

# The Effectiveness of an Integrated Intervention of Yoga Exercises and Reality Therapy on Psychological Reactance and Somatic Symptoms in Patients with Multiple Sclerosis (MS)

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### ABSTRACT

Multiple sclerosis (MS), in addition to somatic symptoms, is associated with various psychological reactions that affect patients' quality of life. The present study aimed to determine the effectiveness of an integrated intervention of yoga exercises and reality therapy on psychological reactance and somatic symptoms in patients with MS. This quasi-experimental study employed a pretest-posttest design with a control group. The statistical population included all patients with MS in Tehran in 2026–2027. Using purposive sampling, 30 participants were selected and randomly assigned to an experimental group ( $n = 15$ ) and a control group ( $n = 15$ ). The experimental group received the integrated intervention of yoga exercises and group reality therapy in ten 60-minute sessions, while the control group was placed on a waiting list. The research instruments included the SCL-90 Psychological Symptom Checklist, specifically the somatic complaints component, and the Psychological Reactance Scale (Hong & Faedda, 1996), which were completed at the pretest and posttest stages. The data were analyzed using analysis of covariance (ANCOVA) in SPSS version 26. The results showed that the integrated intervention had a significant effect on both psychological reactance ( $F = 451.27, p < .01$ ) and somatic symptoms ( $F = 350.29, p < .01$ ). The integrated intervention of yoga exercises and reality therapy can be used as an effective non-pharmacological approach to reducing psychological reactance and somatic symptoms in patients with MS. It is recommended that this intervention be incorporated into rehabilitation programs and psychophysiological care services for these patients.

**Keywords:** yoga exercises, reality therapy, psychological reactance, somatic symptoms, multiple sclerosis

## 1. Introduction

Multiple sclerosis (MS) is a chronic, progressive, and immune-mediated neurological disorder that affects the central nervous system and is commonly accompanied by a broad spectrum of physical, cognitive, emotional, and psychosocial consequences. Although the clinical course of MS varies across patients, many individuals experience recurrent or persistent symptoms such as fatigue, muscular weakness, sensory disturbances, impaired balance, pain, spasticity, reduced mobility, and limitations in daily functioning. These somatic manifestations do not occur in isolation; rather, they are often intertwined with psychological distress, emotional dysregulation, reduced self-efficacy, and changes in the individual's perception of bodily control. The chronic and unpredictable nature of MS may gradually weaken patients' sense of autonomy and psychological stability, creating conditions in which physical symptoms and psychological reactions intensify one another (Farsi et al., 2023; Jahangiri et al., 2023). In this context, effective rehabilitation for MS requires approaches that simultaneously address bodily symptoms and psychological processes rather than focusing solely on pharmacological or neurological management.

One of the central psychological issues experienced by people with chronic illness is the emergence of maladaptive psychological reactions to perceived restriction, dependency, or loss of control. In patients with MS, limitations imposed by fatigue, relapse, physical disability, medical dependence, uncertainty about disease progression, and reduced participation in social or occupational roles may increase emotional tension and resistance toward internal and external demands. Psychological reactance refers to a motivational state that arises when individuals perceive that their freedom, autonomy, or ability to choose has been threatened. In clinical populations, this reaction can manifest as resistance to treatment, anger, denial, defensiveness, nonadherence, or rejection of supportive recommendations. The study of psychological reactance is especially relevant among individuals with chronic neurological disorders because such patients frequently face repeated restrictions on mobility, lifestyle, social participation, and future planning. Saffarinia and colleagues emphasized psychological reactance as a meaningful psychological construct in populations exposed to disability-related stressors, showing that perceived restriction and reduced social support may be associated with defensive psychological styles (Saffarinia et al., 2017).

Psychological reactance in MS can also be understood in relation to the interaction between illness-related stress, emotional responses, and somatic symptom perception. Patients who experience their disease as a threat to independence may become more vigilant toward bodily sensations, interpret symptoms catastrophically, or respond to illness demands with avoidance, anger, or helplessness. Evidence from psychosomatic and medical psychology suggests that emotional and behavioral factors can affect symptom perception, treatment engagement, and functional outcomes in chronic disease. Feola and colleagues reported that cognitive functioning, depression, anxiety, and functional parameters are closely related in patients with severe medical conditions, indicating that psychological states are not merely secondary consequences but are meaningfully associated with functional health outcomes (Feola et al., 2013). Similarly, Ketterer and colleagues highlighted the role of behavioral and psychological factors in hospital admissions and readmissions among patients with chronic heart failure, demonstrating the clinical importance of psychological functioning in long-term disease management (Ketterer et al., 2013). Although these studies were conducted in non-MS populations, they support the broader biopsychosocial assumption that psychological patterns can influence disease burden, symptom interpretation, and health-related behavior.

MS is also strongly associated with affective symptoms, particularly depression and anxiety. Morris and colleagues explained that depression in MS is related to multiple immune-inflammatory, oxidative, and nitrosative stress pathways, suggesting that mood disturbance in MS is embedded in both biological and psychological mechanisms (Morris et al., 2018). This biological-psychological overlap is important because somatic symptoms in MS may become more severe or more distressing when accompanied by negative mood, anxiety, anger, or perceived loss of control. Fatigue, pain, muscular stiffness, and bodily discomfort may therefore be exacerbated not only by neurological impairment but also by emotional arousal and maladaptive coping. Consequently, interventions that reduce stress, increase self-regulation, and improve patients' relationship with their bodily experiences may contribute to better management of both psychological and somatic aspects of MS.

Yoga has increasingly been considered a useful complementary intervention for individuals with chronic physical and psychological conditions. Yoga integrates physical postures, breathing regulation, relaxation,

attentional control, and meditative awareness. Through these components, yoga may influence autonomic regulation, muscular tension, body awareness, balance, flexibility, fatigue, and psychological well-being. In patients with MS, yoga is particularly relevant because it can be adapted to different levels of physical ability and may simultaneously target mobility, balance, fatigue, mood, and stress. Velikonja and colleagues showed that yoga, along with sport climbing, could influence spasticity, cognitive function, mood, and fatigue in patients with MS, supporting the potential of body-based interventions for this population (Velikonja et al., 2010). In Iran, Il Beigi and colleagues demonstrated that yoga training improved muscular fatigue indices and balance in people with MS, suggesting that structured yoga practice can positively affect functional and neuromuscular outcomes in this group (Il Beigi et al., 2020).

