

Comparison of the Effectiveness of Acceptance and Commitment Therapy and Metacognitive Therapy on Disease Self-Management and Illness Perception in Individuals with Multiple Sclerosis

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ABSTRACT

The present study aimed to compare the effectiveness of Acceptance and Commitment Therapy (ACT) and Metacognitive Therapy (MCT) on disease self-management and illness perception in individuals with multiple sclerosis (MS). In terms of purpose, this was an applied study, and in terms of methodology, it employed a quasi-experimental pretest–posttest design with a control group. The study population consisted of individuals with multiple sclerosis who attended healthcare centers and MS-related treatment facilities in the city under study. Among eligible individuals, 45 participants were selected through convenience sampling and randomly assigned to three groups of 15 participants each: an Acceptance and Commitment Therapy group, a Metacognitive Therapy group, and a control group. The experimental groups received their respective therapeutic interventions, whereas the control group received no intervention during the study period. Data were collected using the Multiple Sclerosis Self-Management Scale and the Revised Illness Perception Questionnaire. The data were analyzed using descriptive statistical indices, the Shapiro–Wilk test, Levene’s test, multivariate analysis of covariance (MANCOVA), and univariate analysis of covariance (ANCOVA). The results indicated significant differences among the three groups in disease self-management and illness perception at the posttest stage. Both therapeutic interventions, compared with the control group, resulted in significant improvements in disease self-management and favorable changes in illness perception. Furthermore, pairwise comparisons showed that Acceptance and Commitment Therapy was more effective than Metacognitive Therapy in enhancing disease self-management and improving illness perception. Based on the findings, it can be concluded that both therapeutic approaches are beneficial for promoting psychological adjustment and improving disease management among individuals with multiple sclerosis; however, Acceptance and Commitment Therapy may be more effective than Metacognitive Therapy in improving disease self-management and illness perception.

Keywords: Acceptance and Commitment Therapy, Metacognitive Therapy, disease self-management, illness perception, multiple sclerosis.

1. Introduction

Multiple sclerosis (MS) is a chronic, immune-mediated, inflammatory, and neurodegenerative disorder of the central nervous system that typically follows an unpredictable course and may lead to a broad range of neurological, cognitive, emotional, and functional impairments. Although the clinical manifestations and progression of the disease vary substantially among affected individuals, common symptoms include fatigue, sensory disturbances, mobility limitations, pain, cognitive dysfunction, visual problems, mood disturbances, and reduced participation in occupational and social activities. The global burden of MS has continued to increase, and recent international estimates indicate that more than three million individuals are currently living with the disease worldwide, emphasizing its growing significance as a public health concern (King et al., 2026). At the same time, inequalities in access to neurological expertise, diagnostic technologies, specialized healthcare services, and disease-modifying treatments remain major challenges in many regions, potentially delaying diagnosis and appropriate management (Solomon et al., 2023). Because MS commonly begins in early or middle adulthood and often persists throughout much of an individual's life, its consequences extend far beyond neurological impairment. Individuals are repeatedly required to adapt to uncertainty regarding disease progression, fluctuating symptoms, treatment demands, lifestyle modifications, occupational limitations, interpersonal changes, and possible future disability. Consequently, effective management of MS increasingly requires an integrated approach in which pharmacological and neurological treatments are complemented by psychological and behavioral interventions that strengthen patients' capacity to understand, manage, and adapt to their disease.

One of the central challenges in long-term MS care is disease self-management. Self-management refers to the range of cognitive, behavioral, interpersonal, and health-related activities through which individuals actively participate in managing symptoms, adhering to treatment recommendations, communicating with healthcare professionals, maintaining health-promoting behaviors, obtaining relevant information, mobilizing social support, and adapting their daily lives to the demands imposed by chronic illness. In MS, self-management is particularly important because many difficulties are persistent, variable, and only partially controllable through medical treatment.

Patients may need to monitor fatigue, regulate activity, maintain medication adherence, modify exercise and nutrition patterns, recognize relapse-related symptoms, communicate effectively with healthcare providers, and develop strategies for preserving functional independence. Evidence suggests that lifestyle-oriented self-management programs can contribute meaningfully to quality of life and broader health outcomes among individuals living with MS (Wills & Probst, 2022). Fatigue management represents an especially important component of this process because fatigue is among the most common and disabling symptoms of the disease. Educational and behavioral approaches to fatigue management have demonstrated beneficial effects and highlight the value of active patient participation in symptom regulation (Wendebourg et al., 2024). Long-term evidence from fatigue self-management interventions further indicates that patients continue to employ individualized strategies years after structured treatment, although the maintenance and effectiveness of such strategies may be influenced by personal, environmental, and disease-related factors (Silverman et al., 2024). These findings suggest that effective self-management is not simply a matter of providing medical recommendations; rather, it depends on sustained psychological flexibility, motivation, self-efficacy, knowledge, coping skills, and the capacity to respond adaptively to changing illness demands.

Adequate knowledge about MS is also fundamental to effective self-management, yet research indicates that patients' understanding of the disease and its risk-related characteristics is often uneven. Limited or inaccurate knowledge may influence treatment decisions, adherence, expectations, symptom interpretation, and interactions with healthcare professionals (Smith & Langdon, 2024). In chronic neurological disease, however, objective knowledge alone does not determine adaptation. Equally important is how individuals subjectively understand and represent their illness. Illness perception encompasses the cognitive and emotional representations that patients develop regarding the identity of their disease, its consequences, duration, causes, controllability, treatment responsiveness, coherence, and emotional significance. These representations influence the way individuals interpret symptoms, evaluate treatment, anticipate the future, and select coping strategies. A systematic review of illness perceptions in MS demonstrated consistent associations between maladaptive illness representations and poorer psychological, behavioral, and functional outcomes, indicating that patients' beliefs about their disease constitute an important component of

adjustment (Luca et al., 2022). More recent evidence has further demonstrated that illness perceptions are interconnected with difficulties in emotional processing, including alexithymia, suggesting that the subjective representation of MS is embedded within broader emotional and interpersonal processes (Luca et al., 2024). Therefore, unfavorable illness perceptions may contribute to emotional distress, disengagement, avoidance, reduced confidence in treatment, and ineffective self-management, whereas more adaptive and coherent representations may support acceptance, realistic control, and constructive engagement with disease-related demands.

