



## The Effect of Progressive Muscle Relaxation with Imagery-based Relaxation on the Mental Health and Maternal-Fetal Attachment in Women with a First Unwanted Pregnancy

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### Abstract

**Background:** The present study aims to investigate the effect of progressive muscle relaxation intervention with imagery-based relaxation technique on the mental health and maternal-fetal attachment in women with a first unwanted pregnancy.

**Methods:** From all the pregnant women referred to the clinics of Semnan city, 60 individuals were purposefully selected and randomly divided into two groups of experimental and control. The mothers of the experimental group received the corresponding intervention, while the control group was only provided with normal care. Before and after the intervention, the general health and maternal-fetal attachment questionnaires were filled by the individuals.

**Results:** The results of the multivariate analysis of covariance indicated that a relaxation intervention period can significantly improve the mental health and maternal-fetal attachment as well.

**Conclusions:** According to the present results, it can be concluded that the current intervention can be used as a low-cost and non-pharmacological method to improve the psychological issues and arrive at a higher maternal-fetal attachment during the pregnancy.

**Keywords:** Relaxation, Mental health, Attachment, Pregnancy.

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all of which point out the high prevalence (27.8%) of this event.<sup>3</sup> Studies have shown that women with unwanted pregnancies fail to make an emotional relationship and maternal-fetal attachment.<sup>4</sup> The initial relationship between mother and fetus before delivery is described as the maternal-fetal attachment. A mother who becomes attached to her fetus during pregnancy is ready to establish a pleasurable relationship with the newborn after delivery.<sup>5</sup> Attachment is a warm, intimate, and lasting relationship between mother and child that is satisfying for both and facilitates the mother-infant interaction. According to Bowlby's theory of attachment, attachment is created from the onset of pregnancy and gradually intensifies so that it reaches its peak in the third trimester, continues until after the post-delivery period, and plays an important role in the successful adaptation of the mother to the pregnancy.<sup>1</sup> The creation of the maternal-fetal attachment causes timely initiation and continuation of prenatal care, proper nutrition, sleep and exercise, the tendency to recognize the fetus during pregnancy, desired pregnancy outcome, and finally promote the health of mother and child. In the meantime, it plays an important role in accepting the parental identity, future relationship between mother and infant as well as the growth and evolution of the child.<sup>6</sup> Studies have reported that the maternal-fetal attachment in women with intentional pregnancy is higher compared to those with unwanted one<sup>5</sup> and this issue makes the need to find a solution and remedy for the latter group more important.

Furthermore, unwanted pregnancy not only increases the index of high-risk pregnancies and reduces the interval between births, but also increase the risk of maternal and neonatal mortality. This type of pregnancy also makes women vulnerable to stress and may cause them to experience higher levels of psychological problems.<sup>7</sup> It can be stated that the mental health of the pregnant woman has a great impact on fetal health and mental disorders during pregnancy causes schizophrenia, emotional disorders, and behavioral problems in the child's future.<sup>8</sup> The results of researches have indicated that women with an unwanted pregnancy have significantly less mental health than those with intentional one and their psychosis scores, morbid fear, physical complaints and anxiety are higher.<sup>7</sup> However, in most health care centers, therapists focus more on the physical health of the pregnant women than on mental health.

## Introduction

Although the motherhood process is one of the most enjoyable and evolving events in a woman's life and often brings great happiness to the parents, it can also lead to tensions and worries due to the related physical and psychological changes. Anxious events in the prenatal period not only affect the mental health of children during their childhood but are also associated with mental problems in adulthood. Many studies have indicated the relationship between high cortisol levels, which is itself influenced by maternal anxiety and stress, risks, injuries, mental disorders, and low neonatal growth.<sup>1</sup> However, unwanted pregnancies intensify the risk of pregnancy-induced problems. Unwanted pregnancies indicate cases where a person has no plan to have children in the future. According to available statistics, out of every 175 million annual pregnancies that occur in the world, 75 million are unwanted, of which 45 million lead to abortion.<sup>2</sup> In Iran, there are different statistics of unwanted pregnancies,

In the meantime, one of the non-pharmacological strategies used is relaxation intervention. Relaxation is a combination of cognitive-behavioral and psychological-physical interventions that makes a balance between the mental states and reduces the psychological stress through creating appropriate physical and mental responses.<sup>9</sup> This treatment approach benefits from two categories of techniques, including first-class techniques focused on the physiological responses (Jacobson's breathing exercises) that range from muscle exercises to the mental ones (progressive muscle relaxation) and various types of relaxation, such as meditation, starting with mental exercises and leading to the muscle relaxation (mental imagery-based relaxation).<sup>10</sup>

