

Effect of Psychoeducational Childbirth Preparation with Relaxation on PTSD and Childbirth Fear After Traumatic Birth: A Randomized Controlled Trial

Abstract

Background: Traumatic childbirth significantly elevates the risk of developing post-traumatic stress disorder (PTSD) and fear of childbirth (FOC). This study aimed to investigate the effects of a psychoeducational intervention, incorporating relaxation training, on PTSD and FOC in pregnant women with a history of traumatic childbirth. **Materials and Methods:** This randomized controlled trial included 70 pregnant women in Hamadan, Iran, with a history of traumatic childbirth. Participants were randomly assigned to either an intervention group ($n = 35$) or a control group ($n = 35$). The intervention group underwent an 8-session psychoeducation protocol that integrated relaxation training, delivered between 24 and 32 weeks of gestation, while the control group received standard prenatal care. PTSD symptoms were assessed using the PSS-SR, and FOC was measured with the CAQ at baseline and at 36 weeks of gestation (4 weeks' postintervention). Data analysis was conducted using ANCOVA in Stata-13. **Results:** Four weeks' postintervention, the intervention group exhibited a statistically significant reduction in PTSD scores compared to the control group (adjusted mean difference: -9.23 ; 95% CI: -11.28 , -7.18 ; $p < 0.001$; Cohen's $d = 2.29$). Similarly, FOC scores were significantly lower in the intervention group (adjusted mean difference: -5.02 ; 95% CI: -7.00 , -3.05 ; $p < 0.001$; Cohen's $d = 1.30$). **Conclusions:** A structured psychoeducational intervention for childbirth preparation that incorporates relaxation training effectively alleviates PTSD symptoms and reduces fear of childbirth in pregnant women with a history of traumatic childbirth. The substantial effect sizes observed underscore its clinical relevance.

Keywords: Childbirth, education, post-traumatic stress disorder, psychology, pregnancy, randomized controlled trial

Introduction

Maternal psychological distress during childbirth can persist long after delivery, significantly impacting mothers.^[1] Traumatic childbirth, defined as experiencing physical harm to the mother or baby and/or psychological damage, occurs globally in 20-40% of cases,^[2] with a reported prevalence of 48.3% in Iran.^[3] Traumatic childbirth is a notable risk factor for post-traumatic stress disorder (PTSD).^[4]

PTSD is characterized by intense anxiety triggered by severe trauma, such as life-threatening events, resulting in physical, cognitive, emotional, and behavioral symptoms.^[5,6] These symptoms can manifest as re-experiencing the trauma through nightmares or flashbacks, avoidance of trauma-related stimuli, such as elective

cesarean section, and increased arousal, including difficulties with concentration.^[7] A significant proportion of at-risk pregnant women are affected by PTSD.^[8] Symptoms may become chronic, with pregnancy potentially exacerbating anxiety stemming from past traumatic births, sexual violence, or medical injuries. This may lead to avoidance behaviors, such as reluctance to pursue future pregnancies or prenatal care, and a preference for elective cesarean sections.^[7,9] A previous traumatic birth experience is a strong predictor of future fear of childbirth.^[10]

Baas *et al.*'s^[11] systematic review of 13 studies on PTSD treatment during pregnancy examined various interventions, including trauma-focused cognitive behavioral therapy (CBT), exposure therapy, and

