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Comparison of the Effectiveness of Metacognitive Therapy (MCT) and Mindfulness-Based Cognitive Therapy (MBCT) on Worry and Intolerance of Uncertainty in Generalized Anxiety Disorder

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A B S T R A C T

Purpose: The present study aimed to compare the effectiveness of Metacognitive Therapy (MCT) and Mindfulness-Based Cognitive Therapy (MBCT) in reducing worry and intolerance of uncertainty among individuals with generalized anxiety disorder.
Methods and Materials: This quasi-experimental study employed a pretest–posttest–follow-up design with a control group. The statistical population consisted of adults with generalized anxiety disorder who referred to psychological and counseling centers in Tehran, Iran. A total of 45 eligible participants were selected through purposive sampling and randomly assigned to the MCT group (n = 15), MBCT group (n = 15), and control group (n = 15). The MCT group received eight weekly individual sessions of approximately 60 minutes, while the MBCT group received eight weekly sessions of approximately 90 minutes. The control group received no structured psychological intervention during the study period. Participants completed the Penn State Worry Questionnaire and the 12-item Intolerance of Uncertainty Scale at pretest, posttest, and three-month follow-up. Data were analyzed using mixed repeated-measures analysis of variance and Bonferroni-adjusted post hoc comparisons in SPSS version 27.
Findings: The results showed significant effects of time, group, and time × group interaction for worry, with the interaction effect reaching $F(3.30, 69.28) = 74.52$, $p < .001$, $\eta^2p = .780$. Significant effects were also observed for intolerance of uncertainty, with a significant time × group interaction, $F(3.38, 71.02) = 62.91$, $p < .001$, $\eta^2p = .750$. Bonferroni comparisons indicated that both MCT and MBCT were significantly more effective than the control condition in reducing worry and intolerance of uncertainty at posttest and follow-up ($p < .001$). Moreover, MCT produced significantly greater reductions than MBCT in worry at posttest ($p = .028$) and follow-up ($p = .026$), as well as in intolerance of uncertainty at posttest ($p = .047$) and follow-up ($p = .041$).
Conclusion: Both MCT and MBCT were effective in reducing worry and intolerance of uncertainty in generalized anxiety disorder, but MCT demonstrated greater and sustained effectiveness across both outcomes.

Keywords: *Metacognitive Therapy, Mindfulness-Based Cognitive Therapy, Worry, Intolerance of Uncertainty, Generalized Anxiety Disorder*

1. Introduction

Generalized anxiety disorder (GAD) is characterized by persistent, excessive, and difficult-to-control worry concerning multiple areas of everyday life. Although worry is a common cognitive response to perceived threat or uncertainty, in GAD it becomes chronic, repetitive, and functionally impairing, often occurring in the absence of an immediate or objectively proportionate danger. The persistence of worry can consume substantial cognitive resources, interfere with concentration and decision-making, reduce emotional flexibility, and reinforce avoidance-oriented patterns of coping. Contemporary psychological models increasingly emphasize that the severity of pathological worry cannot be adequately explained by the content of threatening thoughts alone; rather, the way individuals interpret, regulate, monitor, and respond to their own cognitive and emotional experiences may play a decisive role in maintaining the disorder. Research has consequently focused on metacognitive beliefs, emotion-regulation processes, coping responses, and cognitive reactions to uncertainty as major mechanisms underlying persistent worry (Ge & Tolmie, 2025; Mohammadkhani et al., 2022).

Worry is particularly important in the clinical understanding of GAD because it functions not merely as a symptom but also as a self-perpetuating cognitive process. Individuals may initially engage in worry because they believe that anticipating negative possibilities will enhance preparedness, prevent undesirable events, or facilitate problem solving. However, repeated worry can increase threat salience, heighten internal monitoring, and strengthen beliefs that worrying is uncontrollable or dangerous. Metacognitive accounts of anxiety therefore distinguish between the initial occurrence of worry and secondary appraisals about worry itself. Meta-worry, or worry about one's own worrying, may intensify anxiety by transforming ordinary concerns into evidence of perceived cognitive danger or loss of control. Evidence from both analogue and clinical samples supports the relevance of meta-worry to GAD and indicates that metacognitive processes may also be associated with broader interpersonal difficulties among individuals with generalized anxiety symptoms (Nordahl et al., 2024). Similarly, empirical studies have found meaningful relationships between metacognitive beliefs and worry and have suggested that emotional flexibility and characteristic affective-response styles may partly explain how metacognitive processes become translated into persistent worry (Mohammadkhani et al., 2022). Experiential avoidance has likewise been identified as a mechanism linking maladaptive metacognitions to excessive worry, suggesting that attempts to escape or control uncomfortable internal experiences may paradoxically sustain the cognitive processes responsible for anxiety (Yildirim & Bahtiyar, 2022).

The relevance of metacognition extends beyond GAD and has been observed across a range of anxiety-related conditions. Health-related metacognitive beliefs, anxiety sensitivity, and intolerance of uncertainty have been found to contribute to health anxiety, suggesting that anxious responding is shaped not only by external threat but also by beliefs concerning internal cognitive and emotional experiences (Soleimani Babadi et al., 2022). During periods of widespread uncertainty, such as the COVID-19 outbreak, metacognitive beliefs have also been associated with anxiety through mechanisms involving obsessive thinking and difficulty tolerating ambiguous or uncertain circumstances (Khodabakhsh Pirkalaei, 2022). Furthermore, the associations of intolerance of uncertainty and metacognitive beliefs with test anxiety indicate that these cognitive mechanisms have transdiagnostic relevance in situations involving anticipated threat, performance evaluation, and incomplete predictability (Huntley et al., 2022). Such findings reinforce the view that maladaptive beliefs about thinking and uncertainty can create a cognitive environment in which worry becomes more persistent, self-referential, and resistant to spontaneous regulation.

Among the cognitive mechanisms implicated in GAD, intolerance of uncertainty has received particular attention. Intolerance of uncertainty refers to a dispositional tendency to perceive uncertain events and situations as stressful, threatening, unacceptable, or difficult to manage, regardless of the objective likelihood that a negative event will occur. Individuals high in intolerance of uncertainty often experience a strong need for predictability and may respond to ambiguous situations with heightened apprehension, repetitive thinking, reassurance seeking, indecision, avoidance, or attempts to obtain complete certainty. Because absolute certainty is rarely achievable in daily life, these strategies may increase rather than resolve anxiety. Intolerance of uncertainty therefore provides an important explanatory bridge between ambiguous future-oriented situations and the excessive worry that characterizes GAD. Research has shown that intolerance of uncertainty is meaningfully associated with anxiety-related vulnerability and may interact with mindfulness, resilience, social

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connectedness, and feelings of entrapment in shaping psychological adjustment (Akyıl et al., 2024). Associations between intolerance of uncertainty, anxiety sensitivity, mindfulness, and social anxiety have also been reported, supporting the broader relevance of this construct across anxiety presentations (Nikpour & Moslehi Jouybari, 2023).

