

Investigating the Effect of Body Awareness Training on Self-Compassion, Body Awareness, and Somatic Symptoms in Patients with Rheumatoid Arthritis

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ABSTRACT

Rheumatoid arthritis, in addition to its physical consequences, can be associated with negative psychological effects such as anxiety, stress, and reduced self-compassion. The present study was conducted with the aim of examining the effect of body awareness training on self-compassion, body awareness, and somatic symptoms in patients with rheumatoid arthritis. This quasi-experimental study was conducted in 2024 in Kashan among patients diagnosed with rheumatoid arthritis. The patients were randomly assigned to experimental and control groups. The experimental group received the body awareness training intervention, whereas the control group received no intervention. Data were collected using standardized questionnaires measuring self-compassion, body awareness, and somatic symptom severity, and were analyzed using multivariate and univariate analysis of covariance (MANCOVA and ANCOVA). Body awareness training significantly increased self-compassion and body awareness among patients with rheumatoid arthritis ($p < .001$). Furthermore, the severity of somatic symptoms decreased in the experimental group compared to the control group ($p < .001$). The eta squared statistic indicated that the intervention explained 52% of the combined variance of the dependent variables. The results of between-group analyses, after controlling for pretest scores, demonstrated significant differences between the experimental and control groups in body awareness, self-compassion, and somatic symptoms, indicating a strong and significant effect of the training on improving body awareness, enhancing self-compassion, and reducing somatic symptoms. Body awareness training can be used as a complementary intervention alongside medical treatments to improve self-compassion, body awareness, and somatic symptoms in patients with rheumatoid arthritis.

Keywords: Body awareness, self-compassion, body awareness, rheumatoid arthritis, somatic symptoms, stress management.

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Introduction

Rheumatoid arthritis (RA) is a chronic, systemic autoimmune disorder characterized by persistent inflammation of synovial joints, progressive structural damage, and long-term functional impairment. Recent advances in immunopathology have demonstrated that RA involves complex interactions between genetic susceptibility, immune dysregulation, inflammatory mediators, and environmental triggers, resulting in both peripheral and central nervous system alterations that contribute to chronic pain and psychosomatic distress (1). Beyond its well-documented physiological manifestations, RA significantly

affects psychological well-being, emotional regulation, and quality of life. Patients frequently experience persistent stress, emotional dysregulation, depressive symptoms, and maladaptive coping patterns due to chronic pain, physical limitations, and uncertainty regarding disease progression (2). These psychological consequences are not secondary or incidental but represent integral components of the disease experience, interacting bidirectionally with inflammatory processes and influencing symptom severity, functional disability, and treatment outcomes.

One of the most important psychological constructs relevant to chronic illness, including RA, is self-compassion. Self-compassion refers to an adaptive emotional regulation strategy involving self-kindness, recognition of shared human suffering, and mindful awareness of personal distress rather than self-criticism or avoidance (3). Research has consistently demonstrated that individuals with higher levels of self-compassion exhibit better emotional resilience, reduced psychological distress, and improved adaptive coping when facing chronic health challenges (4). Conversely, individuals with chronic inflammatory diseases often experience reduced self-compassion due to persistent pain, perceived loss of bodily control, and negative body image perceptions, which may exacerbate psychological distress and functional impairment (5). Moreover, interventions designed to enhance self-compassion have been shown to significantly improve emotional regulation, psychological well-being, and physical symptom perception among individuals with chronic health conditions (6). These findings underscore the importance of identifying interventions capable of strengthening self-compassion as a protective factor in RA management.

Closely related to self-compassion is the construct of body awareness, which refers to the conscious perception, interpretation, and integration of bodily sensations, internal states, and physical signals. Body awareness represents a core dimension of self-regulation and plays a critical role in emotional processing, stress regulation, and somatic perception (7). In individuals with chronic diseases such as RA, altered body awareness is common and may contribute to maladaptive pain perception, emotional distress, and functional limitations. Qualitative and quantitative studies have shown that patients with RA frequently experience disrupted body awareness, characterized by alienation from bodily sensations, increased vigilance to pain signals, and impaired integration of sensory feedback (8). Reduced body awareness may contribute to dysfunctional coping mechanisms, increased anxiety, and heightened somatic symptom perception. Conversely, improved body awareness has been associated with enhanced emotional regulation, improved functional adaptation, and reduced symptom severity in individuals with chronic musculoskeletal conditions (9).