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eye movement desensitization and reprocessing (EMDR). Limitations of the review included poor research design, inadequate methodology, and a lack of control groups, which hindered the ability to draw reliable conclusions. The authors recommended evidence-based treatments such as psychoeducation, CBT, and EMDR, in accordance with international guidelines.^[12] Psychoeducation, initially described by Ekhtiari *et al.*^[12] in 1980 for schizophrenia, aims to educate patients and families about mental health conditions, addressing etiology, treatment options, coping strategies, and life skills. It has been shown to reduce symptom severity and relapse rates, while improving treatment adherence in disorders such as depression,^[13] anxiety.^[14] The theoretical rationale for implementing psychoeducation in addressing childbirth-related PTSD and fear is based on several key psychological mechanisms. First, by providing accurate information about the childbirth process, psychoeducation seeks to correct catastrophic misinterpretations and facilitate cognitive reframing, thereby addressing trauma-related cognitive distortions.^[15] Second, it enhances perceived predictability and control by familiarizing women with labor procedures and coping strategies, which helps to alleviate anxiety stemming from uncertainty.^[16] Finally, structured instruction in relaxation techniques, such as paced breathing and progressive muscle relaxation, aims to improve emotional regulation and reduce physiological hyper arousal—both of which are core symptoms of PTSD.^[17] Through these integrated approaches—cognitive, informational, and physiological—psychoeducation is expected to alleviate intrusive memories of past trauma as well as anticipatory anxiety regarding future childbirth experiences. This study investigates the effects of a structured childbirth preparation psychoeducation intervention, incorporating relaxation training, on PTSD and fear of childbirth in pregnant women with a history of traumatic childbirth.

Materials and Methods

This randomized controlled trial, conducted from March 2023 to February 2024, involved 70 pregnant women from comprehensive health centers in Hamadan, Iran, who met specific inclusion criteria. The study employed a two-group parallel design. Eligible participants had scores of ≥ 12 on the Post-traumatic Stress Disorder Self-Report Scale (PSS-SR) and ≥ 28 on the childbirth attitude questionnaire (CAQ), had experienced one prior vaginal delivery, were at 24 weeks of gestation with a singleton pregnancy, were literate in Farsi, and had no diagnosed mental illnesses or medical conditions (e.g., diabetes, hypertension, thyroid disorders) or pregnancy complications (e.g., gestational diabetes, pre-eclampsia). Additionally, participants had not experienced any adverse events in the month before enrollment. The study was registered with the Iranian Registry of Clinical Trials (IRCT20201102049233N2, registered on February 1, 2023).

Following approval from the ethics committee of Hamedan University of Medical Sciences, participants were recruited from 12 comprehensive health centers across Hamadan to ensure socioeconomic diversity. The researcher obtained permission to access the contact details of pregnant women with prior vaginal deliveries. These women were contacted, informed about the study's objectives and procedures, and invited to visit a health center for eligibility assessment. Eligibility was verified using the PSS-SR and CAQ questionnaires, and informed consent was obtained. A demographic and obstetric questionnaire was completed. Out of 308 women assessed, 177 were deemed ineligible, and 61 declined participations [Figure 1]. Participants were randomized into intervention and control groups in a 1:1 ratio using a random block method (blocks of 4 and 6) and a computer-generated sequence. Allocation was concealed using sequentially numbered sealed envelopes prepared by an individual not involved in recruitment, data collection, or analysis. Blinding was not implemented, as both participants and data collectors were aware of the intervention type.

The intervention group, organized into teams of five, participated in eight weekly psychological training sessions (60-90 minutes each) from weeks 24 to 32 of pregnancy at Hamadan health centers, in conjunction with routine care. This childbirth preparation psychoeducation intervention was designed as an integrated protocol, specifically incorporating relaxation training. A consulting clinical psychologist (a co-author) synthesized key components, including childbirth preparedness education,^[16] CBT for anxiety and trauma,^[15,18] and evidence-based relaxation training (breathing exercises, progressive muscle relaxation (PMR), and imagery techniques).^[17,19] All medical information regarding labor procedures and pain management was consistent with current clinical guidelines, such as those established by the American College of Obstetricians and Gynecologists.^[20] The psychologist ensured the theoretical coherence, perinatal adaptation, and safety of the integrated intervention [Table 1]. The control group received only routine care. Following the study, a group meeting was convened to address the concerns of control group participants, in order to uphold ethical standards.

Primary outcomes included PTSD and fear of childbirth, assessed at baseline and at 36 weeks of gestation (4 weeks' postintervention) utilizing the PSS-SR, CAQ, and a demographic and midwifery questionnaire. The questionnaire encompassed variables such as age, occupation, gestational age, education, BMI, spouse's information, income, duration of marriage, health insurance status, pregnancy intention, adherence to prenatal care, fetal gender, prior delivery details, and occurrences of episiotomy or tearing.