Psychological responses to MS are shaped not only by illness perceptions but also by the coping strategies individuals employ when confronted with symptoms and uncertainty. Coping patterns can influence quality of life, treatment participation, emotional well-being, and perceived control over the disease. A systematic review examining coping strategies among people with MS concluded that adaptive forms of coping are generally associated with better quality of life, while avoidant, emotion-driven, or inflexible coping styles may contribute to poorer outcomes (Culicetto et al., 2024). This relationship is particularly relevant because individuals with MS often encounter internal experiences that cannot be fully eliminated, including pain, fatigue, fear of progression, uncertainty, cognitive concerns, and distress about possible future disability. Attempts to suppress, avoid, or rigidly control such experiences may paradoxically increase psychological distress and interfere with adaptive disease management. For this reason, contemporary contextual and metacognitive therapies have attracted considerable attention in MS research. These approaches do not primarily seek to eliminate all negative thoughts or emotions; instead, they aim to modify the processes through which patients respond to their internal experiences. Acceptance and Commitment Therapy (ACT) emphasizes psychological flexibility, whereas Metacognitive Therapy (MCT) focuses on maladaptive metacognitive beliefs and repetitive patterns of thinking. Both approaches may therefore be relevant to disease self-management and illness perception, although they operate through partially different therapeutic mechanisms.

Acceptance and Commitment Therapy is a contextual behavioral intervention designed to increase psychological flexibility, defined as the capacity to remain in contact with present-moment experiences while engaging in behavior that is consistent with personally chosen values. ACT conceptualizes psychological suffering as being maintained

in part by experiential avoidance, cognitive fusion, rigid self-concepts, disconnection from values, and ineffective attempts to control internal experiences. Its core therapeutic processes include acceptance, cognitive defusion, present-moment awareness, self-as-context, values clarification, and committed action. These processes may be particularly relevant for people with MS because many disease-related experiences cannot be completely controlled and require ongoing psychological adaptation. Rather than organizing behavior around the avoidance of distress, individuals are encouraged to make room for difficult thoughts, feelings, and bodily sensations while continuing to engage in meaningful activities. Research in MS populations has provided growing support for this therapeutic model. A systematic review and meta-analysis found that ACT can improve quality of life and mood among individuals with MS, although the magnitude of effects may vary according to study characteristics and intervention design (Thompson et al., 2022). Similarly, a systematic review and meta-analysis of mindfulness- and acceptance-based interventions reported beneficial effects on quality of life, coping, cognitive outcomes, and mindfulness-related processes in people with MS (Han, 2022). Such findings support the possibility that acceptance-based interventions may improve not only emotional symptoms but also broader adaptive functioning.

Several clinical studies have further documented the usefulness of ACT for psychological adaptation among individuals with MS. Comparative research has shown that ACT can enhance resilience and quality of life and may produce outcomes comparable to or greater than other established psychological treatments under certain conditions (Karimi et al., 2022). ACT has also been associated with improvements in self-efficacy and quality of life when compared with mindfulness-based cognitive therapy, suggesting that its emphasis on values and committed action may be particularly useful for strengthening active coping and perceived competence (Hesami et al., 2025). Similar findings have been reported for compassion-focused adaptations of ACT. For example, Compassion-Focused Acceptance and Commitment Therapy has been found to improve psychological flexibility and self-efficacy among women with MS (Masoudi Margmaleki et al., 2023), and more recent evidence indicates that this approach can reduce experiential avoidance and strengthen self-care behaviors (Ebrahimpour Azizi et al., 2026). These outcomes are theoretically relevant to disease self-management because greater psychological flexibility,

reduced avoidance, and stronger self-care engagement may enable patients to adhere more effectively to health recommendations, communicate more constructively with healthcare professionals, and sustain adaptive behaviors despite fatigue, emotional distress, or uncertainty. ACT has also demonstrated favorable effects on illness-related cognition. In a comparative study, Acceptance and Commitment Therapy and mindfulness-based cognitive therapy both improved illness perception and treatment adherence among patients with MS, indicating that modifying the way patients relate to illness-related experiences may influence how the disease itself is cognitively represented (Sami et al., 2022). Research comparing ACT with logotherapy has similarly demonstrated improvements in resilience and quality of life among individuals with MS (Najafi et al., 2024).

Metacognitive Therapy represents another potentially relevant intervention for people with MS, but its theoretical emphasis differs from that of ACT. Rather than primarily modifying the content of thoughts, MCT focuses on the processes that govern thinking, particularly beliefs about worry, rumination, attentional control, threat monitoring, and the perceived uncontrollability or danger of thoughts. According to the metacognitive model, emotional distress may be maintained by the cognitive attentional syndrome, which includes persistent worry and rumination, excessive self-focused attention, threat monitoring, and maladaptive coping behaviors. In chronic illness, patients may become preoccupied with symptom changes, disease progression, treatment outcomes, future disability, and uncertainty. Repeated monitoring and analysis may be experienced as protective or necessary, yet these strategies can intensify distress and reduce attentional flexibility. This framework appears particularly relevant in MS because cognitive impairment, fatigue, and metacognitive functioning may interact in complex ways. Research examining metacognition across MS phenotypes has demonstrated that cognitive impairment and fatigue are important factors associated with metacognitive differences, underscoring the clinical relevance of metacognitive processes in this population (Coll-Martínez et al., 2023). Such findings imply that interventions targeting metacognitive regulation may help patients disengage from repetitive negative thinking, reduce symptom-related threat monitoring, and develop more flexible responses to disease-related uncertainty.

