



The effect of body awareness on shoulder functionality and psychological factors in individuals with rotator cuff tendinopathy

Özlem Görgülü Göksu^{*1,2,A-B,D-F}, Gülay Aras Bayram^{3,A,E-F},
Remziye Akarsu^{2,C,E}

¹ Department of Physical Therapy and Rehabilitation, Graduate School of Health Sciences, Istanbul Medipol University, İstanbul, Turkey

² Faculty of Health Sciences, Department of Occupational Therapy, Biruni University, İstanbul, Turkey

³ Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Istanbul Medipol University, İstanbul, Turkey

* **Corresponding author:** Özlem Görgülü Göksu; Department of Physical Therapy and Rehabilitation, Graduate School of Health Sciences, Istanbul Medipol University, İstanbul, Turkey; e-mail: ogorgulu@biruni.edu.tr

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ABSTRACT

Introduction: This study examined associations between body awareness, shoulder function, body image, and psychological factors in individuals with rotator cuff tendinopathy (RCT) compared with asymptomatic controls.

Material and methods: Twenty-five adults aged 30–65 years with RCT and 25 age- and sex-matched healthy controls were included in the study. Pain intensity and shoulder range of motion were assessed using the visual analogue scale (VAS) and a digital goniometer. Patient-reported outcomes included shoulder pain and functional status assessed by the American Shoulder and Elbow Surgeons (ASES) score, body awareness (Body Awareness Questionnaire [BAQ]), body image (Body Image Scale [BIS]), kinesiophobia (Tampa Scale of Kinesiophobia), anxiety and depression (Hospital Anxiety and Depression Scale) and disease-specific quality of life (Rotator Cuff Quality of Life Questionnaire [RC-QoL]).

Results: Compared with the controls, RCT patients showed impaired function, reduced body awareness and body image; higher kinesiophobia, anxiety and depression; and lower quality of life, greater pain and limited motion. A significant negative correlation was determined between pain and quality of life. VAS-R showed a negative correlation with the emotional ($r = -0.608$, $p = 0.001$) and work-related ($r = -0.550$, $p = 0.004$) sub-areas of RC-QoL, while VAS-activity showed a significant negative correlation with ASES scores ($r = -0.578$, $p = 0.002$). Furthermore, the BAQ showed a negative correlation with the BIS ($r = -0.497$, $p = 0.011$).

Conclusions: The associations of body awareness and body image with functional outcomes emphasise the importance of a biopsychosocial approach in rehabilitation and support the need for larger studies.

Keywords: awareness, body image, kinesiophobia, quality of life, rotator cuff

INTRODUCTION

One of the most common causes of shoulder pain is rotator cuff tendinopathy (RCT), which is a significant category of musculoskeletal disorders. The incidence of RCT varies between 0.3% and 5.5% (approximately 300–5500 cases per 100,000 individuals), with an annual prevalence ranging from 0.5% to 7.4%¹.

Typically beginning with tendinitis, the clinical course may ultimately progress to degenerative changes, partial tears and full-thickness ruptures². RCT becomes more common with age and has a detrimental impact on social engagement³. Performance in activities of daily living is limited by shoulder pain and range of motion (ROM) limitations, which also lower proprioception, upper extremity function and quality of life⁴. Kinesiophobia may develop progressively as a result of pain-related avoidance behaviours. Particularly in individuals with chronic musculoskeletal pain, previous studies have demonstrated that kinesiophobia is not only cross-sectionally associated with greater pain severity, disability and reduced quality of life, but also serves as a longitudinal predictor of these adverse outcomes over time^{5,6}.

Individuals with RCT demonstrate considerable psychosocial impacts with functional limitations⁷. A vital component of overall health and the effectiveness of rehabilitation is psychological resilience. Negative emotional states in chronic shoulder pain have an impact on the psychosocial well-being and decrease treatment compliance⁸. Depression and kinesiophobia were identified as predictors of pain intensity, quality of life, functional capability and timelines for return to sport in individuals with shoulder instability⁹. Additionally, research on RCT has demonstrated that elevated anxiety and depression levels impair quality of life in addition to increasing pain perception^{10,11}. These results emphasise the value of a multidisciplinary approach and the need to take psychosocial assessments into account when developing a treatment plan.