The Post-Traumatic Stress Disorder Scale-Self Report (PSS-SR) is a 17-item Likert scale designed to assess

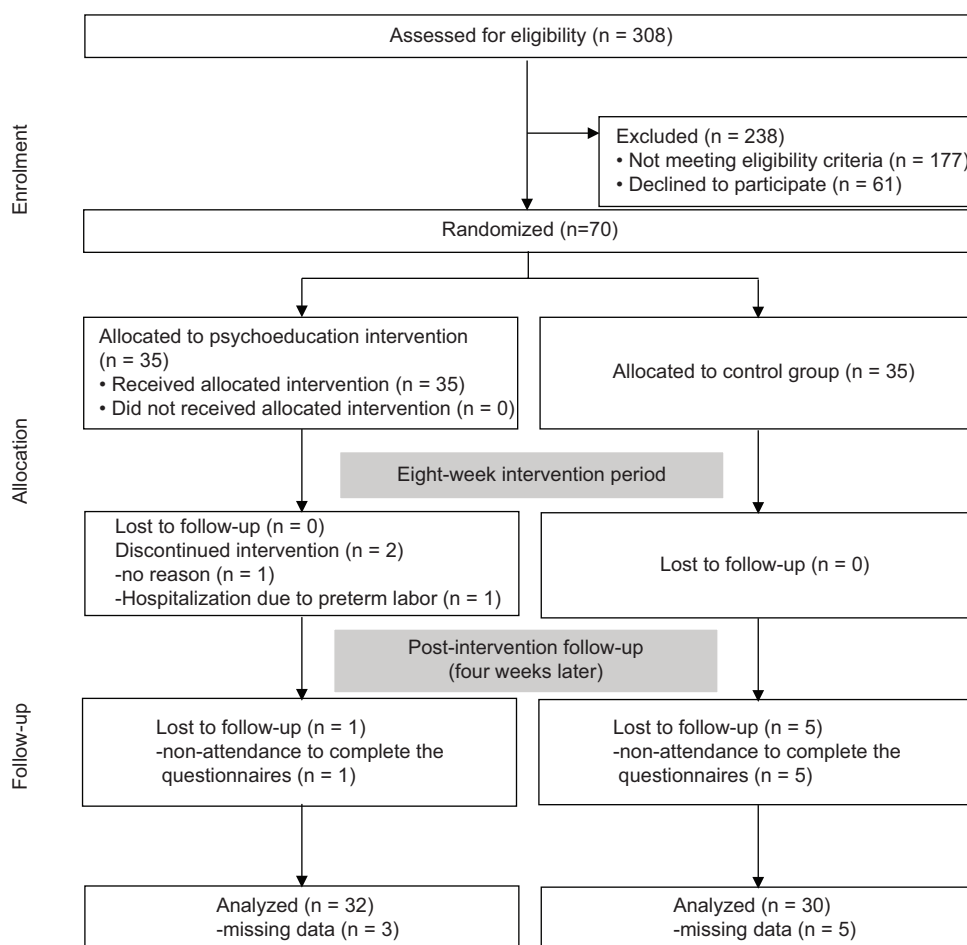


Figure 1: Study flow diagram

PTSD symptoms in accordance with DSM-IV criteria, encompassing three domains: re-experiencing (5 items), avoidance (7 items), and arousal (5 items). Participants are instructed to rate the severity of their symptoms over the past two weeks, with responses ranging from 0 (not at all) to 3 (very much), resulting in a total score that ranges from 0 to 51. A score of 12 or higher indicates the presence of PTSD symptoms.^[21] The PSS-SR demonstrates strong internal consistency, with Cronbach's alpha coefficients of 0.92 for the total scale, 0.86 for re-experiencing, 0.79 for avoidance, and 0.91 for arousal,^[22] and its psychometric properties have been validated in Iran.^[23]