Further evidence indicates that yoga-based programs may improve physical fitness, functional capacity, and health-related outcomes in women with MS. Farahbakhsh and colleagues reported that eight weeks of yoga exercises combined with vitamin D supplementation improved insulin resistance, balance, coordination, and power in women with MS (Farahbakhsh et al., 2025). Mahmoudi Rad and colleagues also found that yoga exercises combined with vitamin D supplementation affected lipid profile, muscular strength, muscular endurance, flexibility, and body composition in women with MS (Mahmoudi Rad et al., 2025). These findings indicate that yoga may function as a comprehensive rehabilitative modality, not merely as a relaxation technique. In addition, Jahangiri and colleagues compared acceptance and commitment therapy, compassion-focused therapy, and yoga exercises in people with MS and reported improvements in self-management, showing that yoga can contribute to psychological and behavioral dimensions of chronic illness care (Jahangiri et al., 2023). Collectively, these studies suggest that yoga may be valuable for MS patients because it addresses both embodied and self-regulatory dimensions of illness.

The benefits of yoga are not limited to MS. Studies in other populations also support its role in improving physical, psychological, and functional outcomes. Babaei Khorzooghi and colleagues showed that yoga exercises using the ultimate readiness approach and hatha yoga improved static balance in middle-aged women (Babaei Khorzooghi et al., 2021). Rezaei and Akbari Amraghan demonstrated that yoga exercises improved psychological indicators, emotion regulation, and quality of life among housewives, indicating the relevance of yoga for emotional and psychological

functioning (Rezaei & Akbari Amraghan, 2025). Soltanian and colleagues reported positive effects of cyclic yoga exercises on upper crossed syndrome, increased lordosis, and mental health in elderly women (Soltanian et al., 2024). Olfati also emphasized the role of combined yoga and exercise training in preventing and improving injuries, musculoskeletal disorders, and psychological disorders in athletes (Olfati, 2024). Moreover, Zarghami and colleagues found that combined massage–yoga exercises had beneficial effects on pain, function, range of motion, and quality of life in women with knee osteoarthritis (Zarghami et al., 2025). These findings from diverse populations support the view that yoga can operate across physical and psychological domains and may be particularly appropriate for patients whose symptoms are simultaneously bodily and emotional.

Alongside yoga, reality therapy offers a psychological framework that may be useful for patients with chronic illness. Reality therapy is grounded in Glasser's choice theory, which proposes that human behavior is purposeful and directed toward satisfying basic needs, including survival, love and belonging, power, freedom, and fun (Glasser, 1999). From this perspective, psychological distress often emerges when individuals rely on ineffective behaviors to satisfy their needs or when they perceive that external conditions prevent them from exercising choice and responsibility. In the context of MS, patients may experience frustration because the disease threatens their perceived freedom, competence, independence, and ability to participate in meaningful relationships. Reality therapy can help patients distinguish between controllable and uncontrollable aspects of illness, accept responsibility for their choices and emotional reactions, and develop more effective behaviors for coping with symptoms, treatment demands, and interpersonal challenges.

Reality therapy is also consistent with person-centered and goal-oriented treatment planning. Wubbolding and colleagues described the WDEP system of reality therapy, which focuses on wants, doing, evaluation, and planning, and emphasized its usefulness in supporting person-centered treatment planning (Wubbolding et al., 2017). This structure is particularly relevant for patients with MS because it can help them clarify what they want, examine how their current thoughts and actions affect their well-being, evaluate whether their coping strategies are effective, and formulate realistic plans for managing emotional and somatic symptoms. Jusoh also discussed the use of choice theory and reality therapy in individual and group counseling, emphasizing their applicability in structured counseling

contexts and group-based interventions (Jusoh, 2018). Group reality therapy may therefore be suitable for patients with MS because it combines responsibility, social support, interpersonal feedback, and practical planning.

Empirical evidence also supports the usefulness of reality therapy in chronic disease and pain-related contexts. Seehusen and colleagues discussed the application of reality therapy for clients experiencing chronic pain, emphasizing that the approach can help individuals focus on choice, responsibility, need satisfaction, and effective behavioral planning despite persistent physical discomfort (Seehusen & Tlmhc, 2018). In patients with MS, Farsi and colleagues reported that reality therapy reduced rumination and improved emotional expressiveness, showing that this intervention may be effective for psychological difficulties associated with MS (Farsi et al., 2023). Similarly, Besharatian and colleagues compared the effectiveness of reality therapy and meaning therapy in patients with diabetes and found positive effects on inner self-talk and health-promoting lifestyle, indicating that reality therapy can support adaptive cognition and health-related behavior in chronic illness (Besharatian et al., 2025). These studies suggest that reality therapy may strengthen patients' ability to reframe illness-related thoughts, reduce maladaptive emotional responses, and adopt more constructive self-care behaviors.

The integration of yoga exercises and reality therapy may offer a more comprehensive intervention than either approach alone. Yoga directly engages the body through movement, breathing, relaxation, and mindful attention, while reality therapy addresses the cognitive, motivational, behavioral, and interpersonal dimensions of coping. For patients with MS, this combination may be especially appropriate because psychological reactance and somatic symptoms are mutually reinforcing. When patients perceive their illness as a threat to freedom and control, they may experience anger, anxiety, denial, or resistance, which can increase physiological arousal and intensify fatigue, spasms, pain, or bodily discomfort. Conversely, worsening somatic symptoms may further increase helplessness and psychological resistance. Yoga may reduce bodily tension and improve self-regulation, while reality therapy may help patients reinterpret their choices, assume responsibility for manageable reactions, and develop practical strategies for emotional and symptom management. Therefore, an integrated intervention can target both the bodily pathway and the psychological pathway involved in MS-related distress.

