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## Effects of Nursing Care Based on Watson's Theory of Human Caring on Anxiety, Distress, And Coping, When Infertility Treatment Fails: A Randomized Controlled Trial

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### ABSTRACT

**Introduction:** The failure of infertility treatment leads to individual, familial, and social problems. The objective of this study was to evaluate the effectiveness of the nursing care program based on Watson's "Theory of Human Caring" on anxiety and distress caused by coping when the treatment fails.

**Methods:** This study randomized controlled trial study was conducted from April to November 2012, with 86 Turkish women with infertility (intervention group: 45, control group: 41). Follow-up of 32 infertile women, who failed infertility treatment from intervention group, and 35 infertile women, who failed infertility treatment from control group, continued for another four weeks. Data were collected through Spiel Berger's State/Trait Anxiety Inventory, Distress Scale, and Ways of Coping Questionnaire. The analyses of data were conducted using SPSS ver 13.

**Results:** The intervention and control groups significantly differed in terms of anxiety, distress, and coping levels. The intervention group's mean anxiety score decreased by thirteen points and distress by fourteen points (in a positive direction). The intervention group's mean positive coping style score increased. Whereas a negative increase was observed in the control group's values depending on the failure of the treatment.

**Conclusion:** Watson's theory of human caring is recommended as a guide to nursing patients with infertility treatment to decrease levels of anxiety and distress, and to increase the positive coping style among infertile women.

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## Introduction

Infertility affects 10%-15% of couples.<sup>1</sup> In Turkey, statistics indicate that 9% of all married women have never given birth, and 1 to 1.5 million couples are infertile.<sup>2</sup>

Infertility is a case of unexpected loss for the women, their husbands, and their families. This situation requires adapting oneself to a life without children and coping with difficulties.<sup>3</sup> To avoid this stress and life crisis, individuals start searching for treatment alternatives, and most of the time, Assisted Reproductive Technology (ART) is thought to be the solution. When they first start the treatment, couples expect the treatment to be successful and hope they will become pregnant.<sup>4</sup> In studies carried out with infertile women, they reported that the most upsetting

situation for them was the failure of the treatment.<sup>5</sup>

Anxiety is an unpleasant, fear-like feeling, and experience of worry or concern usually accompanied by various physiological symptoms that everyone has experienced in certain periods of their lives.<sup>6</sup>

It has been pointed out that based on the influence of infertility, anxiety increases in the process of infertility treatment<sup>7</sup> and that failure of treatment increased the related influence as well.<sup>8-11</sup> Some researchers demonstrated that anxiety did not have any significant influence on the success of IVF treatment.<sup>12</sup> Some other researchers, however, reported that women's levels of anxiety had significant influence on the success of In Vitro Fertilization (IVF) treatment.<sup>13</sup>

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Distress is defined as an unpleasant situation that occurs when an individual is confronted with expectations above their own characteristics and in which the individual perceives environmental stimuli as threats within the process of an interaction between themselves and the environment.

Coping with stress refers to an individual's resistance to a case they consider to be a stressor.<sup>14</sup> Gourounti *et al.*, argue that the increasing level of anxiety and infertility distress during treatment has a negative influence on pregnancy rates.<sup>15</sup> It has been reported that anxiety increases in the infertility treatment process<sup>5</sup> and decreases with the use of effective coping methods.<sup>16</sup> According to Pasch, the most important point to be taken into account to decrease anxiety in the infertility treatment process and in case of failure of the treatment is not only to prepare patients for the infertility treatment process and for the possible failure of the treatment, but also to help them cope with this effectively.<sup>8</sup> According to relevant literature, women whose infertility treatment fails experience more problems in the rest of their lives; however, the follow-ups and nursing care for these women are not continued; that is considered to be a gap in the medical field. Infertile women need professional help and support, both in the treatment process and in the case of treatment failure.<sup>17</sup>

If the treatment fails after all the related difficult processes, or if pregnancy does not occur, how will these women reform their lives? Will infertile women be able to cope with such negative feelings as loss and hopelessness? Due to all these uncertainties and questions that come to mind, the treatment on women is ceased for some time or forever.

The starting point for the present study was the need for continuing the nursing care of women whose infertility treatment results in failure. When the ART for the infertile women resulted in failure, maintaining the care in cases of lack of pregnancy requires nursing knowledge and practices. To achieve this, it

has been suggested that theories or models specific to nursing should be used as a guide.<sup>18</sup>

In the application process for the study, the difficulties and obstacles likely to be encountered in relation to evaluating the infertile women, focusing on their problems, and providing these women with holistic care could be dealt with the use of theories already developed. Infertile women experience several traumas in both physical and emotional aspects of their treatment processes. In addition, bear they do not bear a child, they feel social pressure. The nursing care approaches applied to these women are mostly treatment based.

