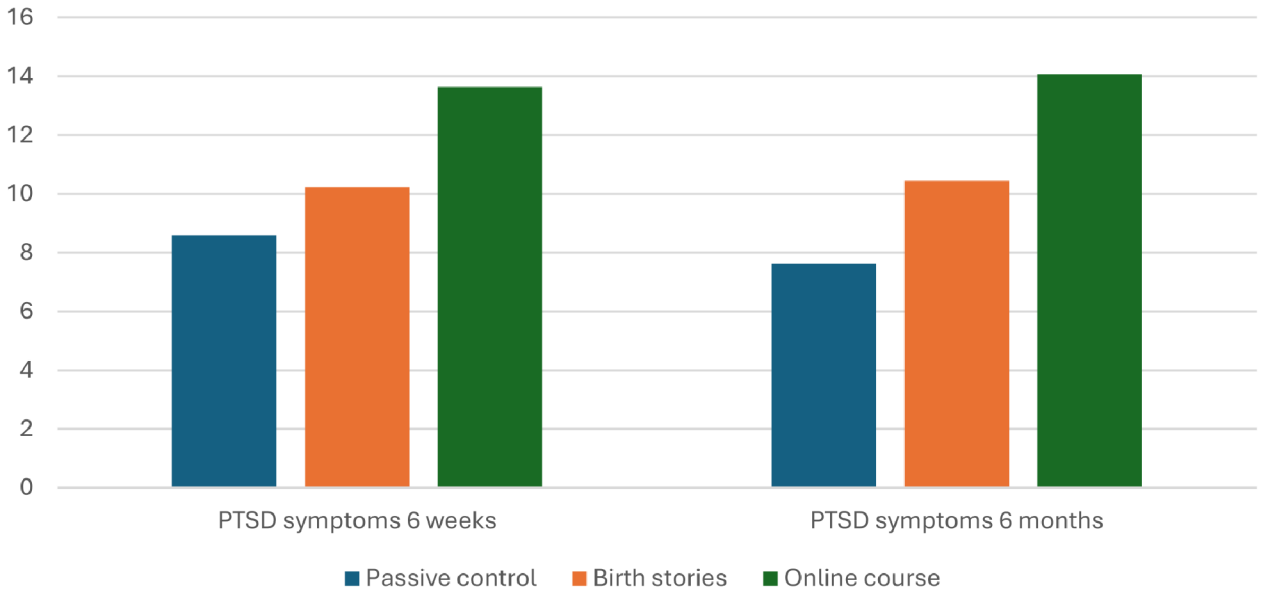

Fig. 2 Mean Scores by group for PTSD Symptoms at 6 weeks and 6 months postnatal (higher scores indicate greater PTSD symptoms)

Table 5 Means (SD) for childbirth self-efficacy across Time, group and whole sample (higher scores indicate greater childbirth self-efficacy)

Intervention	Passive Control	Active Control	Online Course	Sample
Pre (36 weeks pregnant)	226 (41.38)	226 (43.96)	211 (45.57)	221.93 (43.08)
Post (6 weeks postnatal)	232 (46.89)	242 (31.22)	248 (25.67)	238.64 (38.56)

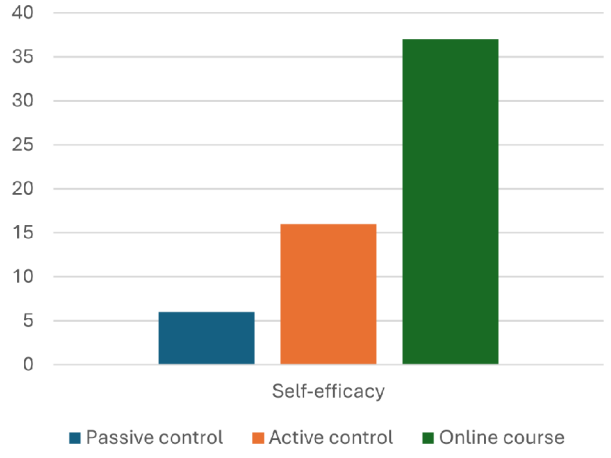

Fig. 3 Mean score differences by group for childbirth self-efficacy post intervention

