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Comparing the Effectiveness of Group Schema Therapy and Group Metacognitive Therapy on Intolerance of Uncertainty in Infertile Women

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ABSTRACT

Objective: The present study aimed to compare the effectiveness of group schema therapy and group metacognitive therapy on intolerance of uncertainty in infertile women.

Methods and Materials: This semi-experimental study employed a pretest–posttest design with a control group and a three-month follow-up. The statistical population consisted of infertile women who attended Shahed Counseling Centers in Alborz Province during the second half of 2025. From eligible participants, 60 women were selected through purposive sampling and randomly assigned to three groups of 20 (group schema therapy, group metacognitive therapy, and control). The study instrument was the Intolerance of Uncertainty Questionnaire developed by Freeston et al. (1994). The first experimental group received ten 90-minute sessions of group schema therapy based on Young's (2003) protocol, and the second experimental group received eight 90-minute sessions of group metacognitive therapy based on Wells et al. (2009). Data were analyzed using repeated-measures ANOVA and Bonferroni post-hoc tests in SPSS-26.

Findings: Findings showed that both interventions led to a significant reduction in intolerance of uncertainty compared with the control group ($P < 0.001$). These therapeutic effects remained stable at the three-month follow-up. Comparison of mean difference scores indicated that group metacognitive therapy was more effective in reducing components of intolerance of uncertainty, particularly the stressfulness of ambiguous situations, negative attitudes toward unexpected events, and uncertainty about the future.

Conclusion: Both group schema therapy and group metacognitive therapy are effective in improving psychological indicators in infertile women; however, metacognitive therapy demonstrated greater effectiveness in reducing intolerance of uncertainty.

Keywords: Schema Therapy, Metacognitive Therapy, Intolerance Of Uncertainty, Infertile Women.

Introduction

Infertility is a profound and widespread biopsychosocial crisis that exerts multidimensional effects on women's quality of life, mental health, family stability, and even their social and cultural relationships (Ostrowska et al., 2025). Infertility is defined as the inability to achieve pregnancy after one year of regular sexual intercourse without the use of contraception. According to available statistics, its prevalence is increasing worldwide, affecting approximately 10% to 15% of couples, with even higher rates reported in some societies (Sharma et al., 2025). In Iranian society, where traditional family structures, cultural pressures, and social expectations concerning women's reproductive role are deeply rooted, infertile women are particularly vulnerable to stigma, blame, rejection, and psychological distress. Anxiety arising from the inability to fulfill this culturally expected role affects not only marital relationships but also personal identity, self-esteem, and perceived competence, exposing infertile women to a wide range of psychological and social difficulties that threaten their quality of life and mental health (Dayhimi et al., 2025). Infertility may trigger a broad spectrum of negative emotions, including sadness, shame, jealousy, feelings of inadequacy, and hopelessness. These emotional responses interact with demographic factors, family history, the quality of marital relationships, and the level of social support available to women, thereby creating substantial difficulties for this population (Mori et al., 2024). Due to repeated experiences of failure, prolonged periods of waiting and uncertainty, unsuccessful or lengthy treatment procedures, and exposure to negative judgments and attitudes from family members and others, infertile women are more vulnerable than many other groups to emotional and psychological disorders as well as deterioration in social and occupational functioning (Hecht et al., 2025). In recent years, numerous studies have attempted to identify and strengthen psychological factors and therapeutic strategies that can reduce these adverse consequences and promote the mental health of infertile women. Nevertheless, important gaps remain in understanding the complex psychological dimensions of infertility and how they can be effectively addressed through intervention (Hong et al., 2024).

One of the fundamental psychological characteristics that plays a decisive role in coping with infertility is intolerance of uncertainty (Tolere & ile Belirsizliğe, 2025). Infertile women are often trapped in a cycle of waiting, doubt, failure, and persistent concern about the future, all of which share the common feature of uncertainty regarding reproductive outcomes (Edis & Yanıç, 2025). This state of uncertainty continuously activates some of the most fundamental and maladaptive cognitive schemas in infertile women. Feelings of lack of control over life, fear of unfavorable treatment outcomes, and difficulty accepting adverse possibilities can reduce their capacity to tolerate uncertainty (Gül et al., 2025). According to theoretical models, intolerance of uncertainty is defined as an individual's tendency to experience impatience, worry, helplessness, and distress in uncertain or ambiguous situations. Research has shown that this construct is a key factor in predicting and intensifying anxiety, obsessive behaviors, and maladaptive emotional responses such as self-blame, avoidance, and social isolation (Flores-Lovon et al., 2023).