Jean Watson's human care theory aims at moving away from treatment-centeredness and focuses on "caring".<sup>19</sup> The theory focuses on both human and nursing paradigms.<sup>18</sup> It asserts that a human being cannot be healed like an object to be repaired. The conceptual elements of the Watson's theory include the *caritas* process, the transpersonal caring relationship, caring moments and caring occasions, and caring-healing modalities.<sup>19</sup> Various studies have established that the theory of human caring can make nursing care more efficient and aware, and improve care outcomes.<sup>20</sup>

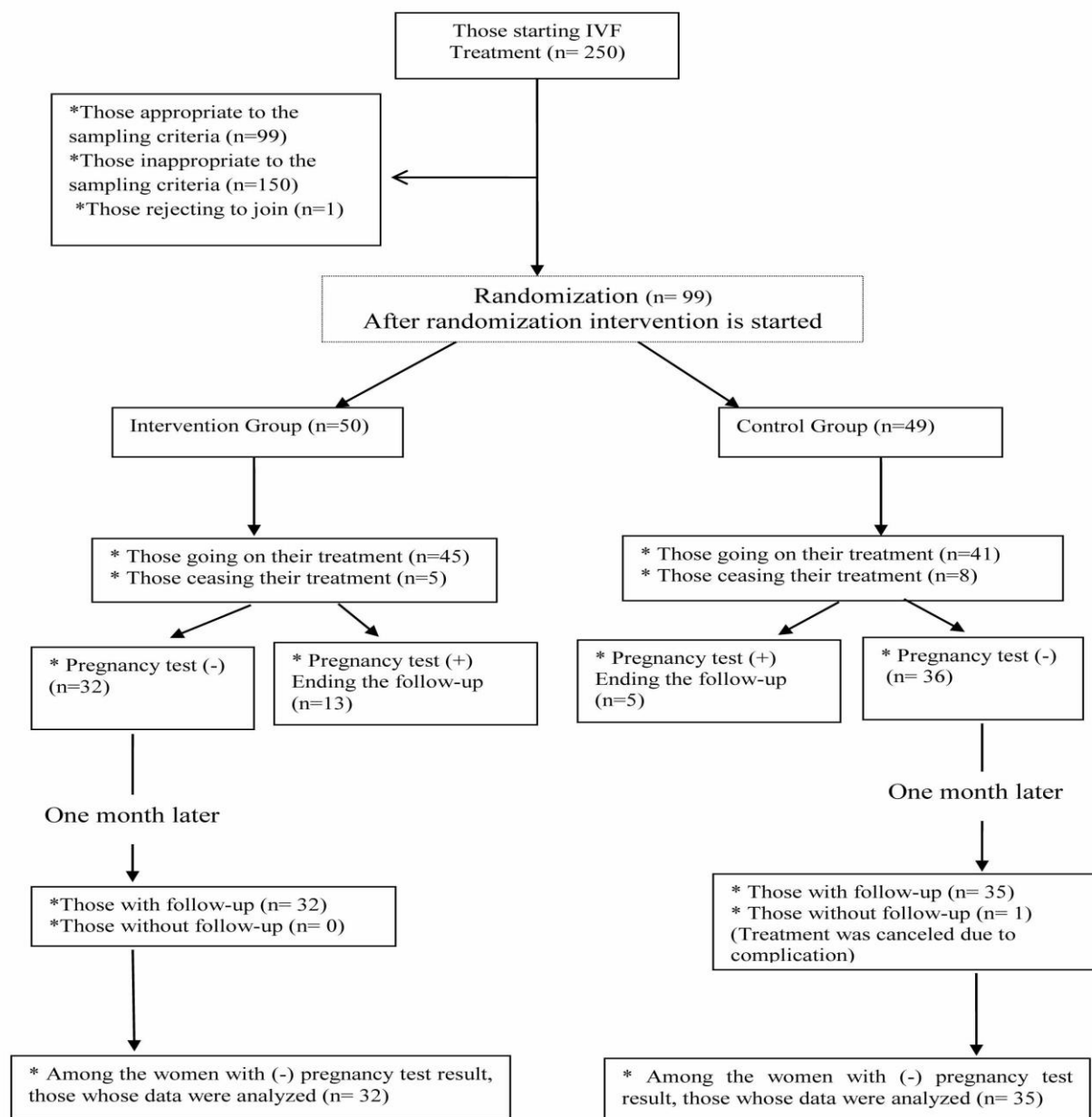
With the belief that these features would provide a solution to the problems experienced by infertile women, it was thought that planning nursing care based on this theory would be appropriate. The present study evaluated the effectiveness of a nursing care program based on Watson's theory of human caring for managing distress caused by infertility, the accompanying anxiety, and also for assisting the patient to cope when the treatment fails.

## Materials and methods

The study was carried out with a single-blind, randomized controlled trial research method. The women who participated in the study were blinded to their assignment to either the intervention group or in the control group. All phases of this study were designed

based on the Consolidated Standards of Reporting Trials (CONSORT).<sup>21,22</sup> Figure 1 is a CONSORT diagram showing the flow through the study. The study was conducted in

Diyarbakır Veni-Vidi IVF Center in Turkey between April and November 2012. This center conducts 400 IVF cycles per year. The research sample was made up of infertile women who received treatment in an IVF Center.