Body awareness is a comprehensive concept encompassing body consciousness, body management and an embodied experiential depth, referring to the attentive focus on internal bodily sensations and representing the subjective and phenomenological aspects of proprioception and interoception, which can be modulated by cognitive and emotional processes such as attention, interpretation, appraisal, beliefs, memories, attitudes and emotions¹². Proprioceptive, interoceptive, exteroceptive and vestibular systems must all be integrated to recognise the body's functions, behaviours and role in social contexts^{12,13}. Contrarily, one's perception of their body is a subjective construct that is influenced by their cognitive, perceptual and sensory assessments of it. Body image disturbances have been connected to decreased motor behaviours and ROM in chronic pain conditions, and they may have a detrimental impact on psychosocial well-being and musculoskeletal functioning¹⁴. Research shows that enhancing bodily awareness in older persons can reduce cognitive decline and alleviate discomfort. These results imply that clinical evaluations of body awareness and image should be conducted with consideration for neuromotor and biomechanical aspects in addition to psychological ones¹⁵. Multifaceted clinical outcomes, including mobility, quality of life, body image and pain perception, are closely associated with body awareness. Supporting this view, Akkaya et al.¹⁴ demonstrated that body image disturbances were significantly related to pain severity and were more pronounced in patients with fibromyalgia syndrome than in healthy controls, highlighting the importance of considering body image in the evaluation of pain and quality of life¹⁴. Therefore, this study aimed to examine the associations between body awareness and body image with shoulder function

and psychological factors in individuals with RCT and to compare these outcomes with those of asymptomatic healthy controls.

MATERIALS AND METHODS

Study design

A cross-sectional design was used for this investigation. All participants gave their informed consent, and the study was conducted in compliance with the Declaration of Helsinki's ethical guidelines. Ethical approval was obtained from the Istanbul Medipol University Non-Interventional Clinical Research Ethics Committee (Approval No: E-10840098-202.3.02-2283, Decision No: 320, Date: 28.03.2024). NCT06797232 is the study's registration number in clinicaltrials.gov.

Participants

Fifty adult participants between the ages of 30 and 65 participated in this cross-sectional study. GPower software (version 3.1.9.7; Heinrich Heine University, Düsseldorf, Germany) was used to determine the sample size, which was based on an Independent Samples t-test power of 80%, an effect size of 0.75 and a significance level of 0.05. The analysis indicated that a minimum of 46 participants (23 per group) were required to detect a statistically significant difference between the groups. The total number of participants was determined to be 50 (25 participants per group), taking into account an approximate dropout rate of 10%. Participants were allocated into two groups based on their clinical status rather than random assignment. The control group ($n = 25$) consisted of healthy, asymptomatic individuals without shoulder complaints, while the study group ($n = 25$) included individuals diagnosed with RCT. To minimise potential confounding effects, the groups were matched for age and sex using a frequency-matching approach. Unilateral shoulder pain that lasted longer than 4 weeks, no previous shoulder physiotherapy, a body mass index (BMI) of $<30 \text{ kg/m}^2$ and adequate cognitive ability to cooperate with tests were requirements for inclusion in the study group. Previous shoulder surgery, corticosteroid injections or systemic corticosteroid therapy within the previous 3 months, uncontrolled neurological, cardiac, or systemic diseases and any condition affecting cognitive or visual function were all excluded.

Twenty-five volunteers without shoulder pathology who were matched for age and sex made up the control group. The inclusion criteria for the control group were good general health, age between 30 and 65 years, and a BMI of $<30 \text{ kg/m}^2$. A history of shoulder pain during the previous 6 months, pain at 90° shoulder flexion or abduction, shoulder pain at night and the existence of systemic, neurological or rheumatological diseases formed the exclusion criteria. Before data collection, all participants were briefed on the purpose and methodology of the study, and written informed consent was acquired.

Outcome measures

Sex, age, height, body weight, BMI, dominant side and educational attainment were among the demographic information that was documented. A physiotherapist evaluated each participant's pain, ROM, shoulder functionality, body awareness, body image, kinesiophobia, anxiety, depression and quality of life related to RCT.

The visual analogue scale

Pain intensity was assessed using the visual analogue scale (VAS), ranging from 0 (no pain) to 10 (worst imaginable pain). Participants indicated their perceived pain intensity by marking the point on the scale that best represented their pain¹⁶.