The relationship between worry and intolerance of uncertainty appears to be mutually reinforcing. When uncertainty is experienced as intolerable, individuals may attempt to reduce ambiguity by repeatedly analyzing possible future outcomes. This cognitive activity can temporarily create a subjective sense of preparation or control, yet it simultaneously increases attention to potential threats and expands the number of negative scenarios considered. Worry may therefore function as an attempted solution to uncertainty while becoming part of the problem itself. Over time, unsuccessful attempts to use worry to obtain certainty can strengthen both negative beliefs about uncertainty and metacognitive beliefs concerning the uncontrollability of thinking. This interaction is clinically important because it suggests that effective treatment should address not only anxious thought content but also the processes that regulate attention, cognitive engagement, responses to uncertainty, and beliefs about the function and controllability of worry. Studies examining anxiety in diverse contexts have repeatedly demonstrated the importance of intolerance of uncertainty and related cognitive mechanisms, including research on obsessive-compulsive symptoms and ambiguity intolerance (Kazemi & Izadi, 2025; Yadollahi Ardestani et al., 2022).

Metacognitive Therapy (MCT) was developed specifically to modify the processes that sustain persistent emotional distress rather than to engage primarily in the restructuring of the factual content of individual thoughts. Within the metacognitive model, psychological disorders are maintained by a cognitive-attentional syndrome characterized by repetitive negative thinking, threat monitoring, maladaptive attentional strategies, and unhelpful attempts to regulate cognition. In GAD, the therapeutic focus is placed on modifying positive beliefs about the usefulness of worry, negative beliefs concerning its uncontrollability and harmfulness, excessive internal monitoring, and maladaptive strategies for managing intrusive thoughts. By helping individuals develop greater attentional flexibility and alter their relationship to worry, MCT aims to weaken the mechanisms that perpetuate anxiety. Evidence from intervention research suggests that metacognitive strategies can reduce repetitive negative thinking, including rumination and worry (Mirzaian, 2023). Metacognitive therapy has also demonstrated beneficial effects on anxiety, worry, and rumination in clinical populations characterized by repetitive intrusive cognition (Nematollahi et al., 2023). More recent evidence specifically concerning GAD has strengthened the empirical basis for MCT, with systematic review findings supporting its effectiveness in reducing generalized anxiety symptoms and the cognitive processes involved in the disorder (Uzun & Yilmaz, 2026).

The theoretical rationale for MCT is also supported by evidence demonstrating the central role of metacognitive beliefs in GAD symptoms across different populations. For example, maladaptive metacognitive beliefs have been associated with generalized anxiety disorder in populations facing substantial psychosocial and health-related stressors, suggesting that beliefs about thinking may remain clinically relevant even when anxiety develops within complex contextual circumstances (Bailey et al., 2025). The developmental literature similarly indicates that pathways to worry may involve interactions among emotion regulation, metacognitive beliefs, and coping responses, emphasizing that maladaptive metacognitive patterns can contribute to worry across developmental stages rather than emerging only after a fully developed anxiety disorder is established (Ge & Tolmie, 2025). These findings suggest that interventions targeting the regulation and interpretation of thinking itself may be especially relevant when pathological worry has become habitual and self-maintaining.

Mindfulness-Based Cognitive Therapy (MBCT), in contrast, integrates cognitive therapeutic principles with systematic mindfulness practice. Rather than attempting to eliminate distressing thoughts or determine whether their content is accurate, MBCT teaches individuals to observe thoughts, emotions, and bodily sensations as temporary internal events. This shift toward decentering may be especially relevant for people with GAD, who often respond to uncertainty by becoming cognitively entangled with future-oriented threat predictions. Through mindfulness practice, individuals learn to redirect attention to present-moment experience, recognize automatic cognitive patterns, and adopt a less judgmental and reactive stance toward uncomfortable internal states. These skills may reduce the tendency to elaborate anxious thoughts into extended episodes of worry and may also increase the capacity to remain psychologically engaged in situations that lack complete predictability.

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A growing body of evidence suggests that mindfulness-based interventions can reduce anxiety and worry across different populations. Mindfulness- and acceptance-based interventions have been shown to reduce anxiety and worry in individuals exposed to persistent caregiving stress, demonstrating the potential usefulness of these approaches for altering maladaptive cognitive-emotional reactions under conditions of chronic uncertainty (Al-Natsheh & Imam, 2025). Technology-supported mindfulness interventions have also been associated with changes in repetitive negative thinking processes such as rumination and worry, further supporting the relevance of mindfulness to cognitive perseveration (Hawley et al., 2024). In adolescent populations, mindfulness-based intervention has produced improvements in emotional symptoms and emotion-regulation strategies, indicating that mindfulness may influence the broader regulatory processes that contribute to vulnerability to anxiety (Piguet et al., 2025). Experimental evidence in individuals with GAD has additionally shown that mindfulness interventions can influence responses to stress, including autonomic aspects of emotional responding (Qi et al., 2025).

MBCT may be particularly relevant to intolerance of uncertainty because mindfulness encourages sustained contact with present experience without requiring immediate cognitive closure. Individuals who are intolerant of uncertainty often attempt to resolve discomfort by generating predictions, repeatedly checking possibilities, avoiding ambiguous situations, or seeking reassurance. Mindfulness practice offers an alternative response in which uncertainty can be noticed and experienced without immediate attempts to neutralize it. This process may reduce reactive avoidance and facilitate greater flexibility in responding to ambiguous situations. Clinical research has reported beneficial effects of MBCT on intolerance of uncertainty and related cognitive-emotional variables among individuals with GAD (Ghanizadeh Balderlou et al., 2025). Beneficial effects of MBCT have also been reported for intolerance of ambiguity in individuals with obsessive-compulsive symptoms (Kazemi & Izadi, 2025) and for emotion regulation and distress intolerance in other anxiety-related clinical presentations (Zareei et al., 2024). Furthermore, MBCT has demonstrated effectiveness in reducing meta-worry and improving distress tolerance, suggesting that mindfulness-based cognitive approaches can modify both primary anxious responding and higher-order reactions to distressing cognition (Soltani et al., 2024).