**Figure 1.** CONSORT diagram showing participant flow through the study

At the beginning of the treatment, the inclusion criteria were as follows: (i) primary infertility; (ii) being over the age of 18; (iii) ability to speak, read and write in Turkish; and (iv) application of assisted reproduction techniques such as (IVF-ET (Transfer Embryo))

and Intracytoplasmic Sperm Injection (ICSI). At the end of the treatment, the women whose infertility treatment resulted in failure (who had a negative pregnancy test result) were included in the study.

The exclusion criteria were as follows: (i) being diagnosed with a chronic disease.

The sample size was calculated with an error margin of 0.05 in the reliability range of 80% and 95% using NCSS-PASS software; it was based on the anxiety mean scores and standard deviations 43.3 (5.70) obtained from studies carried out with women receiving infertility treatment.<sup>23</sup>

At the end of the study, based on the analysis conducted depending on the mean scores and the standard deviations with the software of NCSS-PASS, the effect size was calculated and found to be strong at 0.8.

In the present study, the block randomization method was used. In this method, to conceal the information about randomization, the intervention and control groups in the study are determined with the block randomization method by a person not involved in the study. The group distribution is given to the researcher in numbered opaque envelopes previously prepared. For each woman, separate files are formed, and closed opaque envelopes are put in these files. After those women appropriate to the sampling criteria are selected and they agree to participate in the study, the envelopes are opened and whether the woman is to be assigned to the intervention group or to the control group is decided. The women included in the research sample do not know which group they belong to. The staff working in the center is not informed about the members of the intervention and control groups. To prevent the women in the intervention and control groups from communicating with each other, the appointments are set at different times.

In the study, the women whose infertility treatment resulted in failure were followed starting from the beginning of the treatment. In this way, these follow-ups helped develop confidence between the infertile women and the researcher in the treatment process. Therefore, when the treatment resulted in failure, it was easier to do the follow-up of the women. To maintain the care program, a semi-structured nursing care program was

developed as a guide. The program was designed in a way to be executed in six sessions in the infertility treatment process, and in one session before and after the test on the pregnancy test day, and in two sessions on the day following the failure of the infertility treatment. Each session was organized in accordance with the improvement processes selected from the theory.

Examining and internalizing Watson's theory of human caring before putting it into practice and adapting the theory to the present study constituted the first phase of the process. In the study, all the 10 Carative Factors were used. The 10 carative factors included: (1) Humanistic-altruistic system of values; (2) Enabling faith-hope; (3) Cultivation of sensitivity to the self and others; (4) Helping-trusting, human care relationship; (5) Expression of positive and negative feelings; (6) Creative problem-solving caring process; (7) Transpersonal teaching-learning; (8) Supportive, protective, and/or corrective mental, social, spiritual environment; (9) Human needs assistance; (10) Existential-phenomenological-Spiritual forces.<sup>19</sup> Nurses working in an infertility center, nursing academic personnel specialized in infertility, and Dr. Jean Watson were consulted.

On the first day of treatment (the 2<sup>nd</sup> day of cycle), the women were informed about the purpose of the study and included in the study after their approval. Throughout the application process, the women were contacted with via e-mail or phone or when they visited the IVF center. In addition, besides the follow-ups, the women in the care group were informed about the fact that the researcher would do all the nursing cares in the treatment process.

For the follow-ups of the women in the care group, a special room was prepared. A sofa was put in the room for the women's comfort. The chair and the desk to be used by the researcher were placed in the room in a way to avoid any interruption of the interviews. To avoid such interruptions and to maintain silence, a warning sign was put on the door of the interview room. Also, the phones in the

room were switched off during the interviews. There was a pen and a sheet of paper on the interview desk for the researcher's note-taking. In addition, there was a napkin and a washbasin in the room. While expressing their feelings, most of the women cried. Thus, it was suggested that they use the washbasin to relax. With the help of the semi-structured care program based on the Theory of Human Caring, seven follow-ups were done for the infertile women in the care group in the treatment process. Also, the follow-ups of the women whose treatment resulted in failure were continued, and two more follow-ups were done: in all, nine follow-ups were done. The duration of the interviews during the follow-ups lasted about 20 to 40 minutes.

The themes were chosen for each interview in accordance with the improvement processes. Table 1 presents these themes and the interview process. The women were not left alone before, during, and after the Oocyte Pick-up (OPU) and Embryo Transfer (ET) processes. All participants' caring and healing processes were done by the researcher. From the end of the ET process to the pregnancy test, the follow-ups of the women were continued. Also, before the pregnancy test, the women's feelings and thoughts were shared. In addition, the women were not left alone when the doctor informed them about the result of the pregnancy test, and their thoughts were shared in the following period. The follow-ups for the women whose treatment resulted in failure were continued. With these women, two more interviews were held, and related solutions were put forward to help these women cope with this failure and to decrease their anxiety and the negative effects of infertility.