Evidence for metacognitive interventions in MS is emerging but remains less extensive than the evidence base for acceptance-based therapies. A controlled investigation of

a standardized metacognitive intervention for neuropsychological impairment in MS demonstrated that structured metacognitive training can be implemented in this population and may contribute to improved management of cognitive difficulties (Pöttgen et al., 2022). Metacognitive approaches may be particularly useful because they target the regulatory processes through which individuals evaluate and respond to their thoughts rather than attempting to establish certainty about disease progression or eliminate all negative cognitions. By developing detached mindfulness, reducing worry and rumination, challenging beliefs regarding the uncontrollability of thinking, and increasing flexible attentional control, patients may become better able to distinguish clinically meaningful symptoms from repetitive threat-focused processing. This change could influence illness perception by reducing catastrophizing and excessive emotional representation of the disease while simultaneously supporting self-management through improved attentional control and more deliberate behavioral responses. Nevertheless, relatively few studies have directly examined whether MCT can improve disease-specific self-management or illness perception in MS, and the extent to which its effects differ from those of ACT remains unclear.

The distinction between ACT and MCT is clinically important because both therapies seek to reduce dysfunctional engagement with internal experiences but conceptualize and modify those processes differently. ACT encourages acceptance of internal experiences and movement toward valued action without requiring the reduction of unwanted thoughts and emotions, whereas MCT aims to alter maladaptive metacognitive beliefs and interrupt repetitive cognitive-attentional processing. These differences may have practical implications for individuals with MS. Disease self-management often requires persistent behavior in the presence of discomfort, uncertainty, fatigue, and discouraging thoughts, making ACT's emphasis on willingness and committed action potentially advantageous. Illness perception, in contrast, is strongly shaped by cognitive and emotional interpretations of symptoms and disease consequences, which may also be responsive to MCT's focus on worry, threat monitoring, and metacognitive beliefs. Existing studies demonstrate that both acceptance-based and metacognitive approaches have theoretical and empirical relevance in MS; however, direct comparative evidence remains limited. Furthermore, much of the available literature has focused on quality of life, mood, resilience, self-efficacy, fatigue, cognitive impairment, or treatment adherence rather than

simultaneously examining disease self-management and illness perception as clinically meaningful outcomes. This gap is important because self-management reflects how patients behaviorally regulate their illness, whereas illness perception reflects how they cognitively and emotionally understand it; together, these variables provide a broader picture of psychological adaptation to MS.

Accordingly, comparing ACT and MCT may clarify whether increasing psychological flexibility or modifying maladaptive metacognitive processes produces stronger effects on patients' ability to manage their disease and reconstruct their illness representations. Evidence from ACT studies suggests improvements in psychological flexibility, self-efficacy, self-care, resilience, quality of life, illness perception, and treatment adherence (Ebrahimpour Azizi et al., 2026; Hesami et al., 2025; Masoudi Margmaleki et al., 2023; Sami et al., 2022), while metacognitive research highlights the relevance of metacognitive regulation, cognitive impairment, and fatigue-related processes in MS (Coll-Martínez et al., 2023; Pöttgen et al., 2022). At the same time, the broader literature on self-management, coping, illness knowledge, and illness perceptions indicates that successful adaptation to MS depends on an interaction among what patients know about the disease, how they interpret it, how they regulate their thoughts and emotions, and how effectively they translate this regulation into health-related behavior (Culicetto et al., 2024; Luca et al., 2022; Silverman et al., 2024; Smith & Langdon, 2024; Wills & Probst, 2022). A direct comparison of ACT and MCT can therefore provide clinically useful evidence regarding which psychological approach may be more effective for improving these two interrelated but distinct dimensions of adaptation.

The present study aimed to compare the effectiveness of Acceptance and Commitment Therapy and Metacognitive Therapy on disease self-management and illness perception in individuals with multiple sclerosis.

2. Methods and Materials

2.1. Study Design and Participants

The present study was an applied quasi-experimental investigation employing a pretest–posttest design with two intervention groups and one control group. The statistical population consisted of individuals diagnosed with multiple sclerosis (MS) who attended healthcare centers, neurological clinics, and MS-related associations in the city under study during the study period. Following coordination with the

relevant healthcare centers and organizations, potentially eligible individuals were identified and invited to participate. Participants were recruited using convenience sampling after the eligibility criteria had been evaluated and written informed consent had been obtained. A total of 45 eligible individuals were included in the final sample and randomly assigned to three equal groups of 15 participants: an Acceptance and Commitment Therapy (ACT) group, a Metacognitive Therapy (MCT) group, and a control group. Before the interventions began, all participants completed the study instruments assessing disease self-management and illness perception as the pretest assessment. Subsequently, participants assigned to the ACT group received the Acceptance and Commitment Therapy intervention, participants in the MCT group received the Metacognitive Therapy intervention, and participants in the control group received no psychological intervention during the study period. After completion of the treatment sessions, participants in all three groups completed the same instruments as the posttest assessment. The use of pretest scores as covariates made it possible to evaluate post-intervention differences between the groups while statistically controlling for baseline variability. The inclusion criteria consisted of a confirmed diagnosis of multiple sclerosis by a neurologist or other qualified medical specialist, being within the age range established for the study, having sufficient physical and cognitive capacity to participate in group psychotherapy sessions and complete the questionnaires, willingness to participate voluntarily in the study, provision of informed consent, absence of a severe psychiatric disorder that could interfere with participation in the intervention, and absence of simultaneous participation in another structured psychological treatment program. The exclusion criteria included withdrawal of consent, repeated or substantial absence from the therapeutic sessions, initiation of another systematic psychotherapy program during the intervention period, development of a medical or psychological condition that made continued participation inappropriate, or failure to complete the posttest assessment. To minimize the effects of attrition on the intended statistical power, a larger number of potential participants were initially screened before the final sample was established. Participants were informed about the purpose and procedures of the study, the voluntary nature of participation, their right to withdraw without penalty, and the confidentiality of their personal and research information.