The effects of MBCT on worry have also been demonstrated in populations experiencing substantial psychological stress. In infertile women, MBCT has been associated with reductions in worry and improvements in psychological well-being, indicating that mindfulness-based cognitive methods may reduce repetitive negative thought even when worry is embedded in ongoing life uncertainty (Sahour & Heydari, 2024). More directly, randomized controlled research examining MBCT for GAD has provided evidence for its effectiveness in reducing generalized anxiety symptoms, although individual history and vulnerability factors may influence therapeutic response (Tang et al., 2025). These findings are important because they suggest that MBCT can address central features of GAD while also highlighting the need to clarify which therapeutic mechanisms and approaches may produce stronger effects on specific cognitive outcomes.

Although MCT and MBCT share certain therapeutic features, including reduced engagement with maladaptive repetitive thinking and a shift away from automatic cognitive reactions, they are grounded in different theoretical assumptions and emphasize different change processes. MCT directly targets dysfunctional metacognitive beliefs, worry regulation, threat monitoring, and the cognitive-attentional syndrome. Its techniques are designed to help patients recognize that worry does not need to be controlled through further thinking and that attention can be flexibly disengaged from threat-focused cognition. MBCT, by comparison, emphasizes mindful awareness, acceptance, nonjudgment, decentering, and present-focused observation of thoughts and emotions. Rather than directly challenging beliefs about the usefulness or dangerousness of worry, it aims to alter the individual's mode of relating to cognitive events. Both approaches may therefore reduce worry, but MCT may exert its effects more directly through changes in metacognitive control and beliefs, whereas MBCT may act more strongly through decentering, reduced reactivity, acceptance, and increased attentional awareness.

This distinction is clinically relevant when considering intolerance of uncertainty. MCT may reduce intolerance of uncertainty by weakening the metacognitive assumptions that motivate excessive cognitive control, such as the belief that worrying is necessary in order to anticipate and manage future threats. MBCT may reduce it by increasing willingness to experience ambiguity without automatically attempting to eliminate discomfort. Evidence connecting mindfulness with lower levels of maladaptive uncertainty-related responding supports the potential of mindfulness-

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based treatment in this area (Akyıl et al., 2024; Nikpour & Moslehi Jouybari, 2023). At the same time, research linking metacognitive beliefs, uncertainty-related processes, and persistent anxiety supports the possibility that a more direct metacognitive intervention may produce particularly strong changes in worry and intolerance of uncertainty (Huntley et al., 2022; Soleimani Babadi et al., 2022).

Despite the growing evidence supporting both approaches, direct comparisons between MCT and MBCT for the core cognitive features of GAD remain relatively limited. Much of the existing literature has examined one treatment independently, compared mindfulness-based interventions with other therapeutic approaches, or investigated related constructs in populations other than individuals diagnosed with GAD. Studies have compared MBCT with emotional schema therapy on intolerance of uncertainty and related cognitive variables (Ghanizadeh Balderlou et al., 2025), with schema therapy on worry and psychological well-being (Sahour & Heydari, 2024), and with other approaches on distress-related outcomes (Soltani et al., 2024; Zareei et al., 2024). Similarly, research on MCT has established its relevance to repetitive thinking and anxiety (Mirzaian, 2023; Nematollahi et al., 2023), while recent systematic evidence supports its efficacy specifically for GAD (Uzun & Yilmaz, 2026). However, determining whether these two theoretically distinct approaches differ in their effects on worry and intolerance of uncertainty requires direct comparative investigation using the same clinical population, measurement schedule, and outcome criteria.

Such comparative evidence has practical as well as theoretical importance. Worry and intolerance of uncertainty are closely connected but not identical treatment targets. A therapy may substantially reduce repetitive worry while producing a more modest change in the underlying aversion to uncertainty, or it may improve tolerance of ambiguous internal experiences without producing an equivalent reduction in habitual worry. Directly comparing MCT and MBCT can therefore clarify whether targeting metacognitive beliefs and attentional regulation produces outcomes different from those obtained by cultivating mindful, decentered awareness. The increasing evidence for mindfulness-based treatment of GAD (Qi et al., 2025; Tang et al., 2025) and for metacognitive mechanisms in generalized anxiety (Bailey et al., 2025; Nordahl et al., 2024) makes such a comparison particularly timely. It may also contribute to the refinement of psychological treatment selection by identifying whether one approach produces a stronger effect on cognitive processes that are central to the persistence of GAD.

Accordingly, the aim of the present study was to compare the effectiveness of Metacognitive Therapy (MCT) and Mindfulness-Based Cognitive Therapy (MBCT) in reducing worry and intolerance of uncertainty among individuals with generalized anxiety disorder.

2. Methods and Materials

2.1. Study Design and Participants

The present study employed a quasi-experimental design with pretest, posttest, and follow-up assessments and a control group to compare the effectiveness of Metacognitive Therapy (MCT) and Mindfulness-Based Cognitive Therapy (MBCT) in reducing worry and intolerance of uncertainty among individuals with generalized anxiety disorder (GAD). The statistical population consisted of adults with symptoms of generalized anxiety disorder who referred to psychological and counseling centers in Tehran, Iran. Following initial screening and clinical assessment, 45 eligible participants were selected through purposive sampling and randomly assigned to three groups: the Metacognitive Therapy group (n = 15), the Mindfulness-Based Cognitive Therapy group (n = 15), and the control group (n = 15). Random allocation was performed after completion of the pretest assessment to reduce systematic differences between the groups at baseline. The inclusion criteria were being between 20 and 50 years of age, meeting the diagnostic criteria for generalized anxiety disorder based on a structured clinical interview and the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR), having at least a secondary-school education to ensure adequate comprehension of questionnaires and therapeutic assignments, providing informed consent for participation, and not receiving another structured psychological treatment during the study period. Participants who were receiving psychiatric medication were required to have maintained a stable medication regimen before entering the study and throughout the intervention period. The exclusion criteria included the presence of psychotic disorders, bipolar disorder, severe substance use disorder, acute suicidal risk, severe neurological or medical conditions that could interfere with participation, absence from more than two treatment sessions, initiation of another psychological intervention during the study, and unwillingness to continue participation. After the initial assessment, all participants

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completed the study questionnaires as the pretest. Participants assigned to the two experimental groups subsequently received their respective interventions, whereas participants in the control group received no structured psychological intervention during the same period and remained on a waiting list. Immediately after completion of the interventions, all three groups completed the posttest measures. A follow-up assessment was conducted three months after the posttest to examine the maintenance of therapeutic effects. Participants were informed about the objectives and general procedures of the study, the voluntary nature of their participation, the confidentiality of their information, and their right to withdraw from the study at any stage without any negative consequences. Written informed consent was obtained from all participants before data collection, and all information was analyzed anonymously and used exclusively for research purposes.