Numerous studies have been conducted on the effect of progressive muscle relaxation on stress, anxiety, and depression in pregnant women, the results of which illustrate a significant reduction in these mental disorders after the intervention period.<sup>11,12,7</sup> Also, some studies have investigated the influence of this intervention type on the gestational hypertension<sup>13</sup> and several others examined the effect of progressive muscle relaxation intervention along with music on the back pain and quality of life during the pregnancy.<sup>14</sup> However, to the best of the authors' knowledge, no study has been conducted on the examination of the simultaneous effects of progressive muscle and a mental imagery-based relaxation interventions on mental health and maternal-fetal attachment. Therefore, considering the above points and the importance of the critical period of pregnancy for women, especially those with unwanted pregnancies, the present research seeks to investigate whether a course of progressive muscle relaxation intervention together with mental imagery-based one during pregnancy can have a positive impact on the mental health and maternal-fetal attachment of the nulliparous individuals?! Upon the confirmation of the research hypothesis, this low-cost and non-invasive technique can be employed in clinics, hospitals, and medical centers to improve the mental health of pregnant women and yield greater attachment to the fetus.

## Materials and Methods

The present research population included all women with first unwanted pregnancies referred to the clinics of Semnan city. Knowing that the psychological distress in the third trimester of pregnancy is greater in comparison with the first and second ones, and the mother's anxiety and concern increase as the delivery approaches, women being in the last trimester of pregnancy were considered here.<sup>15</sup> In addition, since the intervention duration of the present study was 8 weeks, the length of the full gestational period varies between 38 and 40 weeks and the beginning of the third pregnancy trimester is from week 28, women within the range of 28-30 weeks of pregnancy were selected as the statistical sample. Reviewing the medical files of the participants and considering the inclusion criteria of the current study, 60 people were selected as the statistical sample and were randomly divided into the experimental and control groups.

The inclusion criteria included: mothers' age of 18-35 years, single pregnancy, no history of chronic diseases, no history of taking psychotropic drugs, alcohol and cigarettes, first pregnancy, unwanted pregnancy and no history of

infertility and abortion, having a minimum of secondary educations, no occurrence of stressful events in life during the last 6 months, no history of using relaxation techniques during the pregnancy before the intervention and low-risk pregnancy. Besides, the exclusion criteria included the occurrence of any adverse events during the study, the examinee's dissatisfaction with continuing to participate in the research, not performing relaxation exercises for at least one day a week, occurrence of obstetric problems, and prohibition of doing research by a gynecologist.<sup>13,11</sup>

Personal information form: mothers of both groups were given the personal information form to complete, including several items such as the mother's age, gestational age, income, parents' education, place of residence and occupation.<sup>13</sup>

General Health Questionnaire-28 (GHQ-28): the general health questionnaire was used in order to assess the mental health of pregnant women. This questionnaire which has been developed by Goldberg and Hillier (1979), is one of the most well-known screening tools for mental disorders. The 28-item form of this questionnaire has four options of 'Not at all', 'No more than usual', 'Rather more than usual', 'Much more than usual' scored on the Likert scale (0-1-2-3). The maximum examinee's score is 84 and the higher score indicates lower general health. This questionnaire includes four subscales, each of which contains 7 questions. The questions 1-7, 8-14, 15-21, and 22-28 are related to the somatic symptoms, anxiety, social dysfunction, and depression scales, respectively. The total general health score is obtained from the sum of the scores of the four subscales. The validity of this questionnaire has been investigated before in a study conducted by Noorbala et al. (2008) for a statistical population of over 15 years old.<sup>16</sup>

Maternal-Fetal Attachment Questionnaire (MFAQ): The Cranley's maternal-fetal attachment scale is a standard questionnaire for assessing MFA. This scale consists of 24 items in five domains, including "role taking", "differentiation of self from fetus", "interaction with fetus", "attributing characteristics to the fetus", and "giving of self". The items are scored based on a five-point Likert scale with responses including 'definitely yes', 'yes', 'uncertain', 'no' and 'definitely no'. Scoring is from 1 to 5 and item 22 is reverse scored. The total score obtained ranges from 24 to 120. Higher scores indicate a greater attachment. Since the number of items differs for each domain, the domains are compared by first making the scores obtained in each domain uniform. The internal consistency reliability of the scale was confirmed by its original designer ( $\alpha=0.85$ ).<sup>17</sup> In Iran, the validity and reliability of the scale were confirmed in a study by Abasi, Tafazoli, and Esmacili (2010), yielding a Cronbach's alpha coefficient of 80%.<sup>18</sup>