The Childbirth Anxiety Questionnaire (CAQ), developed by Harman,^[24] assesses fear related to childbirth. The Iranian version consists of 14 items,^[25] rated on a 4-point Likert scale (1 = never, 4 = severe), leading to a total score range of 14 to 56. The questionnaire addresses fears concerning the baby, pain and injury, control, and medical interventions, with a score of 28 or higher indicating a significant fear of childbirth.^[26] The validity and reliability of the CAQ have been confirmed in Iran.^[25] The reliability of both the PSS-SR and CAQ was evaluated through a test-retest method involving 30 pregnant women, with a 14-day interval, resulting in intraclass correlation

coefficients of 0.75 for the PSS-SR and 0.82 for the CAQ, indicating good agreement.

Sample size calculations were conducted using the Sampsi module in Stata-13, following the methodology outlined by Mousavi *et al.*^[27] For the PTSD assessment, a mean (SD) score of 42.13 (11.72) with a clinically significant difference of 10 points,^[28] an alpha level of 0.05, a power of 0.90, and an anticipated attrition rate of 10% indicated a need for 32 participants per group. For the fear of childbirth measure, using data from Kızılırmak and Başer^[29] (mean/SD: 42.02/19.25 vs. 48.58/36.20), similar parameters resulted in a calculated requirement of 35 participants per group, including a 10% margin.

Data analysis was performed using Stata-13. Normality was assessed using the Shapiro-Wilk test and histograms. Quantitative demographic and midwifery variables were compared utilizing Mann – Whitney tests, while categorical variables were analyzed with Chi-square and Fisher's exact tests. Mean scores for the PSS-SR and CAQ were compared using ANCOVA, adjusting for baseline values. Mean differences (MD), standardized mean differences (SMD) calculated using Cohen's *d*, and 95% confidence intervals were determined. Cohen's *d* effect size benchmarks were

Table 1: Content of psychoeducation sessions

Session	Title	Content (60–90 minutes)
1	Physiology and fundamentals	A structured presentation on third-trimester hormonal changes (estrogen, progesterone, relaxing, oxytocin) and the physical adaptations necessary for childbirth. Anatomical charts were utilized to teach pelvic and birth canal anatomy. Introduction & Practice: Step-by-step instruction on diaphragmatic breathing, emphasizing a pattern of deep nasal inhalation (4 counts), a brief breath hold (2 counts), and controlled, prolonged exhalation through the mouth (6 counts).
2	Labor process	A brief medical animation illustrated the stages of labor (latent, active, transition, second stage/descent & delivery), detailing cervical changes, fetal positioning, and the birth mechanism. New Technique: Introduction and practice of progressive muscle relaxation (PMR), in which participants tense specific muscle groups for 5 seconds followed by 30 seconds of complete release.
3	Experience sharing	A facilitated group discussion using open-ended questions to foster a safe environment for sharing experiences. The emphasis was on active listening and peer exchange without direct analysis. Consolidation: Repetition and deepening of the PMR technique learned previously.
4	Correcting misconceptions	Using a “group reality-testing” technique, a list of 15 common misconceptions was presented, accompanied by evidence-based medical information for each, followed by group discussion. Continued Practice: Additional practice of the PMR technique.
5	Hospital environment	Comprehensive information on common labor ward protocols and an overview of pharmacological (epidural, opioids) and nonpharmacological (mobility, birth ball, hydrotherapy, massage, counter-pressure) pain management options, outlining their advantages and limitations. New Technique: Instruction in Guided Imagery, leading participants on a 10-minute mental journey to a safe space.
6	Partner’s role	Emphasis on practical support skills for partners, including verbal support (affirmations), physical support (back massage, assistance with positions), and effective communication with healthcare staff. Partner-inclusive Practice: Partners engaged in coordinated breathing exercises and learned a simple back and shoulder massage technique.
7	Planning and active coping	Participants crafted a personalized “birth plan” with facilitator guidance, outlining preferences for the room environment, nonpharmacological pain methods, skin-to-skin contact, and infant feeding. Integration: Instruction in phase-specific breathing patterns and brief integration with imagery.
8	Consolidation and integration	Final review of all concepts and strategies. Final Composite Practice: A 25-minute guided relaxation exercise, incorporating diaphragmatic breathing, a condensed PMR for key tension areas, guided imagery, and a return to full alertness, followed by an opportunity for feedback sharing.