Body awareness is not merely a passive perceptual process but can be actively enhanced through structured psychological and somatic interventions. Body awareness training represents a therapeutic approach designed to improve individuals' conscious connection with bodily sensations, emotional states, and physical functioning through guided attention, mindful movement, and experiential exercises. Such interventions aim to restore adaptive sensory integration and promote greater psychological and physiological regulation (10). Research has demonstrated that body awareness training can significantly improve pain perception, emotional regulation, and physical functioning across various clinical populations. For example, long-term body awareness interventions have been shown to reduce pain severity and improve psychological functioning in patients with widespread chronic pain conditions (11). Similarly, body awareness training has demonstrated beneficial effects on motor function, balance, and functional recovery

in neurological and musculoskeletal populations (12, 13). These findings highlight the therapeutic potential of body awareness training as a multidimensional intervention targeting both physical and psychological outcomes.

A growing body of evidence suggests that body awareness training is closely aligned with mindfulness-based interventions, which emphasize present-moment awareness, nonjudgmental observation, and acceptance of internal experiences. Mindfulness-based interventions have been extensively studied and shown to produce significant improvements in psychological well-being, emotional regulation, and physical symptom management across a wide range of clinical populations (14). Mindfulness-based stress reduction (MBSR) programs, in particular, have demonstrated effectiveness in improving psychological functioning, reducing stress, and enhancing adaptive coping in individuals with chronic illnesses (15). These interventions promote enhanced interoceptive awareness and emotional regulation, which may contribute to improved symptom perception and reduced distress (16). Furthermore, mindfulness-based interventions have been shown to significantly enhance self-compassion, suggesting a direct mechanism through which such interventions may improve psychological resilience and adaptive coping (17, 18).

Importantly, mindfulness-based and body awareness interventions have demonstrated specific benefits in improving body awareness itself. Mindfulness practices enhance individuals' ability to accurately perceive bodily sensations without excessive emotional reactivity, thereby promoting adaptive physiological and emotional regulation (19). These improvements in body awareness may contribute to reductions in perceived stress, improved emotional balance, and enhanced physical functioning. For example, basic body awareness therapy has been shown to significantly improve body awareness, reduce anxiety, and enhance psychological well-being in clinical populations (20). Similarly, comparative research has demonstrated that body awareness interventions can significantly reduce somatic symptoms, emotional distress, and maladaptive emotional processing in individuals with psychological and somatic disorders (21). These findings suggest that body awareness training may represent an effective intervention for addressing both psychological and somatic symptoms in chronic disease populations.

In addition to improving body awareness and self-compassion, body awareness training may also directly influence somatic symptom perception and stress regulation. Chronic stress plays a critical role in exacerbating inflammatory processes, increasing pain sensitivity, and worsening psychological functioning in individuals with RA. Psychological stress has been shown to contribute to increased symptom severity, disease progression, and reduced quality of life in patients with chronic inflammatory diseases (22). Body awareness training promotes adaptive stress regulation by enhancing interoceptive awareness, emotional regulation, and parasympathetic nervous system activation, thereby reducing physiological stress responses and improving symptom management (23). Furthermore, body-focused interventions have demonstrated effectiveness in improving body image, psychological well-being, and emotional functioning in individuals with RA, highlighting the importance of addressing bodily perception in this population (24).

Complementary therapeutic approaches targeting bodily awareness have also demonstrated beneficial effects on overall well-being and quality of life in patients with RA. Interventions such as balneotherapy and somatic-based therapies have been shown to significantly improve physical functioning, psychological well-being, and quality of life in RA patients, suggesting that integrative interventions targeting both physical and psychological dimensions may produce optimal outcomes (25). Additionally, improved body awareness

has been associated with reduced pain perception, improved emotional functioning, and enhanced adaptive coping in individuals with chronic health conditions (12). These findings support the theoretical and empirical foundation for using body awareness training as an intervention targeting both somatic and psychological dimensions of chronic disease.

Despite the growing body of research supporting the benefits of body awareness and mindfulness-based interventions, there remains a need for further investigation into their specific effects on self-compassion, body awareness, and somatic symptoms in patients with RA. Although previous studies have demonstrated the effectiveness of body awareness interventions in improving physical and psychological functioning, limited research has specifically examined their combined effects on these key psychological constructs within RA populations (8). Furthermore, understanding the role of body awareness training in enhancing self-compassion may provide valuable insights into mechanisms underlying psychological adaptation and symptom management in chronic disease populations.