2.2. Instruments

Penn State Worry Questionnaire. Worry was assessed using the Penn State Worry Questionnaire (PSWQ), developed by Meyer and colleagues to measure the intensity, excessiveness, generality, and uncontrollability of pathological worry. The questionnaire consists of 16 items designed to assess an individual's general tendency to engage in persistent and excessive worry rather than worry related to a particular situation or life domain. Participants respond to each item on a 5-point Likert scale ranging from 1 (not at all typical of me) to 5 (very typical of me). Several items are reverse scored, and after appropriate recoding, item scores are summed to obtain a total score. Total scores range from 16 to 80, with higher scores indicating greater levels of pervasive and uncontrollable worry. The PSWQ has been extensively used in both clinical and nonclinical populations and is particularly relevant to the assessment of generalized anxiety disorder because excessive and difficult-to-control worry represents a central feature of the disorder. Previous psychometric investigations have demonstrated satisfactory internal consistency, test-retest reliability, convergent validity, and discriminant validity for the questionnaire. In the present study, the total PSWQ score was used as the primary indicator of worry at pretest, posttest, and follow-up assessments.

Intolerance of Uncertainty Scale–12. Intolerance of uncertainty was assessed using the 12-item version of the Intolerance of Uncertainty Scale (IUS-12), which measures negative cognitive, emotional, and behavioral reactions to uncertain situations and events. The instrument is based on the conceptualization of intolerance of uncertainty as a dispositional tendency to perceive uncertain situations as stressful, unacceptable, threatening, or difficult to manage regardless of the actual probability or consequences of the event. The IUS-12 contains 12 statements rated on a 5-point Likert scale ranging from 1 (not at all characteristic of me) to 5 (entirely characteristic of me). The instrument provides a total intolerance-of-uncertainty score, with higher scores indicating a stronger tendency to react negatively to ambiguity and uncertainty. The scale also reflects two closely related dimensions commonly described as prospective intolerance of uncertainty, involving a desire for predictability and information about future events, and inhibitory intolerance of uncertainty, involving behavioral or cognitive paralysis when confronted with uncertainty. The IUS-12 has demonstrated satisfactory internal consistency, construct validity, convergent validity, and associations with symptoms of generalized anxiety and pathological worry. Given the theoretical importance of intolerance of uncertainty in the development and maintenance of generalized anxiety disorder, the total score of the scale was used in the present study to assess changes in this construct across the three measurement occasions.

2.3. Intervention

Metacognitive Therapy. Participants in the Metacognitive Therapy group received eight weekly individual therapy sessions, each lasting approximately 60 minutes. The intervention was based on the metacognitive model of psychological disorders, which proposes that persistent emotional distress is maintained primarily by a maladaptive pattern of thinking known as the cognitive-attentional syndrome rather than solely by the content of negative thoughts. During the initial sessions, participants were introduced to the metacognitive model of generalized anxiety disorder, and an individualized case formulation was developed to identify triggers for worry, positive beliefs about the usefulness of worrying, negative beliefs concerning the uncontrollability and dangerousness of worry, threat-monitoring processes, and maladaptive coping strategies. Participants were helped to distinguish between ordinary thoughts and extended worry processes and to understand how attempts to control or suppress thoughts could maintain anxiety. Subsequent sessions focused on modifying positive and negative metacognitive beliefs, particularly beliefs that worry is necessary for coping or

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preventing negative outcomes and beliefs that worrying is uncontrollable or psychologically harmful. Detached mindfulness was introduced to help participants experience thoughts as transient mental events without engaging with, suppressing, or attempting to modify their content. Attention Training Technique and other attentional-control exercises were used when appropriate to increase flexible control over attention and reduce excessive self-focused attention and threat monitoring. Participants also practiced postponement of worry, behavioral experiments designed to test beliefs concerning the uncontrollability and utility of worry, and strategies for abandoning maladaptive thought-control behaviors. Toward the final sessions, treatment gains were reviewed, residual metacognitive beliefs were addressed, and participants developed an individualized relapse-prevention plan emphasizing flexible attentional control, reduced engagement with worry, and appropriate responses to future triggers. Participants were assigned between-session exercises to practice the therapeutic techniques and apply them to naturally occurring episodes of worry.

Mindfulness-Based Cognitive Therapy. Participants in the Mindfulness-Based Cognitive Therapy group received eight weekly sessions, each lasting approximately 90 minutes. The intervention integrated mindfulness practices with principles derived from cognitive therapy and was adapted to address excessive worry, repetitive negative thinking, and maladaptive reactions to uncertainty. In the early sessions, participants were introduced to the concept of mindfulness as purposeful, present-focused, and nonjudgmental awareness of internal and external experiences. They practiced basic mindfulness exercises, including mindful breathing, body-scan meditation, awareness of bodily sensations, and mindful engagement in routine daily activities. Participants were encouraged to identify habitual automatic reactions to distressing thoughts and uncertain situations and to develop the ability to observe these experiences without immediately attempting to avoid, suppress, analyze, or resolve them. In subsequent sessions, sitting meditation, mindful movement, awareness of thoughts and emotions, and the three-minute breathing space were introduced and repeatedly practiced. Cognitive components of the intervention emphasized recognizing thoughts as mental events rather than objective representations of reality, reducing identification with worry-related cognitions, and developing a decentered perspective toward predictions of negative future outcomes. Particular attention was given to accepting uncertainty and uncomfortable emotional states without engaging in excessive reassurance seeking, avoidance, cognitive checking, or repetitive attempts to achieve certainty. Participants were taught to recognize early signs of anxiety escalation and to respond with mindful observation and deliberate behavioral choice rather than automatic worry. Home practice constituted an essential component of the intervention and included formal meditation exercises as well as informal mindfulness practices during everyday activities. In the final sessions, participants reviewed the skills they had acquired, identified situations associated with an increased risk of returning to habitual worry, and developed personal plans for maintaining regular mindfulness practice and responding adaptively to future experiences of anxiety and uncertainty.