2.2. Measures

The Multiple Sclerosis Self-Management Scale–Revised (MSSM-R) was used to assess disease self-management. The scale was originally developed by Bishop and Frain as a disease-specific measure of self-management among individuals with multiple sclerosis. The revised original instrument contained 24 items designed to evaluate major dimensions of MS self-management, including communication and relationships with healthcare providers, treatment adherence and barriers to adherence, social and family support, MS-related knowledge and information, and health maintenance behaviors. In the validated Persian version, psychometric evaluation and confirmatory factor analysis resulted in the removal of Items 21 and 22 and supported a 22-item version, which was used in the present study. In the original 24-item structure, the healthcare provider relationship and communication domain included Items 9, 12, 14, 16, 18, and 20; treatment adherence and barriers included Items 11, 15, 17, 21, 22, 23, and 24; social and family support included Items 6, 10, and 13; MS-related knowledge and information included Items 1 through 4; and health maintenance behaviors included Items 5, 7, 8, and 19. Responses are provided on a five-point Likert-type scale ranging from 1, indicating strong disagreement, to 5, indicating strong agreement. In the original version, Items 21, 23, and 24 were reverse-scored; however, because Items 21 and 22 were omitted from the validated Persian version, scoring in the present study followed the scoring key of the validated 22-item Persian form. In the original 24-item instrument, total scores ranged from 24 to 120, with higher scores indicating better disease self-management; similarly, higher scores on the validated 22-item Persian version represent more effective self-management of multiple sclerosis. Psychometric evaluation of the Persian version was conducted among 210 individuals with MS and demonstrated satisfactory face and content validity, acceptable content validity ratio and content validity index values, and an adequate factorial structure following removal of Items 21 and 22. Evidence of convergent and discriminant validity was also reported through theoretically consistent relationships with self-efficacy, quality of life, and depression. The Cronbach's alpha coefficient for the total Persian scale was reported as 0.86, while the coefficients for its subscales ranged from 0.65 to 0.90. Test–retest reliability was also excellent, with an intraclass correlation coefficient of 0.97 for the total scale and coefficients ranging from 0.95 to 0.99 for its subscales.

These findings indicate that the validated Persian version has satisfactory reliability and validity for assessing disease self-management among Persian-speaking individuals with multiple sclerosis.

The Revised Illness Perception Questionnaire (IPQ-R) was used to assess participants' cognitive and emotional representations of multiple sclerosis. The instrument was developed on the basis of Leventhal's self-regulation model and is widely used to assess how individuals conceptualize, interpret, and emotionally respond to their illness. It evaluates multiple dimensions of illness representation, including illness identity, perceived consequences, timeline, personal control, treatment control, illness coherence or understanding, and emotional representations. Of particular relevance to the present study, a Persian version of the IPQ-R was specifically validated in 2025 among 400 Iranian patients with multiple sclerosis, providing population-specific evidence supporting its use in Persian-speaking individuals with MS. The validated Persian version contains 74 items and retains a multidimensional structure organized primarily around seven major components: illness identity, perceived consequences, illness timeline, personal control, treatment control, illness coherence, and emotional representations. The causal attribution component was assessed separately, and exploratory analyses identified four interpretable dimensions of perceived causes. In the illness identity section, respondents indicate whether particular symptoms are experienced and whether they attribute those symptoms to their multiple sclerosis, whereas the remaining sections assess the degree of agreement or disagreement with statements concerning the expected duration of the illness, its consequences, perceived personal control, perceived effectiveness of treatment, understanding of the illness, and emotional responses to the condition. Items in the principal dimensions are rated using the response format specified in the validated Persian version, and negatively worded items are reverse-scored before the respective dimension scores are calculated. In the present study, scoring was performed according to the official instructions for the validated 74-item Persian version to maintain consistency with its established item structure and psychometric properties. Evaluation of the Persian version in 400 Persian-speaking patients with multiple sclerosis demonstrated satisfactory face and content validity, with all items meeting acceptable content-validity criteria. Confirmatory factor analysis supported the seven-factor structure and yielded excellent goodness-of-fit indices, including a chi-square-to-degrees-of-freedom ratio of 1.048, a comparative fit index of 0.998,

and a root mean square error of approximation of 0.011. Construct validity was further supported by evidence of convergent and discriminant validity. Internal consistency coefficients for most subscales ranged from 0.839 to 0.962, indicating very good to excellent reliability, although the illness identity subscale demonstrated a comparatively lower Cronbach's alpha of 0.590 and was therefore interpreted with appropriate caution. Overall, the Persian IPQ-R demonstrated adequate psychometric properties and was considered suitable for assessing illness perceptions among individuals with multiple sclerosis in the present study.

2.3. Interventions

The Acceptance and Commitment Therapy intervention was delivered to participants in the ACT group in a structured group format over eight weekly sessions, with each session lasting approximately 90 minutes. The intervention was based on the core principles of the ACT model and was designed to enhance psychological flexibility by reducing experiential avoidance, modifying the individual's relationship with distressing thoughts and emotions, clarifying personally meaningful values, and increasing engagement in adaptive and value-consistent behaviors despite the presence of MS-related symptoms and limitations. The initial session focused on establishing the therapeutic framework, developing rapport, explaining confidentiality and group rules, reviewing participants' experiences with multiple sclerosis, identifying major difficulties associated with disease management, and introducing the ACT perspective on psychological suffering and ineffective control strategies. The second session emphasized creative hopelessness and helped participants examine previous attempts to control or eliminate unpleasant thoughts, emotions, fatigue, pain, and disease-related worries, while identifying the long-term costs of excessive psychological control. The third session focused on acceptance and willingness, teaching participants to make room for unpleasant internal experiences without unnecessary avoidance or struggle and using experiential exercises to distinguish acceptance from resignation or passivity. The fourth session addressed cognitive defusion and included exercises designed to help participants observe thoughts as transient mental events rather than literal truths that must automatically guide behavior; particular attention was paid to catastrophic thoughts about disease progression, disability, treatment, dependency, and uncertainty. The fifth session emphasized present-moment awareness through

mindfulness-based practices and encouraged participants to observe bodily sensations, emotions, and thoughts in a nonjudgmental manner. The sixth session introduced the concept of self-as-context and helped participants distinguish their broader sense of self from illness-related labels, symptoms, and distressing experiences, thereby reducing overidentification with multiple sclerosis. The seventh session focused on values clarification, during which participants identified personally meaningful directions in areas such as health, family relationships, social participation, personal development, work, and self-care, and examined discrepancies between their current behavior and their values. The final session emphasized committed action by translating identified values into specific, realistic, and achievable behavioral goals related to self-care, adherence to treatment recommendations, communication with healthcare professionals, social support, and adaptive coping with MS-related challenges. Homework and experiential exercises were assigned between sessions to facilitate the generalization of therapeutic skills to everyday life. Attendance and participation were monitored throughout the intervention, whereas members of the control group received no structured psychological intervention during the corresponding period.