The measurement of somatic and psychological symptoms in this area also requires reliable instruments. The Symptom Checklist framework has been widely used to assess psychological and somatic symptom dimensions. Tanhaye Roshanloo and Saadati Shamir examined the validity and construct validity of the 25-item Symptom Checklist of Psychological Symptoms and reported evidence supporting its psychometric adequacy in Iranian samples (Tanhaye Roshanloo & Saadati Shamir, 2015). Khajeh Goldloo and Farshbaf Manisefat also used psychological assessment procedures in the context of anxiety-related intervention research and highlighted the importance of validated tools for evaluating intervention outcomes (Khajeh Goldloo & Farshbaf Manisefat, 2025). The use of standardized symptom measures is important in MS research because changes in somatic symptoms may reflect not only neurological disease activity but also perceived symptom burden, emotional distress, and coping-related changes.

In addition to clinical relevance, the present study is grounded in the broader need for methodologically structured intervention research in psychology and rehabilitation. Delavar emphasized the importance of appropriate experimental and quasi-experimental designs in psychological and educational research, particularly when evaluating the effectiveness of interventions (Delavar, 2022). In MS-related intervention studies, controlled pretest–posttest designs are valuable because they allow researchers to examine whether changes in post-intervention outcomes are attributable to the intervention after considering baseline differences. Furthermore, Ramezani and colleagues showed that psychological well-being differs meaningfully across physically active and non-active student groups, indirectly supporting the importance of physical activity and exercise-related engagement for psychological outcomes (Ramezani et al., 2015). This broader evidence strengthens the rationale for examining interventions that combine movement-based and psychological components.

Despite the growing literature on yoga and reality therapy, several gaps remain. Many prior studies have examined yoga primarily in relation to physical outcomes such as balance, fatigue, strength, flexibility, or body composition, while fewer studies have focused on psychological reactance as a specific outcome in MS. Likewise, studies on reality therapy in MS have mainly addressed variables such as rumination, emotional expressiveness, self-talk, or lifestyle, rather than its combined use with body-based interventions. Moreover,

although the literature suggests that psychological distress and somatic symptoms are interconnected in chronic illness, relatively limited empirical attention has been given to integrated protocols that simultaneously target emotional responsibility, perceived control, bodily relaxation, breathing regulation, and symptom awareness. In patients with MS, such integration may be particularly important because disease-related restrictions may trigger reactance, and reactance may in turn intensify perceived somatic burden.

Accordingly, the present study aimed to determine the effectiveness of an integrated intervention of yoga exercises and reality therapy on psychological reactance and somatic symptoms in patients with multiple sclerosis.

## 2. Methods and Materials

### 2.1. Study Design and Participants

The present study was a quasi-experimental study with a pretest–posttest design and a control group. The statistical population consisted of all patients with multiple sclerosis (MS) in Tehran who had referred to MS treatment centers in 2026–2027. Considering the sample sizes commonly used in similar quasi-experimental studies and based on the average sample size of three comparable studies (Bashartian et al., 2025; Farsi et al., 2023; Zarghami et al., 2025), 30 participants were selected through purposive sampling, in accordance with Delavar's (2022) recommendation for experimental research. Accordingly, after referring to MS treatment centers in Tehran, 30 patients with MS who met the inclusion criteria were selected as the study sample and were randomly assigned to an experimental group ( $n = 15$ ) and a control group ( $n = 15$ ). The inclusion criteria were having a confirmed diagnosis of relapsing–remitting MS, full willingness to participate in the study through written informed consent, confirmation of the diagnosis by a neurologist based on the patient's MRI findings, literacy, the ability to walk at least 100 meters, absence of psychiatric disorders and other chronic diseases based on self-report, and not receiving any specific treatment for psychological problems, including psychotherapy or educational classes, during the study period. The exclusion criteria included a history of psychotherapeutic interventions during the previous six months, use of psychiatric medications, absence from more than two intervention sessions, and disease relapse or attack during the study, such as the occurrence of a bodily-system problem requiring urgent medical intervention and absolute rest. To observe ethical

considerations, the objectives of the study were explained honestly to the participants at the beginning of the research, informed consent was obtained, confidentiality and privacy of the participants' information were fully maintained by the researcher, and none of the costs related to the intervention were imposed on the participants. The intervention was provided free of charge. The integrated intervention of yoga exercises and reality therapy was delivered to the experimental group, while the control group received no intervention during this period and remained on the waiting list. After completion of the intervention, the posttest was administered to both groups.

### 2.2. Measures

The Psychological Reactance Scale was developed by Hong and Faedda (1996) and consists of 14 items. The items are scored on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Therefore, the minimum and maximum possible scores are 14 and 70, respectively (Saffarinia, 2015). Hong and Faedda (1996) administered the scale to 1,425 university students and 1,660 non-student participants in Australia. After removing three items and re-conducting principal component analysis, they reported reliability coefficients of .80 and .77 for the 14-item and 11-item versions, respectively. In Iran, Saffarinia (2015) reported a Cronbach's alpha coefficient of .81 for the scale. In the present study, the reliability of the questionnaire, calculated using Cronbach's alpha, was .71.

The SCL-90 Clinical Symptom Checklist was used to assess somatic symptoms through its somatic complaints component. The full questionnaire includes 90 items and measures nine psychological symptom dimensions, including somatic complaints, obsessive–compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. For scoring the nine dimensions, each item is assigned a score from 0 to 4. The score for each dimension is first calculated and then divided by the number of items belonging to that dimension; this procedure is repeated for all nine dimensions. A high mean score in each symptom dimension, generally 3 or above, indicates a serious problem in that domain. In the present study, only the somatic complaints component was used to assess somatic symptoms. The somatic complaints dimension includes items 1, 4, 12, 27, 40, 42, 48, 49, 52, 53, 56, and 58. The raw score of the somatic complaints dimension ranges from 0 to 48, and by dividing this score by 12, the respondent's final

score is obtained as a value between 0 and 4. This questionnaire has been widely used in domestic and international studies and has demonstrated acceptable validity. In the original standardization of the instrument by Derogatis et al. (1973), the highest Cronbach's alpha coefficient was reported for depression at .90, and the lowest was reported for psychoticism at .77. Test-retest reliability coefficients ranged from .78 to .90 (as cited in Khajeh-ye Goldloo et al., 2025). In addition, Tanhaye Rashvanloo et al. (2015) reported Cronbach's alpha coefficients ranging from .71 to .95 and split-half reliability coefficients ranging from .65 to .96 for the subscales and the total scale. In the present study, the reliability coefficient of the somatic complaints subscale was .76.