2.4. Data Analysis

Data analysis was performed using IBM SPSS Statistics version 27. Descriptive statistics, including means and standard deviations, were calculated for worry and intolerance-of-uncertainty scores across the pretest, posttest, and three-month follow-up assessments in each study group. Before conducting inferential analyses, the assumptions required for parametric repeated-measures analysis were examined. The normality of the distribution of the dependent variables was evaluated using the Shapiro–Wilk test and examination of distributional indices, and homogeneity of variances across the groups was assessed using Levene's test. The assumption of homogeneity of covariance matrices was evaluated where appropriate, and Mauchly's test was used to assess the sphericity assumption for the within-subject factor. When the assumption of sphericity was violated, the Greenhouse–Geisser correction was applied to adjust the degrees of freedom. To evaluate changes in worry and intolerance of uncertainty over time and compare the patterns of change among the Metacognitive Therapy, Mindfulness-Based Cognitive Therapy, and control groups, mixed repeated-measures analysis of variance was conducted separately for each dependent variable, with time comprising three levels (pretest, posttest, and follow-up) as the within-subject factor and treatment group comprising three levels (MCT, MBCT, and control) as the between-subject factor. The main effects of time and group and, most importantly, the time × group interaction were examined to determine whether changes across the measurement occasions differed among the three groups. Effect sizes were reported using partial eta squared (η^2p) to indicate the magnitude of intervention effects. When statistically

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significant main or interaction effects were identified, Bonferroni-adjusted pairwise comparisons were conducted to determine differences between measurement occasions and to establish whether MCT and MBCT differed from the control condition and from each other. Statistical significance was set at $p < .05$ for all analyses, and the results were interpreted by considering both statistical significance and the magnitude of the observed effects.

3. Findings and Results

The study included 45 participants with generalized anxiety disorder who were equally assigned to the Metacognitive Therapy (MCT), Mindfulness-Based Cognitive Therapy (MBCT), and control groups, with 15 participants in each group. Of the total sample, 26 participants (57.78%) were women and 19 (42.22%) were men. The mean age of the participants was 35.42 years (SD = 7.18), with an age range of 22 to 49 years. The mean ages of participants in the MCT, MBCT, and control groups were 35.13 (SD = 7.26), 35.67 (SD = 6.94), and 35.47 (SD = 7.58) years, respectively. Regarding marital status, 25 participants (55.56%) were married and 20 (44.44%) were single. In terms of educational level, 11 participants (24.44%) had a high-school diploma or associate degree, 23 (51.11%) held a bachelor's degree, and 11 (24.44%) had a master's degree or higher. Examination of the demographic characteristics indicated that the three groups were generally comparable in terms of age, gender distribution, marital status, and educational level, and no substantial baseline demographic differences were observed among the groups.

Table 1

Descriptive Statistics for Worry and Intolerance of Uncertainty Scores in the Three Groups Across the Three Measurement Occasions

Variable	Group	Pretest M (SD)	Posttest M (SD)	Follow-up M (SD)
Worry	MCT	65.20 (5.14)	40.73 (5.89)	42.13 (5.76)
Worry	MBCT	64.47 (5.62)	45.80 (6.11)	47.27 (6.25)
Worry	Control	64.93 (5.37)	63.27 (5.58)	62.67 (5.71)
Intolerance of Uncertainty	MCT	47.13 (4.82)	29.47 (4.76)	30.67 (4.92)
Intolerance of Uncertainty	MBCT	46.60 (5.05)	33.20 (5.14)	34.53 (5.22)
Intolerance of Uncertainty	Control	46.87 (4.91)	45.53 (5.06)	45.07 (5.18)

As shown in Table 1, the three groups demonstrated relatively similar mean scores for worry and intolerance of uncertainty at the pretest assessment. However, substantial reductions were observed in both outcome variables following treatment in the MCT and MBCT groups, whereas only minor changes occurred in the control group. For worry, the mean score in the MCT group decreased from 65.20 (SD = 5.14) at pretest to 40.73 (SD = 5.89) at posttest and remained relatively stable at 42.13 (SD = 5.76) at the three-month follow-up. The MBCT group also showed a considerable reduction in worry, from 64.47 (SD = 5.62) at pretest to 45.80 (SD = 6.11) at posttest, with a follow-up mean of 47.27 (SD = 6.25). In contrast, the control group's worry scores changed only slightly, from 64.93 (SD = 5.37) at pretest to 63.27 (SD = 5.58) at posttest and 62.67 (SD = 5.71) at follow-up. A similar pattern was found for intolerance of uncertainty. In the MCT group, the mean score decreased from 47.13 (SD = 4.82) at pretest to 29.47 (SD = 4.76) at posttest and was 30.67 (SD = 4.92) at follow-up. The corresponding scores in the MBCT group were 46.60 (SD = 5.05), 33.20 (SD = 5.14), and 34.53 (SD = 5.22), respectively. By comparison, the control group exhibited only a small decline from 46.87 (SD = 4.91) at pretest to 45.53 (SD = 5.06) at posttest and 45.07 (SD = 5.18) at follow-up. The descriptive findings therefore indicated that both therapeutic interventions were associated with reductions in worry and intolerance of uncertainty, with the magnitude of reduction appearing greater in the MCT group.

Before conducting the repeated-measures analyses, the relevant statistical assumptions were examined. The Shapiro–Wilk test indicated that the distributions of worry and intolerance-of-uncertainty scores did not significantly deviate from normality across the study groups and measurement occasions ($p > .05$). Levene's test was also nonsignificant for both dependent variables at pretest, posttest, and follow-up ($p > .05$), supporting the assumption of homogeneity of variances. Examination of the covariance structure did not indicate any serious violations that would preclude the use of repeated-measures analysis. Mauchly's test of sphericity was statistically significant for worry ($W = .79$, $\chi^2 = 9.62$, $p = .008$) and intolerance of uncertainty ($W = .81$, $\chi^2 = 8.54$, $p = .014$), indicating that the assumption of

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sphericity was violated for both variables. Consequently, the Greenhouse–Geisser correction was applied to the within-subject effects. In addition, inspection of standardized residuals revealed no extreme outliers, and the observed patterns supported the use of parametric repeated-measures analysis of variance.

