http://dx.doi.org/10.61186/pcnm.13.3.1

**Preventive Care in Nursing and Midwifery Journal**
**2023; 13(3): 1-8**

# *Hope and Happiness in Infertile Women Undergoing Assisted Reproductive Therapy (ART): The Effect of Positive Psychology Interventions (PPIs)*

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**Received**: 6 Jun 2023
**Accepted**: 12 Jun 2023
**Published:** 2 Jul 2023

## Abstract

***Background:*** Infertility can have many negative psycho-social consequences including depression, anxiety, and feelings of shame in couples, especially women.
***Objectives:*** This study aimed to explore the effectiveness of positive psychology interventions (PPIs) in increasing hope and happiness in women undergoing assisted reproductive therapy (ART).
***Methods:*** This quasi-experimental study was conducted using a pre-test and post-test design with a control group. The research population consisted of all infertile women who had been admitted to Omid Royan Infertility Center in Arak, Iran, in 2022. The participants were a sample of 40 infertile women undergoing ART who were selected through convenience sampling and then they were placed into two intervention and control groups (each group with 20 members) through permuted block randomization. Afterward, the participants in the intervention group received PPIs for 10 sessions. However, the controls received no intervention. The data were collected through the Oxford Happiness Questionnaire (OHQ) and Adult Hope Scale (AHS). Finally, the collected data were analyzed through one-way ANCOVA with SPSS-26 software.
***Results*:** The data showed a statistically significant difference between the mean scores of the variables of hope ($p<0.001$) and happiness ($p<0.001$) for the participants of the two groups in the post-test stage, while this difference was not significant in the control group ($p>0.05$).
***Conclusion:*** Psycho-social interventions can be implemented as a part of infertility treatments along with medical treatments and as complementary treatments for infertile couples in regular meetings. Thus, health and medical professionals can provide their supportive consultations in time to reduce the negative psycho-social effects of infertility.

***Keywords: hope, happiness, infertility, assisted reproductive therapy (ART), positive psychology interventions (PPIs)***

## Introduction

Infertility can lead to a fundamental problem in couples and endanger the mental health of people. Infertility is defined as the absence of pregnancy after one year of sexual intercourse without using contraceptive methods. According to the World Health Organization (WHO), around 80 million couples around the world are suffering from infertility [1]. Barbosa et al. (2020) also stated thatthe number of infertile couples will reach one billion two hundred million people by 2030 [2].
The prevalence of infertility in Iran ranges from 10.3% to 24.9% [3]. The high prevalence of infertility in Iranian women under the age of 35 is

a warning for health and treatment policymakers [4]. The average infertility rate in Iran is 2.13%, primary infertility is 2.5%, and secondary infertility is 2.3%, and this rate is increasing with adverse effects on infertile couples, especially women. Most of the people suffering from infertility live in developing countries and in all these countries, infertility is considered a crisis threatening the stability of individuals, relationships, and the community followed by emotional problems [5].

The relationship between psychological stress and infertility has been addressed by pregnancy and mental health professionals for years. Infertile women report high levels of anxiety and depression. Thus, infertility causes stress [6]. Moreover, infertile women have irrational beliefs that can harm their marital relationship [7].

The importance of the maternal role has turned infertility into a serious threat to women's lives and their quality of life. The concept of quality of life involves constructs such as happiness, physical and psychological health, hope, and satisfaction with life; it is usually explicitly or implicitly in conflict with people's lifespan, and it can be satisfactory, pleasant, or unsatisfactory [8].

The application of psychological interventions, including cognitive-behavioral therapy (CBT), can help both in reducing psychological distress and improving clinical pregnancy rates [9].

The two psychological constructs of hope and happiness can enhance the quality of life in infertile women. Although psychological and emotional problems may directly contribute to infertility, they may also be serious side effects of infertility. Thus, addressing the psychological needs of infertile couples is a part of infertility treatment. Stress, despair, and feeling ashamed of infertility can be painful and destructive for the psychological health of couples [10].