ROM

A digital goniometer was used to measure shoulder flexion, abduction, extension, internal rotation and external rotation while the subject was in the supine position. No warm-up programme was applied before the ROM measurements. All ROM assessments were performed by the same assessor to ensure measurement consistency. The measurements were performed as active movements and recorded in degrees. Three repetitions of each movement were obtained, and the mean value was used for analysis¹⁷.

American Shoulder and Elbow Surgeons score

American Shoulder and Elbow Surgeons (ASES) score is a self-reported questionnaire consisting of two subscales: pain (0–50 points) and activities of daily living (ADLs; 0–50 points), yielding a total score ranging from 0 to 100, with higher scores indicating better shoulder function. The test–retest reliability of the ASES pain subscale, function subscale and total ASES score demonstrated good to excellent reliability, with intraclass correlation coefficients (ICCs) of 0.95, 0.86 and 0.94, respectively. These findings are consistent with previous research reporting high reliability of the ASES questionnaire in individuals with shoulder disorders, including the Turkish version validated by Celik et al. Additionally, the internal consistency of the total ASES score was high, with a Cronbach's alpha coefficient of 0.88¹⁸.

In the present study, the ASES total score and its pain and activities of daily living subscale scores were used as outcome measures to compare shoulder pain and functional status between individuals with RCT and healthy controls. Statistical significance was set at $p < 0.05$. The minimal clinically important difference for individuals with RCT has been reported to range between 12 and 17 points¹⁸.

Body Awareness Questionnaire

The Body Awareness Questionnaire (BAQ) was created by Shields¹⁹ and later translated and adapted into Turkish by Karaca and Bayar²⁰. It is a validated and reliable instrument used to assess body awareness. Internal consistency of the BAQ was assessed using Cronbach's alpha coefficient. A Cronbach's alpha value between 0.70 and 1.00 is considered acceptable for reliability. The Turkish version of the BAQ demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.917. Similarly, high reliability has been reported for the original version ($\alpha = 0.923$) and the Swedish version ($\alpha = 0.870$), supporting the robustness of the scale across different populations. The questionnaire was constructed based on four conceptual components, including awareness of bodily changes or responses to specific stimuli, the ability to anticipate reactions to stimuli, awareness of sleep–wake cycles and sleep duration, and perception of impending illness. The BAQ comprises 18 items developed around these components and evaluates body awareness using a single total score²⁰.

Body Image Scale

The Body Image Scale (BIS), validated in Turkish by Hovardaoğlu²¹, was used as an assessment instrument to evaluate body image. Hovardaoğlu reported a Cronbach's alpha internal consistency coefficient of 0.91. The scale assesses how satisfied a person is with their body and its capabilities. Higher body and function satisfaction is indicated by lower scores, which range from 40 to 200²¹.

The Tampa Scale of Kinesiophobia

The Tampa Scale, created by Miller et al.²² and validated in Turkish by Tunca Yılmaz et al.²³, was used to measure fear of movement. Test-retest reliability of the Tampa Scale of Kinesiophobia (TSK) was evaluated using the ICC. The ICC value was 0.806, with a 95% confidence interval (CI) of 0.720 to 0.867, indicating excellent reliability. The scale consists of 17 items, each rated on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). The total score is calculated after reverse scoring items 4, 8, 12 and 16. Total scores range from 17 to 68, with higher scores indicating greater levels of kinesiophobia²³.

Hospital Anxiety and Depression Scale

Zigmond and Snaith's Hospital Anxiety and Depression Scale (HADS) was used to assess anxiety and depression levels²⁴. The scale consists of 14 items, including 7 items assessing Hospital Anxiety and Depression Scale-Anxiety (HADS-A) and 7 items assessing Hospital Anxiety and Depression Scale-Depression (HADS-D). Items are rated on a 4-point Likert scale (0–3) based on symptoms experienced during the 7 days immediately before the assessment. Scores of 0–7 indicate normal levels, 8–10 indicate borderline levels and scores of ≥11 indicate abnormal levels. HADS was validated for the Turkish population by Aydemir²⁵. The Turkish version has demonstrated acceptable reliability, with Cronbach's alpha coefficients of 0.85 for the anxiety subscale and 0.77 for the depression subscale²⁵.