In response to these difficulties, increasing attention has been directed toward modern evidence-based psychotherapeutic approaches. One such approach is schema therapy, which was developed on the basis of cognitive-behavioral models and emphasizes identifying and modifying core maladaptive schemas that develop during childhood and continue to influence an individual's thoughts, emotions, and behaviors into adulthood (Sahour et al., 2024). Within the schema therapy framework, it is assumed that individuals, particularly women experiencing the pressure of infertility, may develop catastrophic interpretations of infertility and marked reductions in self-efficacy as a result of the activation of schemas such as defectiveness/shame, abandonment, mistrust, and failure. Consequently, they often become highly intolerant of uncertainty and ambiguity and may experience chronic anxiety (Barraca et al., 2025). Schema therapy combines cognitive, behavioral, and emotional techniques, including cognitive restructuring, empty-chair dialogue, imagery exercises, and training in self-supportive strategies. Through these techniques, it seeks to reconstruct infertile women's beliefs regarding their own efficacy, regulate excessive responses to uncertainty, and reduce health anxiety arising from excessive concern about themselves and treatment

outcomes (Meamar et al., 2025). Studies have demonstrated the considerable effectiveness of this approach in modifying maladaptive cognitive patterns, improving mental health, reducing depression and anxiety, and increasing feelings of competence and self-efficacy among infertile women (Karaca et al., 2019; Petre et al., 2021).

Group metacognitive therapy, on the other hand, is a contemporary approach based on cognitive-information processing models that emphasizes the role of metacognitive beliefs and processes—that is, thoughts about thoughts—in maintaining and perpetuating maladaptive emotional states (Dong et al., 2025). Irrational beliefs about worry, obsessive thoughts, and the perceived necessity of completely controlling thoughts and emotions are among the key factors targeted in this therapeutic approach (Silva et al., 2024). By teaching techniques for regulating worry, reducing attentional focus on intrusive thoughts, and strengthening infertile women's ability to distinguish useful worry from unproductive worry, group metacognitive therapy helps them move toward greater acceptance of ambiguity and uncertainty, more effective management of health anxiety, and greater confidence in their cognitive capacities to cope with the infertility crisis (Marwat et al., 2025). Through practical exercises, mindfulness-based experiences, and coping strategies for regulating and managing thoughts, infertile women may improve their cognitive-emotional self-efficacy, reduce anxiety symptoms, increase tolerance of ambiguity, and decrease excessive health-related concerns (Xiao et al., 2022). Contemporary research has confirmed the effectiveness of group metacognitive therapy in treating anxiety disorders, depression, and emotion-regulation difficulties; however, its comprehensive application among infertile women and its comparison with more established therapeutic approaches remain insufficiently investigated.

Considering the above, comparing the effectiveness of schema therapy and group metacognitive therapy among infertile women has a strong scientific and theoretical basis. Both approaches focus on modifying fundamental beliefs and cognitive processes and share the overarching goals of promoting mental health, improving tolerance of uncertainty, reducing health anxiety, and increasing self-efficacy among infertile women. However, they operate through distinct

pathways and are grounded in different theoretical models. Schema therapy primarily focuses on modifying emotional-cognitive roots and restructuring core schemas originating in childhood (Hepworth & Simpson, 2025), whereas group metacognitive therapy focuses on teaching individuals how to regulate moment-to-moment cognitive processes and metacognitive beliefs, particularly in situations characterized by uncertainty and anxiety (Schaich et al., 2026).

A substantial research gap exists in both Iranian and international literature regarding direct comparisons of the effectiveness of these two approaches among infertile women. Clarifying their differences and relative advantages could make an important contribution to selecting appropriate evidence-based interventions for this population and may represent a significant step toward improving psychological services in the field of infertility. Accordingly, the present study was conducted to answer the following question: Is there a significant difference between schema therapy and group metacognitive therapy in reducing intolerance of uncertainty among infertile women?