Hope in life can lead to purposefulness and a sense of control over life decisions. Hope helps clients to [1] define clearer goals for themselves, [2] create new paths to reach their goals, and [3] reproduce the psychological energy necessary to pursue long-term goals. Hope lies with a person's understanding of the two components of agency and pathways that contribute to people's goal setting [11].

Besides, happiness, as one of the personality characteristics of a person, has emotional, cognitive, and social consequences. Happy people are those who process and interpret information in a way that leads to their happiness [12].

Previous studies have found many psychological interventions to be effective in improving women's psychological health. For instance, they have confirmed the effectiveness of cognitive-behavioral therapy in reducing psychological distress [9], the effectiveness of e-cognitive group therapy with emotional disclosure in improving the mental health of infertile women [13], the effectiveness of group logo therapy in reducing psychological distress in infertile women [14], and the effectiveness of positive psychology in increasing mental endurance, self-compassion, and resilience of infertile women [15].

Furthermore, positive psychology interventions (PPIs) as innovative approaches can be used with other psychological techniques to reduce psychological and emotional problems and their side effects in infertile women. Positive psychology was introduced by Seligman in the late 1990s and at the turn of the 21st century. One of the main goals of this approach is to emphasize the positive aspects of an individual's personality instead of paying attention to the psychopathological aspects of the person. Instead of paying too much attention to disabilities, positive psychology focuses on human abilities such as happiness, enjoyment, problem-solving ability, and optimism. The goal of this approach is to develop and create methods by which people can feel more pleasure and happiness, express their altruism, and play a more prominent role in creating family, professional, and social environments [16,17]. Positive psychology is an approach that emphasizes increasing human abilities and virtues and empowers individuals and communities to achieve success [17,18]. In practice, positive psychotherapy has been developed based on traditional scientific methods for understanding and psychopathology of behavior [19-21].

Having children is one of the basic needs of mankind, and being deprived of it puts women who want to become mothers under a lot of stress and disrupts their quality of life [22]. Thus, it is essential to investigate interventions that can reduce the psychological distress caused by infertility and improve the quality of life of infertile women. In general, psychosocial

interventions have been able to improve psychological outcomes, marital relationships, and pregnancy rates among infertile couples [23]. Educational and preventive psychological interventions can be useful in reducing the effects of psychological and emotional distress in infertile women. The use of positive psychology interventions (PPIs) can be effective in improving optimism, hope, and happiness in women. In addition, positive psychology interventions (PPIs) could be used by the midwifes. Midwifes have important role in emotional distress management of the infertile couples and helping them to accomplishment the assisted reproductive therapy (ART). Thus, this study sought to examine the effectiveness of positive psychology interventions (PPIs) on the hope and happiness of women undergoing assisted reproductive therapy (ART).

## Methods

This quasi-experimental study was conducted using a pre-test and post-test design with a control group. The research population consisted of all infertile women undergoing assisted reproductive therapy (ART) at Omid Royan Infertility Center affiliated with Arak University of Medical Sciences, Iran, in 2022. The participants were selected through convenience and voluntary sampling. To this end, the Oxford Happiness Questionnaire (OHQ) and Adult Hope Scale (AHS) were administered to a total of 86 women, and 40 women with scores lower than the average cut-off score were selected as the participants and were randomly placed into two intervention and control groups through permuted block randomization. The sample size was estimated using the following values based on previous reserches [13,14]: α=0.05; β=0.02; $S_1^2 = 7.6$; $S_2^2 = 7.2$; $d^2 = 6$

The criteria for enrolment in the study were: (1) Women who had infertility problems diagnosed by a gynecologist and Royan Institute, (2) having at least a middle school degree, and (3) the willingness to attend the intervention. The non-inclusion criteria included (1) suffering from acute psychiatric diseases as diagnosed by a psychiatrist at the center, and (2) attending other psychology courses or programs at the same time. The exclusion criteria were (1) not attending more than 3 sessions, (2) not completing the questionnaires.

### Measurement

The data in this study were collected through the following instruments:

Demographic Questionnaire: This questionnaire was developed to examine Women's demographic information, such as age, education, and Infertility period.

