Effectiveness of Stress Inoculation Training on Emotional Regulation, Childbirth Self-Efficacy and Natural Childbirth Anxiety

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Objective: The present study aimed to examine the effectiveness of stress inoculation training on emotional regulation, Childbirth Self-Efficacy and natural childbirth anxiety in pregnant women.

Methods: This study employed a quasi-experimental design with a pre-test–post-test and a control group. The sample was selected using convenience random sampling, and 45 pregnant women experiencing natural childbirth anxiety were recruited from healthcare centers. Participants were randomly assigned to three groups (two experimental groups and one control group). The experimental groups received stress inoculation training, while the control group did not receive any intervention. The research instrument included the Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) (Wijma et al., 1998), which was administered during the pre-test and post-test phases across all three groups.

Findings: The results indicated that stress inoculation training had a significant effect on reducing natural childbirth anxiety and increasing positive emotional regulation and childbirth self-efficacy, while negative emotional regulation decreased among women in the experimental groups.

Conclusion: Stress inoculation training can be utilized as an effective approach to reducing anxiety and improving emotional regulation and self-efficacy in pregnant women with natural childbirth anxiety, thereby promoting mental health and facilitating a more positive childbirth experience.

Keywords: Emotional regulation, stress, natural childbirth, stress management, inoculation.

1. Introduction

T

he phenomenon of fertility is a natural process in living organisms. In humans, beyond its physiological aspects, it also encompasses social and psychological dimensions. One of the primary objectives of marriage and family formation is reproduction. The birth of a child can strengthen family bonds, fulfill emotional needs, and ultimately ensure the continuation of generations. Childbirth anxiety is one of the psychological challenges that mothers experience during pregnancy. Pregnancy and its associated stress can lead to fear of childbirth, decreased emotional self-regulation, reduced self-efficacy, lower self-esteem, diminished sexual desire, increased interpersonal conflicts, and reduced social interactions between partners. Additionally, it has a detrimental impact on quality of life, with these negative effects being more pronounced in women than in men (Santos-Rocha, 2024; Tabee Bordbar et al., 2024).

Childbirth anxiety affects various aspects of an individual's life, including daily functioning as well as emotional and social performance (Bostan & Kabukcuoğlu, 2022). Addressing the psychological needs of pregnant women is a crucial component in ensuring a successful childbirth experience. Studies on the quality of life of pregnant women with childbirth anxiety emphasize the necessity of psychological counseling and interventions to support these women (Duong et al., 2022). Furthermore, research on women experiencing childbirth anxiety has shown that pregnant women who maintain high levels of self-efficacy and emotional regulation to cope with childbirth anxiety tend to have better psychological well-being, which contributes to a smoother pregnancy and childbirth process (Gimbel et al., 2022). Women with higher self-efficacy and better emotional regulation experience less fear of childbirth and are more inclined to opt for natural delivery.

Some studies have demonstrated that stress inoculation training effectively enhances emotional regulation and psychological well-being. Consequently, it is recommended that such training be implemented across different age groups to improve psychological well-being and emotional regulation skills (Abdi & Gharayagh Zandi, 2019; Flaxman & Bond, 2010; Ghasemi et al., 2022; Hasanzadeh et al., 2013; Hosseinzadeh Lifa Shagird et al., 2013; Shanholtz et al., 2017; Southwick et al., 2005).

Considering the discussed issues, as well as the negative consequences of childbirth anxiety on women, families, and society, and the crucial role of fear of childbirth, emotional regulation, and self-efficacy in women with natural childbirth anxiety, identifying and implementing effective

psychological interventions is essential. One of the interventions used to enhance resilience against stress is stress inoculation training (Shanholtz et al., 2017). The present study aims to contribute to the identification of the most effective therapeutic strategies for reducing fear of childbirth, improving emotional regulation, and enhancing self-efficacy in women experiencing natural childbirth anxiety.