The Metacognitive Therapy intervention was administered to participants in the MCT group in eight weekly group sessions of approximately 90 minutes each and was based on the metacognitive model of psychological distress. The intervention focused primarily on identifying and modifying maladaptive metacognitive beliefs, reducing persistent worry and rumination, decreasing excessive self-focused attention and threat monitoring, and replacing inflexible cognitive control strategies with more adaptive modes of responding to disease-related thoughts and emotions. During the first session, the therapeutic framework was established and participants were introduced to the metacognitive model, with particular emphasis on distinguishing ordinary negative thoughts from the patterns of worry, rumination, threat monitoring, and unhelpful coping responses that maintain emotional distress. The second session focused on identifying each participant's cognitive attentional syndrome, including repetitive thinking about disease progression, disability, uncertainty, physical symptoms, treatment outcomes, and future functioning, as well as associated behaviors such as repeated checking, reassurance seeking, and avoidance. The third session introduced detached mindfulness and taught participants to notice thoughts without attempting to suppress, analyze,

challenge, or respond to them, thereby weakening habitual engagement with repetitive negative thinking. The fourth session addressed uncontrollability beliefs concerning worry and rumination and used behavioral and attentional exercises to demonstrate that individuals can postpone, interrupt, and redirect repetitive thinking rather than being controlled by it. The fifth session focused on positive metacognitive beliefs, such as beliefs that worry is necessary for preparedness, that repeated analysis can prevent negative outcomes, or that constant monitoring of symptoms protects against disease deterioration, and these beliefs were evaluated through guided questioning and behavioral experiments. The sixth session targeted negative metacognitive beliefs concerning the danger and harmfulness of thoughts, emotions, and worry, while helping participants develop more flexible beliefs about the meaning and consequences of their internal experiences. The seventh session emphasized attention training, reduction of threat-focused monitoring, and development of flexible attentional control, particularly in relation to bodily sensations and MS-related symptoms that could otherwise become the focus of excessive vigilance. The eighth session integrated the skills learned throughout treatment, reviewed changes in worry, rumination, attentional control, and metacognitive beliefs, identified potential triggers for future difficulties, and developed an individualized relapse-prevention plan. Participants were encouraged to practice the techniques between sessions and to apply them to everyday challenges associated with multiple sclerosis, including treatment adherence, disease-related uncertainty, emotional reactions, and interactions with healthcare providers and family members. The control group did not participate in either psychotherapy protocol during the active intervention phase.

2.4. Data Analysis

After completion of data collection, questionnaire responses were coded and entered into statistical software, and the dataset was initially screened for data-entry errors, missing values, outliers, and implausible responses before inferential analyses were conducted. Descriptive statistics were calculated to summarize the demographic and study variables; frequencies and percentages were used for categorical variables, whereas means and standard deviations were calculated for continuous variables and for the pretest and posttest scores of disease self-management and illness perception. The assumptions required for covariance analysis were subsequently examined. The

Shapiro–Wilk test was used to assess the normality of the distributions, and Levene’s test was used to evaluate homogeneity of error variances across groups. The homogeneity of regression slopes was assessed by examining the interaction between the pretest scores and group membership, and other relevant assumptions, including linearity of relationships between covariates and dependent variables, the absence of problematic multicollinearity between dependent variables, and the suitability of the covariance matrices, were evaluated before conducting the primary analyses. Because the study included two conceptually related dependent variables, namely disease self-management and illness perception, three study groups, and pretest measurements that required statistical adjustment, multivariate analysis of covariance (MANCOVA) was used as the principal inferential procedure. In the MANCOVA model, group membership was entered as the independent variable, posttest scores for disease self-management and illness perception were entered as the dependent variables, and the corresponding pretest scores were entered as covariates. When the overall multivariate effect of group was statistically significant, separate univariate analyses of covariance (ANCOVAs) were conducted for each dependent variable to determine which outcomes contributed to the multivariate difference. Adjusted posttest means were then compared using appropriate pairwise post hoc comparisons with control of the familywise Type I error rate to identify differences between the ACT, MCT, and control groups. Effect sizes, including partial eta squared where applicable, were reported in addition to statistical significance to indicate the magnitude and practical importance of the intervention effects. All statistical tests were two-tailed, and the level of statistical significance was set at $p < .05$.

3. Findings and Results

Data from 45 individuals with multiple sclerosis were included in the final analysis, with 15 participants assigned to the Acceptance and Commitment Therapy (ACT) group, 15 to the Metacognitive Therapy (MCT) group, and 15 to the control group. Descriptive statistics for disease self-management and illness perception at the pretest and posttest stages are presented in Table 1. As shown, the three groups had relatively similar mean scores at pretest. At posttest, however, disease self-management increased substantially in both intervention groups, with the greatest increase observed in the ACT group. Illness perception scores also

decreased in both intervention groups, with the largest reduction occurring in the ACT group, whereas only minimal changes were observed in the control group.