Quantitative findings

Effectiveness of the intervention on childbirth self-efficacy

The repeated measures ANOVA showed the main effect of time for childbirth self-efficacy was statistically significant, Wilks' Lambda = 0.92, $F(2, 78) = 6.92$, $p = .01$, $\eta^2 = .08$. There was no significant interaction by group Wilks' Lambda = 0.96, $F(2, 78) = 1.71$, $p = .19$ $\eta^2 = .04$, indicating the intervention did not significantly impact childbirth-self efficacy scores. However, the mean difference scores for each group indicate a trend in the online group towards higher childbirth self-efficacy compared with the two control groups. No adverse events were reported. See Table 5; Fig. 3 for means and standard deviations.

Birth related PTSD symptoms by group

An ANCOVA was conducted to examine the effects of the intervention on birth related PTSD symptom scores while controlling for depression levels at six weeks and six months postnatal. The main effect of group on birth related PTSD symptom scores at six weeks postnatal was not statically significant, after controlling for depression levels, $F(2, 66) = 0.68$, $p = .51$, $\eta^2 = 0.021$. The covariate, depression, was not statically significant, $F(1, 66) = 0.03$, $p = .86$, $\eta^2 = 0.001$. The main effect of group on birth related PTSD symptom scores at six months postnatal was not statically significant, after controlling for depression levels, $F(2, 66) = 1.18$, $p = .31$, $\eta^2 = 0.037$. The covariate, depression, was also not statically significant, $F(1, 66) = 2.05$, $p = .16$, $\eta^2 = 0.032$. Effect sizes for birth related PTSD at six weeks and six months indicated a small effect. See Table 4; Fig. 2 for means and standard deviations.

Table 6 Mean (SD) postpartum bonding scores across time, group and whole sample (higher scores indicate poorer bonding)

Postnatal	Passive Control	Active Control	Online Course	Sample
6 weeks	13.00 (9.96)	10.33 (9.85)	14.92 (8.29)	12.68 (9.60)
6 months	11.44 (7.50)	10.83 (7.75)	13.43 (7.83)	11.70 (7.58)

Mother-infant relationship quality by group

An ANCOVA was conducted to examine the effects of an intervention on mother-infant relationship while controlling for depression levels. The main effect of group on mother-infant relationship scores at six weeks postnatal was not statically significant, after controlling for depression levels, $F(2, 66) = 0.98$, $p = .38$, $\eta^2 = 0.03$. The covariate, depression, was not statically significant, $F(1, 66) = 0.22$, $p = .64$, $\eta^2 = 0.003$.

The main effect of group on mother-infant relationship scores at six months postnatal was not statically significant, after controlling for depression levels, $F(2, 66) = 0.51$, $p = .60$, $\eta^2 = 0.016$. The covariate, depression, was not statically significant, $F(1, 66) = 0.06$, $p = .81$, $\eta^2 = 0.001$. See Table 6; Fig. 4 for means and standard deviations.

Qualitative findings

What women wanted to be better or different about their births

The qualitative analysis of responses from the women in all groups who reported a desire for a different or improved birth experience generated four main themes, as can be seen in Table 7. Some responses were included in multiple categories where appropriate.

A persistent response across the data set was a desire to have had less obstetric and medical intervention, especially inductions. For example, "I had an emergency Caesarean section after an induction. The caesarean had a lot of complications, blood loss and scarring/adhesions on uterus from previous surgery and readmission to hospital due to an infection afterwards. I would never have had an induction if I knew the pain was so bad and I was going to have so much medical intervention". Many women indicated that they wanted better communication, mostly feeling unheard and not listened to, for example, "Yes, when I got induced, I wish they were listening to me that my waters had broken.". Two women queried issues with consent, for example one woman wrote "Maybe less