**Adult Hope Scale (AHS):** This 12-item instrument was developed by Snyder et al. (2007) to evaluate the life expectancy of people aged 15 years old and above. This scale was developed based on Snyder's theory of hope. This theory assumes hope can create multiple pathways to goals [24]. The scale measures two subscales of agency and pathways. Each item is scored on a five-point Likert scale (5=strongly agree, 4=agree, 3= undecided, 2=disagree, and 1=strongly disagree). A score of 4-8 indicates no to very low hope, a score of 9-12 indicates slightly hopeful, a score of 13-16 indicates moderately hopeful, and a score of 17-24 indicates highly hopeful. In the present study, Cronbach's alpha coefficient of the scale was estimated as 0.87.

**Oxford Happiness Questionnaire (OHQ):** This 29-item questionnaire was developed by Hills and Argyle (2002). The items in the questionnaire are scored on a six-point Likert scale (1= strongly disagree, 2= moderately disagree, 3= slightly disagree, 4= slightly agree, 5=moderately agree, and 6= strongly agree). The scores may range from 9 to 45, with higher scores indicating greater happiness [25]. In the present study, the reliability of the questionnaire was confirmed with Cronbach's alpha coefficient of 0.91.

### Procedure

The protocol for this study was approved with the code of ethics IR.IAU.ARAK.REC.1400.037 by the Islamic Azad University, Arak Branch. After obtaining the code of ethics from the university, the infertile women visiting the Omid Royan Jihad Infertility Center affiliated with Arak University of Medical Sciences were invited to participate in the study. Then, a total of 40 infertile women who met the inclusion criteria were selected and randomly placed into two intervention and control groups via permuted block randomization. Afterward, the two questionnaires were administered to the participants in both groups to collect the pre-test data. Moreover, positive psychology interventions (PPIs) were conducted for the participants in the

intervention group for 10 sessions, each lasting 90 minutes. However, the participants in the control group did not receive any intervention. After the end of the 10-week intervention program, the Adult Hope Scale (AHS) and Oxford Happiness Questionnaire (OHQ) were re-administered to the participants in both groups as the post-test.

The positive psychology interventions (PPIs) were conducted every week on Wednesdays from 10 to 11:30 in the Omid Royan Infertility Center located in Arak, by a Ph.D. candidate in psychology under the supervision of a gynecologist working in the same center. The content of the intervention was developed based on psychological treatment programs [20,21].

***Table 1: The Content of Positive Psychology Interventions (PPIs)***

| Sessions | Focus | Goals and content |
|---|---|---|
| **1** | What is positive psychology? | Getting familiar with the group members, introducing the intervention sessions, self-image, and positive psychology |
| **2** | Positive experiences | Discussing the members' strengths and underlying reasons |
| **3** | Self-doubt about connection, competence, and choice | Emphasizing individual abilities, communication with oneself and others, and the value of friendly and social behavior |
| **4** | Forgiveness | Discussing forgiveness and its process, writing a forgiveness letter, and providing instructions for writing a forgiveness letter |
| **5** | Appreciation message | Ways of expressing appreciation and gratitude and practicing writing thank you letters to ourselves and those we love |
| **6** | Optimism | Discussing the concept of optimism and its benefits, providing homework on the concept of the locus of control, providing an example ofattributional styles |
| **7** | Hope and goal setting | Discussing the importance of having hope in life, helping members to divide life into positive and negative aspects, assigning homework to members to determine goals for each area of life (goal setting), helping the members to identify obstacles to achieving goals and how to overcome obstacles |
| **8** | Self-esteem, self-worth, and self-efficiency | Providing strategies to improve self-esteem, self-efficacy, and positive coping strategies (such as problem-solving, social support, reframing, and skill acquisition) with a focus on the members' strengths and weaknesses |
| **9** | Meaning of life | The benefits of having meaning in life, the role of goals in the meaningfulness of life, encouraging the members to find meaning in life |
| **10** | Courage, justice, humanity, temperance, transcendence, and wisdom | Reviewing the core concepts of positive psychology |

To comply with the ethical protocols in this study and protect the participants' rights, some instructions were provided to the participants about the objectives of the study and the procedures taken to conduct it. The participants were also told that their attendance in the study would be voluntary and they could leave it if they wished. They were also assured that the personal information collected from them would remain confidential and that their data would be published anonymously. After signing a written consent form, the participants completed the items in the self-report instruments before and after the intervention (in the pre-test and post-test stages). At the end of the study, the control group attended 6 intervention sessions. The collected data were analyzed using Chi-squared test and one-way analysis of covariance (ANCOVA) in SPSS-25 software.