categorized as 0.20-0.50 (small), 0.50-0.80 (moderate), and ≥ 0.80 (large).^[30] The analysis adhered to a per-protocol approach with a significance threshold set at <0.05 .

Ethical considerations

Ethical approval was granted by the Vice-Chancellor for Research at Hamadan University of Medical Sciences (Ethics code: IR.UMSHA.REC.1401.732). Written permission to conduct the study was obtained from the relevant comprehensive health centers in Hamadan. All participants were thoroughly informed about the study’s objectives, procedures, potential benefits, and risks by the researcher. They were assured of the confidentiality of their data and their right to withdraw from the study at any time without repercussions to their routine care. Informed written consent was secured from all eligible pregnant women prior to enrollment. This study was conducted in accordance with the ethical standards of the institutional research committee and the Declaration of Helsinki.

Results

The sociodemographic characteristics of the intervention and control groups were compared. The intervention group had a mean (SD) age of 27.78 (5.12) years, while the control group had a mean (SD) age of 27.13 (3.80)

years. The mean (SD) time since the previous delivery was 3.59 (0.71) years for the intervention group and 3.37 (0.67) years for the control group, with no significant differences observed [Table 2].

Baseline PTSD mean (SD) were recorded at 29.72 (7.99) for the intervention group and 27.43 (5.20) for the control group. Postintervention analysis using ANCOVA revealed significantly lower PTSD scores in the intervention group ($p < 0.001$; adjusted mean difference -9.23 , 95% CI -7.18 to -11.28 ; Cohen’s d 2.29, 95% CI 1.65-2.93). Additionally, fear of childbirth scores was significantly lower in the intervention group ($p < 0.001$; adjusted mean difference -5.02 , 95% CI -3.05 to -7.00 ; Cohen’s d 1.30, 95% CI 0.75-1.85) [Table 3].

Discussion

This study investigated the effects of psychoeducation interventions on PTSD and FOC in pregnant women with a history of traumatic childbirth experiences. While childbirth is generally perceived as a positive event, approximately 50% of women may experience it as traumatic, with some subsequently developing symptoms of PTSD.^[31] The perception of traumatic childbirth encompasses potential harm to the mother or baby and

Table 2: Baseline characteristics of the participants by study group

Variables		Intervention group <i>n</i> =35	Control group <i>n</i> =35	<i>p</i>
Age (years), Mean (SD)*		27.78 (5.12)	27.13 (3.80)	0.84**
Husband's age (years), Mean (SD)		33.06 (4.79)	32.30 (3.54)	0.82**
Time elapsed since previous delivery (years), Mean (SD)		3.59 (0.71)	3.37 (0.67)	0.22**
Employment status, <i>n</i> (%)	Housewife	25 (71.43)	22 (62.86)	0.44
	Employed	10 (28.57)	13 (37.14)	
Education, <i>n</i> (%)	Less than diploma	8 (22.86)	10 (28.57)	0.63
	Diploma	20 (57.14)	16 (45.72)	
	University	7 (20.00)	9 (25.71)	
Husband's employment status, <i>n</i> (%)	Employed	26 (74.29)	27 (77.14)	0.78
	Unemployed	9 (25.71)	8 (22.86)	
Husband's education, <i>n</i> (%)	Less than diploma	10 (28.57)	10 (28.57)	0.35
	Diploma	17 (48.57)	12 (34.29)	
	University	8 (22.86)	13 (37.14)	
Household income status, <i>n</i> (%)	Low	11 (31.43)	11 (31.43)	0.21***
	Medium	23 (65.71)	19 (54.29)	
	High	1 (2.86)	5 (14.28)	
Health insurance status, <i>n</i> (%)	Yes	30 (85.71)	28 (80.00)	0.75
	No	5 (14.29)	7 (20.00)	
Pregnancy status, <i>n</i> (%)	Wanted	23 (65.71)	21 (60.00)	0.62
	Unwanted	12 (34.29)	14 (40.00)	
Fetus sex, <i>n</i> (%)	Female	23 (65.71)	19 (54.29)	0.32
	Male	12 (34.29)	16 (45.71)	
History of episiotomy in previous birth, <i>n</i> (%)	Yes	27 (77.14)	31 (88.57)	0.34***
	No	8 (22.86)	4 (11.43)	
Place of previous birth, <i>n</i> (%)	Public hospital	31 (88.57)	32 (91.43)	1.00***
	Private hospital	4 (11.43)	3 (8.57)	