The present investigation was a clinical trial study including two groups of experimental and control with pre and post-test. This research has an ethics code number (IR.SSRC.REC.1399.087) from sports sciences research institute. The experimental group underwent 30-minute sessions of progressive muscle relaxation as well as mental imagery-based relaxation exercises twice a week for a total period of 8 weeks. In the first 20 minutes, for the physical relaxation purpose, the mother was placed in a comfortable

position and then started the exercises by entering concentration in the form of deep and slow abdominal breathing. This step involves contracting and then consciously releasing the muscles. Then, relaxation was done through mental imagery in the final 10 minutes. At this point, the mother was imagining a scene in which she felt safe, relieved of tension, and anxiety. Then, with appropriate music and the therapist's voice, a pleasant atmosphere was established being of interest to the patient.<sup>13</sup> The control group also engaged in daily activities without any training.

In order to statistically analyze the obtained raw data, the descriptive statistics of central tendency and dispersion measures were used. Also, chi-squared and multivariate analysis of covariance (MANCOVA) tests were employed in order to investigate the differences between the studied variables of the two groups and the pre-test measurements were considered as the covariate variables. Dividing the conventional level of 0.05 by the number of dependent variables (11 variables), the significance level was considered to be 0.004, which is called Bonferroni adjustment method and is used to reduce the type 1 error. The data analysis was performed with SPSS 20 software.

Before performing the MANCOVA test, the corresponding assumptions, namely, the normality of the scores associated

with the dependent variables, variance-covariance homogeneity, conventional correlation of the covariates with each other, and interaction of the covariate variables with the dependent variable were examined using Kolmogorov-Smirnov (KS), Box, Pearson's correlation coefficient and one-way ANOVA tests, respectively and all the mentioned assumptions were confirmed.

## Results

The demographic characteristics associated with the two groups indicated that there is no significant difference (Pvalue>0.05) between the mother's age (Pvalue=0.34, X<sup>2</sup>=17.66), mother's educations (Pvalue=0.95, X<sup>2</sup>=0.93), father's educations (Pvalue=1.00, X<sup>2</sup>=0.00), mother's job (Pvalue=0.60, Fisher's Exact=0.61), father's job (Pvalue=0.061, X<sup>2</sup>=5.61) and family's economic status (Pvalue=0.28, X<sup>2</sup>=2.50) of the studied groups. The mean and standard deviation of the dependent variables of the research corresponding to the experimental and control groups in the pre-test and post-test are listed in table 1.

To evaluate the effect of relaxation intervention on the general health and maternal-fetal attachment subscales, MANCOVA was used and the obtained results are presented in table 2.

**Table 1. The central tendency and dispersion measures of the studied variables associated with the experimental and control groups in the pre and post-test**

| Variable                             | Group        | Number | Pre-test<br>Mean±SD | Post-test<br>Mean±SD |
|--------------------------------------|--------------|--------|---------------------|----------------------|
| Somatic symptoms                     | Experimental | 30     | 10.0±36.92          | 8.1±20.03            |
|                                      | Control      | 30     | 10.0±30.79          | 9.1±16.14            |
| Anxiety                              | Experimental | 30     | 10.1±93.22          | 6.1±73.22            |
|                                      | Control      | 30     | 11.1±6.04           | 10.1±6.04            |
| Social dysfunction                   | Experimental | 30     | 11.1±16.20          | 8.1±66.15            |
|                                      | Control      | 30     | 10.1±53.07          | 9.1±26.28            |
| Depression                           | Experimental | 30     | 11.1±26.36          | 7.1±86.19            |
|                                      | Control      | 30     | 10.1±86.50          | 9.0±66.99            |
| Total general health                 | Experimental | 30     | 43.2±73.71          | 31.2±46.41           |
|                                      | Control      | 30     | 42.2±76.29          | 38.2±16.39           |
| Interaction with fetus               | Experimental | 30     | 16.1±26.14          | 22.1±33.82           |
|                                      | Control      | 30     | 16.1±66.12          | 18.1±36.49           |
| Attributing characteristics to fetus | Experimental | 30     | 19.1±3.42           | 19.1±46.81           |
|                                      | Control      | 30     | 19.1±23.59          | 18.1±43.40           |
| Giving of self                       | Experimental | 30     | 18.1±3.24           | 20.2±16.76           |
|                                      | Control      | 30     | 18.1±21.32          | 18.1±10.18           |
| Differentiation of self from fetus   | Experimental | 30     | 15.1±36.95          | 18.1±10.09           |
|                                      | Control      | 30     | 15.1±76.67          | 14.1±70.68           |
| Role taking                          | Experimental | 30     | 15.1±53.65          | 17.1±53.04           |
|                                      | Control      | 30     | 15.1±43.60          | 16.1±53.19           |
| Total maternal-fetal attachment      | Experimental | 30     | 84.4±23.95          | 97.4±60.04           |
|                                      | Control      | 30     | 83.5±93.04          | 86.3±13.72           |