## Results

Table 2 presents the participants' demographic data:

***Table 2: The Participants' Demographic Characteristics***

| Variable | Categories | Number (%) | | |
|---|---|---|---|---|
| | | Control | Intervention | *P–value |
| Age (year) | 35-37 | 8 (40) | 7 (35) | P=0.753 |
| | 38-40 | 10 (50) | 11 (55) | |
| | 41-43 | 2 (10) | 2 (10) | |
| Education | Diploma | 7 (35) | 6 (30) | P=0.557 |
| | Bachelor's | 11 (55) | 10 (50) | |
| | Master's | 2 (10) | 4 (20) | |
| Infertility period (year) | 2-4 | 8 (40) | 9 (45) | P=0.467 |
| | 5-7 | 12 (60) | 11 (55) | |

***Chi-squared test**

Table 3 shows the descriptive statistics for the dependent variables, hope and happiness, for the participants in the two intervention and control groups on the pre-test and post-test.

***Table 3: The Descriptive Statistics for the Research Variables***

| Dependent variables | N | Groups | Pretest | | Posttest | |
|---|---|---|---|---|---|---|
| | | | Mean | Std. Deviation | Mean | Std. Deviation |
| Hope | 20 | Intervention | 12.71 | 5.14 | 19.82 | 4.12 |
| | 20 | Control | 13.02 | 2.14 | 12.59 | 2.08 |
| Happiness | 20 | Intervention | 20.35 | 3.14 | 28.20 | 3.92 |
| | 20 | Control | 21.02 | 3.02 | 22.08 | 2.98 |

One-way analysis of covariance (ANCOVA) was runto compare the mean scores of hope between the two groups. The assumptions to run ANCOVA were established using Levene'sand Box's M tests (p>0.05). Table 4 shows the results of one-way ANCOVA for group effects on hope in infertile women.

***Table 4: The Results of Univar ate ANCOVA for the Group Effects on Hope***

| Variable | SS | df | MS | F | P* | Eta |
|---|---|---|---|---|---|---|
| Pretest | 202.625 | 1 | 202.625 | 11.209 | 0.001 | 0.129 |
| Group effect | 164.625 | 1 | 164.625 | 12.669 | 0.001 | 0.167 |
| Error | 80.150 | 38 | 19.225 | | | |

**df: degree of freedom; SS: Sum of squares; MS: Mean of squares; *P<0.001**

The data in Table 4 confirm a significant difference in terms of hope between the infertile women in the intervention and control groups (F=11.209; df=38 and 1; P<0.05). Accordingly, the mean scores of hope for the participants in the intervention group were significantly higher than the corresponding values for the participants in the control group after the intervention. Moreover, the group variable explains 12.9% of the variances in hope.

Table 5 presents the results of one-way ANCOVA for group effects on happiness in infertile women:

***Table 5: The Results of Univar ate ANCOVA for the Group Effects on Happiness***

| Variable | SS | df | MS | F | P* | Eta |
|---|---|---|---|---|---|---|
| Group effect | 118.900 | 1 | 118.900 | 0.026 | 0.026 | 0.137 |
| Error | 66.672 | 38 | - | - | - | - |

**df: degree of freedom; SS: Sum of squares; MS: Mean of squares; *P<0.001**

As can be seen in the table above, there was a significant difference in terms of happiness between the infertile women in the intervention and control groups (F=11.209; df=38 and 1; P<0.05). Accordingly, the participants in the intervention group reported a significantly higher

level of happiness compared to the participants in the control group after the intervention. In addition, the group variable explains 13.7% of the variances in happiness