Therefore, given the significant psychological and somatic challenges experienced by patients with rheumatoid arthritis, and the growing evidence supporting the effectiveness of body awareness and mindfulness-based interventions in improving psychological and physical outcomes, the present study aimed to investigate the effect of body awareness training on self-compassion, body awareness, and somatic symptoms in patients with rheumatoid arthritis.

Methods and Materials

Study Design and Participants

This quasi-experimental study was conducted from May 2024 to October 2024 at the Dr. Betoul Zamani Rheumatology Center in Kashan. In terms of objective, the study was applied research, and in terms of design, it was a quasi-experimental study using a pretest–posttest format. Accordingly, individuals aged 18 to 60 years who were under the supervision of a rheumatologist during the two-month study period and were not concurrently using any psychotropic medications were included in the study. Exclusion criteria included substance abuse (drugs or alcohol), the presence of any joint disease other than rheumatoid arthritis, unwillingness to participate in the study, and absence from more than two body awareness training sessions. Sampling was conducted using simple random sampling from patients referred to the rehabilitation center. Based on statistical methods and the desired statistical power, a total sample size of 50 participants was selected. Participants were then randomly assigned to intervention and control groups of 25 individuals each. Ultimately, 20 participants remained in the intervention group and 25 participants remained in the control group.

Data Collection

Data collection instruments included three standardized questionnaires. Self-compassion in patients with rheumatoid arthritis was assessed using the Self-Compassion Scale developed by Raes et al. (2011). This questionnaire consists of 12 items and 6 components measured on a 5-point Likert scale. In the study by Shahbazi et al. (2015), the Cronbach's alpha coefficient for the overall scale was reported as .91. Additionally, the Cronbach's alpha coefficients for the subscales of self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification were reported as .83, .87, .91, .88, .92, and .77, respectively.

Concurrent validity and convergent validity of the questionnaire were also reported as satisfactory. Body awareness was assessed using the Body Awareness Questionnaire (BAQ). This questionnaire consists of 15 items and 4 subscales measured on a 9-point Likert scale. In the study by Shields et al. (1989), the internal consistency of this questionnaire, calculated using Cronbach's alpha, was reported as .82. Test–retest reliability over a two-week interval in a sample of 70 participants was also found to be acceptable. Furthermore, convergent validity, discriminant validity, and the factor structure of this questionnaire, consisting of 18 items and 4 factors, were confirmed in their study. Somatic symptoms were assessed using the Physical Symptom Questionnaire developed by Powell and Enright (1991). This questionnaire consists of 18 items designed to measure physical symptom severity. The reliability of this questionnaire, assessed through test–retest reliability over a two-week interval in Isfahan, was reported as .68. Its validity was also confirmed. Demographic information was additionally collected. Questionnaire data were collected at three time points: prior to the intervention, immediately after completion of the intervention, and two months following the completion of the intervention. The primary instruments included the Self-Compassion Questionnaire, the Body Awareness Questionnaire, and the Somatic Symptom Severity Scale.

Intervention

The body awareness training intervention consisted of eight 120-minute sessions conducted once weekly over a period of two months and delivered in a group format. Each session began with a structured exercise and concluded with group discussion regarding the exercise, guided associative awareness, relaxation meditation, listening to music, and light refreshments. This training program was based on the educational protocol developed by Christine Caldwell and derived from the book *Bodyfulness*. The body awareness training sessions at this center were conducted in the presence of psychology specialists and therapeutic counselors. The study sample consisted of 50 patients diagnosed with rheumatoid arthritis who voluntarily agreed to participate in the research. This design was selected due to its suitability for comparing changes before and after the intervention in order to evaluate the effectiveness of body awareness training on self-compassion, body awareness, and somatic symptoms in patients with rheumatoid arthritis.

Data Analysis

Data were analyzed using SPSS software. To compare pretest and posttest changes, paired-samples t-tests were employed. Additionally, repeated-measures analysis of covariance (ANCOVA) was used to evaluate relationships between variables and determine the effects of the intervention. The level of statistical significance was set at .05.