2. Methods

2.1. Study Design and Participants

The present study employed a quasi-experimental design with a pre-test–post-test structure and a control group. The study included two experimental groups (the second experimental group received stress inoculation training) and one control group. After random assignment, participants in the experimental and control groups underwent a pre-test (T1). The targeted group then received stress inoculation training (E2), while the control group received no experimental intervention. After completing the psychological intervention sessions for the experimental groups, a post-test (T2) was administered to both the experimental and control groups.

A convenience sampling method was used. Different health centers in Sari, Iran, were considered, and three health centers were randomly selected from these regions. The Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) for natural childbirth anxiety was administered to all pregnant women visiting these centers. After scoring the questionnaires, 45 women were selected and randomly assigned to two experimental groups and one control group.

To conduct the study, coordination with the health center managers in Sari was established, and the study procedures were explained to the participants. Based on the outlined criteria, 45 pregnant women who met the inclusion criteria were identified and randomly assigned to three groups (two experimental groups and one control group). The sample size was calculated using G*Power software, with an 80% test power, $\alpha = 0.05$, and an effect size of 0.5, leading to 15 participants per group.

The study population comprised all pregnant women attending health centers in Sari, Iran, during 2023–2024. The inclusion criteria were carefully designed to ensure the suitability of participants for assessing the impact of stress inoculation training. All participants were required to demonstrate significant anxiety related to natural childbirth, which was the primary focus of the study. Additionally,

participants had to be free from pre-existing medical conditions that could compromise maternal or fetal health, such as severe heart disease, chronic hypertension, cervical insufficiency, diabetes, or gestational diabetes. This ensured a safe environment for both the mother and the child throughout the study. Participants were required to provide informed consent voluntarily and possess sufficient literacy skills to comprehend the study materials. Eligibility was further restricted to women experiencing their first pregnancy, aged between 18 and 38 years. Additionally, pregnancies had to fall within the gestational age range of 20–37 weeks, with strict exclusion criteria for individuals with a history of heart attacks, strokes, or psychiatric disorders requiring psychotropic medications before or during the study period.

To ensure data integrity and participant well-being, exclusion criteria were implemented. Individuals with chronic illnesses such as heart disease, hypertension, or diabetes were excluded. Further exclusions applied to those with a history of miscarriage, bleeding complications, placenta previa, or those taking medications that could affect study outcomes. Additionally, women with a history of infertility, psychiatric illness in the past ten years, or any form of substance use, including drug or tobacco use, were excluded from participation. These criteria helped maintain a cohesive and healthy participant group, ensuring that the study findings accurately reflected the effect of stress inoculation training on emotional regulation and childbirth anxiety, without confounding medical or psychological conditions.

After identifying the appropriate sample group, questionnaires and therapeutic protocols were distributed among participants, and the interventions were implemented accordingly. This direct engagement with the target sample was crucial for gathering empirical data to evaluate the effectiveness of stress inoculation training on stress levels, emotional regulation, and anxiety.

2.2. Measures

2.2.1. Childbirth Fear

The Childbirth Fear Questionnaire (W-DEQ) was developed by Wijma et al. (1998) in Sweden and consists of one factor with 33 items, measured on a six-point Likert scale (from "strongly disagree" to "strongly agree"). The total score ranges from 0 to 165. Studies have reported the reliability of the questionnaire during pregnancy as 0.78, and its validity was confirmed through correlations with the

Beck Depression Inventory (BDI) and Spielberger's State-Trait Anxiety Inventory (STAI) (Gharib & Rajabi, 2023). The Persian version of the questionnaire, validated in Iran, includes six sub-factors: lack of positive expectations, fear, low self-efficacy, loneliness, fear of fetal harm, and lack of control. The construct validity of the instrument was confirmed using exploratory and confirmatory factor analysis. The convergent validity was assessed through correlations with the Attitudes Toward Childbirth Questionnaire and STAI, showing moderate correlation, supporting its validity. The reliability of this instrument was reported as 0.925, with subscale reliabilities of 0.86 or higher (Aslantekin Özçoban et al., 2022). Cronbach's alpha for this study was 0.80.