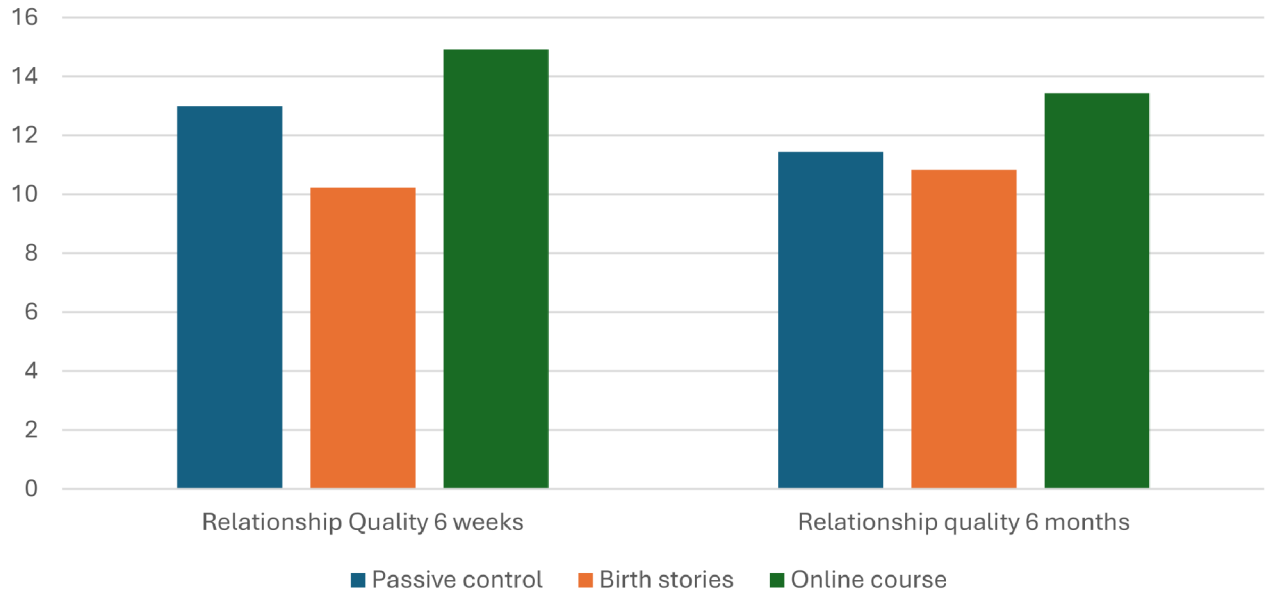

Fig. 4 Mean scores by group for mother-infant relationship quality at 6 weeks and 6 months postnatal (higher scores indicate poorer relationship quality)

Table 7 Themes Derived from the Questions "Is there anything that could have improved your birth experience?" and "Are there any aspects of your birth that you would prefer to have been different?" (*N* = 66, active control *n* = 34, passive control *n* = 18, online course *n* = 14)

Theme	Passive Control (%)	Active Control (%)	Online Course (%)	Sample (%)
Less intrusive intervention (e.g., induction, forceps)	9 (26)	5 (28)	6 (43)	20 (30)
Access to more supportive intervention (e.g., pain relief, water)	9 (26)	1 (6)	2 (14)	12 (18)
Problems with staff (e.g., staff shortages, interpersonal issues)	7 (21)	2 (10)	3 (21)	12 (18)
Better communication (e.g., being informed, being listened to)	7 (21)	1 (6)	0 (0)	8 (12)

'assistance' i.e., forceps/suction cup/episiotomy - was not asked before any.". Some women indicated that they had negative experiences with staff interpersonally or due to shortages and lack of experience, e.g., "The staff after delivery could have been nicer.", "More experienced staff, better documentation." and "Hospital was short staffed and the doctor unable to attend.". The responses also indicated women were not getting enough or adequate intervention when they wanted it, particularly pain relief. More than half of the women wanting more supportive intervention specifically expressed a desire to have had access to water for pain relief, in particular a water birth, for example one woman responded, "To be allowed to have a water birth / use the bath." and another responded "Access to water birth.".