Table 1

Mean and Standard Deviation of Disease Self-Management and Illness Perception by Group at Pretest and Posttest

Group	Variable	Stage	M	SD
Acceptance and Commitment Therapy	Disease self-management	Pretest	67.53	7.21
Acceptance and Commitment Therapy	Disease self-management	Posttest	86.47	6.18
Acceptance and Commitment Therapy	Illness perception	Pretest	43.27	6.84
Acceptance and Commitment Therapy	Illness perception	Posttest	31.40	5.72
Metacognitive Therapy	Disease self-management	Pretest	68.13	6.94
Metacognitive Therapy	Disease self-management	Posttest	80.93	6.47
Metacognitive Therapy	Illness perception	Pretest	42.80	6.51
Metacognitive Therapy	Illness perception	Posttest	35.73	5.91
Control	Disease self-management	Pretest	67.87	7.06
Control	Disease self-management	Posttest	69.20	7.12
Control	Illness perception	Pretest	43.13	6.73
Control	Illness perception	Posttest	42.27	6.81

Before conducting the covariance analyses, the relevant statistical assumptions were examined. The Shapiro–Wilk test indicated no significant departure from normality for disease self-management in the ACT group, $W = .961$, $p = .704$, the MCT group, $W = .958$, $p = .658$, or the control group, $W = .967$, $p = .816$. Similarly, the distribution of illness perception scores did not significantly deviate from normality in the ACT group, $W = .956$, $p = .632$, the MCT group, $W = .963$, $p = .741$, or the control group, $W = .969$, $p = .842$. Levene’s test was also nonsignificant for disease self-management, $F(2, 42) = 0.842$, $p = .437$, and illness perception, $F(2, 42) = 0.613$, $p = .547$, supporting the assumption of homogeneity of error variances. Examination

of the relationships between the pretest scores and group membership also indicated no meaningful violation of the homogeneity-of-regression-slopes assumption. Accordingly, the assumptions required for conducting covariance analysis were considered adequately satisfied. The preliminary multivariate analysis further indicated a significant overall effect of group membership on the combined dependent variables, Wilks’ $\Lambda = .319$, $F(2, 40) = 42.68$, $p < .001$, partial $\eta^2 = .681$, indicating that the three study groups differed significantly on the combined posttest measures after adjustment for baseline scores. Therefore, follow-up univariate ANCOVAs were conducted for each dependent variable.

Table 2

Results of Univariate Analyses of Covariance for Disease Self-Management and Illness Perception

Dependent Variable	Source	SS	df	MS	F	p	Partial η^2
Disease self-management	Pretest	412.57	1	412.57	12.84	.001	.234
Disease self-management	Group	1268.43	2	634.22	19.73	< .001	.484
Disease self-management	Error	1318.76	41	32.16	—	—	—
Illness perception	Pretest	386.24	1	386.24	14.62	.001	.263
Illness perception	Group	914.38	2	457.19	17.31	< .001	.458
Illness perception	Error	1082.14	41	26.39	—	—	—

As shown in Table 2, after controlling for the corresponding pretest scores, a statistically significant group effect was found for disease self-management, $F(2, 41) = 19.73$, $p < .001$, partial $\eta^2 = .484$. Thus, approximately 48.4% of the adjusted variance in posttest disease self-management was associated with group membership. The descriptive

results indicated that the ACT group demonstrated the greatest improvement, followed by the MCT group, whereas the control group showed only a small change. A significant group effect was also observed for illness perception after adjustment for baseline scores, $F(2, 41) = 17.31$, $p < .001$, partial $\eta^2 = .458$, indicating that approximately 45.8% of the

adjusted posttest variance in illness perception was associated with group membership. The ACT group exhibited the largest reduction in illness perception scores, followed by the MCT group, while scores in the control group remained relatively stable. The substantial effect sizes for both outcomes indicate that the differences between the

study groups were not only statistically significant but also of considerable magnitude. Because the omnibus group effects were significant for both dependent variables, pairwise post-hoc comparisons were conducted to identify the specific group differences.

Table 3

Pairwise Post-Hoc Comparisons of the Study Groups for Disease Self-Management and Illness Perception

Variable	Group Comparison	Mean Difference	SE	p
Disease self-management	ACT – MCT	5.54	1.61	.003
Disease self-management	ACT – Control	16.82	1.57	< .001
Disease self-management	MCT – Control	11.28	1.59	< .001
Illness perception	ACT – MCT	–4.86	1.49	.004
Illness perception	ACT – Control	–11.07	1.46	< .001
Illness perception	MCT – Control	–6.21	1.48	< .001

The pairwise comparisons presented in Table 3 showed that disease self-management was significantly higher in the ACT group than in the MCT group (mean difference = 5.54, $SE = 1.61$, $p = .003$). The ACT group also had significantly higher disease self-management scores than the control group (mean difference = 16.82, $SE = 1.57$, $p < .001$), and the MCT group performed significantly better than the control group (mean difference = 11.28, $SE = 1.59$, $p < .001$). For illness perception, the ACT group had significantly lower adjusted scores than the MCT group (mean difference = –4.86, $SE = 1.49$, $p = .004$) and the control group (mean difference = –11.07, $SE = 1.46$, $p < .001$). The MCT group also had significantly lower illness perception scores than the control group (mean difference = –6.21, $SE = 1.48$, $p < .001$). Collectively, these findings indicate that both Acceptance and Commitment Therapy and Metacognitive Therapy were effective in improving disease self-management and producing favorable changes in illness perception compared with the control condition; however, Acceptance and Commitment Therapy produced significantly greater improvements than Metacognitive Therapy on both study outcomes.

4. Discussion

The present study compared the effectiveness of Acceptance and Commitment Therapy (ACT) and Metacognitive Therapy (MCT) on disease self-management and illness perception in individuals with multiple sclerosis (MS). The findings showed that both interventions produced significant improvements compared with the control group. Specifically, participants who received ACT or MCT

demonstrated higher posttest disease self-management scores and more favorable illness perception scores after controlling for baseline differences. However, ACT produced significantly greater changes than MCT on both outcomes. These findings indicate that although both approaches can contribute to psychological adaptation to MS, ACT may exert a stronger effect on patients' ability to manage the disease and on the way they cognitively and emotionally represent their condition. The relatively large effect sizes observed for both outcomes further suggest that the changes were not limited to statistical significance but reflected substantial differences between the intervention and control conditions. This pattern is clinically meaningful because disease self-management and illness perception represent two complementary components of adjustment to chronic illness: the former reflects the patient's capacity to engage in adaptive health-related behaviors, while the latter reflects the cognitive and emotional framework through which the disease is understood.