Methods and Materials

The present study was quasi-experimental and employed a pretest–posttest design with a control group and a three-month follow-up period. The statistical population consisted of all infertile women who attended counseling centers and the Royesh Center in Alborz Province during the winter of 2025. Among those who expressed willingness to participate, 60 eligible volunteers were entered into the study through purposive sampling based on the inclusion criteria. To select infertile women, the researchers referred to counseling centers and the Royesh Center in Alborz Province, obtained a list of infertile women, contacted them, and prepared a list of those who were willing to participate in the study. These individuals completed the Intolerance of Uncertainty Questionnaire, and infertile women who obtained scores above the mean were selected.

The inclusion criteria were willingness to participate in the study, infertility, and absence of severe physical or psychological disorders based on the records available at the counseling center. The exclusion criteria included absence from more than two sessions, incomplete or

invalid questionnaires, lack of cooperation, and failure to complete assignments during the treatment sessions.

Instruments

Intolerance of Uncertainty Questionnaire (IUQ)

The Intolerance of Uncertainty Questionnaire is a 27-item instrument developed by [Freeston & Komes \(2023\)](#) to assess individuals' emotional, cognitive, and behavioral responses to uncertain situations. The scale is scored on a five-point Likert scale ranging from completely true (= 5) to completely false (= 1). Freeston et al. reported satisfactory psychometric properties for the instrument. [Buhr & Dugas \(2002\)](#) reported a Cronbach's alpha coefficient of .94 for the scale ([Buhr & Dugas, 2002](#)). The English version was validated by Carleton et al. The scale showed significant correlations with the Penn State Worry Questionnaire ($r = .60$), Beck Depression Inventory ($r = .59$), and Beck Anxiety Inventory ($r = .55$) ([Besharat et al., 2015](#)). In Iran, the construct, convergent, and discriminant validity of the Intolerance of Uncertainty Scale were examined through

simultaneous administration of the Beck Anxiety Inventory. Pearson correlation results showed a significant positive correlation of .43 between participants' scores on the Intolerance of Uncertainty Scale and anxiety ($p < .001$). These findings supported the convergent and discriminant validity of the scale. Preliminary confirmatory factor analysis also supported two factors for the Intolerance of Uncertainty Scale: nonacceptance and avoidance of uncertainty, and uncertainty inhibiting action ([Besharat et al., 2015](#)). [Besharat et al. \(2015\)](#) also reported Cronbach's alpha coefficients of .87 for nonacceptance and avoidance of uncertainty, .87 for uncertainty inhibiting action, and .89 for the total intolerance of uncertainty score. In the present study, Cronbach's alpha was .89.

Schema Therapy

The first experimental group received schema therapy based on the schema therapy protocol ([Kordmirza Nikoozadeh et al., 2023](#)). Summary of group schema therapy sessions is presented in [Table 1](#).

Table 1

Summary of Group Schema Therapy Sessions

Session	Content	Activity
First	Introduction and explanation of group rules, development of a sense of group belonging, discussion of clients' main problems in the treatment setting, and review of schema and mode triggers	Administration of the pretest and completion of the "safe bubble" worksheet
Second	Review of the five basic needs, examination of the relationship between schemas and needs in the treatment setting, and guided imagery involving a client	Examination of how needs were met during childhood, in the present, and within the therapeutic environment
Third	Examination of the case formulation of the individual's current problem, related and recurring patterns, childhood needs, early environment, biological factors, triggers, and Healthy Adult capacity	Examination of modes and triggering factors within the therapeutic setting
Fourth	Examination of situations in which modes are activated, major signs, emotions, bodily sensations, thoughts, memories, schemas, and needs	Assessment of coping styles in the therapeutic setting
Fifth	Identification of core parental messages, examination of evidence supporting and refuting the Parent mode, and introduction to the Demanding Parent, Punitive/Critical Parent, Guilt-Inducing Parent, and Fear-Inducing Parent modes	Assessment of Parent modes and their effects on therapy
Sixth	Examination of Healthy Adult capacities and assertive behaviors, including distancing, self-care, and confrontation	Strengthening access to the Healthy Adult mode
Seventh	Identification of schemas and needs related to Child modes and use of enactment to establish communication with the Child mode	Story-writing assignment and dialogue with the Child mode
Eighth	Imagery of a lonely child in the street and the Vulnerable Child, examination of thoughts, emotions, memories, bodily sensations, and needs of the Vulnerable Child, and training in kindness and self-compassion	Practice of kindness and self-compassion to soothe the Vulnerable Child mode
Ninth	Replacing messages from the Good Parent with the voices of the Critical, Demanding, Guilt-Inducing, and Fear-Inducing Parent modes	Experiential work aimed at changing modes
Tenth	Play and recreation, identifying Good Parent messages in magazines, and expressing Good Parent messages to one another	Examination of the functioning of modes in current life