The women in the control group received the standard nursing care given in the IVF center. The first day of the treatment was the day when everyone was introduced, informed about the study, and asked for their consent. After opening the envelope, the application was planned. The study process for the control group included pre-treatment assessments

(T1), assessments made just after the ET (T2), and one month follow-up assessments (T3).

For the present study, the data were gathered from pre-treatment assessments (T1), the assessments that were made just after the ET (T2), and the eighth week follow-up assessments (T3). The data were collected by the researcher through face-to-face interviews in the fertility clinic. The women completed the data collection tools in 10 to 15 minutes.

#### *Sociodemographic data form*

This form includes 17 questions developed by the researchers to collect research data regarding participants' fertility and sociodemographic characteristics.

#### *Spiel Berger's State-Trait Anxiety Scale*

The State-Trait Anxiety Scale was developed by Spiel Berger and colleagues in USA in 1970 and standardized and adapted into Turkish, then tested for its validity and reliability by Öner and LeComte between 1974 and 1977.<sup>24</sup>

The scale was made up of two scales with a total of 40 items. Among the items, 20 aim at determining the state of anxiety level, and 20 of them help determine the trait anxiety level (Cronbach's alpha: 0.92 and 0.86, respectively). A higher score refers to a high level of anxiety. In the present study, Cronbach's alpha: 0.75 and 0.70

#### *Infertility Distress Scale*

The Infertility Distress Scale developed by Akyüz and colleagues (2008) helps describe individuals' feelings and emotions regarding infertility. The scale includes of 21 items, 16 of which are direct and five are reverse. The scale produces scores ranging between 21 and 84, and it does not include a cutting point. Higher scores received from the scale refer to a high level of infertility distress.<sup>25</sup> In the original study, Cronbach's alpha: 0.93; in the present study, Cronbach's alpha: 0.87

#### *Ways of Coping Inventory*

The "Ways of Coping Inventory" developed by Folkman and Lazarus was adapted into Turkish, and then tested for its validity and reliability by Şahin and Durak in 1995. The

**Table 1.** Caring and healing process in the intervention group

Follow-ups		Follow-up Process
<b>Follow-up 1</b> (T <sub>1</sub> )	Introduction	<ul style="list-style-type: none"> <li>▪ Determining and informing on random basis</li> <li>▪ Sharing the contact information, and informing about the maintenance of contact via phone during the process</li> <li>▪ Approaching the woman with love and affection; who is that person? How can I do the caring? (<i>CF 1</i>)</li> <li>▪ Creating a therapeutic environment for all the follow-ups carried out in the infertility treatment process; respecting and meeting the needs (<i>CF 8, 9</i>)</li> <li>▪ Sharing infertility-related experiences (<i>CF 4, 5</i>)</li> <li>▪ Talking about the fears related to infertility treatment (<i>CF 4, 5</i>)</li> <li>▪ Talking about the priorities in infertility treatment and about the decisions regarding health care (<i>CF 4, 5, 6</i>)</li> </ul>
<b>Follow-up 2</b>	Beginning of ovulation induction	<ul style="list-style-type: none"> <li>▪ Talking about the feelings and emotions regarding medicine practices (<i>CF 4, 5, 6,7</i>)</li> <li>▪ Explaining the medicine practices in a relationship of mutual learning-teaching (<i>CF 4, 5, 6, 7</i>)</li> <li>▪ Talking about experiences regarding infertility (<i>CF 4, 5, 6,7</i>)</li> <li>▪ Talking about the meaning of life with the woman (<i>CF 10</i>)</li> <li>▪ Talking about the negative and positive developments in the infertility treatment process; trying to support and strengthen the positive aspects via religious beliefs and hope (<i>CF 2</i>)</li> <li>▪ Talking about what they have done to cope with the negative situations in the infertility treatment process (<i>CF 3</i>)</li> </ul>
<b>Follow-up 3</b>	hCG injection and OPU preparation	<ul style="list-style-type: none"> <li>▪ Talking about the experiences related to hCG injection (<i>CF5, 6, 7</i>)</li> <li>▪ Explaining the hCG injection in a relationship of mutual learning-teaching (<i>CF 5, 6, 7</i>)</li> <li>▪ Explaining the OPU process in a relationship of mutual learning-teaching (<i>CF5, 6, 7</i>)</li> <li>▪ Talking about what they have done to cope with the negative situations in the infertility treatment process (<i>CF 3</i>)</li> </ul>
<b>Follow-up 4</b>	OPU process and ET preparation after OPU	<ul style="list-style-type: none"> <li>▪ Meeting all the needs before and after OPU (<i>CF 9</i>)</li> <li>▪ Explaining the ET process in a relationship of mutual learning-teaching (<i>CF 5, 6, 7</i>)</li> </ul>