### 2.3. Intervention

The integrated intervention protocol was developed based on Glasser's reality therapy approach (Glasser, 1999) and yoga exercises, and its content validity was confirmed by experts in this field. In the present study, the intervention was implemented in ten weekly 60-minute sessions. The first session included participant introduction, explanation of group rules and intervention goals, administration of the pretest questionnaires, initial relaxation through rotation of awareness, basic warm-up movements and dynamic movements coordinated with inhalation and exhalation, yogic breathing, mental concentration exercises and meditation, final relaxation, and explanation of yoga exercises as home assignments. The second session included initial relaxation, seated and supine body postures, yogic breathing, meditation, inner journey exercises, and discussion of common psychological reactions in MS, including depression, anxiety, denial, and anger, with emphasis on the role of these reactions in intensifying somatic symptoms such as fatigue and spasms. The third session focused on reviewing the previous session, explaining basic needs and their role in somatic symptoms, teaching the five basic needs of survival, love, power, freedom, and fun, and examining how unmet needs, particularly love and power, may be converted into somatic symptoms through psychological tension, such as increased fatigue or pain in response to helplessness. The fourth session included initial relaxation, meditation, self-awareness and realistic awareness of the body and emotions, review of the needs profile, acceptance training, differentiation between controllable psychological reactions and certain uncontrollable somatic symptoms, and

introduction of emotional self-care as a strategy for reducing pressure on the nervous system and moderating symptoms. The fifth session involved initial relaxation through rotation of awareness, warm-up and dynamic breathing-coordinated movements, yogic breathing, and training in the concept of total behavior and its role in exacerbating or moderating symptoms. In this session, total behavior was explained through four components: action, thinking, feeling, and somatic symptoms. The patients were taught that somatic symptoms in MS may be understood as part of the individual's total behavior and may be influenced by thoughts and emotions; for example, negative thoughts about the future may lead to anxiety and subsequently increase fatigue and muscle stiffness. The sixth session included initial relaxation, warm-up and dynamic movements, yogic breathing or pranayama, review of assignments, discussion of the quality world, anxiety and anger in the context of illness, definition of the desirable world, examination of the gap between the desirable world and the reality of illness, and clarification of how anxiety and anger in MS are often reactions to the inability to achieve the desirable world and may intensify somatic symptoms through activation of the stress system. The seventh session focused on emotional responsibility and realistic goal-setting, defining responsibility for one's psychological reactions rather than responsibility for the disease itself, helping patients set small and practical goals in two domains, namely emotional management, such as reducing self-blame, and somatic symptom management, such as regulating rest time based on fatigue, and strengthening self-worth through acceptance of limitations and identification of alternative ways to meet needs. The eighth session included initial relaxation through rotation of awareness, basic warm-up and dynamic breathing-coordinated movements, pranayama, meditation, and final relaxation. The ninth session included review of the previous content, discussion of internal control versus psychosomatic reactions, differentiation between internal control, meaning acceptance of one's role in emotional reactions, and external control, meaning blaming the illness, others, or circumstances, as well as group discussion about how psychological reactions such as hopelessness can affect somatic symptoms and vice versa. Practical strategies were also presented to increase internal control, including daily recording of the relationship between mood and symptoms, positive self-talk, and replacing self-blame with self-compassion. The tenth session included initial relaxation through rotation of awareness, basic warm-up and dynamic breathing-

coordinated movements, yogic breathing, meditation, final relaxation, review and summarization of the previous sessions, and administration of the posttest.

## 2.4. Data Analysis

After data collection, the obtained data were analyzed using SPSS version 26. Descriptive statistics, including mean and standard deviation, were used to describe the study variables in the experimental and control groups at the pretest and posttest stages. Before conducting inferential analysis, the statistical assumptions required for analysis of covariance were examined, including normality of score distributions, homogeneity of variances, and homogeneity of regression slopes. Analysis of covariance was then used to compare the posttest scores of psychological reactance and

somatic symptoms between the experimental and control groups while controlling for the corresponding pretest scores. The level of statistical significance was set at  $p < .05$ .

## 3. Findings and Results

A total of 30 patients with multiple sclerosis participated in the present study. Of these participants, 15 were assigned to the experimental group and 15 to the control group. All participants completed the pretest and posttest assessments, and the data obtained from both groups were included in the final statistical analysis. The experimental group received the integrated intervention of yoga exercises and reality therapy, whereas the control group remained on the waiting list during the intervention period.

**Table 1**

*Descriptive Statistics of Psychological Reactance and Somatic Symptoms in the Experimental and Control Groups at Pretest and Posttest*

| Variable                | Group        | Pretest M | Pretest SD | Posttest M | Posttest SD |
|-------------------------|--------------|-----------|------------|------------|-------------|
| Psychological reactance | Experimental | 46.466    | 6.311      | 43.733     | 6.158       |
| Psychological reactance | Control      | 46.333    | 6.137      | 46.133     | 6.545       |
| Somatic symptoms        | Experimental | 2.327     | 0.607      | 2.111      | 0.608       |
| Somatic symptoms        | Control      | 2.316     | 0.587      | 2.305      | 0.637       |

As shown in Table 1, the mean scores of psychological reactance and somatic symptoms decreased in the experimental group from pretest to posttest. Specifically, the mean score of psychological reactance in the experimental group decreased from 46.466 at pretest to 43.733 at posttest, and the mean score of somatic symptoms decreased from 2.327 to 2.111. In contrast, the control group showed no considerable change from pretest to posttest in either psychological reactance or somatic symptoms. These descriptive findings indicate an initial pattern of improvement in the experimental group following the integrated intervention of yoga exercises and reality therapy.