Discussion

This study aimed to assess the effectiveness of a psychoprophylactic based intervention on childbirth self-efficacy, posttraumatic stress disorder (PTSD) symptoms, and subsequent quality of the mother-infant relationship at six weeks and six months postnatal. As hypothesised, the results showed the online course group was effective, with participants in that group reporting greater childbirth self-efficacy than the two control groups following the intervention. Paradoxically and contrary to our hypothesis, the online course group did not have less birth related PTSD symptoms. In fact, the online course group tended to report higher birth related PTSD scores than both of the control groups and in turn reported poorer mother-infant relationship quality. However, none of these differences were statistically significant. The finding of poorer quality mother-infant relationship quality in the online group makes sense in light of the greater PTSD symptoms reported in that group and is consistent with research showing its association with birth related PTSD. Birth type by group indicated proportionately similar rates of emergency caesarean births and assisted births in the online course group, compared with the two control groups, suggesting medical interventions

or emergencies alone were not a likely explanation for the greater level of trauma symptoms seen in the online course group as per Table 3.

Our findings seem consistent with the findings reported by Avignon et al. and Smarandache et al., whose results suggest that while childbirth education can improve childbirth self-efficacy, this does not necessarily translate to more a positive birth experience. One explanation may be that if birth deviates too far from the expectations shaped from course content, this may lead to a disappointing or even traumatic birth [37, 38]. While a mismatch in course material versus the reality of the birth is one possible explanation, another explanation is that external factors beyond individual control, such as medical paternalism, obstetric violence, and unforeseen medical emergencies, may exert greater influence over a childbirth experience than a woman's self-efficacy level, however there is no way to know for sure based on the data from this study.

Medical paternalism, characterized by decisions made by healthcare providers without adequate patient involvement, can limit a woman's ability to exercise their perceived self-efficacy. In a paternalistic model, information is directed from doctor to patient and the doctor is the decision maker [76]. Medical paternalism is contrary to the recommendations by the WHO Intrapartum Care for a Positive Birth Experience [77], which refers to respectful maternity care that includes informed choice and responsiveness to women's preferences. Medical paternalism may also contribute to an environment where obstetric violence occurs. Obstetric violence is a widely recognised form of gender based violence involving disrespectful or abusive treatment during childbirth [12, 15]. Obstetric violence may also introduce traumatic elements independent of an individual's self-efficacy beliefs. Examples of obstetric violence may include instances of unnecessary vaginal examinations, denial of pain relief, episiotomies without consent and many other forms of abuse and mistreatment [15].

Similarly, medical emergencies, which are inherently unpredictable, can swiftly alter the trajectory of childbirth, rendering individual self-efficacy less effective in navigating unforeseen challenges. As such, it may be that the influence of high self-efficacy may diminish in the face of complex and often uncontrollable variables inherent in the childbirth process. While medical emergencies may explain a small number of traumatic births, it is insufficient to explain the high prevalence rates of reported birth related trauma and is likely only a small part of the picture, especially in this study where the intervention rate in the three groups was similar.

Further, the results from this study suggest that high self-efficacy may even be unhelpful. High self-efficacy, typically considered a positive trait, could pose as a vulnerability for trauma during childbirth for several reasons. One explanation is that individuals with high self-efficacy often have a strong belief in their ability to control and manage situations. In the context of childbirth, some women experience loss of control and events can be unpredictable. This may mean individuals with high self-efficacy might struggle to reconcile their expectation of control with the reality of the birthing process. These individuals may enter childbirth with a sense of confidence in their ability to navigate and manage the experience. However, when things happen during labour and birth that a woman may not have been expecting, the dissonance between their high self-efficacy expectations and the actual events may lead to increased stress and anxiety. The inability to exert the anticipated level of control may contribute to the perception of the birth as traumatic. This is similar with the findings of recent study where women with greater extraversion traits reported significantly more birth related PTSD symptoms and those with higher childbirth self-efficacy also showed a trend towards greater birth related PTSD [78].