**Table 1 (continue).** Caring and healing process in the intervention group

Follow-ups	Follow-up Process	
<b>Follow-up 5 (T<sub>2</sub>)</b>	Embryo transfer (ET) and the following period	<ul style="list-style-type: none"> <li>▪ Meeting all the needs of before and after ET (<i>CF 9</i>)</li> </ul>
<b>Follow-up 6</b>	Follow-up via phone until the pregnancy test	<ul style="list-style-type: none"> <li>▪ This follow-up was done via phone because the women were taking a rest after ET.</li> <li>▪ Talking about the expectations from infertility treatment (<i>CF 2</i>).</li> <li>▪ Talking about what they would feel in case of pregnancy or failure in pregnancy (<i>CF 5, 9, 10</i>)</li> <li>▪ Talking about miracles in life; do they believe in miracles? Do they think life is unfair? (<i>CF 5, 9, 10</i>)</li> </ul>
<b>Follow-up 7</b>	Interview before the pregnancy test	<ul style="list-style-type: none"> <li>▪ Talking about their feelings regarding the pre-pregnancy period (<i>CF 5, 9, 10</i>)</li> </ul>
	Interview after the pregnancy test	<ul style="list-style-type: none"> <li>▪ Talking about their feelings regarding the pregnancy test result (<i>CF 5, 9, 10</i>)</li> <li>▪ Informing the women whose pregnancy test was negative that the follow-ups would continue; that face-to-face interviews would be hold for a month; and that communication could be maintained via phone</li> </ul>
<b>Follow-up 8</b>	Repetition of follow-up 15 days after the pregnancy test for the women with a negative test result	<ul style="list-style-type: none"> <li>▪ Talking about their feelings regarding the pregnancy test result (<i>CF 5, 9, 10</i>)</li> <li>▪ Talking about how to cope with the negative result of the pregnancy test (<i>CF 3</i>)</li> </ul>
<b>Follow-up 9 (T<sub>3</sub>)</b>	Repetition of follow-up a month after the pregnancy test for the women with a negative test result	<ul style="list-style-type: none"> <li>▪ Sharing the women's experiences regarding the failure in treatment (<i>CF 3, 4, 5</i>)</li> <li>▪ Talking about what to do in future; talking about their feelings regarding whether to start a new treatment or not (<i>CF 1, 2, 3</i>)</li> <li>▪ Talking about their plans in the near future (for the 3<sup>rd</sup> and 6<sup>th</sup> months) (<i>CF 2</i>)</li> </ul>

scale includes two dimensions: one relates to the ways of coping with the problem, and the other relates to the ways of coping with emotions. These two dimensions include five factors: “self-confident”, “optimistic”, “unconfident”, “submissive”, and “seeking social support”. The reliability coefficients of the sub-dimensions of the scale were calculated as 0.80, 0.68, 0.73, 0.70 and 0.47, respectively. For the present study, the Cronbach Alpha values were found to be 0.75, 0.76, 0.70, 0.60 and 0.42, respectively. In this scale, which included 30 items and scored as 0 to 3, the 1<sup>st</sup> and 9<sup>th</sup> items were calculated via reversed scoring for the factor of social-support seeking. The lowest score to be received for each scale is 0, and the highest score is 3. The total score is not calculated.<sup>26</sup> After all the participants were informed about the purpose of the study, its application process, volunteerism in the study, and about the possibility to refuse participation in the study at any time, those willing to take part in the study were given the Voluntary Participation Form and asked for their oral and written consents. In addition, the Noninvasive Studies Ethical Council of Dokuz Eylul University was also presented for their consent (Date of the ethical council’s approval of the study: 13.01.2011; protocol number: 04-GOA). Lastly, the center where the application would be carried out and developers of the scale were asked for their consents as well.

The data were analyzed using the Statistical Package for Social Sciences (SPSS for Windows 15.0). The sample size and power analysis of the study were determined using NCSS-PASS (Number Cruncher Statistical System-Power Analysis and Sample Size).

To determine the homogeneity of the intervention and control groups after randomization, the chi-square test and t-test were conducted to determine whether there was a significant difference between the mean scores. For the comparison of the pre-tests, after ET and one month follow-up data for the intervention and control groups, the t-test was used. One-way analysis of variance was used

in the repetitive measurements to determine whether there was a difference between the groups’ own measurements. Additionally, the t-test in Bonferroni correction dependent groups was performed to find which measurement led to the difference. Because there are three comparisons in the analysis, the p value was divided by three and found to be  $0.05/3=0.016$ . The significance level was determined as  $P < 0.05$ .

## Results

At the end of one-month follow-up, data were collected from 67 (77.9%) of the participants. At the beginning of the treatment, no significant difference was found between the intervention and control groups in terms of their demographic characteristics, age, educational status, work activity, income, social security, accommodation place, the treatment applied, infertility diagnosis, and the duration of treatment ( $P > 0.05$ ), which indicated that the groups were homogeneous (Table 2).