Metacognitive Therapy

In the present study, the German, Canadian, and Iranian metacognitive training protocol ([Bahadori et al.,](#)

[2011](#)) was used. A brief description of its sessions is presented in [Table 2](#).

Table 2

Sessions of the Metacognitive Training Protocol (25)

Unique Metacognitive Therapy Topics	Topic	Treatment Content
Mental filtering, overgeneralization	Thinking and Reasoning 1	—
Memory distortion, reconstructive changes in memory	Memory and concentration, memory errors	Memory
Tyranny of “shoulds”; finding an appropriate balance	Tyranny of “should” statements	—
Discounting the positive, black-and-white thinking	Thinking and Reasoning 2	—
Identifying values and strategies for living according to valued directions	Self-esteem, perfectionism	Self-esteem and valuing oneself
Magnification and minimization, attributional style	Thinking and Reasoning 3	Cognitive distortions in depression
Withdrawal leading to a vicious cycle, depressive rumination, thought suppression	Strategies and behaviors	—
Jumping to conclusions, mind reading, fortune telling	Thinking and Reasoning 4	—
Self-confidence, changing negative feelings and mental images	Understanding emotions, emotional reasoning, understanding nonverbal cues	Understanding emotions and feelings, self-confidence

Ethical Considerations

Ethical principles, including voluntary participation, informed consent, confidentiality of information, and participants’ freedom to withdraw from the study, were observed throughout the research process. Finally, the data were analyzed using repeated-measures analysis of variance and the Bonferroni post hoc test in SPSS version 26. The ethics code of the study was IR.IAU.K.REC.1404.209.

Procedure

The participants were then randomly assigned to two experimental groups and one control group, and the Intolerance of Uncertainty Questionnaire was administered to all three groups. The schema therapy and group metacognitive therapy groups each received ten 90-minute intervention sessions, whereas the control group received no intervention. The

interventions were conducted by the researchers at one of the centers in Alborz Province. The center had appropriate space, facilities, and educational equipment.

Data Analysis

Data were analyzed using repeated measures ANOVA and Bonferroni post hoc tests in SPSS 26.

Findings and Results

Table 3 presents the mean and standard deviation of intolerance of uncertainty in the experimental and control groups. Given that the significance levels were greater than .05, no statistically significant differences were observed among the three groups in terms of educational level, employment status, age, or duration of marriage. Therefore, the three groups can be considered homogeneous ($p>.05$).

Table 3

Mean and Standard Deviation of Intolerance of Uncertainty in the Experimental and Control Groups

Subcomponent	Group	Pretest Mean	Pretest SD	Posttest Mean	Posttest SD	Follow-Up Mean	Follow-Up SD
Inability to Act Under Ambiguous Conditions	Schema Therapy	31.8	2.88	26.8	2.90	26.9	2.46
	Group Metacognitive Therapy	32.9	1.91	27.1	2.58	25.7	2.17
	Control	33.3	3.23	32.5	3.39	32.1	3.49
Stressfulness of Ambiguous Situations	Schema Therapy	32.9	3.33	28.4	2.07	27.9	3.06
	Group Metacognitive Therapy	34.1	2.64	27.4	3.46	26.6	2.67
	Control	32.5	3.56	32.4	2.30	31.3	3.10
Negativity and Avoidance of Unexpected Events	Schema Therapy	17.6	3.20	14.6	2.70	15.02	3.01
	Group Metacognitive Therapy	18.3	3.87	12.9	2.31	14.3	3.65
	Control	18.2	2.80	17.6	3.16	17.8	3.06
Uncertainty About the Future	Schema Therapy	13.3	2.65	9.38	2.47	8.88	1.89