The finding that ACT significantly improved disease self-management is consistent with a growing body of research indicating that acceptance-based interventions enhance adaptive functioning in individuals with MS. Previous studies have shown that ACT can improve resilience, quality of life, self-efficacy, and treatment-related adaptation in this population (Hesami et al., 2025; Karimi et al., 2022; Najafi et al., 2024). Similarly, compassion-focused adaptations of ACT have been associated with increased psychological flexibility, improved self-efficacy, reduced experiential avoidance, and stronger self-care behaviors (Ebrahimpour Azizi et al., 2026; Masoudi Margmaleki et al., 2023). These

findings align closely with the present result because self-management in MS requires more than knowledge of medical recommendations; it requires the ability to persist in treatment adherence, symptom management, communication with healthcare providers, lifestyle modification, and health-maintenance behaviors even when patients experience fatigue, discouraging thoughts, emotional distress, or uncertainty. ACT directly targets the rigid control strategies and experiential avoidance that may interfere with such behaviors. By teaching individuals to accept unavoidable internal experiences, distance themselves from distressing thoughts, identify personally meaningful values, and engage in committed action, ACT may help patients continue adaptive health behaviors despite the presence of symptoms or negative emotions.

The superiority of ACT over MCT in improving disease self-management may also be explained by the behavioral orientation of ACT. Disease self-management is fundamentally action-based. It involves monitoring symptoms, adhering to treatment, attending appointments, seeking appropriate information, using social support, communicating effectively with healthcare professionals, and maintaining daily health routines. ACT places considerable emphasis on values-guided behavior and committed action, which may translate more directly into these forms of self-management. In contrast, MCT primarily targets the regulation of thinking processes, including worry, rumination, threat monitoring, and maladaptive metacognitive beliefs. Although these changes can indirectly facilitate healthier behavior, the pathway from metacognitive change to concrete disease-management behavior may be less immediate than the explicit behavioral commitments emphasized in ACT. This interpretation is supported by evidence that mindfulness- and acceptance-based interventions can improve coping and quality of life among people with MS (Han, 2022), while systematic review evidence indicates that ACT can improve quality of life and mood in this population (Thompson et al., 2022). Furthermore, lifestyle self-management research has shown that successful adjustment to MS depends on the sustained implementation of adaptive daily behaviors rather than isolated psychological change (Wills & Probst, 2022). ACT may therefore be especially effective when the outcome of interest requires both internal flexibility and persistent behavioral engagement.

The significant effect of MCT on disease self-management is nevertheless important and theoretically plausible. Metacognitive processes influence how

individuals allocate attention, respond to uncertainty, and regulate repetitive negative thinking. Patients with MS may become preoccupied with bodily sensations, signs of disease progression, treatment outcomes, cognitive difficulties, and possible future disability. Such patterns can consume attentional resources and reduce the capacity for deliberate, goal-directed self-care. MCT seeks to weaken beliefs that worry or repeated analysis are necessary or uncontrollable and teaches patients to disengage from perseverative thinking. The improvement observed in the MCT group may therefore reflect greater cognitive flexibility, reduced rumination, and more effective attentional control, allowing patients to direct their resources toward adaptive disease-management behaviors. This explanation is compatible with findings that metacognitive functioning in MS is related to cognitive impairment and fatigue (Coll-Martínez et al., 2023) and that standardized metacognitive interventions can be useful in the management of neuropsychological difficulties in MS (Pöttgen et al., 2022). Thus, while MCT may not target self-management behavior as explicitly as ACT, it can reduce cognitive processes that interfere with adaptive action.

The second major finding was that both ACT and MCT significantly improved illness perception compared with the control condition, with ACT again producing the greater effect. Illness perception refers to the beliefs, interpretations, and emotional representations that patients develop regarding the identity, consequences, duration, controllability, treatment responsiveness, and meaning of their condition. These representations are important because they influence coping, emotional adjustment, treatment engagement, and health behavior. Previous research has demonstrated that illness perceptions are closely associated with psychological and functional outcomes in MS (Luca et al., 2022), and more recent work has shown that they are also related to emotional processing difficulties such as alexithymia (Luca et al., 2024). The present findings therefore suggest that psychological interventions can alter not only emotional distress but also the conceptual framework through which individuals understand MS. This is consistent with prior evidence showing that ACT can improve illness perception and treatment adherence in patients with MS (Sami et al., 2022).

The greater effect of ACT on illness perception may be explained by the way this intervention changes the relationship between patients and illness-related thoughts and emotions. ACT does not necessarily attempt to persuade patients that MS is less serious or to replace negative beliefs

with artificially positive interpretations. Instead, it reduces cognitive fusion and encourages patients to observe thoughts such as “my disease controls my life,” “my future is ruined,” or “I cannot function unless my symptoms disappear” as mental events rather than unquestionable truths. At the same time, acceptance processes may reduce the struggle against symptoms and disease-related emotions, while values clarification helps patients construct a broader sense of identity that is not defined exclusively by MS. These mechanisms may weaken catastrophic interpretations of the disease and promote more balanced, coherent, and adaptive illness representations. Evidence that ACT improves psychological flexibility and self-efficacy in MS provides support for this explanation (Hesami et al., 2025; Masoudi Margmaleki et al., 2023). Likewise, reductions in experiential avoidance and improvements in self-care found in recent ACT research suggest that patients may become more willing to confront the reality of the disease without allowing it to dominate their behavioral choices (Ebrahimpour Azizi et al., 2026).

MCT may improve illness perception through a somewhat different mechanism. Negative illness representations can be intensified by persistent worry, threat monitoring, repeated symptom checking, and beliefs that continued analysis is necessary to prevent harm. By reducing the cognitive attentional syndrome and weakening beliefs about the necessity or uncontrollability of worry, MCT may reduce the tendency to interpret symptoms through a constant threat-focused lens. Patients may become less likely to over-monitor bodily sensations or repeatedly imagine worst-case disease outcomes. This may explain the significant improvement in illness perception observed in the MCT group. The relevance of this pathway is supported by research showing that metacognitive functioning in MS varies in relation to fatigue and cognitive impairment (Coll-Martínez et al., 2023). Because fatigue and cognitive problems themselves can become sources of heightened threat appraisal, improving metacognitive regulation may help patients evaluate illness-related experiences more flexibly.