Findings and Results

Of the 45 participants, including 25 in the control group and 20 in the experimental group, 22% were male and 78% were female. The mean age was 48.40 years in the experimental group and 47.12 years in the control group. The majority of participants (51%) had completed lower secondary education. No statistically significant differences were observed between the groups in terms of demographic characteristics. Table 1 presents the comparison of the mean scores of psychological indicators at pretest and posttest in the control and experimental groups (body awareness therapeutic model).

Table 1. Psychological indicators at pretest and posttest

Group	Experimental (20)	Control (25)
Variables	Pretest (Mean ± SD)	Posttest (Mean ± SD)
Body Awareness	102.45 ± 19.87	114.50 ± 12.34
Self-Compassion	35.95 ± 9.87	45.25 ± 4.49
Somatic Symptoms	15.85 ± 7.82	7.08 ± 4.66

According to Table 1, the experimental group demonstrated substantial improvement at posttest in body awareness and self-compassion, along with a reduction in somatic symptoms. In contrast, the control group showed limited changes, and in some cases, such as somatic symptoms, the condition worsened. The changes in standard deviation also indicated that the experimental group experienced greater overall improvement compared to the control group at posttest. Overall, the experimental group showed superior performance relative to the control group in reducing psychological symptom scores.

The Kolmogorov–Smirnov test indicated that the significance level for all variables was greater than .05, confirming that the data distribution for all examined variables was normal. Therefore, analysis of covariance (ANCOVA) was used.

Table 2. Effect of training on the correlation of study variables between pretest and posttest

Variable	Pearson Correlation Coefficient (pretest)	Pearson Correlation Coefficient (posttest)
Body Awareness	Pretest: 1	Posttest: .604
	Posttest: .604	Posttest: 1
Self-Compassion	Pretest: 1	Posttest: .551
	Posttest: .551	Posttest: 1
Somatic Symptoms	Pretest: 1	Posttest: .462
	Posttest: .462	Posttest: 1

According to Table 2, the Pearson correlation coefficient results showed significant linear relationships between pretest and posttest scores for body awareness ($r = .604$, $p < .01$), self-compassion ($r = .551$, $p < .01$), and somatic symptoms ($r = .462$, $p < .01$). These findings indicate the presence of linear relationships among the variables and confirm the suitability of the data for covariance analysis.

Table 3. Multivariate analysis of covariance examining the simultaneous effect of training on study variables

Effect	Value	F	Hypothesis df	Error df	Significance Level	Eta Squared
Intercept	.527	12.651	3	34	.001	.527
Body Awareness	.393	7.336	3	34	.001	.393
Self-Compassion	.611	17.800	3	34	.001	.611
Somatic Symptoms	.350	6.094	3	34	.002	.350
Group	.744	32.979	3	34	.001	.744

According to Table 3, the multivariate analysis of covariance revealed that body awareness training produced significant simultaneous changes in body awareness, self-compassion, and somatic symptoms ($p < .001$). Based on Pillai's Trace test, body awareness training had a significant effect on body awareness ($p < .001$), self-compassion ($p < .001$), and somatic symptoms ($p = .002$). The effect size results (eta squared) indicated that body awareness training explained approximately 52% of the variance in body awareness, self-compassion, and somatic symptoms.

Table 4. Univariate analysis of covariance examining the effect of training on study variables

Source of Variation	Dependent Variable	Sum of Squares	df	Mean Square	F	Significance Level	Eta Squared
Group	Body Awareness	4667.470	1	4667.470	25.014	.001	.410
	Self-Compassion	771.827	1	771.827	38.546	.001	.517
	Somatic Symptoms	1739.680	1	1739.680	61.879	.001	.632
Error	Body Awareness	6717.344	36	186.593	—	—	—
	Self-Compassion	720.848	36	20.024	—	—	—
	Somatic Symptoms	1012.119	36	28.114	—	—	—
Total	Body Awareness	418602.000	41	—	—	—	—
	Self-Compassion	72384.000	41	—	—	—	—
	Somatic Symptoms	13945.000	41	—	—	—	—

Based on the results presented in Table 4, the evaluation of between-group differences in the effectiveness of the training showed that, after adjusting for pretest scores, the difference between the experimental and control groups in body awareness was statistically significant ($F = 25.01$, $p < .001$). Furthermore, the difference between groups in self-compassion was also statistically significant ($F = 38.54$, $p < .001$). Additionally, body awareness training had a statistically significant effect on somatic symptoms ($F = 61.87$, $p < .001$). These findings indicate that body awareness training had a strong and statistically significant effect on improving body awareness, increasing self-compassion, and reducing somatic symptoms.