The whole group qualitative analysis of women's responses regarding their desires for a different or improved birth experience revealed several important themes. These themes provide valuable insights into the aspects of childbirth that women found lacking or unsatisfactory. The themes derived cross-validate some of the proposed explanations for the findings in the experimental data and provide a more comprehensive understanding of the overall results. The four main themes that emerged from the data are discussed below:

Theme 1: Less Intrusive Intervention (e.g., induction, forceps). A recurring desire among participants was for less obstetric and medical intervention, particularly with regards to inductions. Nearly half the women in the online course group wanted less intrusive intervention compared with around one third of women in the other two groups, suggesting this may have been more of a problem for women in that group. Women expressed a wish for more spontaneous labour and less interference during the birthing process. The distress and dissatisfaction associated with interventions was prevalent in the responses. Women shared experiences of distressing emergency Caesarean sections following inductions, citing a range of complications. Some of these responses describe a known problem referred to as the 'cascade of interventions'. Research shows induction for low risk women increases the rates of instrumental birth and caesarean Sect. [79]. The desire for minimal intervention was a common thread, with some expressing regret over inductions they felt were unnecessary or too rapid. Inductions and intrusive interventions have been on the increase in Australia with nearly half of primiparous women now being induced [15, 80]. Rates of caesarean

sections are around one third and around one quarter for episiotomies [15, 80], with similar trends worldwide [79].

Theme 2: Access to More Supportive Intervention (e.g., pain relief). This theme focused on the need for more supportive interventions, particularly pain relief. Around one quarter of women in the passive control group wanted access to better intervention with only three others responding this way from the other two groups. Women expressed a desire for options like epidurals, caesarean sections, and general pain management to be more readily available and accessible during labour. The responses indicated that some women felt they did not receive adequate pain relief when needed. Again, some of the responses in this theme also bore similarity to the responses in Keedle et al.'s research on obstetric violence [15]. In that study, a number of women reported being denied pain relief in the category 'I felt dehumanised', which formed part of a sub-category 'my pain wasn't real'.

A notable sub-theme within this theme was the desire for access to water for pain relief, with some participants expressing a specific desire for a water birth. The lack of opportunities to utilize water, whether in the form of baths or water births, was mentioned as a source of dissatisfaction. Water immersion is an established and evidence based non-pharmacological method of pain relief for labour and birth. Evidence indicates that labouring in water can reduce the use of epidurals for pain relief and may shorten the length first stage labour [81, 82].

Theme 3: Problems with Staff (e.g., staff shortages, interpersonal issues). The third theme highlighted challenges related to hospital staff, including shortages and interpersonal issues. This theme was similar across groups with slightly less responses in the active control. Women shared experiences of negative interactions with staff or perceived shortcomings in the level of care provided. Instances of staff shortages affecting the birthing experience were also mentioned, suggesting a potential impact on the overall quality of care.

While some women credited the lack of intervention to a shortage of staff, others expressed a desire for more experienced and supportive healthcare professionals during the birthing process.

Staffing issues and concerns described by the respondents may offer further insights into difficult and traumatic birth experiences. Firstly, staffing ratios are thought to contribute to the risk of obstetric violence occurring [15]. Secondly, this theme is similar to findings of Harris and Ayers [8] who found interpersonal concerns and lack of support during birth to be predictive of birth related PTSD. This is consistent with existing trauma research which purports that interpersonally traumatising events are more likely to result in PTSD than non-interpersonal events and lack of support is a risk factor for developing PTSD [83, 84].

Theme 4: Better Communication (e.g., being listened to). Communication emerged as a critical factor influencing women's birth experiences. All but one response from this theme came from the passive control group. Many participants expressed a desire for better communication, emphasizing the importance of being heard and listened to by healthcare providers. Instances of feeling unheard, not taken seriously, or experiencing a lack of responsiveness from hospital staff were highlighted. Issues with consent were also raised, indicating a need for improved communication around medical procedures.

Two participants mentioned instances where they felt consent may not have been adequately obtained and other examples were reflective of medical paternalism and obstetric violence. Those responses were similar to some of the responses described in an Australian study of obstetric violence, where women's desires and requests were not respected [15]. Further, poor communication itself has also been shown to be predictive of birth related PTSD, including being ignored [8]. This supports the notion that external factors such as obstetric violence and medical paternalism may be playing more of a role in how birth is ultimately experienced compared to individual characteristics such as self-efficacy.