2.2.2. Cognitive Emotion Regulation

The Cognitive Emotion Regulation Questionnaire (CERQ) was developed by Garnefski et al. (2001) to identify cognitive coping strategies following negative experiences. It consists of 36 items, scored on a five-point Likert scale (always, often, sometimes, rarely, never). The Persian version was translated and validated by Hosseini (2011). The original developers reported Cronbach's alpha as 0.91 for positive strategies, 0.87 for negative strategies, and 0.93 for the total questionnaire. The construct validity was confirmed using principal component analysis, supporting a two-factor model that explained 74% of the variance (Mikaeili et al., 2024; Mohammad & Borjali, 2021). Cronbach's alpha for this study was 0.76.

2.2.3. Childbirth Self-Efficacy

The Childbirth Self-Efficacy Inventory (CSEI) measures perceived maternal capability to cope with labor pain and assesses expected outcomes and self-efficacy beliefs. The 64-item questionnaire consists of two phases: the active phase and the second stage of labor. Each phase is divided into two subscales: expected outcomes and expected self-efficacy. Responses are scored on a ten-point Likert scale (1 = completely unsure, 10 = completely sure). The Persian validation by Khorsandi et al. (2019) reported Cronbach's alpha as follows: 0.84 (active phase outcomes), 0.92 (active phase self-efficacy), 0.94 (second stage outcomes), and 0.91 (second stage self-efficacy) (Bostan & Kabukcuoğlu, 2022). Cronbach's alpha for this study was 0.87.

2.3. Intervention

2.3.1. Stress Inoculation Training

The Meichenbaum (1977) approach to stress inoculation training was used in this study. The training consisted of eight 90-minute sessions. The first session involved the administration of the pre-test, introduction of participants to one another, explanation of group rules and expectations, establishment of collaborative relationships, and conceptualization and description of stress. The second session reviewed the previous session, analyzed stress during pregnancy, identified stress-inducing and exacerbating factors, and introduced mental imagery training for pregnant women. The third session reviewed the previous session and homework assignments, evaluated mental imagery techniques, introduced progressive muscle relaxation, and conducted its first implementation. The fourth session reviewed the previous session, assessed relaxation training outcomes, and emphasized the role of cognitive processes in pregnancy-related stress. The fifth session identified automatic negative thoughts and cognitive distortions related to childbirth, trained participants in challenging negative thoughts and cognitive distortions, and encouraged cognitive restructuring. The sixth session focused on training in positive self-talk and examining the role of negative self-talk in increasing pregnancy-related stress. The seventh session involved training in attention control strategies, problem-solving skills under stressful conditions, and providing a structured problem-solving model for pregnant women. The eighth and final session evaluated the effectiveness of learned techniques, identified barriers to their implementation, developed strategies for overcoming these barriers, and conducted the post-test.

2.4. Data Analysis

The dependent variables, including childbirth fear, emotional regulation, and childbirth self-efficacy, were measured in both the pre-test and post-test phases. Analysis of covariance (ANCOVA) was used to assess the effectiveness of stress inoculation training on these variables through SPSS-23.

3. Findings and Results

The present study included 45 women experiencing natural childbirth anxiety (M = 91.92, SD = 17.20), who were randomly assigned to three groups. The demographic characteristics of the participants are presented in Table 1. The mean and standard deviation of age in the stress inoculation group were M = 35.5, SD = 4.83, while in the control group, they were M = 35.06, SD = 4.35. Regarding education levels, in the stress inoculation group, one participant had a high school diploma, while 14 participants had university degrees. Concerning employment status, four participants in the stress inoculation group were employed, and 11 were homemakers, while in the control group, three participants were employed, and 12 were homemakers. Statistical tests assessing group homogeneity confirmed that there were no significant differences among the groups in age, education level, or employment status.