## Discussion

This study examined the effectiveness of positive psychology interventions (PPIs) in hope and feeling of happiness in infertile women undergoing assisted reproductive therapy (ART). The results showed that the women who attended 10 sessions of positive psychology interventions (PPIs) reported significantly higher levels of hope and happiness compared to the women in the control group who did not receive any intervention. Likewise, Yazdani et al. reported that counseling-supportive interventions could reduce the level of stress perceived by infertile women [26]. Moreover, another study showed that the positive psychology intervention significantly helped to improve mental endurance, self-compassion, and resilience in infertile women [15]. A study examined the effectiveness of the expressive writing intervention (EWI) in reducing distress and improving pregnancy rates for couples undergoing ART. The results suggested that emotional expression in writing and performing tasks focusing on emotional disclosure about infertility and psychological problems caused by it could reduce infertility-related depression, anxiety, and distress in couples [27]. Moreover, psychological interventions for Korean women undergoing in vitro fertilization (IVF) could help improve intimacy and sexual satisfaction after four weeks [28]. Accordingly, we can argue that the first major reason for the effectiveness of positive psychology interventions during 10 weeks in increasing the hope and happiness in infertile women undergoing ART is the nature of positive psychology interventions themselves. Positive psychology interventions focus on acquiring skills and performing exercises that lead to enhancing positive feelings, behaviors, cognitions, and finally well-being in people [16-18]. Such interventions also teach people to strengthen their courage and appreciate what they have. Moreover, focusing on one's strengths, recording one's experiences, being grateful, showing gratitude, and developing skills to increase positivity can help people to recognize optimism and happiness and set new goals for their lives [29].

In contrast, intheir most recent study on the effectiveness of psychosocial therapies, Kremer et al.concluded that these therapies do not reduce anxiety and pregnancy rates in women undergoing ART but can reduce their depression. This finding is valuable since psycho-social interventions can be used at least to reduce depression in women [30]. It seems that the application of counseling, support, and psychological interventions can reduce the psychological effects of infertility during ART. Accordingly, Smith et al. revealed that conducting positive psychology interventions, even online, can lead to an increase in students' happiness, health, and well-being [31].

The second argument in support of positive psychology interventions is the compatibility of these interventions with the cultural norms of non-western countries. For example, Hendriks et al. concluded that positive psychology interventions focus on promoting well-being skills. Although these interventions are very diverse and have been developed based on the culture of western countries, they can be merged into many non-western cultures due to their focus on optimism, gratitude, and self-respect. Such interventions are also effective for individuals or groups of clients [32].

Overall, previous studies have confirmed the effectiveness of positive psychology interventions in increasing well-being through the creation of pathways, strengths in life, and quality of life, and reducing depression, anxiety, and stress [33].

The sample in this study was limited to women undergoing ARTatOmid Royan Infertility Center in Arak. Besides, the participants were selected through convenience sampling.It was not also possible to conduct a follow-up phase to determine the retention effects of the intervention on happiness and hope in infertile women due to the restrictions in the fertility center and the participants' psychological well-being.

Following the insights from this study, positive psychological interventions need to be carried out in infertility centers before starting infertility treatment. Moreover, such interventions can be incorporated into monthly visits of midwives and mental health specialists in the form of short-term sessions in the training and therapy programs for

infertile couples to provide timely support and counseling to couples.

## Conclusion

The findings of this study revealed that positive psychological interventions could improve hope and happiness in infertile women undergoing assisted reproductive therapy (ART). Thus, reproductive health professionals and counselors can use positive interventions to reduce the effects of psychological distress in infertile women undergoing ART.

## Acknowledgments

The authors would like to appreciate managers and staff of the Omid Royan Infertility Center in Arak and all participants in the study. This article reports the results of a Ph.D. thesis by the first author in the field of Counseling at the Islamic Azad University, Khomein Branch. The thesis was registered in Iran National Committee for ethics in Biomedical Research with code of ethics IR.IAU.ARAK.REC.1400.037.

## Conflict of interest

The authors reported no conflict of interest.

## Funding

This research project was funded by Islamic Azad University, Khomein branch.

## Authors' contributions

All authors equally contributed to preparing this article.

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