These themes underscore the importance of personalized and less intrusive care, effective respectful communication between healthcare providers and women, addressing staff-related challenges, and providing a range of supportive interventions, including those related to pain relief, to enhance the overall birthing experience for women. As with our quantitative findings, the qualitative findings suggest that the women in this study were distressed in relation to the existence of medical paternalism as opposed to medical emergencies and they were dissatisfied and frustrated with this. The qualitative questions did not elicit concerns about not having enough antenatal education, being underprepared or inadequate capacity for coping with their birth, further suggesting the existence of factors other than individual characteristics as important influences of how women experience birth. Indeed, women in the online course group, who had the highest childbirth self-efficacy scores, simultaneously reported more problems with intrusive interventions than the other two groups, suggesting the interventions or how they are delivered may be more important than individual childbirth self-efficacy.

In line with the findings of Avignon et al. and Frankham et al. [37, 78], our results from both the experimental and qualitative data suggest the stress-diathesis model does not adequately explain the aetiology of birth related PTSD symptoms and therefore the theory of self-efficacy may not be an important theoretical explanation either. Birth related PTSD symptoms, like other trauma, may be better explained by the Power Threat Meaning

Framework (PTMF) [10, 78]. The PTMF offers a holistic, broad pronged approach to explain and describe trauma and mental distress that considers contextual experiences of an individual including socio-political factors and personal narratives. It has been used to operationalise and describe mental distress experienced in marginalised groups, including pregnant women [85, 86] and recently in relation to birth related PTSD [10, 78]. Since some birth related PTSD symptoms may arise from experiences of disempowerment and system based external forces, using the PTMF gives scope to incorporate a range of factors and the interplay between these, offering an integrated theory of birth trauma (ITB), see Fig. 5. Being able to identify and recognise the interplay between the various risk and vulnerability factors may better focus prevention and intervention approaches and reduce the risk of emphasising single causative factors in the aetiology of birth related PTSD. The proposed integrated theory of birth trauma brings together known risk and vulnerability factors, both external and individual, and allows for multiple potential trajectories to be described and understood, as well as removing the need for pathologisation of traumatic birth experiences.

Strengths and limitations

This study recruited online and was mostly comprised of white university educated women. There was a large attrition rate, especially in the intervention group, which may indicate problems with the time commitment required or the volume of content in the course. The study employed a robust experimental design using random allocation including an active and passive control. The study used an intervention that is a recognised evidenced based program known to reduce caesareans and epidurals during birth [33]. Our study utilised the online version of the intervention which possibly may have yielded different results compared with the face-to-face version. The intervention group was also smaller than the two controls and the overall sample size was small, limiting the power of analyses and generalizability of the findings given small rather than moderate effects. Reasons for the higher dropout rate within the online course group were unclear, none of the participants who contacted the researcher indicated problems with the course itself. However, the commitment to the ten-hour course may have been too much for some participants. The incentive offered for participation may have also contributed to the high attrition in the online course group, compared with those in the non-active groups. Participants in the control groups were more likely to continue in the study, possibly due to the incentive and minimal commitment required of them. Due to the small sample size, it was not possible to explore the effect of other potentially influential variables by group, such as birth type, which would have added more depth to our understanding of the study's findings. Overall, there was also a reversal of effects from what was expected and none of the results from the main analyses were statistically significant.