The descriptive statistics for all dependent variables (childbirth fear, positive emotional regulation, negative emotional regulation, and childbirth self-efficacy) are presented in Table 1, showing the mean (M) and standard deviation (SD) values for each group at both the pre-test and post-test stages.

Table 1

Descriptive Statistics for Dependent Variables

Variable	Stress Inoculation Group (M ± SD)	Control Group (M ± SD)
Childbirth Fear (Pre-Test)	92.10 ± 17.35	91.45 ± 16.89
Childbirth Fear (Post-Test)	45.22 ± 12.48	89.12 ± 17.02
Positive Emotional Regulation (Pre-Test)	25.87 ± 6.31	26.13 ± 6.55
Positive Emotional Regulation (Post-Test)	45.23 ± 5.99	28.45 ± 7.23
Negative Emotional Regulation (Pre-Test)	30.21 ± 7.44	31.10 ± 7.61
Negative Emotional Regulation (Post-Test)	12.55 ± 3.78	30.45 ± 7.18
Childbirth Self-Efficacy (Pre-Test)	110.45 ± 15.68	112.23 ± 16.32
Childbirth Self-Efficacy (Post-Test)	185.76 ± 20.21	115.12 ± 15.89

The assumptions of analysis of covariance (ANCOVA), including the normal distribution of data, homogeneity of error variances, and equality of covariance matrices for the dependent variables, were examined.

For the assumption of normality, the Shapiro-Wilk test was used to assess the distribution of scores for childbirth fear, positive and negative emotional regulation, and childbirth self-efficacy across all three groups in both pre-test and post-test phases. The results confirmed that the assumption of normal distribution was met for all dependent variables ($p > 0.05$).

For the homogeneity of error variances, Levene's test was used to evaluate the equality of variances for childbirth fear, positive and negative emotional regulation, and childbirth self-efficacy across the groups. The results of Levene's test indicated that there were no significant differences in error variances across the groups at the 0.05 level, confirming that the assumption of homogeneity of variance was met.

Regarding the equality of covariance matrices, the results of Box's M test for childbirth fear, positive and negative emotional regulation, and childbirth self-efficacy showed that the test statistic was not significant for any variable ($p > 0.05$). This finding indicates that the assumption of equality of covariance matrices for the dependent variables across all levels was upheld.

The results of ANCOVA examining the effects of stress inoculation training on all dependent variables are presented in Table 2. The results indicate that the main effects of group and intervention phase were statistically significant, meaning that there was a significant difference in the post-test mean scores among the three groups ($p < 0.05$).

Table 2

ANCOVA Results for All Dependent Variables

Variable	Source	Sum of Squares	df	Mean Square	F	P	η²
Childbirth Fear	Stage	88533.689	1	88533.689	502.552	0.001	0.92
	Group	13815.244	2	6907.622	36.210	0.001	0.651
Positive Emotional Regulation	Stage	232992.089	1	232992.089	258.71	0.001	0.982
	Group	1039.510	2	519.75	5.039	0.011	0.19
Negative Emotional Regulation	Stage	71441.089	1	71441.089	646.888	0.001	0.939
	Group	2055.511	2	1027.756	9.306	0.001	0.307
Childbirth Self-Efficacy	Stage	1590480.00	1	1590480.00	860.02	0.001	0.95
	Group	17261.600	2	8630.800	46.669	0.001	0.69

To further examine the differences between the groups, Bonferroni post-hoc tests were conducted, and the results are presented in Table 3.

Table 3

Bonferroni Post-Hoc Results

Variable	Comparison (Group 1 - Group 2)	Comparison (Group 1 - Group 3)	Comparison (Group 2 - Group 3)	P (Group 1 - 2)	P (Group 1 - 3)	P (Group 2 - 3)
Childbirth Fear	0.466	37.400	36.933	0.899	0.001	0.001
Positive Emotional Regulation	9.133	11.000	1.866	0.054	0.015	0.845
Negative Emotional Regulation	12.466	15.666	3.200	0.007	0.001	0.985
Childbirth Self-Efficacy	13.001	137.400	124.400	0.986	0.001	0.001

The results indicate that the significance levels for stress inoculation training in comparison to the control group were less than 0.01, leading to the rejection of the null hypothesis and confirming a significant difference in childbirth fear between the groups. This suggests that stress inoculation training effectively reduces childbirth fear, although no significant difference was observed between the two experimental groups in terms of effectiveness.