### *Findings on State Anxiety*

The analysis found no significant difference between the intervention and control groups’ pre-treatment anxiety mean scores ( $t: -0.53, P: 0.59$ ), whereas a statistically significant difference was observed between after ET ( $t: -10.69, P: 0.00$ ) and one month follow-up ( $t: -8.29, P: 0.00$ ) anxiety mean scores. It also found a statistically significant difference between the intervention group’s measurements ( $F: 78.09, P: 0.00$ ), whereas no statistically significant difference was observed in the control group’s measurements ( $F: 2.69, P: 0.07$ ), (Table 3).

### *Findings on infertility distress*

The analysis found no significant difference between the intervention and control group’s pre-treatment infertility exposure mean scores ( $t: -0.13, P: 0.89$ ), whereas a statistically significant difference was observed between after ET ( $t: -9.99, P: 0.00$ ) and one-month follow-up ( $t: -7.81, P: 0.00$ ) infertility exposure mean scores. It also found a statistically



significant difference between the intervention (F: 52.31, P: 0.00) and control (F: 6.80, P: 0.00) groups' measurements, (Table 3).

#### *Findings on Ways of Coping with Stress Self-confident approach*

The analysis found no significant difference between the intervention and control group's pre-treatment self-confident approach mean scores (t: 1.17, P: 0.24), whereas a statistically significant difference was observed between after ET (t: 11.77, P: 0.00) and one-month follow-up (t: 11.85, P: 0.00) self-confident

approach mean scores. It also found a statistically significant difference between the intervention (F: 39.78, P: 0.00) and control (F: 19.83, P: 0.00) groups' measurements.

#### *Optimistic approach*

The analysis found no significant difference between the intervention and control group's pre-treatment optimistic approach mean scores (t: 0.25, P: 0.80), whereas a statistically significant difference was observed between

**Table 2.** Participants' demographic characteristics

Variable	Intervention group (n=32) N (%)	Control group (n=35) N (%)	P
<b>Education</b>			0.64
Literate	7 (21.9)	10 (28.6)	
Elementary School	13 (40.6)	8 (22.9)	
Secondary School	3 (9.4)	4 (11.4)	
High School	3 (9.4)	5 (14.3)	
University and higher	6 (18.8)	8 (22.9)	
<b>Work activity</b>			0.59
Working	28 (87.5)	29 (82.9)	
Nonworking	4 (12.5)	6 (17.1)	
<b>Income (TL)</b>			0.10
Income is lower than the expenditures	11 (34.4)	16 (45.7)	
Income is equal to the expenditures	20 (62.5)	14 (40.0)	
Income is higher than the expenditures	1 (3.1)	5 (14.3)	
<b>Social security</b>			0.17
Yes	25 (78.1)	22 (62.9)	
No	7 (21.9)	13 (37.1)	
<b>Place of accommodation</b>			0.94
City	18 (56.2)	20 (57.1)	
District, town, village	14 (43.8)	15 (42.9)	
<b>Previous treatments</b>			0.23
COH <sup>€</sup>	6 (18.8)	4 (11.4)	
IUI <sup>£</sup>	9 (28.1)	16 (45.7)	
COH and IUI	2 (6.2)	15 (42.9)	
No treatment	15 (46.9)		
<b>Age<sup>¥</sup> (Years)</b>	28.8 (6.5)	31.4 (6.7)	0.60
<b>The time for diagnosis of fertility problems<sup>¥</sup> (Years)</b>	5.1(3.8)	7.9(5.0)	0.13
<b>Duration of fertility treatment<sup>¥</sup> (Years)</b>	3.1(2.5)	5.9(4.7)	0.20

<sup>¥</sup>Mean (Standard Division) was reported, <sup>€</sup>Controlled Ovarian Hyperstimulation Intrauterine, <sup>£</sup>Insemination

**Table 3.** Comparison of the intervention (N=32) and control (N=35) groups in terms of anxiety level, infertility distress, and coping with stress