Before conducting analysis of covariance, the required statistical assumptions were examined. The correlation between pretest and posttest scores was significant for psychological reactance ( $r = .958$ ) and somatic symptoms ( $r = .972$ ), indicating that the assumption of linearity between the covariate and dependent variable was met. The results of

Levene's test were not significant for psychological reactance,  $F(1, 28) = 0.459$ ,  $p = .504$ , or somatic symptoms,  $F(1, 28) = 0.634$ ,  $p = .433$ , indicating that the assumption of homogeneity of error variances was satisfied. In addition, the Kolmogorov-Smirnov test confirmed the normality of score distributions in both groups. In the experimental group, the Kolmogorov-Smirnov values were not significant for psychological reactance at pretest ( $Z = 0.123$ ,  $p = .200$ ) and posttest ( $Z = 0.137$ ,  $p = .200$ ), as well as for somatic symptoms at pretest ( $Z = 0.096$ ,  $p = .200$ ) and posttest ( $Z = 0.101$ ,  $p = .200$ ). In the control group, the results were also not significant for psychological reactance at pretest ( $Z = 0.135$ ,  $p = .200$ ) and posttest ( $Z = 0.105$ ,  $p = .200$ ), and for somatic symptoms at pretest ( $Z = 0.099$ ,  $p = .200$ ) and posttest ( $Z = 0.129$ ,  $p = .200$ ). Therefore, the assumptions of normality, homogeneity of variance, and linearity were met, and the use of analysis of covariance was justified.

**Table 2**

*One-Way Analysis of Covariance for Comparing Posttest Scores of Psychological Reactance and Somatic Symptoms Between the Experimental and Control Groups*

| Source                  | Sum of Squares | df | Mean Square | F      | p    | Effect Size | Statistical Power |
|-------------------------|----------------|----|-------------|--------|------|-------------|-------------------|
| Psychological reactance | 48.123         | 1  | 48.123      | 27.451 | .001 | .504        | .999              |
| Error                   | 47.333         | 27 | 1.753       |        |      |             |                   |
| Total                   | 61744.000      | 30 |             |        |      |             |                   |
| Somatic symptoms        | 0.318          | 1  | 0.318       | 29.350 | .001 | .521        | .999              |
| Error                   | 0.292          | 27 | 0.011       |        |      |             |                   |
| Total                   | 157.465        | 30 |             |        |      |             |                   |

As presented in Table 2, after controlling for pretest scores, there was a statistically significant difference between the experimental and control groups in posttest scores of psychological reactance,  $F(1, 27) = 27.451$ ,  $p = .001$ ,  $\eta^2 = .504$ . This finding indicates that the integrated intervention of yoga exercises and reality therapy significantly reduced psychological reactance in patients with multiple sclerosis. The results also showed a statistically significant difference between the two groups in posttest scores of somatic symptoms,  $F(1, 27) = 29.350$ ,  $p = .001$ ,  $\eta^2 = .521$ . Therefore, the intervention was also effective in reducing somatic symptoms. Overall, the findings suggest that the integrated intervention of yoga exercises and reality therapy had a significant positive effect on both psychological reactance and somatic symptoms among patients with multiple sclerosis.

#### 4. Discussion

The present study aimed to determine the effectiveness of an integrated intervention of yoga exercises and reality therapy on psychological reactance and somatic symptoms in patients with multiple sclerosis. The findings showed that, after controlling for pretest scores, there was a statistically significant difference between the experimental and control groups in psychological reactance at the posttest stage. The mean score of psychological reactance decreased in the experimental group from pretest to posttest, whereas no meaningful change was observed in the control group. The ANCOVA results also indicated a large effect size, suggesting that the integrated intervention had a substantial effect on reducing psychological reactance among patients with MS. This finding indicates that combining yoga-based bodily regulation with reality therapy-based cognitive and behavioral responsibility can reduce patients' resistant, defensive, and autonomy-protective reactions toward illness-related restrictions and psychological pressure.

This finding can be explained through the theoretical foundations of reality therapy and choice theory. According to Glasser's choice theory, human behavior is purposeful and is directed toward satisfying basic psychological needs,

including survival, love and belonging, power, freedom, and fun (Glasser, 1999). In chronic illnesses such as MS, the unpredictable course of the disease may threaten patients' sense of freedom, competence, autonomy, and control. When patients perceive that their bodily condition, treatment requirements, or life limitations restrict their freedom, psychological reactance may emerge as anger, resistance, denial, hopelessness, or rejection of help. Reality therapy helps individuals distinguish between what can and cannot be controlled, evaluate the effectiveness of their current behaviors, and choose more adaptive actions. Therefore, by helping patients accept responsibility for their emotional and behavioral reactions without blaming themselves for the disease, the intervention may have reduced the perceived threat to autonomy and consequently decreased psychological reactance.

The results are consistent with previous studies on the effectiveness of reality therapy in chronic illness and psychological adjustment. Farsi and colleagues showed that reality therapy reduced rumination and improved emotional expressiveness in patients with MS, indicating that this approach can help MS patients modify maladaptive cognitive-emotional patterns and express emotions more constructively (Farsi et al., 2023). Similarly, Besharatian and colleagues found that reality therapy improved inner self-talk and health-promoting lifestyle in patients with diabetes, suggesting that reality therapy can be effective in chronic disease populations by strengthening adaptive cognition, responsibility, and self-care behaviors (Besharatian et al., 2025). Seehusen and colleagues also emphasized the usefulness of reality therapy for clients with chronic pain, arguing that focusing on choice, responsibility, and effective planning can help individuals cope with persistent physical discomfort (Seehusen & Tlmhc, 2018). These findings align with the present results because MS, like chronic pain and diabetes, requires long-term adaptation to physical limitations, emotional burden, and health-related behavioral demands.