Rotator Cuff Quality of Life Questionnaire

The Rotator Cuff Quality of Life Questionnaire (RC-QoL) was used to assess disease-specific quality of life. The Turkish version of the RC-QoL has demonstrated excellent internal consistency, with Cronbach's alpha values ranging from 0.83 to 0.98 for the total score and subdomains. Test-retest reliability has also been reported as excellent for the total score and most subdomains (ICC > 0.80), as reported by Çınar et al.²⁶.

The questionnaire consists of 34 items covering five domains: physical symptoms, work, daily living, social and emotional aspects. The total score is expressed as a percentage, with higher scores indicating better quality of life. Each item is scored on a 100-point scale²⁶.

Statistical analysis

IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA), was used for all statistical analyses. The mean ± standard deviation, median and minimum–maximum values were used to display descriptive statistics. Normality of the data was assessed using the Shapiro–Wilk test. Independent sample t-tests were applied for variables with normal distribution, whereas the Mann–Whitney U test was employed for non-normally distributed variables. These tests were used

to assess baseline demographic comparability between groups and to compare the scale scores of the study and control groups.

The results were reported using the U-statistic, *z*-values, *p*-values and effect sizes (*r*). Effect size *r* was calculated by dividing the *z* value by the square root of the total sample size and was interpreted according to Cohen's classification, where *r* = 0.10 indicates a small effect, *r* = 0.30 a medium effect and *r* ≥ 0.50 a large effect. Spearman's rank correlation coefficient (*ρ*) was used to examine non-linear relationships between the variables. Correlation coefficients were interpreted as weak (0.00–0.24), moderate (0.25–0.49), strong (0.50–0.74) and very strong (0.75–1.00), in accordance with Cohen's guidelines²⁷. The 95% CIs for both effect size *r* and Spearman's correlation coefficients (*ρ*) were calculated using Fisher's *z* transformation to estimate the precision and range of the observed effect sizes. For all statistical analyses, the level of statistical significance was set at *p* < 0.05²⁷.

RESULTS

The study comprised 50 participants in total, ranging in age from 30 to 65 years. Table 1 indicates that there were no statistically significant differences in age, BMI, sex or educational attainment between the study and control groups (*p* > 0.05).

Table 1. Sociodemographic characteristics of the participants

	Study group (<i>n</i> = 25)	Control group (<i>n</i> = 25)	<i>p</i> -value
Age(years): mean ± SD	44.8 ± 8.71	42.72 ± 7.08	0.359
BMI, (kg/m ²): mean ± SD	25.54 ± 3.23	24.55 ± 2.05	0.199
Sex, <i>n</i> (%): Female, male	16 (64) 9 (36)	15 (60) 10 (40)	0.771
Dominant hand (<i>n</i>): right, left	23 2	19 6	0.123
Education level (<i>n</i>)			0.531
Primary school	3	3	
Secondary school	1	1	
High school	8	7	
Undergraduate	12	9	
Postgraduate	1	5	

BMI – body mass index, *n* – number of participants, *p*-value – probability value, SD – standard deviation

Wilcoxon Mann Whitney U test

As presented in Table 2, all evaluation parameters showed statistically significant differences between the patient group and the asymptomatic control group (*p* < 0.001). Individuals with RCT demonstrated significantly lower values in shoulder ROM (flexion, extension, abduction, internal rotation and external rotation), ASES, BAQ and RC-QoL scores, and significantly higher scores in VAS-R, VAS-A, BIS, TSK and HADS subscales compared with healthy controls (*p* < 0.001).

As shown in Table 3, a statistically significant and strong negative correlation was observed between VAS-R and the RC-QoL lifestyle (*r* = –0.608, *p* = 0.001) and RC-QoL emotional (*r* = –0.550, *p* = 0.004) subdomains. No statistically significant correlations were found between VAS-R and other variables (*p* > 0.05) (Table 3). VAS-A showed a statistically significant negative correlation only with ASES (*r* = –0.578, *p* = 0.002). No statistically significant correlations were observed between VAS-A and the other variables (*p* > 0.05).