Variable	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	F	P
	Mean (SD)	Mean (SD)	Mean (SD)		
<b>State anxiety</b>					
Intervention group	46.53 (7.67)	27.78 (4.59)	33.71 (7.21)	78.09	<0.001
Control group	47.48 (6.87)	47.08 (9.21)	50.51 (9.14)	2.69	0.07
t-test	-0.53	-10.69	-8.29		
P	0.59	0.00	0.00		
<b>Distress</b>					
Intervention group	45.18 (10.05)	28.37 (4.59)	31.25 (8.35)	52.31	<0.001
Control group	45.54 (11.42)	50.68 (12.29)	52.02 (13.07)	6.80	<0.001
t-test	-0.13	-9.99	-7.81		
P	0.89	0.00	0.00		
<b>Ways of Coping</b>					
<b>Self-confident approach</b>					
Intervention group	1.94 (0.41)	2.61 (0.26)	2.56 (0.36)	39.78	<0.001
Control group	1.83 (0.35)	1.48 (0.47)	1.30 (0.48)	19.83	<0.001
t-test	1.17	11.77	11.85		
p	0.24	0.00	0.00		
<b>Optimistic approach</b>					
Intervention group	1.83 (0.51)	2.61 (0.27)	2.46 (0.43)	28.70	<0.001
Control group	1.80 (0.50)	1.51 (0.46)	1.41 (0.48)	8.16	<0.001
t-test	0.25	11.88	9.35		
P	0.80	0.00	0.00		
<b>Social support seeking approach</b>					
Intervention group	1.14 (0.61)	1.89 (0.60)	1.79 (0.57)	21.82	<0.001
Control group	1.02 (0.61)	0.90 (0.61)	0.82 (0.55)	2.64	0.07
t-test	0.74	6.68	7.02		
P	0.45	0.00	0.00		
<b>Unconfident approach</b>					
Intervention group	1.96 (0.60)	1.17 (0.33)	1.26 (0.42)	38.47	<0.001
Control group	2.01 (0.49)	2.11 (0.65)	2.19 (0.46)	1.63	0.20
t-test	-0.36	-7.29	-8.49		
P	0.71	0.00	0.00		
<b>Submissive approach</b>					
Intervention group	1.82 (0.37)	1.20 (0.40)	1.17 (0.53)	27.93	<0.001
Control group	2.00 (0.48)	2.30 (0.50)	2.31 (0.33)	10.22	<0.001
t-test	-1.65	-9.75	-10.36		
P	0.10	0.00	0.00		

after ET (t: 11.88, P: <0.001) and one-month follow-up (t: 9.35, P: <0.001) optimistic approach mean scores. It also found a statistically significant difference between the intervention (F: 28.70, P: <0.001) and control (F: 8.16, P: <0.001) groups' measurements.

#### *Social support seeking approach*

The analysis found no significant difference between the intervention and control group's

pre-treatment social support seeking approach mean scores (t: 0.74, P: 0.45), whereas a statistically significant difference was observed between after ET (t: 6.68, P: <0.001) and one-month follow-up (t: 7.02, P: <0.001) social support-seeking approach mean scores. It also found a statistically significant difference between the intervention group's measurements (F: 21, 82 P: <0.001), whereas no statistically significant difference was observed

in the control group's measurements (F: 2.64, P: 0.07).

#### *Unconfident approach*

The analysis found no significant difference between the intervention and control group's pre-treatment unconfident approach mean scores (t: -0.36, P: 0.71), whereas a statistically significant difference was observed between after ET (t: -7.29, P: <0.001) and one-month follow-up (t: -8.49, P: <0.001) unconfident approach mean scores. It also found a statistically significant difference between the intervention group's measurements (F: 38.47 P: <0.001), whereas no statistically significant difference was observed in the control group's measurements (F: 1.63, P: 0.20).

#### *Submissive approach*

The analysis found no significant difference between the intervention and control group's pre-treatment submissive approach mean scores (t: -1.65, P: 0.10), whereas a statistically significant difference was observed between after ET (t: -9.75, P: <0.001) and one-month follow-up (t: -10.36, P: <0.001) submissive approach mean scores, (Table 3).

## Discussion

Related studies revealed that anxiety increases in the process of infertility treatment, and that those differences occur in the levels of state anxiety in all phases of the treatment.<sup>7,27</sup> In the related literature, it is reported that the changes in anxiety levels occur before the treatment, during OPU, ET, in the period of 12 days spent waiting for the pregnancy test result, and in the case of failure of the treatment.<sup>7,27,28</sup> In line with these results, to decrease the women's levels of anxiety during and after the infertility treatment, the nursing cares were planned based on these crucial periods.

This difference is likely to result from the caring process applied to the intervention group. It was also found that planning the caring moments based on the critical periods in the treatment process was influential not only on decreasing the anxiety level, but also

on developing the interpersonal caring relationship. It was found that theory of human caring was influential on the decreasing anxiety scores, and that this influence continued after ET and during the first-month measurements. In one study carried out on women whose first infertility treatment resulted in failure, Verhaak and colleagues reported that women's anxiety levels increased following the failure of the treatment; that they started their second treatment attempt with a high level of anxiety; and that they were at risk of depression. In sum, the researcher stated that cycles of anxiety and repeated failure occurred.<sup>29</sup>

In the present study, the fact that among the intervention group women who were followed up until the beginning of the treatment, there was an increase in the anxiety levels of those whose infertility treatment resulted in failure and whose pregnancy test results were negative, was a natural result. To understand the difference caused by the nursing care based on the theory of human caring, when compared with the control group, women whose infertility treatment resulted in failure, a significant difference was found. When compared with the standard nursing care, the fact that the theory causing a difference in the anxiety level is not medicine-focused but is based on the human, improvement and love. Because the theory was a guide for providing infertility nurses with individual-centered, respectful, sensitive, honest, and accessible caring could be regarded as the source of the decrease in anxiety.

#### *Infertility Distress*

The infertility treatment process is not a fixed process, but rather one involving different treatment and interventional procedures.