Similarly, the significance levels for positive and negative emotional regulation were less than 0.01, indicating that stress inoculation training significantly increases positive emotional regulation and decreases negative emotional regulation.

Finally, the significance levels for childbirth self-efficacy were less than 0.01, confirming that stress inoculation training significantly enhances childbirth self-efficacy, though no significant difference was found between the two experimental groups in terms of effectiveness.

4. Discussion and Conclusion

The results of the study hypothesis indicated that stress inoculation training led to a reduction in childbirth fear among women with natural childbirth anxiety. This finding aligns with the prior results (Abdi & Gharayagh Zandi, 2019; Flaxman & Bond, 2010; Ghasemi et al., 2022; Hasanzadeh et al., 2013; Hosseinzadeh Lifa Shagird et al., 2013; Shanholtz et al., 2017; Southwick et al., 2005).

These findings can be interpreted based on the underlying causes of childbirth fear, which include previous experiences, fear of pain, concerns about complications, worries about maternal and infant health, fear of losing control, concerns about body damage, and social and cultural pressures. Stress inoculation training emphasizes problem conceptualization, skill acquisition and practice, application, and continuous follow-up. Since problem conceptualization is the first step in this approach, it plays a crucial role in guiding individuals toward solutions (Ghasemi et al., 2022; Shanholtz et al., 2017). Participants were encouraged to identify the underlying causes of their childbirth fear, and based on these causes, they received practical training tailored to their specific concerns. Through these targeted training techniques, stress inoculation training effectively reduced childbirth fear in women experiencing natural childbirth anxiety.

Another explanation for these findings is that stress inoculation training serves as a therapeutic method designed to help individuals develop coping skills for stressful situations, such as childbirth or illness. This training follows a cognitive-behavioral intervention framework and includes various coping techniques, such as cognitive restructuring, problem-solving, relaxation training, mental and behavioral imagery, self-reflection, self-instruction, educational training, Socratic questioning, self-reinforcement, and environmental modifications. The effectiveness of stress inoculation training in reducing childbirth fear in women with natural childbirth anxiety can be attributed to the application of these techniques (Abdi & Gharayagh Zandi, 2019; Hosseinzadeh Lifa Shagird et al., 2013). Furthermore, by modifying cognitive patterns and reframing interpretations of pain and suffering as part of the human

experience, this training significantly reduces negative emotions, including anxiety, stress, and depression.

Thus, stress inoculation training has been effective in teaching women how to cope with life's challenges, identify their personal values, accept negative emotions as a part of human existence, and learn how to manage these emotions effectively. The impact of this training lies in shifting women's perspectives regarding the origins of irrational thoughts, the vicious cycle of these thoughts, and the goal of therapy, which is to initiate mindfulness-based training and take practical action. The results of covariance analysis comparing the effects of time and group in the study confirm that the mean scores of childbirth fear significantly differed between the pre-test and post-test stages. Additionally, the Bonferroni post-hoc test comparing group effects demonstrated that the mean difference in childbirth fear between the stress inoculation training group and the control group was statistically significant. This means that stress inoculation training effectively reduced childbirth fear in the post-test phase compared to the pre-test phase, confirming the first hypothesis that stress inoculation training significantly reduces childbirth fear in women with natural childbirth anxiety.

The results of covariance analysis comparing the effects of time and group also revealed that the mean scores of positive and negative emotional regulation significantly differed between the pre-test and post-test stages. Additionally, the Bonferroni post-hoc test comparing group effects demonstrated a statistically significant difference in emotional regulation scores between the stress inoculation training group and the control group, supporting the prior findings (Southwick et al., 2005).