Table 2. Comparative analysis of assessment parameters between the study and control groups

Variables	Stud group (n = 25)	Control group (n = 25)	p-value
VAS-R	4.72 ± 2.72	0.00 ± 0.00	0.001 ^a
VAS-A	7.72 ± 2.75	0.00 ± 0.00	0.001 ^a
Flexion [°]	136.40 ± 18.99	176.52 ± 2.33	0.001 ^a
Extension [°]	32.24 ± 5.94	49.32 ± 6.16	0.001 ^a
Abduction [°]	110.52 ± 16.15	173.20 ± 4.04	0.001 ^a
Internal rotation [°]	45.56 ± 1.63	72.88 ± 5.68	0.001 ^a
External rotation [°]	41.64 ± 12.40	81.32 ± 4.40	0.001 ^a
ASES	27.47 ± 10.62	95.93 ± 2.68	0.001 ^a
BAQ	75.12 ± 16.59	94.16 ± 14.25	0.001 ^a
BIS	110.60 ± 21.14	86.64 ± 17.47	0.001 ^a
TSK	44.32 ± 3.73	33.56 ± 3.76	0.001 ^a
HADS-D	8.56 ± 1.96	5.08 ± 2.38	0.001 ^a
HADS-A	10.08 ± 3.09	6.88 ± 2.70	0.001 ^a
RC-QoL - symptom	32.28 ± 8.89	98.32 ± 1.38	0.001 ^a
RC-QoL - work	34.38 ± 14.38	98.10 ± 2.31	0.001 ^a
RC-QoL - life style	33.04 ± 12.57	97.28 ± 3.95	0.001 ^a
RC-QoL - emotional	34.76 ± 13.66	96.88 ± 3.92	0.001 ^a

ASES – American Shoulder and Elbow Surgeons score, BAQ – Body Awareness Questionnaire, BIS – Body Image Scale, HADS-A – Hospital Anxiety and Depression Scale-Anxiety, HADS-D – Hospital Anxiety and Depression Scale-Depression, p-value – probability value, RC-QoL – Rotator Cuff Quality of Life Questionnaire, TSK – Tampa Scale of Kinesiophobia, VAS-A – pain during activity, VAS-R – pain at rest

^a- Significant

Mann-Whitney U test ($p < 0.05$)

Table 3. Analysis of Spearman's correlation between each variable and pain severity

		ASES	BAQ	BIS	TSK	HADS-D	HADS-A	RC-QoL - symp- tom	RC-QoL - lifestyle	RC-QoL - emotio- nal	RC-QoL - work
VAS-R	r	-0.252	0.273	-0.105	0.147	0.122	0.319	-0.319	-0.233	-0.608 ^a	-0.550 ^a
	95% CI	-0.577-0.121	-0.152-0.632	-0.517-0.367	-0.271-0.573	-0.251-0.443	-0.021-0.579	-0.708-0.134	-0.833-0.225	-0.810-0.162	-0.701-0.284
	p-value	0.224	0.186	0.616	0.482	0.560	0.120	0.120	0.263	0.001 ^a	0.004 ^a
VAS-A	r	-0.578	-0.222	0.052	0.014	0.341	-0.036	-0.038	-0.063	0.073	0.195
	95% CI	-0.841-0.190	-0.582-0.176	-0.398-0.484	-0.466-0.468	-0.022-0.644	-0.469-0.397	-0.417-0.347	-0.375-0.465	-0.215-0.543	-0.527-0.409
	p-value	0.002 [*]	0.287	0.806	0.949	0.096	0.865	0.855	0.766	0.730	0.349

ASES – American Shoulder and Elbow Surgeons score, BAQ – Body Awareness Questionnaire, BIS – Body Image Scale, CI – confidence interval, HADS-A – Hospital Anxiety and Depression Scale-Anxiety, HADS-D – Hospital Anxiety and Depression Scale-Depression, p-value – probability value, RC-QoL – Rotator Cuff Quality of Life Questionnaire, TSK – Tampa Scale of Kinesiophobia, VAS-A – pain during activity, VAS-R – pain at rest

^a- Significant

Spearman's correlation analysis ($p < 0.05$)

As presented in Table 4, BAQ and body image were found to be statistically significantly correlated negatively ($\rho = -0.497$, $p = 0.011$). There was a positive correlation between BAQ and ASES ($\rho = 0.201$, $p = 0.335$), but it was not statistically significant. Furthermore, HADS-D, HADS-A, the TSK and the RC-QoL subdomains (Symptoms, Lifestyle, Emotional and Work) showed weak and non-significant correlations with BAQ ($p > 0.05$). According to these results, there was no significant correlation between body awareness and these psychological variables.