Total	Group	Metacognitive	13.9	3.05	9.22	2.24	8.56	2.71
	Therapy							
	Control		14.5	2.39	13.9	2.27	14.08	2.68
	Schema Therapy		97.9	3.09	80.4	3.35	81.2	2.84
	Group	Metacognitive	96.6	2.60	78.8	3.66	78.3	2.32
	Therapy							
	Control		98.4	2.68	97.3	3.11	97.9	2.52

Table 3 presents the means and standard deviations of intolerance of uncertainty in the experimental and control groups across the three measurement stages: pretest, posttest, and follow-up. As shown, there were no substantial differences in the mean component scores among the three groups at pretest. However, following

the interventions, the experimental groups demonstrated noticeable changes at posttest compared with both their pretest scores and the control group. These differences were also observed at the follow-up stage.

Table 4

Box's M Test for Homogeneity of Variance–Covariance Matrices

Dependent Variable	Box's M	F	p
Inability to Act Under Ambiguous Conditions	30.9	1.55	.064
Stressfulness of Ambiguous Situations	29.6	1.48	.084
Negativity and Avoidance of Unexpected Events	25.2	1.42	.099
Uncertainty About the Future	21.2	1.35	.121
Total Intolerance of Uncertainty Score	12.6	.987	.480

According to the results presented in Table 4, all significance levels were greater than .05. Therefore, the data did not violate the assumption of equality of the

variance–covariance matrices, indicating that the assumption of homogeneity of variance–covariance matrices was satisfied.

Table 5

Results of Levene's Test for Homogeneity of Error Variances

Dependent Variable	Stage	F	df1	df2	p
Inability to Act Under Ambiguous Conditions	Pretest	.694	2	57	.559
	Posttest	.832	2	57	.451
	Follow-up	.869	2	57	.721
Stressfulness of Ambiguous Situations	Pretest	.051	2	57	.985
	Posttest	.908	2	57	.211
	Follow-up	.259	2	57	.215
Negativity and Avoidance of Unexpected Events	Pretest	.654	2	57	.584
	Posttest	.245	2	57	.864
	Follow-up	.685	2	57	.565
Uncertainty About the Future	Pretest	2.08	2	57	.113
	Posttest	2.11	2	57	.108
	Follow-up	1.94	2	57	.132
Total Intolerance of Uncertainty Score	Pretest	.626	2	57	.437
	Posttest	1.50	2	57	.233
	Follow-up	.250	2	57	.622

Table 5 presents the results of Levene's test. Since all obtained significance levels were greater than .05, the assumption of homogeneity of error variances was satisfied. The significance levels for the interaction

between group and pretest were greater than .05. Therefore, the assumption of homogeneity of regression slopes was supported for the study variables.

Table 6*Summary of Multivariate Tests for Posttest Intolerance of Uncertainty*

Multivariate Test	Value	<i>F</i>	<i>p</i>	Effect Size	Statistical Power
Pillai's Trace	1.61	2.64	< .001	.805	1.00
Wilks' Lambda	.005	8.36	< .001	.932	1.00
Hotelling's Trace	81.8	23.8	< .001	.976	1.00
Roy's Largest Root	80.2	51.2	< .001	.988	1.00

Table 6 presents a summary of the multivariate tests for the posttest scores of the study variables. Wilks' lambda was statistically significant ($F = 8.36, p < .001$). Given the significance of Wilks' lambda, it can be

concluded that the posttest scores of the study variables were significantly affected by the independent variables, namely schema therapy and group metacognitive therapy.