Table 2

Mixed Repeated-Measures Analysis of Variance for Worry and Intolerance of Uncertainty

Variable	Effect	df	F	p	Partial η^2
Worry	Time	1.65, 69.28	238.41	< .001	.850
Worry	Group	2, 42	48.76	< .001	.699
Worry	Time × Group	3.30, 69.28	74.52	< .001	.780
Intolerance of Uncertainty	Time	1.69, 71.02	214.63	< .001	.836
Intolerance of Uncertainty	Group	2, 42	41.28	< .001	.663
Intolerance of Uncertainty	Time × Group	3.38, 71.02	62.91	< .001	.750

As presented in Table 2, the repeated-measures analysis demonstrated a statistically significant main effect of time on worry, $F(1.65, 69.28) = 238.41$, $p < .001$, $\eta^2p = .850$, indicating that worry scores changed significantly across the pretest, posttest, and follow-up assessments. The main effect of group was also statistically significant, $F(2, 42) = 48.76$, $p < .001$, $\eta^2p = .699$, demonstrating overall differences among the MCT, MBCT, and control groups. More importantly, the time × group interaction was statistically significant, $F(3.30, 69.28) = 74.52$, $p < .001$, $\eta^2p = .780$. This finding indicated that the pattern of change in worry over time differed significantly among the three groups and provided evidence that the observed reductions were associated with the therapeutic interventions rather than merely with the passage of time. For intolerance of uncertainty, a significant main effect of time was similarly observed, $F(1.69, 71.02) = 214.63$, $p < .001$, $\eta^2p = .836$. The main effect of group was significant, $F(2, 42) = 41.28$, $p < .001$, $\eta^2p = .663$, and the time × group interaction was also significant, $F(3.38, 71.02) = 62.91$, $p < .001$, $\eta^2p = .750$. The large partial eta-squared values for the interaction effects indicated substantial intervention-related changes in both dependent variables. Accordingly, Bonferroni-adjusted pairwise comparisons were conducted to determine the specific differences among the groups at posttest and follow-up.

Table 3

Bonferroni Post Hoc Comparisons Between the Three Groups at Posttest and Follow-up

Variable	Time	Group Comparison	Mean Difference	SE	p
Worry	Posttest	MCT – MBCT	-5.07	2.19	.028
Worry	Posttest	MCT – Control	-22.54	2.19	< .001
Worry	Posttest	MBCT – Control	-17.47	2.19	< .001
Worry	Follow-up	MCT – MBCT	-5.14	2.21	.026
Worry	Follow-up	MCT – Control	-20.54	2.21	< .001
Worry	Follow-up	MBCT – Control	-15.40	2.21	< .001
Intolerance of Uncertainty	Posttest	MCT – MBCT	-3.73	1.82	.047
Intolerance of Uncertainty	Posttest	MCT – Control	-16.06	1.82	< .001
Intolerance of Uncertainty	Posttest	MBCT – Control	-12.33	1.82	< .001
Intolerance of Uncertainty	Follow-up	MCT – MBCT	-3.86	1.84	.041
Intolerance of Uncertainty	Follow-up	MCT – Control	-14.40	1.84	< .001
Intolerance of Uncertainty	Follow-up	MBCT – Control	-10.54	1.84	< .001

The Bonferroni-adjusted comparisons presented in Table 3 showed that both MCT and MBCT were significantly more effective than the control condition in reducing worry at both posttest and follow-up. At posttest, the mean worry score in the MCT group was significantly lower than that of the control group (mean difference = -22.54, $p < .001$), and the MBCT group also had a significantly lower score than the control group (mean difference = -17.47, $p < .001$). In addition, the difference between MCT and MBCT was statistically significant (mean difference = -5.07, $p = .028$), indicating a greater reduction in worry following MCT. This pattern was maintained at the three-month follow-up, where

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MCT remained significantly more effective than the control condition (mean difference = -20.54, p < .001) and MBCT remained significantly more effective than the control condition (mean difference = -15.40, p < .001). The difference between MCT and MBCT also remained statistically significant at follow-up (mean difference = -5.14, p = .026). For intolerance of uncertainty, both intervention groups demonstrated significantly lower scores than the control group at posttest, with mean differences of -16.06 for MCT versus control (p < .001) and -12.33 for MBCT versus control (p < .001). The MCT group also showed a significantly greater reduction than the MBCT group at posttest (mean difference = -3.73, p = .047). At follow-up, these effects remained evident: MCT differed significantly from the control group (mean difference = -14.40, p < .001), MBCT differed significantly from the control group (mean difference = -10.54, p < .001), and MCT remained significantly more effective than MBCT (mean difference = -3.86, p = .041). Collectively, these findings indicated that both MCT and MBCT produced sustained reductions in worry and intolerance of uncertainty among individuals with generalized anxiety disorder, while MCT demonstrated a statistically greater therapeutic effect than MBCT on both outcomes.

4. Discussion and Conclusion

The present study aimed to compare the effectiveness of Metacognitive Therapy (MCT) and Mindfulness-Based Cognitive Therapy (MBCT) in reducing worry and intolerance of uncertainty among individuals with generalized anxiety disorder. The findings showed that both MCT and MBCT produced significant reductions in worry and intolerance of uncertainty compared with the control group at posttest, and these improvements were largely maintained at the three-month follow-up. In addition, MCT produced significantly greater reductions than MBCT in both worry and intolerance of uncertainty at posttest and follow-up. These findings indicate that although both interventions are effective approaches for modifying central cognitive features of generalized anxiety disorder, MCT may exert a more pronounced effect on the specific mechanisms represented by pathological worry and difficulty tolerating uncertainty.

The finding that MCT significantly reduced worry is consistent with the theoretical assumptions of the metacognitive model and with previous research demonstrating the importance of maladaptive metacognitive beliefs in the persistence of repetitive negative thinking. Pathological worry in generalized anxiety disorder is not maintained solely by the content of threatening thoughts, but also by beliefs about the usefulness, uncontrollability, and dangerousness of worry. When individuals believe that worrying helps them anticipate danger or solve future problems, they are more likely to engage in prolonged chains of repetitive thinking. At the same time, negative beliefs that worry is uncontrollable or harmful can generate secondary anxiety about the worrying process itself. This pattern of meta-worry can intensify cognitive distress and perpetuate generalized anxiety symptoms. Previous findings have demonstrated a meaningful relationship between metacognitive beliefs and worry and have shown that affective style and emotional flexibility may partly explain how maladaptive metacognition contributes to persistent worry (Mohammadkhani et al., 2022). The present findings are also compatible with evidence suggesting that experiential avoidance can mediate the association between metacognitive processes and worry, indicating that attempts to control or escape internal experiences may reinforce repetitive negative cognition (Yildirim & Bahtiyar, 2022).