The reduction in psychological reactance can also be interpreted in light of the WDEP system of reality therapy.

The WDEP framework focuses on wants, doing, evaluation, and planning and is designed to help clients clarify their needs, evaluate their current behaviors, and develop realistic plans for change (Wubbolding et al., 2017). In the present intervention, patients were encouraged to recognize their basic needs, examine the gap between their desired world and the reality of illness, and identify practical ways to manage emotional reactions. This process may have reduced external control beliefs and helped patients experience a stronger sense of internal control. Jusoh also emphasized that choice theory and reality therapy can be effectively applied in both individual and group counseling settings, particularly when clients are guided toward responsibility, realistic decision-making, and need satisfaction (Jusoh, 2018). In the present study, the group format may have further supported this process by normalizing patients' experiences, reducing feelings of isolation, and increasing interpersonal learning.

Another finding of the present study was that the integrated intervention significantly reduced somatic symptoms in patients with MS. The mean score of somatic symptoms decreased in the experimental group from pretest to posttest, while the control group showed almost no change. The ANCOVA results showed a significant group difference in posttest somatic symptoms after controlling for baseline scores, with a large effect size. This finding suggests that the intervention was not limited to psychological change but also influenced patients' perceived bodily symptoms. Given the psychophysiological nature of MS-related symptom experience, such a result is theoretically meaningful. Somatic symptoms in MS are influenced by neurological mechanisms, but their intensity, perception, and functional consequences may also be affected by stress, emotional arousal, fatigue, muscular tension, anxiety, and illness-related cognition.

The effectiveness of the intervention in reducing somatic symptoms is consistent with previous research on yoga in patients with MS. Velikonja and colleagues reported that yoga influenced spasticity, cognitive function, mood, and fatigue in patients with MS, supporting the potential of yoga as a complementary rehabilitation approach for this population (Velikonja et al., 2010). Il Beigi and colleagues also found that yoga training improved muscular fatigue indices and balance in people with MS, showing that yoga can affect both functional and neuromuscular dimensions of the disease (Il Beigi et al., 2020). Farahbakhsh and colleagues demonstrated that eight weeks of yoga exercises combined with vitamin D supplementation improved insulin

resistance, balance, coordination, and power in women with MS (Farahbakhsh et al., 2025). In another related study, Mahmoudi Rad and colleagues reported that yoga exercises combined with vitamin D supplementation improved lipid profile, muscular strength, muscular endurance, flexibility, and body composition in women with MS (Mahmoudi Rad et al., 2025). These studies support the present finding by showing that yoga-based interventions can improve bodily functioning and reduce physical burden in individuals with MS.

The mechanisms through which yoga may reduce somatic symptoms are multidimensional. Yoga combines gentle movement, stretching, breathing regulation, relaxation, attentional focus, and body awareness. These components may reduce muscular tension, improve autonomic regulation, increase relaxation response, enhance balance and coordination, and help patients reinterpret bodily sensations with less fear and reactivity. The breathing and relaxation components used in the present intervention may have reduced physiological arousal, while the movement components may have contributed to improved bodily flexibility and reduced stiffness. The emphasis on mindful attention and meditation may also have helped patients observe physical discomfort without immediately responding with anxiety, catastrophizing, or avoidance. This explanation is consistent with Jahangiri and colleagues, who showed that yoga exercises, along with acceptance and commitment therapy and compassion-focused therapy, improved self-management in people with MS (Jahangiri et al., 2023). Improved self-management may be one of the important pathways through which yoga reduces symptom burden.

The present results are also consistent with broader evidence on the benefits of yoga in non-MS populations. Babaei Khorzooghi and colleagues found that yoga exercises improved static balance in middle-aged women, supporting the role of yoga in postural and motor regulation (Babaei Khorzooghi et al., 2021). Rezaei and Akbari Amraghan showed that yoga exercises improved psychological indicators, emotion regulation, and quality of life in housewives, indicating that yoga has psychological as well as physical benefits (Rezaei & Akbari Amraghan, 2025). Soltanian and colleagues reported that cyclic yoga exercises improved musculoskeletal conditions and mental health in elderly women (Soltanian et al., 2024). Olfati emphasized that combined yoga and exercise training can contribute to the prevention and improvement of musculoskeletal and psychological disorders in athletes (Olfati, 2024). Zarghami

and colleagues also found that combined massage-yoga exercises improved pain, function, range of motion, and quality of life in women with knee osteoarthritis (Zarghami et al., 2025). Although these studies were conducted in different populations, they support the general conclusion that yoga can improve bodily regulation, reduce symptom-related distress, and strengthen psychological well-being.

The findings can also be explained through the interaction between psychological distress and somatic symptom perception. MS is associated with emotional disturbances such as depression and anxiety, and these emotional states may intensify perceived physical symptoms. Morris and colleagues explained that depression in MS is linked to immune-inflammatory, oxidative, and nitrosative stress pathways, showing that psychological symptoms in MS are closely intertwined with biological mechanisms (Morris et al., 2018). Therefore, reducing psychological tension through reality therapy and yoga may indirectly reduce perceived somatic symptoms. Feola and colleagues also demonstrated relationships among cognitive function, depression, anxiety, and functional parameters in patients with chronic medical conditions, suggesting that psychological and functional domains are interconnected (Feola et al., 2013). Ketterer and colleagues similarly emphasized the role of behavioral factors in hospital admissions and readmissions among patients with chronic heart failure, indicating that psychological and behavioral patterns can influence physical health outcomes (Ketterer et al., 2013). These findings support the biopsychosocial interpretation of the present results.

The integrated nature of the intervention is one of the most important aspects of the present findings. Yoga may have primarily affected bodily arousal, relaxation, fatigue, muscular tension, and body awareness, whereas reality therapy may have influenced responsibility, choice, internal control, emotional regulation, and adaptive coping. Psychological reactance and somatic symptoms in MS may reinforce each other: disease-related bodily symptoms can increase frustration and resistance, and psychological reactance can intensify stress responses and symptom perception. The combined intervention may have interrupted this cycle by teaching patients both body-based regulation and cognitive-behavioral responsibility. In this regard, the intervention did not merely aim to reduce symptoms but also helped patients construct a more adaptive relationship with their illness, their body, and their choices.