Table 7*Within-Group and Between-Group Effects on Intolerance of Uncertainty According to Time, Group, and Their Interaction*

Dependent Variable	Source	Sum of Squares	df	Mean Square	<i>F</i>	<i>p</i>	Effect Size	Statistical Power
Inability to Act Under Ambiguous Conditions	Time	823.2	1.95	422.1	50.8	< .001	.471	1.00
	Group	477.06	2	238.5	30.4	< .001	.516	1.00
	Time × Group	147.7	3.90	37.8	4.56	.002	.138	.932
Stressfulness of Ambiguous Situations	Time	711.9	1.89	376.5	43.6	< .001	.434	1.00
	Group	259.09	2	129.5	13.04	< .001	.314	.996
	Time × Group	280.2	3.78	74.1	8.58	< .001	.231	.998
Negativity and Avoidance of Unexpected Events	Time	352.9	1.98	177.7	17.8	< .001	.239	1.00
	Group	183.1	2	91.5	9.63	< .001	.253	.976
	Time × Group	95.4	3.97	24.03	3.41	.040	.178	.890
Uncertainty About the Future	Time	373.3	1.49	250.2	55.4	< .001	.493	1.00
	Group	553.9	2	276.9	22.8	< .001	.445	1.00
	Time × Group	133.8	2.98	44.8	9.94	< .001	.259	1.00
—	Time	466.9	1.56	298.6	36.2	< .001	.389	1.00

The results presented in Table 7 indicate that the within-subject effect of time on intolerance of uncertainty was statistically significant ($p \leq .01$). Likewise, the between-group effect of the two interventions—schema therapy and group

metacognitive therapy—on improvement in intolerance of uncertainty was significant. Pairwise comparisons of the adjusted means across the pretest, posttest, and follow-up stages are presented in Table 8.

Table 8*Bonferroni Post Hoc Test for Intolerance of Uncertainty to Examine the Durability of Treatment Effects*

Dependent Variable	Comparison Between Stages	Mean Difference	p
Inability to Act Under Ambiguous Conditions	Pretest–Posttest	4.23*	< .001
	Pretest–Follow-up	4.78*	< .001
	Posttest–Follow-up	.548	.965
Stressfulness of Ambiguous Situations	Pretest–Posttest	3.79*	< .001
	Pretest–Follow-up	4.54*	< .001
	Posttest–Follow-up	.755	.428
Negativity and Avoidance of Unexpected Events	Pretest–Posttest	3.34*	< .001
	Pretest–Follow-up	3.32*	< .001
	Posttest–Follow-up	–1.02	.261
Uncertainty About the Future	Pretest–Posttest	2.87*	< .001
	Pretest–Follow-up	3.20*	< .001
	Posttest–Follow-up	.333	.441

As shown in Table 8, the mean differences between pretest and posttest, representing the intervention effect, and between pretest and follow-up, representing the persistence of change over time, were larger and statistically significant. In contrast, the differences

between posttest and follow-up were not statistically significant. These findings indicate that the effects of both interventions on intolerance of uncertainty were maintained at the follow-up stage.

Table 9*Bonferroni Post Hoc Test Comparing the Effectiveness of the Therapeutic Approaches on Intolerance of Uncertainty*

Dependent Variable	Intervention Group	Comparison Group	Mean Difference	p
Inability to Act Under Ambiguous Conditions	Group Schema Therapy	Control	–3.49*	< .001
	Group Metacognitive Therapy	Control	–3.41*	< .001
Stressfulness of Ambiguous Situations	Group Schema Therapy	Control	–2.36*	< .001
	Group Metacognitive Therapy	Control	–2.69*	< .001
Negativity and Avoidance of Unexpected Events	Group Schema Therapy	Control	–1.80*	.007
	Group Metacognitive Therapy	Control	–2.36*	< .001
Uncertainty About the Future	Group Schema Therapy	Control	–3.63*	< .001
	Group Metacognitive Therapy	Control	–3.80*	< .001

Note. An asterisk indicates a statistically significant mean difference.

Posttest comparisons in Table 9 showed that both group schema therapy and group metacognitive therapy produced statistically significant differences in intolerance of uncertainty compared with the control group ($p < .05$). However, comparison of the magnitudes of the mean differences indicated that group schema therapy had a slightly stronger effect on reducing inability to act under ambiguous conditions than group metacognitive therapy.