*SD: Standard Deviation; **Mann–Whitney *U* test, ***Fisher's exact test, and the rest: Chi-squared test

Table 3: Comparison of mean (standard deviation) PTSD and fear of childbirth scores between study groups

Variables	Study groups	Before intervention,	After intervention*				
		Mean (SD)**	Mean (SD)	<i>F</i>	<i>p</i>	Mean difference (95% CI)***	Cohen's <i>d</i> (95% CI)
PTSD****	Intervention	29.72 (7.99)	18.84 (4.03)	80.09	<0.001	−9.23 (−7.18, −11.28)	−2.29 (−1.65, −2.93)
	Control	27.43 (5.20)	28.07 (4.03)				
Fear of childbirth	Intervention	41.28 (8.60)	31.40 (3.87)	25.69	<0.001	−5.02 (−3.05, −7.00)	−1.30 (−0.75, −1.85)
	Control	38.70 (7.72)	36.42 (3.87)				

*Adjusted for the baseline values (using ANCOVA); **SD: Standard Deviation; ***CI: Confidence Interval; ****PTSD: Post-Traumatic Stress Disorder

is influenced by previous traumatic birth experiences, individual personality traits, emotional responses, societal perspectives, and cultural factors.^[32] Our findings indicate that psychoeducation resulted in a significant reduction of PTSD scores by 9.23 points in the intervention group. However, this reduction narrowly fell short of the established minimal clinically important difference (MCID) of 10 points for the PSS-SR.^[28] Nevertheless, the exceptionally large effect size (Cohen's *d*: 2.29, 95% CI: 1.65–2.93) strongly suggests a substantial and meaningful clinical impact on PTSD symptoms within this specific population.^[28] Additionally, Dilcen and Genc^[33] found that a four-session psychoeducation program effectively reduced birth trauma perception among women with substance use disorders. Similarly, Azogh *et al.*^[34] reported that four

psychoeducation sessions significantly decreased anxiety in women with prior stillbirths.

Contrasting results were observed in the study conducted by Rowe *et al.*,^[35] which examined the effects of psychoeducation on pregnant women with PTSD stemming from childhood abuse. Their findings indicated small, nonsignificant effect sizes for postpartum PTSD symptoms. This discrepancy may be attributed to differences in the timing of outcome assessments—our study evaluated PTSD at 36 weeks of pregnancy, whereas Yildiz *et al.*^[36] conducted their assessments postdelivery, a period during which labor events may have diminished the intervention's effectiveness or exacerbated symptoms. Additionally, variations in the type of trauma (childbirth versus

childhood abuse) may further account for these differences. A meta-analysis conducted by Park *et al.*^[37] reported a small effect size (SMD: -0.307 , 95% CI: -0.47 to -0.14) concerning the impact of psychoeducation on mental health outcomes such as depression and anxiety, excluding PTSD, which suggests a degree of heterogeneity in the study outcomes.