**Table 2. Results of MANCOVA to investigate the effect of relaxation intervention on the general health and maternal-fetal attachment of pregnant women in experimental and control groups**

| Variable                  | Test               | Value | Hypothesis<br>df | Error<br>df | F      | Sig    | $\eta^2$ |
|---------------------------|--------------------|-------|------------------|-------------|--------|--------|----------|
| General health            | Pillai's trace     | 0.735 | 4                | 54          | 37.361 | 0.0001 | 0.735    |
|                           | Wilks' lambda      | 0.265 | 4                | 54          | 37.361 | 0.0001 | 0.735    |
|                           | Hotelling's Trace  | 2.768 | 4                | 54          | 37.361 | 0.0001 | 0.735    |
|                           | Roy's largest root | 2.768 | 4                | 54          | 37.361 | 0.0001 | 0.735    |
| Maternal-fetal attachment | Pillai's trace     | 0.771 | 5                | 53          | 35.778 | 0.0001 | 0.771    |
|                           | Wilks' lambda      | 0.229 | 5                | 53          | 35.778 | 0.0001 | 0.771    |
|                           | Hotelling's Trace  | 3.376 | 5                | 53          | 35.778 | 0.0001 | 0.771    |
|                           | Roy's largest root | 3.376 | 5                | 53          | 35.778 | 0.0001 | 0.771    |

As can be seen from table 2, the significance levels of all tests indicate that there is a significant difference between the general health of women in the experimental and control groups in terms of at least one of the subscales of general health ( $F=37.36$ ,  $Pvalue<0.0001$ ) as well as those of the maternal-fetal attachment ( $F=37.77$ ,  $Pvalue<0.0001$ ). Also, partial eta square ( $\eta^2$ ) is equal to 0.73, indicating that 73% of the general health differences between the two groups of pregnant women are due to the influence of the relaxation intervention. The corresponding value of the maternal-fetal attachment scale is ( $\eta^2=0.77$ ), which indicates that 77% of the differences between the maternal-fetal attachments associated with the two groups are due to the present intervention.

Therefore, to find out in which of the subscales of the two groups there is a significant difference, one-way ANOVA was performed in the context of MANCOVA, the results of which are presented in table 3.

According to the pre-test data listed in table 3, there is a significant difference between the two groups of pregnant women in terms of all general health subscales except social dysfunction. Also, regarding the maternal-fetal attachment, only the subscale of attribution of specific characteristics to the fetus did not differ significantly between the two groups and other variables were significantly better in the experimental group than the control one ( $Pvalue\leq 0.004$ ).

**Table 3. Results of one-way ANOVA within the context of MANCOVA on the post-test of general health and maternal-fetal attachment subscales in pregnant women of the experimental and control groups**