In contrast, group metacognitive therapy demonstrated greater effectiveness than schema therapy in reducing the stressfulness of ambiguous situations, negativity and avoidance of unexpected events, and uncertainty about the future. Thus, although both interventions were significantly more effective than the control condition, the pattern of mean differences suggests that the two approaches may differ in their

relative effects across specific dimensions of intolerance of uncertainty.

Discussion and Conclusion

The results of the first hypothesis showed that both group schema therapy and group metacognitive therapy produced statistically significant differences in all examined variables compared with the control group. However, comparison of the magnitude of the mean differences indicated that group schema therapy was more effective in reducing “inability to act under ambiguous conditions,” a subcomponent of intolerance of uncertainty.

This finding is consistent with the results reported by Alizade et al. (2024), Peterson et al. (2025), Fisher et al. (2018), and Richter-Benedikt et al. (2024). The findings of

the present study demonstrated that both group schema therapy and group metacognitive therapy were able to produce significant changes in all study variables compared with the control group. However, comparison of the magnitude of the mean effects revealed that schema therapy was more effective than metacognitive therapy in reducing the “inability to act under ambiguous conditions” component of intolerance of uncertainty. To explain this pattern, it is necessary to examine the theoretical relationship among the constructs under study, the structure of the interventions, and previous research findings. It is important to recognize that inability to act under ambiguous conditions primarily reflects deep-rooted schemas through which individuals experience incompetence, vulnerability, or fear of decision-making when confronted with uncertain situations. Therefore, an intervention that directly addresses fundamental personality patterns would naturally be expected to exert a stronger effect on this component.

The effectiveness of both treatments was initially expected because both approaches can broadly modify cognitive and emotional processes associated with anxiety, worry, and uncertainty. Schema therapy exerts its effects by identifying early maladaptive schemas and modifying longstanding cognitive-emotional patterns (Peterson et al., 2025; Richter-Benedikt et al., 2024).

On the other hand, metacognitive therapy has also been shown to effectively reduce worry, stress, and threat processing, and this effectiveness is consistent with numerous research findings. Metacognitive therapy is based on modifying positive and negative metacognitive beliefs about worry, reducing threat-focused attentional cycles, and interrupting dysfunctional cognitive processing styles. Ghasemi Pirbalouti et al. (2026) showed that metacognitive therapy explained 88% of the variance in perceived stress and that its effects remained stable at follow-up. Masoodian et al. (2023) also emphasized the effectiveness of this treatment in reducing anxiety among patients.

The central question, however, is why schema therapy was more effective in the “inability to act under ambiguous conditions” subcomponent. This can be explained through a closer examination of the underlying constructs. Unlike other dimensions of intolerance of uncertainty, which are relatively more cognitive in nature, this component is more strongly

related to behavioral and motivational domains and, at a deeper level, to individuals’ identity-related beliefs. Many individuals experience decision paralysis in ambiguous situations because of schemas such as incompetence, failure, vulnerability to harm, unrelenting standards, or subjugation. Schema therapy directly targets these schemas and, through cognitive-emotional restructuring, corrective therapeutic experiences, imagery, empty-chair dialogues, and other techniques, modifies individuals’ deepest beliefs about their ability, competence, and safety. This process may enable individuals to feel more capable of taking action in ambiguous situations (Kordmirza Nikoozadeh et al., 2023).

Unlike schema therapy, metacognitive therapy does not directly address core identity structures or mental models originating in childhood. Rather, it primarily focuses on patterns of worry, metacognitive appraisals, selective attention, and threat-processing strategies. Therefore, although the changes produced by metacognitive therapy are effective, they are more closely related to cognitive control and emotion regulation and may have less direct influence on deeply rooted behavioral patterns such as behavioral avoidance or inability to act. This structural difference between the two therapeutic approaches may explain why schema therapy demonstrated superior effectiveness for this particular variable (Masoodian et al., 2023).