The mixed methods approach enabled triangulation of the results, which in the face of the non-significant and unexpected results found in the experimental data, allowed for better refinement of potential explanations for our findings. More needs to be understood about why self-efficacy may have a paradoxical impact on birth

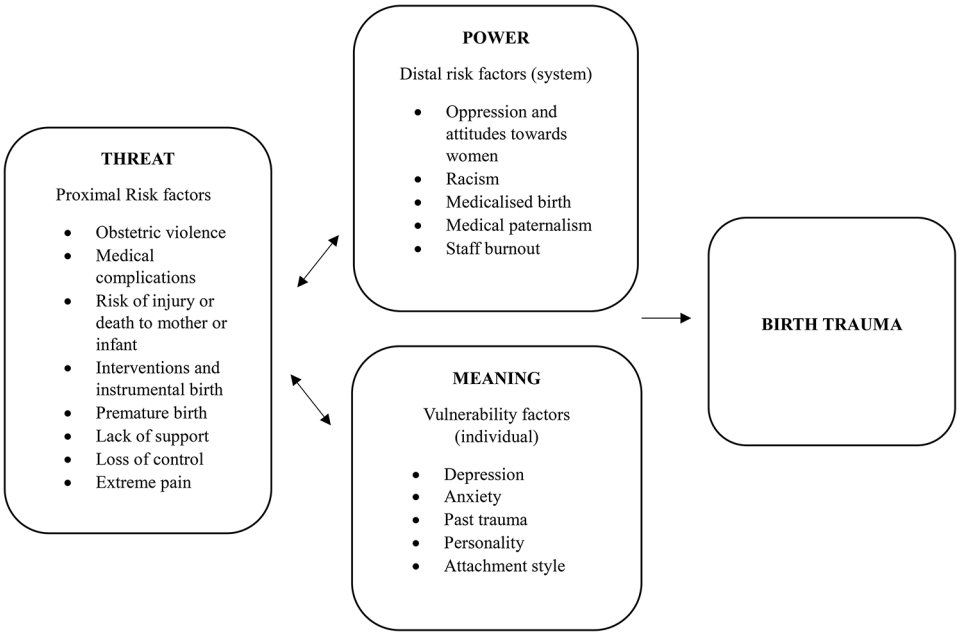

Fig. 5 Proposed integrated theory of birth trauma, using the power threat meaning framework

experiences. Future research could include more specific questions relating to power imbalances and obstetric violence alongside self-efficacy and other individual characteristics with a larger more diverse sample size to draw out the contribution of each these variables and any mediating or moderating factors. Additionally, measuring antenatal bonding would allow antenatal bonding to be tested as moderator in the relationship between birth related PTSD and mother-infant quality. Birth mode could also be tested as a moderator for both birth related PTSD and mother-infant bonding. Another possibility would be to conduct further qualitative research on childbirth self-efficacy and its influence on birth related PTSD symptoms by asking women about the association postnatally.

Conclusion

Our study suggests that the She Births® intervention shows a trend in increasing childbirth self-efficacy but has no positive impact on birth related PTSD. External factors may be more important than childbirth self-efficacy, highlighting the need for a holistic approach that addresses systemic and socio-political influences to improve communication, autonomy, and respectful maternity care. The findings highlight the influence of other external factors. It is an important reminder of the multifactorial nature of the childbirth experience, underscoring the need for a comprehensive understanding that extends beyond individual characteristics, medical emergencies, and obstetric intervention. Themes in the study show that women desire better communication, autonomy in labour and birth, and more respectful maternity care. Women would like choices about how, when and what interventions they access. The power threat meaning framework is a holistic and comprehensive framework that may offer an integrated theoretical way to understand the various interacting factors and potential trajectories for birth trauma that could be expanded as new research emerges. If important external factors can be addressed at a system level, perhaps confident women may swing the paradox and report better and more satisfying births. Future research, policy and interventions focused on external system based and socio-political factors need attention.

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Author contributions
The authors confirm contribution to the paper as follows: study conception and design: L.J.F., E.B.T. and W.B.; data collection: L.J.F.; analysis and interpretation of results: L.J.F.; draft manuscript preparation: L.J.F. All authors have read and agreed to the published version of the manuscript.

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Data availability
The dataset supporting the conclusions of this article is available in the figshare repository at https://doi.org/10.6084/m9.figshare.25059092.v1.

Declarations

Ethics approval and consent to participate
The study was conducted in accordance with the Declaration of Helsinki and approved by the Human Research Ethics Committee of the UNIVERSITY OF NEW ENGLAND (HE20-227 13 January 2021). Informed consent was given before proceeding with the survey.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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