| Variable                             | Source of changes | Sum of squares | df | Mean squares | F      | Sig      | $\eta^2$ |
|--------------------------------------|-------------------|----------------|----|--------------|--------|----------|----------|
| Somatic symptoms                     | Pre-test          | 0.329          | 1  | 0.329        | 0.27   | 0.60     | 0.005    |
|                                      | Group             | 12.74          | 1  | 12.74        | 10.58  | 0.002**  | 0.157    |
|                                      | Error             | 68.63          | 57 | 1.20         |        |          |          |
| Anxiety                              | Pre-test          | 0.181          | 1  | 0.181        | 0.13   | 0.71     | 0.002    |
|                                      | Group             | 162.82         | 1  | 162.82       | 122.83 | 0.0001** | 0.683    |
|                                      | Error             | 75.55          | 57 | 1.32         |        |          |          |
| Social dysfunction                   | Pre-test          | 0.175          | 1  | 0.175        | 0.11   | 0.73     | 0.002    |
|                                      | Group             | 5.57           | 1  | 5.57         | 3.68   | 0.060    | 0.061    |
|                                      | Error             | 86.35          | 57 | 1.51         |        |          |          |
| Depression                           | Pre-test          | 2.44           | 1  | 2.44         | 2.05   | 0.15     | 0.035    |
|                                      | Group             | 50.99          | 1  | 50.99        | 42.93  | 0.0001** | 0.430    |
|                                      | Error             | 67.69          | 1  | 1.18         |        |          |          |
| Total general health                 | Pre-test          | 3.36           | 1  | 3.36         | 0.57   | 0.45     | 0.010    |
|                                      | Group             | 667.26         | 1  | 667.26       | 114.46 | 0.0001** | 0.668    |
|                                      | Error             | 332.27         | 57 | 5.82         |        |          |          |
| Interaction with fetus               | Pre-test          | 5.18           | 1  | 5.18         | 1.88   | 0.175    | 0.32     |
|                                      | Group             | 241.09         | 1  | 241.09       | 87.83  | 0.0001** | 0.606    |
|                                      | Error             | 156.44         | 57 | 2.74         |        |          |          |
| Attributing characteristics to fetus | Pre-test          | 2.53           | 1  | 2.53         | 0.96   | 0.331    | 0.17     |
|                                      | Group             | 17.39          | 1  | 17.39        | 6.59   | 0.013    | 0.001    |
|                                      | Error             | 150.29         | 57 | 2.63         |        |          |          |
| Giving of self                       | Pre-test          | 0.96           | 1  | 0.96         | 0.20   | 0.649    | 0.004    |
|                                      | Group             | 61.11          | 1  | 61.11        | 13.30  | 0.0001** | 0.189    |
|                                      | Error             | 261.90         | 57 | 4.59         |        |          |          |
| Differentiation of self from fetus   | Pre-test          | 2.45           | 1  | 2.45         | 1.22   | 0.274    | 0.21     |
|                                      | Group             | 175.84         | 1  | 175.84       | 87.50  | 0.0001** | 0.606    |
|                                      | Error             | 114.54         | 57 | 2.01         |        |          |          |
| Role taking                          | Pre-test          | 0.41           | 1  | 0.41         | 0.32   | 0.57     | 0.006    |
|                                      | Group             | 15.39          | 1  | 15.39        | 12.09  | 0.001**  | 0.175    |
|                                      | Error             | 72.51          | 57 | 1.27         |        |          |          |
| Total maternal-fetal attachment      | Pre-test          | 26.01          | 1  | 26.01        | 1.74   | 0.190    | 0.030    |
|                                      | Group             | 1998.01        | 1  | 1998.01      | 133.88 | 0.0001** | 0.701    |
|                                      | Error             | 850.65         | 57 | 14.92        |        |          |          |

\*\* Significance level:  $Pvalue \leq 0.004$

## Discussion

The current study aimed to investigate the effect of a progressive muscle relaxation intervention with imagery-based relaxation exercises on the mental health and maternal-fetal attachment in women with first unwanted pregnancy. The results of the first part of the study illustrated that the mental health of mothers in the experimental group significantly improves after 8 weeks of intervention compared to the examinees of the control one. As mentioned earlier, pregnancy is a period that causes many physiological and psychological changes in women and unwanted pregnancies further intensifies these issues. Therefore, employing a method capable

of overcoming the stress is of high importance. Studies on the effect of this type of intervention have been conducted mostly on the mental states of athletes. Explaining the effect of mental relaxation on the athletes' anxiety, it can be stated that the imagery-based relaxation by consciously adjusting and changing the contents of mental images can reduce the negative thoughts which lead to the anxiety.<sup>19,20</sup> Also, the implementation of progressive muscle relaxation reduces the cortisol secretion level through reducing physical anxiety and sympathetic activity. Muscle relaxation also reduces the oxygen consumption, heart rate, respiration rate and blood lactate through a regular set of physiological changes, indicating a reduction in one's physical anxiety symptoms.<sup>19</sup>