Table 4. Analysis of Spearman's correlation between each variable and body awareness score

BAQ	ASES	BIS	TSK	HADS-D	HADS-A	RC-QoL - symp-tom	RC-QoL - lifestyle	RC-QoL - emotio-nal	RC-QoL - work
<i>r</i>	0.201	-0.497	0.082	-0.038	0.175	-0.251	-0.337	-0.009	0.118
95% CI	-0.172-0.539	-0.781- -0.056	-0.399- -0.553	-0.464- 0.383	-0.243- 0.607	-0.323- 0.493	-0.680- -0.073	-0.494- 0.448	-0.658- -0.261
<i>p</i> -value	0.335	0.011 ^a	0.696	0.857	0.402	0.227	0.099	0.964	0.574

ASES – American Shoulder and Elbow Surgeons score, BAQ – Body Awareness Questionnaire, BIS – Body Image Scale, CI – confidence interval, HADS-A – Hospital Anxiety and Depression Scale-Anxiety, HADS-D – Hospital Anxiety and Depression Scale-Depression, *p*-value – probability value, RC-QoL – Rotator Cuff Quality of Life Questionnaire, TSK – Tampa Scale of Kinesiophobia

^a- Significant

Spearman's correlation analysis ($p < 0.05$)

DISCUSSION

This study investigated the relationships among body awareness, shoulder functionality, body image and psychological factors in adults aged 30 and 65 years with RCT. Statistically significant differences were observed across all evaluated parameters, including pain intensity, shoulder ROM, functional status, body awareness, body image, kinesiophobia, depression, anxiety and quality of life, when compared with age and sex matched asymptomatic adult controls. These findings indicate that, in this adult population, RCT extends beyond a localised musculoskeletal condition and represents a multidimensional health problem that substantially affects both psychosocial well-being and daily functional capacity.

Traditionally, treatment outcomes in RCT have been predominantly assessed using objective clinical indicators, such as joint ROM, muscle strength and imaging findings. However, in recent years, the increasing use of patient-reported outcome measures has highlighted the clinical relevance of subjective evaluations, including pain perception, functional limitations and health-related quality of life²⁸. This shift underscores that reliance on clinical indicators alone is insufficient to fully capture the complexity of RCT. Psychological and social factors, particularly depression, anxiety and body image, play a critical role in functional health among affected adults²⁹. Recent evidence from patients with non-specific chronic low back pain indicates that anxiety significantly influences pain intensity, psychological functioning and disability, highlighting the close interaction between psychosocial factors and functional outcomes. Accordingly, comprehensive evaluations and tailored interventions are required³⁰. Within this holistic framework, the assessment

of psychosocial and patient-reported outcomes should be incorporated into the clinical history-taking process during physician consultations and systematically monitored throughout physiotherapy to optimise treatment planning and improve overall clinical outcomes. Accordingly, the present study evaluated both physical and psychosocial variables, including depression, anxiety, body image and body awareness.

Consistent with previous findings, individuals with RCT in the present study exhibited significantly higher pain levels and reduced shoulder ROM compared with asymptomatic controls, supporting earlier reports of impaired shoulder mobility and increased pain in this population^{31–33}. The results further indicate that shoulder pain, whether experienced at rest or during activity, should not be regarded solely as a biomechanical issue but rather as a multidimensional phenomenon affecting functional capacity, body awareness, body image, psychological status and quality of life. Pain at rest was significantly associated with limitations in daily activities and emotional well-being, with greater pain intensity observed in individuals experiencing increased functional restrictions and emotional distress. These findings emphasise the importance of evaluating rotator cuff pathologies beyond purely clinical parameters, as lifestyle factors and emotional state have been shown to substantially influence both the intensity and duration of pain^{34,35}.

In line with previous literature, individuals with RCT demonstrated reduced functional activity levels and significantly higher levels of kinesiophobia, anxiety and depression compared with asymptomatic healthy controls^{28,29,35}. Pain experienced during activity was significantly correlated with shoulder functional status, suggesting that greater functional impairment is associated with increased pain during movement. These findings highlight the negative impact of RCT on both physical function and psychological well-being, which may, in turn, affect engagement in rehabilitation. Although prior studies have reported associations between pain intensity and psychological factors, no such relationships were observed in the present study, possibly due to the multidimensional nature of pain, which is influenced by factors such as pain duration, disease progression, coping strategies and overall functional capacity.