The use of valid psychological and symptom assessment tools also strengthens the interpretation of the results.

Psychological reactance is a relevant construct in populations facing disability, bodily limitations, and perceived restriction, and Saffarinia and colleagues showed the importance of assessing psychological reactance in relation to disability-related family and social contexts (Saffarinia et al., 2017). The use of symptom checklists for assessing psychological and somatic symptoms is also supported by previous validation studies. Tanhaye Roshanloo and Saadati Shamir reported acceptable validity and construct validity for the Symptom Checklist of Psychological Symptoms in Iranian samples (Tanhaye Roshanloo & Saadati Shamir, 2015). Khajeh Goldloo and Farshbaf Manisefat also emphasized the role of structured psychological assessment in intervention studies related to anxiety and psychological symptoms (Khajeh Goldloo & Farshbaf Manisefat, 2025). Therefore, the observed posttest changes can be interpreted with greater confidence because the outcomes were measured using established psychological instruments.

## 5. Conclusion

Overall, the findings of the present study support the effectiveness of an integrated intervention of yoga exercises and reality therapy in reducing psychological reactance and somatic symptoms in patients with MS. These results are consistent with the theoretical assumptions of choice theory, which emphasize responsibility, choice, and need satisfaction, and with empirical evidence supporting yoga as a complementary approach for improving physical and psychological functioning. The findings also extend previous studies by examining the combined effect of a body-based intervention and a reality therapy-based psychological intervention on two clinically meaningful outcomes in MS. From a methodological perspective, the use of a quasi-experimental pretest-posttest design with a control group is appropriate for evaluating intervention effectiveness in psychological and rehabilitation research (Delavar, 2022). Moreover, the results are consistent with broader evidence suggesting that physical activity and psychological well-being are related, as shown in research comparing athlete and non-athlete students in terms of psychological well-being (Ramezani et al., 2015). Thus, the present study contributes to the literature by showing that a combined intervention can simultaneously address psychological resistance and bodily symptom burden in MS.

Despite its meaningful findings, the present study had several limitations. First, the sample size was relatively

small and included only 30 patients with MS, which may limit the generalizability of the findings to the broader population of patients with different disease courses, disability levels, age groups, and clinical histories. Second, the study used a purposive sampling method and was conducted only among patients referring to MS treatment centers in Tehran; therefore, cultural, regional, socioeconomic, and healthcare-access differences may affect the applicability of the results to other settings. Third, the study examined outcomes only at pretest and posttest stages and did not include a follow-up assessment, making it impossible to determine the long-term stability of the intervention effects. Fourth, the outcomes were assessed through self-report questionnaires, which may be influenced by response bias, social desirability, mood state, and participants' subjective interpretation of symptoms. Finally, the intervention combined yoga exercises and reality therapy, so the separate contribution of each component could not be determined.

Future studies are recommended to replicate the present research with larger and more diverse samples of patients with MS, including participants from different cities, disease stages, disability levels, and demographic backgrounds. It is also suggested that future research use randomized controlled trial designs with longer follow-up periods to evaluate the durability of treatment effects over time. Comparative studies could examine yoga alone, reality therapy alone, and the combined intervention in separate groups to identify the independent and additive effects of each component. Future studies may also include physiological and clinical indicators such as fatigue severity, balance performance, pain intensity, inflammatory markers, sleep quality, relapse frequency, and medication adherence in addition to psychological questionnaires. Qualitative studies are also recommended to explore patients' lived experiences of participating in integrated mind-body and psychological interventions.

Based on the findings, the integrated intervention of yoga exercises and reality therapy can be used as a complementary, non-pharmacological approach in rehabilitation and psychological care programs for patients with MS. Clinicians, rehabilitation specialists, psychologists, counselors, and MS care teams may benefit from incorporating structured yoga practices, breathing exercises, relaxation techniques, emotional responsibility training, internal control strategies, and realistic goal-setting into patient-centered care plans. Because MS patients may differ in physical ability, fatigue level, balance capacity, and

symptom severity, the yoga component should be adapted to individual limitations and implemented under professional supervision. Reality therapy sessions should also be delivered in a supportive and nonjudgmental manner, emphasizing choice, responsibility, self-compassion, and practical coping rather than blame. Integrating these components into group-based rehabilitation programs may help patients manage psychological reactions, reduce somatic distress, and improve their overall adjustment to 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

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

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The authors report no conflict of interest.

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### Ethical Considerations

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

### References

- Babaei Khorzooghi, M., Maleki Vasegh, M., & Rasekh, S. A. (2021). The effect of a period of yoga exercises with the ultimate readiness approach and hatha yoga on static balance in middle-aged women. *Rehabilitation Research in Nursing*, 7(4), 9-17.
- Besharatian, S., Khademi, A., & Jalili, A. (2025). Comparing the effectiveness of reality therapy and meaning therapy on inner