Aghebati, et al. (2010) expressed that muscle relaxation leads to peace of mind, as there will be no emotional state when the organs are completely relaxed. In other words, relaxation prevents the creation of negative thoughts and emotions such as anxiety and stress and neutralizes the impacts of the increased muscle tension on the body. This method also makes a balance between the posterior and anterior hypothalamus, thus preventing the adverse effects of the stress and anxiety.<sup>21</sup> Researches have examined the effects of progressive muscle relaxation and imagery-based relaxation exercises on various mental states of the pregnant women. For example, the effect of this method has been explored on the back pain and quality of life during pregnancy,<sup>14</sup> gestational anxiety,<sup>22</sup> quality of life and anxiety associated with the ectopic pregnancy,<sup>23</sup> stress, anxiety and depression in pregnant women.<sup>11,24,12</sup> However, few studies have examined the effect of this intervention type on the mental health of the pregnant women. In this regard, Sadeghi et al. (2015) reported that the mental health of pregnant women after progressive muscle relaxation intervention is significantly better than those in the control group.<sup>25</sup> Their results are consistent with the achievements of the first part of the present study. Due to the scarce number of studies in this field, it is not possible to compare the results of the different studies. The explanation that this treatment can lead to the observed benefits can be justified by various reasons. In the autonomic nervous system, tension and relaxation involve the triggering of sympathetic and parasympathetic nerve fibers, respectively. Since muscle relaxation is the most important factor in this type of intervention, the parasympathetic system plays a major role during and after the intervention, thereby reducing the heart rate, respiration and blood pressure. Therefore, deep physical relaxation together with the parasympathetic dominance reduces the anxiety.<sup>14</sup> The researchers also declared that the relaxation exercises are a class of appropriate non-pharmacological interventions to rid the body and soul of the stressors, an effective treatment for depression, anxiety, stress and a way to arrive at deep physical and psychological relaxation.<sup>23</sup> Affecting the hypothalamic pituitary adrenal (HPA) axis, these exercises are one of the standard behavioral therapies in improving the mental states during pregnancy.<sup>26</sup>

Physiological hypotheses also justify the role of physical activity on the mental health based on the two major factors of monoamines and endorphins. The first hypothesis is supported by the fact that physical activity increases the neurotransmitters (monoamines) present in the synapses, which probably play the same role as the antidepressants. The second hypothesis is expressed based on the fact that physical activity causes the release of endorphins, especially beta-endorphins, whose inhibitory role on the central nervous system causes a feeling of relaxation and improves the mood after exercising.<sup>27,28</sup>

The results of the second part of the present investigation indicated an increase in the maternal-fetal attachment of the women in the experimental group compared to the control one. Examining the influences of counseling training and attachment behaviors on the maternal-fetal attachment in women with first pregnancy and gestational age of 30-32 weeks, Parsa et al. (2016) observed a significant increase in this parameter in the experimental group compared to the control

one.<sup>29</sup> Also, Kordi et al. (2016) found a positive and significant relationship between the mindfulness of pregnant women and the maternal-fetal attachment.<sup>30</sup> Also, the results of the studies conducted by Akbarzadeh et al. (2011) and Abasi et al. (2009) on teaching the maternal-fetal attachment behaviors in pregnant women indicated an increase in the attachment level of the experimental group.<sup>18,31</sup> Toosi et al. (2014) investigated the effect of training attachment behaviors with relaxation on the maternal attachment to the fetus and infant in women with first pregnancy. They concluded that this intervention, which included four 90-minute training sessions, improves the mother-fetus and mother-infant attachments.<sup>32</sup>

Applying two weeks of imagery and twice a day on women with unwanted pregnancies, Kordi et al. (2016) concluded that the maternal-fetal attachment significantly increases compared to that of the mothers in the control group, the results of which are consistent with the present findings.<sup>30</sup> However, another study which has been conducted by Kim (1990) on American couples illustrated that the imagery program significantly increases the paternal-fetal attachment, but no significant difference was observed in the maternal-fetal attachment scores. These results were not consistent with the present achievements. This discrepancy is mainly because has considered the primiparous and polygamous women, being different from other relevant studies in this field.<sup>33</sup>

According to Bowlby's theory, being attached to a person increases a human being's psychological security. Also, according to Solchany, psychological stresses can be overcome when the focus of attention is shifted and diverted from daily activities and issues, and thinking about the fetus and performing related behaviors may provide such conditions. Hence, performing such exercises, in addition to diverting one's attention from worrying issues (unwanted pregnancy and its consequences) and focusing on the fetus, is itself a kind of meditation, the repetition of which during the intervention period leads to the cessation of unwanted thoughts and reduces the activity of the autonomic nervous system as well.<sup>34</sup>

One of the limitations of the present study was that despite attempting to evaluate and control the demographic characteristics and socio-economic status of the examinees, it was not possible for the researcher to absolutely control their psychological conditions during the intervention.

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## Conflict of Interest

The authors declare that they have no conflict of interest.

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