In nonpregnant populations, the impact of psychoeducation on PTSD varies. A three-day workshop significantly reduced PTSD checklist scores among Libyan individuals,^[38] while 12 sessions demonstrated improvement in PTSD symptoms among Somali refugee youth.^[39] However, a meta-analysis by Wang *et al.*^[40] on cancer patients indicated that, despite a substantial effect size, internet-based psychoeducation did not lead to a significant reduction in distress.

Our study also evaluated fear of childbirth, a recognized contributor to PTSD during pregnancy,^[41-43] which includes both retrospective and prospective fears.^[42,44] The relationship between PTSD and fear of childbirth is significant, with each factor increasing the risk of the other.^[45] Psychoeducation resulted in a reduction of fear of childbirth scores by approximately 5 points (SMD: 1.30 , 95% CI: 0.75 - 1.85), indicating a strong effect. The effect size observed in our study (Cohen's d : 1.30) is considerably larger than the pooled effect (Hedges' g : 0.59) reported in the meta-analysis by Akgün *et al.*^[46] This discrepancy is likely attributable to key differences in the study populations. Our intervention specifically targeted women with a confirmed history of traumatic childbirth and elevated PTSD symptoms, a subgroup that may be particularly responsive to trauma-informed psychoeducation. In contrast, the meta-analysis by Akgün *et al.*^[46] primarily included studies involving nulliparous women or mixed populations, where baseline levels of trauma-related fear may be lower and more heterogeneous. Abadi Marzoni *et al.*'s^[47] study, utilizing the BELIEF approach, reported a larger reduction in fear of childbirth (adjusted mean difference: -10.51 , 95% CI: -11.60 to -9.41), likely due to its targeted focus. A meta-analysis by Akgün *et al.*^[46] confirmed the effectiveness of psychoeducation in reducing fear of childbirth (Hedges' g : 0.59 , 95% CI: 0.46 - 0.72), although with a smaller effect size compared to our study. Variations may be influenced by factors such as labor pain, prior birth experiences, depression, social support, or levels of knowledge. Our study concentrated on women with traumatic childbirth experiences and PTSD, in contrast to Akgün *et al.*'s^[46] meta-analysis, which primarily included nulliparous women.

Our findings are consistent with studies demonstrating the effectiveness of psychoeducation in reducing fear of childbirth among both nulliparous and multiparous women.^[46-49] However, its efficacy may vary based on individual characteristics, as fear of childbirth is a multifactorial issue. Due to time and budget constraints, our study did not assess long-term

postpartum effects. Additionally, participants in the control group may have sought external psychological support, as they did not receive a placebo or standardized intervention, although this was not investigated.

This study has several limitations that should be acknowledged. First, the reliance on self-reported measures (PSS-SR and CAQ) may introduce biases, such as recall bias or social desirability bias, and lacks clinician-rated assessments of symptom severity. Second, the absence of a postdelivery follow-up assessment limits conclusions regarding the long-term stability of the intervention's effects on PTSD and fear of childbirth symptoms beyond the pregnancy period. Third, despite randomization, potential contamination is a concern, as participants in the control group may have accessed similar psychoeducational resources or support from external sources, which could dilute the observed between-group differences. Finally, due to the nature of the intervention, blinding of participants and intervention providers was not feasible, introducing risks of performance and reporting bias; however, outcome assessors were blinded to group allocation to partially mitigate this issue. Future trials should include postpartum follow-ups, objective or clinician-rated measures where feasible, and, if possible, compare this intervention against other active treatments.

Conclusion

The results of this randomized controlled trial indicate that a structured childbirth preparation psychoeducation intervention, which includes relaxation training, is an effective approach for significantly alleviating PTSD symptoms and reducing fear of childbirth in pregnant women with a history of traumatic childbirth. Given the substantial effect sizes observed, the integration of routine screening for childbirth-related PTSD and fear, along with targeted psychoeducation programs, into standard prenatal care may represent a viable strategy to enhance psychological outcomes for this vulnerable population. Further research with extended follow-up into the postpartum period is necessary to evaluate the long-term sustainability of these effects.

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Conflicts of interest

Nothing to declare.

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