Therefore, in the infertility treatment process, infertility distress increases.<sup>7,30</sup> The cause of this decrease was that the caring moments were planned in accordance with the critical periods in the treatment process. In addition, the caring moments were also influential on the development of caring relationship between individuals.

The reflection of the 10 Carative Factors in the theory into caring allowed the intervention group women to express their positive and negative feelings and thoughts. In addition, these feelings were not rejected, and the women could experience the treatment process with the least influence thanks to the individual problem solving processes.

#### *Ways of Coping with Stress*

Lee and colleagues reported a relationship between the emotions of women whose infertility treatment resulted in failure and the coping methods they applied. For this reason, they claimed that the care given to women whose infertility treatment results in failure should be continued.<sup>31</sup> Lancaster and Boivin stated that the attempts to cope in the process of waiting for the pregnancy test result allowed women to pass this duration of waiting more positively and in a relaxed manner.<sup>32</sup> Related studies revealed that use of effective coping methods in the infertility treatment process helped decrease the influence of infertility and the level of anxiety.<sup>16</sup> Pasch pointed out that the most important point to be taken into consideration to decrease anxiety in the process of infertility treatment and in case of failure of the treatment is not only to prepare patients for the infertility treatment process and for the probability of failure of the treatment but also to help them cope effectively with the treatment and its outcome.<sup>8</sup>

In the present study, no difference was found between the groups in terms of positive coping methods such as the self-confidence approach, optimistic approach, and social support-seeking approach. No significant difference was found between the pre-treatment mean scores of the women in the two groups, whereas there was a statistically significant difference between the groups after ET and during the first-month follow-up. It was also revealed that the care group used positive coping methods more. Expression of emotions, problem solving, teaching-learning, and help-confidence relationship found in the improvement processes of the theory of

human caring could be influential on women's positive coping.

In this study, no difference was found between the groups with respect to such ineffective coping methods applied by the women as unconfident and submissive approaches. Although no significant difference was found between the pre-treatment mean scores of the women in the two groups, there was a statistically significant difference between the groups after ET and during the first-month follow-up.

It was also seen that the care group used effective coping methods more. The help-confidence relationship in theory of human caring improvement processes, expression of emotions, problem solving and teaching-learning could be said to be influential on increasing women's use of effective coping methods.

In the relevant literature, it has been reported that the nursing crisis prevention program based on cognitive behavioral hostility, relaxation exercises, and providing information to infertile women had positive influence on women's psychosocial responses.<sup>33</sup> It has been reported that before treatment of infertility, the psychological support given helps infertile couples cope with depression.<sup>34</sup> Based on the results of relevant studies, in the process of infertility treatment, infertile women's needs for psychological support increase.<sup>35,36</sup> It was found that attempts made in line with this needs are effective for coping.<sup>33,34</sup> In addition to interviews planned in accordance with the needs of the women whose infertility treatment resulted in failure, other interviews were also planned based on connection via phone or on visits to the clinic.

During these interviews, the nursing approaches of teaching-learning, belief-hope development, problem solving, expression of emotions, help-confidence relationship, and human-needs assistance found in theory of human caring improvement processes were used. The results of this study revealed that in cases of the failure of the treatment process, which is one of the most important problems

on the agenda of infertile nursing, it is important to focus on attempts that will not only decrease women's anxiety levels and the effects of infertility and also to increase women's use of positive coping methods. The results obtained also demonstrated that nursing approaches applied based on the theory of human caring are quite influential on women's levels of anxiety, negative feelings and stress.

This study has several limitations. First, in the studies on infertility, using suggestions put forward based on evidence, couples applying for treatment should be evaluated together.<sup>37</sup> In this study, because males do not regularly continue their treatment, the husbands were not included in the research design. The second is the small number of infertile women within treatment fails each group, which may hinder understanding the effects of the intervention in each group. The third limitation, the key limitation of this study, is the nature of the research. It was thought that women whose treatment would start a month later should be involved in the study and that their follow-ups should be done a month later to avoid any loss. The study was limited with respect to examination of the effects of the caring results by maintaining longer-term follow-ups for the women for whom caring was continued after treatment.

## Conclusion

The intervention and control groups significantly differed in anxiety, distress and coping levels. The intervention group's mean anxiety score decreased by thirteen points and distress by fourteen points (in a positive direction). The intervention group's mean positive coping style score increased. Whereas a negative increase was observed in the control group's values depending on the failure of the treatment.

In this study, examining the influence of use of theory of human caring on infertile women whose infertility treatment results in failure not only provides these women with high quality nursing care, but also provides nurses working in IVF centers with good guidance.

The Watson theory of human caring provides a holistic viewpoint for the nursing care in infertility treatment. The present study contributed to the development of theory of human caring, to the application of the theory-based nursing care as well as to the science of nursing.

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## Ethical issues

None to be declared.

## Conflict of interest

The authors declare no conflict of interest in this study.

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