Discussion and Conclusion

The present study aimed to examine the effectiveness of body awareness training on self-compassion, body awareness, and somatic symptoms in patients with rheumatoid arthritis. The findings demonstrated that body awareness training significantly improved body awareness and self-compassion while reducing somatic symptoms in the experimental group compared to the control group. Multivariate and univariate covariance analyses confirmed that these changes were statistically significant, with large effect sizes, indicating that the intervention accounted for a substantial proportion of variance in the dependent variables. These results provide strong empirical support for the effectiveness of body awareness training as a complementary psychological intervention for improving both psychological and somatic outcomes in individuals with rheumatoid arthritis. Given the chronic, inflammatory, and psychosomatic nature of rheumatoid arthritis, these findings highlight the importance of integrating mind–body approaches into conventional treatment frameworks.

One of the key findings of this study was the significant improvement in body awareness among patients who received body awareness training. This result aligns with theoretical models suggesting that body awareness represents a fundamental mechanism underlying self-regulation, emotional processing, and symptom perception. Body awareness facilitates adaptive interpretation of bodily signals and enhances individuals' ability to regulate physiological and emotional responses to stress and pain (7). Previous research has consistently shown that individuals with rheumatoid arthritis often experience disrupted body awareness due to chronic pain, inflammation, and altered sensory integration, which may contribute to maladaptive coping and increased psychological distress (8). The present findings are consistent with prior intervention studies demonstrating that body awareness training significantly enhances awareness of bodily sensations, improves sensory integration, and promotes functional adaptation. For example, body awareness training has been shown to significantly improve bodily perception and physical functioning in patients with

chronic pain conditions (11). Similarly, studies in neurological populations have demonstrated that body awareness training improves functional outcomes and sensorimotor integration, supporting its effectiveness in restoring adaptive bodily awareness mechanisms (12, 13). Moreover, recent research has confirmed that structured body awareness interventions significantly improve body awareness, reduce stress, and enhance psychological functioning across clinical populations (20, 23). The improvement in body awareness observed in the present study may be explained by the intervention's focus on mindful attention to bodily sensations, which enhances interoceptive accuracy and reduces maladaptive bodily hypervigilance.

Another important finding of this study was the significant increase in self-compassion among participants in the experimental group. This finding is particularly important because self-compassion represents a protective psychological factor that promotes emotional resilience and adaptive coping in individuals with chronic illness. Patients with rheumatoid arthritis frequently experience psychological distress, self-criticism, and negative emotional responses due to persistent pain and functional limitations (2). Body awareness training may enhance self-compassion by promoting mindful awareness, emotional acceptance, and nonjudgmental attention to internal experiences. These mechanisms are consistent with mindfulness-based intervention frameworks, which emphasize acceptance and emotional regulation as pathways to improved psychological well-being (16). The present findings are consistent with previous research demonstrating that mindfulness-based and body-focused interventions significantly increase self-compassion across both clinical and nonclinical populations (6). Experimental studies have shown that mindfulness-based interventions improve self-compassionate behaviors by enhancing emotional regulation and reducing self-critical cognitive patterns (17). Similarly, interventions incorporating mindfulness and body awareness practices have been shown to significantly reduce emotional distress and increase adaptive emotional functioning, including self-compassion (18). In addition, systematic reviews have confirmed that self-compassion-focused interventions significantly improve psychological well-being and adaptive coping in individuals with chronic physical health conditions (4). The present findings suggest that body awareness training may enhance self-compassion by strengthening individuals' ability to relate to their bodily experiences with acceptance and kindness rather than judgment or avoidance.