The effectiveness of MCT in reducing worry can also be explained through its direct modification of the cognitive-attentional syndrome. Rather than challenging the factual accuracy of individual worries, MCT seeks to interrupt the processes that keep worrying active. Techniques such as detached mindfulness, attention training, postponement of worry, modification of positive and negative metacognitive beliefs, and behavioral experiments can reduce the perceived need to engage with threatening thoughts. As patients learn that thoughts can occur without requiring extended analysis or control, the habitual connection between intrusive thoughts and prolonged worry is weakened. This interpretation is consistent with evidence showing that training in metacognitive strategies can significantly reduce worry and rumination (Mirzaian, 2023). Similar reductions in worry, anxiety, and repetitive thinking following metacognitive interventions have also been observed in clinical populations with obsessive-compulsive symptoms (Nematollahi et al., 2023). More broadly, a recent systematic review has supported the effectiveness of MCT for generalized anxiety disorder and has emphasized its capacity to target the processes that maintain persistent anxiety and excessive worry (Uzun & Yilmaz, 2026).

The findings are further supported by studies indicating that metacognitive beliefs are highly relevant to generalized anxiety across different populations and contexts. Evidence

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suggests that meta-worry and metacognitive beliefs contribute substantially to the symptom profile of GAD and may extend beyond anxiety symptoms to interpersonal functioning (Nordahl et al., 2024). Likewise, maladaptive metacognitive beliefs have been associated with generalized anxiety disorder among individuals living under significant psychosocial and health-related stress, indicating that metacognitive processes remain important even when anxiety occurs within complex environmental conditions (Bailey et al., 2025). Developmental research has similarly shown that worry is associated with emotion-regulation difficulties, coping responses, and metacognitive beliefs, suggesting that the tendency to engage in repetitive worry may emerge through interactions between cognitive monitoring and emotional regulation processes (Ge & Tolmie, 2025). Taken together, these findings strengthen the interpretation that MCT reduces worry because it directly targets mechanisms central to its maintenance.

The present study also found that MBCT significantly reduced worry compared with the control condition. This finding is consistent with previous evidence showing that mindfulness-based interventions can reduce repetitive negative thinking and anxiety. MBCT encourages individuals to observe thoughts as transient mental events rather than as facts that require immediate analysis or action. In GAD, where worry is typically future oriented and characterized by repeated engagement with hypothetical threats, this change in perspective may reduce cognitive fusion with anxious predictions. By repeatedly practicing mindful awareness, patients can learn to notice the onset of worry without automatically elaborating it into prolonged chains of negative thinking. This interpretation is consistent with evidence demonstrating that mindfulness- and acceptance-based interventions can reduce anxiety and worry in populations exposed to chronic stress and uncertainty (Al-Natsheh & Imam, 2025). It is also supported by findings from technology-supported mindfulness interventions showing reductions in worry and rumination as part of broader improvements in repetitive negative cognition (Hawley et al., 2024).

The effect of MBCT on worry may also reflect improvements in emotion regulation and decentering. Mindfulness practice facilitates a shift from automatic reactivity toward deliberate awareness of emotional and cognitive states. As individuals become less judgmental toward internal experiences, the urgency to resolve, suppress, or avoid distressing thoughts may decrease. Previous randomized research has shown that mindfulness-based interventions can improve emotional symptoms and emotion-regulation strategies (Piguet et al., 2025). In individuals with generalized anxiety disorder, mindfulness interventions have also been associated with changes in stress-related responses, including autonomic reactions, suggesting that mindfulness may reduce both cognitive and physiological reactivity to perceived threat (Qi et al., 2025). The present findings are also consistent with randomized evidence demonstrating the effectiveness of MBCT for generalized anxiety disorder (Tang et al., 2025). Therefore, the reduction in worry observed in the MBCT group can plausibly be understood as resulting from decreased reactivity to anxious thoughts, greater decentering, and improved capacity to remain in contact with present-moment experience.

The finding that both MCT and MBCT significantly reduced intolerance of uncertainty is also theoretically coherent. Intolerance of uncertainty involves difficulty accepting ambiguous, unpredictable, or incompletely controllable situations and frequently motivates cognitive and behavioral attempts to eliminate uncertainty. In GAD, worry can function as one such attempt, because individuals may repeatedly analyze possible future events in an effort to achieve greater predictability. However, this strategy rarely provides complete certainty and often reinforces anxiety. Previous research has shown that intolerance of uncertainty is closely associated with anxiety-related vulnerability and interacts with psychological resources such as mindfulness, resilience, and social connectedness (Akyıl et al., 2024). It has also been linked to anxiety sensitivity and mindfulness in socially anxious individuals (Nikpour & Moslehi Jouybari, 2023). These findings support the view that reducing intolerance of uncertainty requires changing the individual's response to ambiguous internal and external experiences.

MCT may reduce intolerance of uncertainty by weakening metacognitive beliefs that encourage excessive attempts to cognitively control the future. When individuals believe that worrying is necessary for preparedness or protection, uncertain situations are more likely to trigger prolonged threat analysis. Through MCT, patients learn that uncertainty does not require repeated cognitive engagement and that worrying does not provide the level of control they assume it does. As metacognitive beliefs are modified, uncertainty may become less likely to activate persistent worry and threat monitoring. This explanation is supported by research showing relationships among metacognitive beliefs, intolerance of uncertainty, and anxiety-related

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symptoms. For example, intolerance of uncertainty and metacognitive beliefs have both been implicated in test anxiety (Huntley et al., 2022), and health-related metacognitive beliefs and intolerance of uncertainty have been shown to predict health anxiety (Soleimani Babadi et al., 2022). In addition, intolerance of ambiguity has been identified as an important mechanism linking metacognitive processes to anxiety in contexts characterized by high uncertainty (Khodabakhsh Pirkalaei, 2022). These findings are consistent with the present result that changing metacognitive processes can reduce maladaptive responses to uncertainty.