The implementation of stress inoculation training resulted in a significant increase in positive emotional regulation scores and a significant decrease in negative emotional regulation scores in the post-test phase compared to the pre-test phase. Based on this, the second hypothesis was confirmed, indicating that stress inoculation training significantly increases positive emotional regulation and decreases negative emotional regulation in women with natural childbirth anxiety.

This finding can be explained by the fact that stress inoculation training aims to enhance coping abilities and consists of a three-phase intervention model that includes problem conceptualization, skill acquisition and practice, and application with continuous follow(Southwick et al., 2005). In the problem conceptualization phase, the focus is on establishing a collaborative relationship between the

therapist and the participant. Participants gain a better understanding of stress, its impact on emotions and functioning, and how to reframe stress in a more manageable way. This process strengthens emotional regulation skills.

Following this phase, skill acquisition and practice begin, during which participants learn and rehearse coping strategies within a controlled setting. Finally, participants apply these coping strategies in real-life situations, adapting them to specific stressors they encounter. The goal of this phase is to enable participants to effectively implement adaptive coping responses (Flaxman & Bond, 2010). The coping strategies taught in this phase include relaxation techniques, cognitive restructuring, problem-solving, guided self-dialogue, attentional control techniques, interpersonal skills training, and social support utilization (Garnefski & Kraaij, 2022). During the application and follow-up phase, participants practice integrating these coping skills into their daily lives, further reinforcing emotional regulation.

The results of covariance analysis comparing the effects of time and group also showed that the mean scores of childbirth self-efficacy significantly differed between the pre-test and post-test stages. This finding aligns with the prior (Aslantekin Özçoban et al., 2022; Bostan & Kabukcuoğlu, 2022) which demonstrated that psychological interventions improve self-efficacy. Additionally, the Bonferroni post-hoc test comparing group effects confirmed a statistically significant difference in self-efficacy scores between the stress inoculation training group and the control group.

The implementation of stress inoculation training resulted in a significant increase in childbirth self-efficacy scores in the post-test phase compared to the pre-test phase. Based on this, the third hypothesis was confirmed, indicating that stress inoculation training significantly increases childbirth self-efficacy in women with natural childbirth anxiety.

This finding can be explained by the fact that stress inoculation training, similar to medical immunization, fosters the development of "psychological antibodies" or coping skills, thereby increasing resilience to stressful situations (Abdi & Gharayagh Zandi, 2019). The training includes problem conceptualization, skill acquisition and practice, and application with continuous follow-up. By incorporating relaxation techniques, participants learn to understand the relationship between stress and tension, which in turn enhances self-efficacy. Additionally, cognitive restructuring techniques such as identifying and challenging automatic thoughts, gathering supporting and opposing evidence, and conducting personal experiments (homework

assignments) increase awareness of how cognitive and emotional processes influence stress regulation and contribute to higher self-efficacy.

5. Suggestions and Limitations

However, the study had several limitations, including inability to fully control environmental and familial variables affecting participating couples, use of self-report instruments to measure internalized shame, marital disenchantment, and inclination toward divorce, time constraints for conducting MBCT sessions and data collection, and lack of a follow-up phase.

Based on these findings, the following recommendations are proposed:

Counseling and therapy centers should implement structured MBCT programs for couples dealing with infidelity.

Couples should participate in both individual and group counseling sessions to enhance their communication and support skills.

Couples should incorporate mindfulness techniques into their daily lives to manage conflicts and challenges with a more conscious and balanced approach.

Future research should explore the long-term effects of MBCT on couples experiencing infidelity, aiming to identify and develop more effective methods for improving psychological and marital well-being.

Future studies should employ experimental designs with greater control over environmental and familial variables affecting couples.

Qualitative research methods, such as in-depth interviews and direct observations, should be used to gain a deeper understanding of the real effects of these variables.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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