The study also found a significant reduction in somatic symptoms among participants who received body awareness training. This finding is particularly relevant given that somatic symptom severity represents a central aspect of rheumatoid arthritis and is closely associated with psychological stress and emotional dysregulation. Chronic stress has been shown to exacerbate inflammatory responses, increase pain sensitivity, and worsen symptom perception in individuals with chronic inflammatory diseases (22). Body awareness training may reduce somatic symptoms by improving stress regulation, reducing physiological hyperarousal, and enhancing emotional processing. Mindfulness-based interventions have been shown to significantly reduce somatic symptom severity by promoting parasympathetic nervous system activation and reducing stress-related physiological activation (14). Furthermore, body awareness interventions have demonstrated effectiveness in reducing pain intensity, improving functional outcomes, and enhancing quality of life in individuals with chronic musculoskeletal conditions (25). Research has also shown that interventions targeting bodily awareness significantly improve physical symptom perception and emotional well-being in individuals with chronic illness (24). These findings suggest that body awareness training may

influence somatic symptoms through both physiological and psychological mechanisms, including improved stress regulation, enhanced emotional processing, and increased adaptive coping.

The findings of the present study also support the theoretical and empirical relationship between body awareness, self-compassion, and somatic symptom regulation. Body awareness serves as a foundational mechanism that enhances individuals' ability to regulate emotional responses and interpret bodily signals accurately. Improved body awareness may facilitate greater emotional acceptance and reduce maladaptive cognitive and emotional responses to pain and physical discomfort (19). This enhanced emotional regulation may, in turn, contribute to increased self-compassion and reduced psychological distress. Previous research has demonstrated that improved body awareness is associated with increased psychological well-being, reduced stress, and enhanced adaptive coping in individuals with chronic illness (9). Additionally, research has shown that body awareness training significantly improves emotional regulation, executive functioning, and psychological adaptation in clinical populations (10). These findings suggest that body awareness training may produce synergistic effects by simultaneously improving body awareness, enhancing self-compassion, and reducing somatic symptoms.

The large effect sizes observed in this study further highlight the clinical significance of body awareness training as a therapeutic intervention. These findings are consistent with meta-analytic evidence demonstrating that mindfulness-based and body awareness interventions produce significant improvements in psychological and physical health outcomes in individuals with chronic diseases (15). Given the complex interaction between inflammatory processes, psychological stress, and symptom perception in rheumatoid arthritis, interventions targeting both psychological and somatic processes may produce more comprehensive treatment outcomes. The findings of this study are also consistent with recent research demonstrating that integrative mind-body interventions significantly improve psychological functioning and physical symptom perception in individuals with chronic health conditions (21). These findings support the integration of body awareness training into multidisciplinary treatment programs for rheumatoid arthritis.

Overall, the findings of the present study provide strong empirical support for the effectiveness of body awareness training in improving body awareness, enhancing self-compassion, and reducing somatic symptoms in patients with rheumatoid arthritis. These findings are consistent with theoretical models and empirical evidence highlighting the role of body awareness and self-compassion in psychological adaptation and symptom management in chronic illness. Body awareness training represents a promising complementary intervention that addresses both psychological and somatic aspects of rheumatoid arthritis, contributing to improved overall well-being and quality of life.

One of the limitations of this study was the relatively small sample size, which may limit the generalizability of the findings to broader populations of patients with rheumatoid arthritis. Additionally, the study relied primarily on self-report questionnaires, which may be influenced by response bias and subjective interpretation. The absence of long-term follow-up beyond two months also limits the ability to assess the long-term sustainability of the intervention effects. Furthermore, individual differences in disease severity, medication adherence, and psychosocial factors were not fully controlled, which may have influenced the observed outcomes.

Future research should examine the long-term effectiveness of body awareness training using larger and more diverse samples. Studies should incorporate longitudinal designs to assess the durability of intervention effects over extended periods. Additionally, future research should investigate the underlying mechanisms through which body awareness training influences psychological and physiological outcomes, including neurobiological and psychophysiological processes. Comparative studies examining body awareness training alongside other psychological interventions may also provide valuable insights into optimal treatment approaches.

From a practical perspective, body awareness training can be incorporated into comprehensive treatment programs for patients with rheumatoid arthritis as a complementary psychological intervention. Healthcare providers, including psychologists, rehabilitation specialists, and rheumatologists, can integrate body awareness techniques into patient care to improve psychological well-being and symptom management. Training programs can be adapted for clinical and community settings to improve accessibility and promote patient engagement. Integrating body awareness training into standard care may enhance overall treatment effectiveness and improve quality of life for individuals living with rheumatoid arthritis.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants (Ethics code: IR.KAUMS.REC.1402.021).

Transparency of Data

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

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