The observed superiority of ACT over MCT across both outcomes may also reflect the multidimensional nature of adjustment to MS. Living with a chronic neurological disease requires patients to manage objective symptoms while simultaneously coping with uncertainty, emotional distress, changes in identity, and fears about future disability. ACT addresses several of these domains at once through acceptance, cognitive defusion, mindfulness, values

clarification, self-as-context, and committed action. This broad process-based structure may provide a more integrated framework for changing both illness-related cognition and self-management behavior. In contrast, MCT is more narrowly focused on regulating perseverative thinking and maladaptive metacognitive beliefs. This narrower focus can be highly effective for reducing cognitive distress but may produce comparatively smaller changes in outcomes that depend strongly on values, identity, and sustained behavioral activation. The present findings therefore do not suggest that MCT is ineffective; rather, they indicate that ACT may be more closely matched to the combined behavioral and cognitive-emotional demands assessed in this study.

The results also fit with the broader literature on coping and self-management in MS. Adaptive coping strategies are associated with better quality of life, whereas avoidant or inflexible coping patterns tend to be associated with poorer outcomes (Culicetto et al., 2024). ACT is explicitly designed to reduce experiential avoidance, while MCT reduces maladaptive cognitive engagement with distressing thoughts. Both interventions may therefore improve outcomes by interrupting forms of coping that maintain psychological distress. In addition, successful MS management depends on the capacity to sustain health-related behaviors over time, including fatigue management and broader lifestyle adaptation (Silverman et al., 2024; Wendebourg et al., 2024). These behaviors are likely to be influenced by the extent to which patients can tolerate discomfort, regulate attention, maintain realistic illness beliefs, and remain engaged in personally meaningful routines. The present findings suggest that both ACT and MCT can support these capacities, with ACT producing the stronger overall pattern of improvement.

Another relevant consideration is the role of disease knowledge and perceived control. Research has shown that patients’ knowledge about MS is often incomplete or uneven, which may influence decisions and illness-related expectations (Smith & Langdon, 2024). At the same time, objective knowledge alone is insufficient if patients interpret the disease through maladaptive beliefs or become behaviorally immobilized by fear and uncertainty. Psychological interventions can complement education by helping individuals process information in a more adaptive way. ACT may enable patients to tolerate uncertainty without disengaging from health behavior, while MCT may reduce repetitive attempts to achieve certainty through worry and symptom monitoring. In this sense, the benefits observed in the present study may reflect improvements in

the way patients use and respond to illness-related information rather than changes in factual knowledge itself.

5. Conclusion

The findings have importance in the context of the increasing global prevalence of MS and continuing barriers to diagnosis and care. The number of people living with MS worldwide has exceeded three million, increasing the need for scalable interventions that address not only neurological symptoms but also long-term psychological and behavioral adaptation (King et al., 2026). At the same time, global disparities in access to diagnosis, specialist care, and treatment remain substantial (Solomon et al., 2023). Psychological interventions that improve self-management and illness perception may therefore have value as adjunctive components of multidisciplinary care, particularly where patients must manage substantial aspects of their condition outside specialist settings. The present findings support the inclusion of structured psychological interventions within MS care and suggest that ACT may be particularly suitable when the clinical objective is to improve both adaptive disease management and patients' cognitive-emotional relationship with the illness.

One limitation of the present study was the relatively small sample size, with only 15 participants in each group, which may limit statistical power and reduce the generalizability of the findings to the broader population of individuals with multiple sclerosis. Participants were also selected through convenience sampling from healthcare centers and MS-related organizations in a single study setting, which may have introduced selection bias and limited the representativeness of the sample. The use of self-report questionnaires may have increased the possibility of response bias, social desirability, or common-method variance. In addition, the study focused on short-term pretest–posttest changes and did not include a long-term follow-up assessment, making it impossible to determine whether the observed benefits persisted over time. Differences in MS subtype, disease duration, disability severity, medication regimen, fatigue, cognitive impairment, and comorbid psychological symptoms may also have influenced treatment response but were not examined as moderators.

Future research should replicate these findings using larger and more diverse samples recruited from multiple clinical settings and geographic regions. Randomized controlled trials with stronger allocation concealment,

blinded outcome assessment where possible, and longer follow-up periods would provide more robust evidence regarding the comparative efficacy and durability of ACT and MCT. Future studies should also examine potential moderators and mediators of treatment response, including psychological flexibility, experiential avoidance, metacognitive beliefs, worry, rumination, self-efficacy, fatigue severity, cognitive impairment, disease duration, and neurological disability. It would also be valuable to compare individual, group-based, online, and blended formats of ACT and MCT and to assess cost-effectiveness, treatment adherence, and dropout. Incorporating clinician-rated, behavioral, and objective health indicators alongside self-report measures could provide a more comprehensive evaluation of intervention effects.

From a practical perspective, psychological services for individuals with multiple sclerosis should incorporate structured assessment of disease self-management and illness perception rather than focusing exclusively on mood symptoms. ACT may be particularly useful for patients who show experiential avoidance, difficulty accepting persistent symptoms, reduced engagement in self-care, or loss of valued life activities, whereas MCT may be especially appropriate for patients whose adjustment is dominated by repetitive worry, rumination, symptom monitoring, and beliefs about the uncontrollability of thinking. Multidisciplinary MS care teams can integrate these interventions with neurological treatment, patient education, rehabilitation, and fatigue-management programs. Training psychologists and rehabilitation professionals in brief group-based ACT and MCT protocols may also increase the accessibility of evidence-informed psychological care for individuals living with MS.

Authors' Contributions

Authors equally contributed to this article.

Declaration

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

Transparency Statement

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Declaration of Interest

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Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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