- self-talk and health-promoting lifestyle in patients with diabetes. *Journal of Mashhad University of Medical Sciences Faculty of Medicine*, 68(4), 1129-1145. <https://doi.org/10.22038/mjms.2025.85249.4892>
- Delavar, A. (2022). *Research Methods in Psychology and Educational Sciences* (56th ed.). Virayesh.
- Farahbakhsh, N., Farhadfar, E., Bagheri, A., & Mahmoudi Rad, E. (2025). The effect of 8 weeks of yoga exercises and vitamin D supplementation on insulin resistance, balance, coordination, and power in women with multiple sclerosis. *Journal of motor and behavioral sciences*, 8(3), 22-31. <https://doi.org/10.22034/jmbs.2025.548364.1272>
- Farsi, M., Rezaei, A. M., & Poursadegh Fard, M. (2023). The effectiveness of reality therapy on rumination and emotional expressiveness in patients with multiple sclerosis in Shiraz. *Islamic Lifestyle with a Health Orientation*, 7(Special issue), 196-204.
- Feola, M., Garnero, S., Vallauri, P., Salvatico, L., Vado, A., & Leto, L. (2013). Relationship between cognitive function, depression/anxiety and functional parameters in patients admitted for congestive heart failure. *Open Cardiovascular Medicine Journal*, 7, 54-60.
- Glasser, W. (1999). *Choice Theory: A New Psychology of Personal Freedom* (5th ed.). Harper Collins Publisher.
- Il Beigi, S., Haghighi, M., Niksarash, A., & Mahjour, M. (2020). The effect of a yoga training program on muscular fatigue indices and balance in people with multiple sclerosis. *Sport Medicine Studies*, 12(28), 165-182.
- Jahangiri, F., Karimi, J., Roozbehani, M., & Razani, M. (2023). Comparing the effectiveness of acceptance and commitment therapy with compassion-focused therapy and yoga exercises on self-management in people with multiple sclerosis. *Rooyesh-e-Ravanshenasi*, 12(8), 107-116.
- Jusoh, A. J. B. (2018). Choice theory and reality therapy in individual and group counseling in a Malaysian context. *International Journal of Choice Theory and Reality Therapy*, 37(2), 75-85. [https://m.motterninstitute.com/upload/IJCTRT\\_Spring2018%20\(1\)%20\(1\).pdf#page=75](https://m.motterninstitute.com/upload/IJCTRT_Spring2018%20(1)%20(1).pdf#page=75)
- Ketterer, M. W., Draus, C., McCord, J., Mossallam, U., & Hudson, M. (2013). Behavioral factors and hospital admissions/readmissions in patients with CHF. *Psychosomatics*.
- Khajeh Goldloo, G., & Farshbaf Manisefat, F. (2025). Investigating the effectiveness of mother training based on attachment-based intervention on the multidimensional dimensions of anxiety in children with separation anxiety disorder. *Journal of Psychological Science*, 24, 117-134.
- Mahmoudi Rad, E., Farhadfar, E., Bagheri, A., & Farahbakhsh, N. (2025). The effect of 8 weeks of yoga exercises and vitamin D supplementation on lipid profile, muscular strength, muscular endurance, flexibility, and body composition in women with multiple sclerosis. *Journal of motor and behavioral sciences*, 8(3), e233115. <https://doi.org/10.22034/jmbs.2025.544538.1271>
- Morris, G., Reiche, E. M. V., Murru, A., Carvalho, A. F., Maes, M., Berk, M., & Puri, B. K. (2018). Multiple immune-inflammatory and oxidative and nitrosative stress pathways explain the frequent presence of depression in multiple sclerosis. *Molecular Neurobiology*, 55(8), 6282-6306.
- Olfati, M. (2024). The effect of combined yoga and exercise training on the prevention and improvement of injuries, musculoskeletal disorders, and psychological disorders in athletes. *Journal of motor and behavioral sciences*, 7(1), e197796. <https://doi.org/10.22034/jmbs.2024.462452.1210>
- Ramezani, M., Javadpour, M., & Jafari, A. (2015). Comparing psychological well-being of athlete and non-athlete students of Esfaryen universities. First National Conference on Modern Sport Sciences, Professional Sport, and Health Promotion.
- Rezaei, M., & Akbari Amraghan, H. (2025). The effectiveness of yoga exercises on psychological indicators, emotion regulation, and quality of life in housewives. *New Explorations in Computational Sciences and Behavioral Management*, 3(2), 91-105.
- Saffarinia, M., Bayat, S., & Neromohammadi, A. (2017). Comparing prosocial personality, psychological reactance, perceived social support, and defense styles in parents of children with physical-motor disabilities and parents of healthy children in Isfahan. *Exceptional Children Quarterly*, 17(4), 15-26.
- Seehusen, C., & Tlmhc, N. (2018). Using Reality Therapy with clients experiencing chronic pain. *International Journal of Choice Theory and Reality Therapy*, 38(1), 6-12. [https://www.wglasserinternational.org/wp-content/uploads/bsk-pdfmanager/IJCTRT\\_XXXVIII\\_no1\\_250.pdf#page=6](https://www.wglasserinternational.org/wp-content/uploads/bsk-pdfmanager/IJCTRT_XXXVIII_no1_250.pdf#page=6)
- Soltanian, T., Rezvani, M., Naderi, A., & Cheroumzadeh, H. (2024). The effect of eight weeks of cyclic yoga exercises on upper crossed syndrome, increased lordosis, and mental health in elderly women. 12(4), 48-259.
- Tanhaye Roshanloo, F., & Saadati Shamir, A. (2015). Validity and construct validity of the 25-item Symptom Checklist of Psychological Symptoms (SCL-25). *Journal of Fundamentals of Mental Health*, 18(1), 48-56. [https://jfhm.mums.ac.ir/article\\_6255.html](https://jfhm.mums.ac.ir/article_6255.html)
- Velikonja, O., Curic, K., Ozura, A., & Jazbec, S. S. (2010). Influence of sports climbing and yoga on spasticity, cognitive function, mood and fatigue in patients with multiple sclerosis. *Clinical Neurology and Neurosurgery*, 112(7), 597-601. <https://doi.org/10.1016/j.clineuro.2010.03.006>
- Wubbolding, R. E., Casstevens, W. J., & Fulkerson, M. H. (2017). Using the WDEP system of Reality Therapy to support person-centered treatment planning. *Journal of Counseling & Development*, 95(4), 472-477. <https://doi.org/10.1002/jcad.12162>
- Zarghami, S., Naseri, M. H., & Ganji Namin, B. (2025). Comparing the effects of combined massage-yoga exercises with tai chi on pain, function, range of motion, and quality of life in women with knee osteoarthritis. *Scientific-Research Bimonthly Journal of Rehabilitation Medicine*, 14(6), 940-955. <https://doi.org/10.32598/SJRM.14.6.3401>