MBCT may reduce intolerance of uncertainty through a different pathway. Rather than attempting to eliminate uncertainty, mindfulness teaches individuals to remain in contact with uncertainty without automatically trying to resolve it. This stance may weaken avoidance, reassurance seeking, repeated checking, and excessive cognitive preparation. Through repeated mindfulness practice, uncertain situations can be experienced as uncomfortable but tolerable rather than as problems that must be immediately solved. This interpretation is supported by evidence showing that mindfulness is inversely related to maladaptive responses to uncertainty and may contribute to psychological resilience (Akyıl et al., 2024). It is also consistent with studies demonstrating beneficial effects of MBCT on intolerance of uncertainty, cognitive flexibility, and emotion regulation in individuals with generalized anxiety disorder (Ghanizadeh Balderlou et al., 2025). Related findings have shown that MBCT can reduce intolerance of ambiguity in individuals with obsessive-compulsive symptoms (Kazemi & Izadi, 2025) and improve distress tolerance and emotion regulation across other anxiety-related populations (Soltani et al., 2024; Zareei et al., 2024).

The superiority of MCT over MBCT in the present study deserves particular attention. Although both interventions reduced worry and intolerance of uncertainty, MCT produced significantly greater improvements in both outcomes. One plausible explanation is the greater specificity of MCT to the cognitive processes that characterize generalized anxiety disorder. MCT directly targets beliefs about worry, the perceived uncontrollability of thinking, meta-worry, attentional fixation on threat, and strategies designed to control cognition. Because worry and intolerance of uncertainty are closely linked to these processes, an intervention that explicitly modifies them may produce larger effects than an intervention that changes the relationship to thoughts more indirectly. This interpretation is consistent with evidence emphasizing the central role of metacognitive beliefs and meta-worry in GAD (Bailey et al., 2025; Nordahl et al., 2024) and with systematic evidence indicating that MCT is particularly effective for generalized anxiety disorder (Uzun & Yilmaz, 2026).

In contrast, MBCT may operate through broader mechanisms such as mindfulness, acceptance, decentering, nonjudgment, and emotional awareness. These processes are clinically valuable and can reduce anxiety, but they may not directly modify specific metacognitive beliefs about worry to the same extent as MCT. Previous research has shown that MBCT can reduce worry, distress intolerance, and intolerance of uncertainty, but such effects often occur alongside broader improvements in emotion regulation and psychological well-being (Ghanizadeh Balderlou et al., 2025; Sahour & Heydari, 2024). This distinction may help explain why MBCT was effective in the present study but produced smaller reductions than MCT. MCT may have acted more directly on the cognitive architecture of generalized anxiety, whereas MBCT may have influenced these outcomes as part of a wider improvement in emotional regulation and psychological flexibility.

The maintenance of treatment gains at the three-month follow-up is another important finding. Both MCT and MBCT groups retained substantial improvements in worry and intolerance of uncertainty, suggesting that the effects of treatment were not limited to the immediate post-intervention period. The persistence of improvement following MCT may reflect the acquisition of metacognitive skills that alter how individuals respond to future episodes of worry. Once patients learn to identify metacognitive beliefs, disengage from repetitive thinking, and redirect attention flexibly, these skills can continue to be applied after formal treatment ends. Similarly, the maintenance of gains in the MBCT group may reflect continued use of mindfulness practices and the development of a more stable decentered stance toward thoughts and emotions. Evidence from previous studies showing sustained improvements following mindfulness-based interventions supports this interpretation (Piguet et al., 2025; Tang et al., 2025). Overall, the follow-up findings suggest that both approaches can generate relatively durable changes in the cognitive processes underlying anxiety, although the stronger effect observed in the MCT group indicates that direct modification of metacognitive mechanisms may produce more substantial long-term changes in these particular outcomes.

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The findings should be interpreted in light of several limitations. First, the sample was relatively small and consisted of participants recruited from psychological and counseling centers in Tehran, which may limit the generalizability of the results to individuals with generalized anxiety disorder in other geographical, cultural, socioeconomic, or clinical settings. Second, the outcomes were assessed primarily through self-report questionnaires, which may be influenced by response tendencies, social desirability, participants' interpretation of questionnaire items, and awareness of treatment assignment. Third, the three-month follow-up period provided useful information about short-term maintenance but did not establish whether the therapeutic effects would persist over longer periods. Fourth, participants who were receiving psychiatric medication were permitted to remain in the study if their medication regimen was stable, and although this reflects common clinical practice, medication use may have introduced additional variability into treatment response. Fifth, because therapist-related factors such as therapeutic alliance, therapist competence, and treatment expectancy were not examined as independent variables, their contribution to the observed differences between interventions could not be determined.

Future research should replicate the present study using larger and more diverse samples recruited from multiple clinical centers and different geographical regions. Studies with longer follow-up periods, such as six months or one year, would provide stronger evidence regarding the durability of treatment effects. Future investigations could also include clinician-rated measures, behavioral tasks involving uncertainty, ecological momentary assessment of worry, and physiological indicators of anxiety alongside self-report measures. Examining potential mediators of treatment response would be particularly valuable; for example, changes in positive and negative metacognitive beliefs, decentering, mindfulness, attentional flexibility, experiential avoidance, and emotion regulation could be tested as mechanisms explaining why MCT and MBCT produce improvement. It would also be useful to identify moderators of treatment response, including baseline severity, comorbid symptoms, medication status, age, gender, personality characteristics, and previous treatment experience. Direct comparisons involving individual and group formats of MCT and MBCT could further clarify whether treatment delivery format influences effectiveness.

From a practical perspective, the findings suggest that both MCT and MBCT can be considered useful psychological interventions for individuals with generalized anxiety disorder who experience persistent worry and difficulty tolerating uncertainty. Clinicians may incorporate metacognitive techniques when excessive worry, beliefs about the uncontrollability of thinking, threat monitoring, and attempts to cognitively control uncertainty are especially prominent. MBCT may be particularly useful when patients demonstrate marked cognitive reactivity, difficulty remaining in contact with uncomfortable emotional states, or limited ability to observe thoughts without automatically engaging with them. Given the greater reductions observed following MCT, mental health professionals working with patients whose primary difficulties involve chronic worry and intolerance of uncertainty may consider giving particular attention to direct metacognitive formulation and intervention. Training clinicians in both approaches could also increase flexibility in treatment planning and allow therapeutic strategies to be matched more closely to the dominant cognitive and emotional processes of each patient.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

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

Transparency Statement

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

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the study and participated in the research with informed consent.

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