Accordingly, it is reasonable that reductions in “inability to act under ambiguity” would be more strongly influenced by a treatment that directly addresses early parental messages, maladaptive coping styles, frustrating childhood memories, and internalized emotional patterns. When an individual recognizes how schemas such as “incompetence” or “vulnerability” have contributed to behavioral paralysis, newly acquired emotional and cognitive insight may enable the person to confront uncertainty without experiencing the same internal sense of danger or helplessness. This level of structural reconstruction occurs to a lesser extent in metacognitive therapy because its primary goal is to interrupt cycles of worry rather than reconstruct personality.

Another important point is that the “inability to act” component has a behavioral-avoidant nature. Because schema therapy employs techniques that directly challenge behavioral avoidance, such as emotional

exposure, limited reparenting, and corrective emotional experiences, it can also target avoidant behaviors. Metacognitive therapy, by contrast, focuses more heavily on cognitive avoidance than on behavioral avoidance and may therefore exert a less direct effect on behaviors associated with inaction under conditions of ambiguity (Alizade et al., 2024).

Considering these findings as a whole, the pattern observed in the present study appears consistent with both theoretical assumptions and empirical evidence. Both interventions can be effective because they address aspects of anxiety, worry, and uncertainty; however, schema therapy may exert a stronger effect on the “ability to act under ambiguous conditions” component because of its greater depth, its attention to identity-related structures, and its direct targeting of underlying schemas.

Several limitations of the present study should be acknowledged. First, the statistical population was limited to infertile women who attended infertility treatment centers and counseling centers in Alborz Province. Because cultural and social characteristics and access to treatment services may influence the experience of infertility and individuals’ psychological responses, generalization of the findings to other provinces, cultural contexts, or infertile men should be made with caution.

Second, purposive sampling was used. Although participants were randomly assigned to experimental and control groups, the absence of fully random sampling during the participant-selection stage may limit the generalizability of the findings. In clinical intervention research, restricted access to eligible participants frequently results in this type of limitation.

Another limitation concerns the use of self-report instruments to assess the study variables. Responses to these instruments may be influenced by response biases, the tendency to present oneself favorably, or participants’ momentary emotional states. Therefore, the obtained scores may not fully reflect participants’ actual psychological conditions.

Moreover, because of the nature of psychological interventions, individual factors such as participants’ motivation, level of engagement in treatment sessions, and completion of homework assignments may influence therapeutic outcomes. Complete control over these factors is always difficult in intervention research.

Finally, although a follow-up stage was included in the present study, the follow-up period was relatively short and therefore did not allow examination of the long-term stability of treatment effects.

Accordingly, because the study population was limited to infertile women attending treatment centers in Alborz Province, future studies are recommended to replicate the research in different provinces and cultural settings in order to compare findings across various social and cultural contexts. Similar studies involving infertile men or infertile couples could also contribute to a more comprehensive understanding of the psychological dimensions of infertility and improve the generalizability of the findings.

Because purposive sampling was used in the present study, future studies are also recommended to employ random or multistage sampling methods whenever feasible in order to improve the representativeness of the sample and strengthen confidence in the generalizability of the findings. Given the use of self-report instruments, future research should also adopt multimethod assessment approaches. In addition to self-report questionnaires, structured clinical interviews, therapist evaluations, or even spouse reports could be used to obtain a more accurate picture of participants’ psychological functioning.

Because active participation, completion of therapeutic assignments, and individual motivation may affect the effectiveness of psychological interventions, future studies are recommended to examine variables such as treatment motivation, adherence to therapeutic assignments, and level of participation in sessions as mediating or moderating variables in order to clarify their role in therapeutic change. Finally, considering the limited follow-up period in the present study, future research should employ longer follow-up intervals, such as six months or one year, to evaluate the long-term durability of treatment effects and determine the extent to which the observed changes are maintained over time.

Conclusion

Overall, the findings of the present study showed that both schema therapy and metacognitive therapy significantly improved psychological indicators among infertile women. However, the nature of the changes produced by the two approaches differed, and these differences in their mechanisms of action were clearly reflected in the study findings. Infertility, as a complex,

prolonged, and multidimensional experience, not only generates worry and anxiety but also affects deep structures of individuals' beliefs about themselves, their sense of worth, control, and the future. Therefore, examining therapeutic approaches in terms of both the depth of change and the type of cognitive targets they address is of fundamental importance.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this study.

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