RCT is a complex health condition that affects not only pain levels and physical function but also exerts a substantial impact on psychological well-being and body image. Previous research has demonstrated that psychological resilience plays a significant role in determining outcomes following both surgical and conservative management of RCT³⁶. Body image and body awareness, which reflect individuals' perceptions of their own bodies, are recognised as important factors in pain modulation and in maintenance of psychological stability³⁷. Moreover, the literature indicates that reduced body awareness in individuals with chronic musculoskeletal disorders may lead to disturbances in body image^{15,38}.

In the present study, individuals with RCT exhibited significantly lower levels of body awareness and body image compared with asymptomatic healthy participants. These findings are consistent with observations reported in other musculoskeletal conditions; however, to date, body image and body awareness have not been systematically examined in the context of RCT and shoulder rehabilitation. This highlights the novel contribution of the current study. Movement restrictions and postural alterations associated with RCT may negatively influence body perception and have been linked to increased anxiety, depression and reduced body image^{15,39}. Furthermore, our findings demonstrated that higher levels of body awareness were associated with fewer negative perceptions of body image, supporting evidence from studies involving individuals with chronic musculoskeletal disorders.

In chronic shoulder pathologies such as RCT, painful and restricted joint mobility may contribute to altered body perception. Accordingly, interventions aimed at enhancing fundamental body awareness (such as Pilates, yoga and somatic exercise approaches) may offer psychosomatic benefits in the management of RCT. In the present study, no significant associations were observed between body awareness and kinesiophobia, anxiety, depression or RC-QoL subdomains, which may be attributable to limited statistical power related to sample size. Given the scarcity of literature addressing subjective perceptual constructs, including body image and body awareness, in individuals with RCT, the concurrent assessment of these variables in this study provides a valuable reference point for future research.

LIMITATIONS

Several limitations of this study should be acknowledged. First, the cross-sectional design precludes conclusions regarding causal relationships or the long-term effects of body awareness on shoulder function and psychological factors. Second, the reliance on self-reported questionnaires may introduce bias related to subjective perceptions. Although the sample size (25 individuals with RCT and 25 healthy controls) was determined *a priori* using G*Power analysis and provided adequate statistical power, future studies with larger sample sizes are warranted to enhance generalisability and enable more robust comparative analyses. In addition, imaging modalities were not used to confirm the presence of RCT, therefore, some individuals in the control group may have had asymptomatic tendinosis or been coping without reporting pain at the time of assessment. Finally, objective shoulder strength measurements, such as those obtained using a handheld dynamometer, were not included, which may limit the comprehensive assessment of shoulder function.

Clinical importance

The existing literature remains limited regarding the direct assessment of body image and body awareness in individuals with RCT. In this context, the present study represents one of the initial investigations examining the relationship between body awareness and body image in this population. Future research should employ larger sample sizes and longitudinal study designs to more comprehensively explore the associations between body awareness, body image and a range of psychosocial factors, as well as to evaluate the clinical effectiveness of body awareness-based interventions in individuals with RCT.

CONCLUSIONS

Adults with RCT demonstrated significantly greater pain, reduced shoulder ROM, poorer functional status, more pronounced psychological symptoms, and impaired body awareness and body image compared with asymptomatic adults. These findings underscore the importance of adopting a biopsychosocial framework in the evaluation and management of RCT. From a clinical perspective, routine assessment of body awareness and body image, alongside physical and psychological parameters, may contribute to more comprehensive and individualised rehabilitation strategies. Interventions targeting body awareness may support psychological well-being and positively influence body perception, thereby potentially enhancing overall treatment outcomes in this population.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

REFERENCES

1. Littlewood C, May S, Walters S. Epidemiology of rotator cuff tendinopathy: a systematic review. *Shoulder Elb.* 2013;5(4):256-65. doi: [10.1111/sae.12028](https://doi.org/10.1111/sae.12028).
2. Audigé L, Blum R, Müller AM, Flury M, Durchholz H. Complications following arthroscopic rotator cuff tear repair: a systematic review of terms and definitions with focus on shoulder stiffness. *Orthop J Sports Med.* 2015;3(6):2325967115587861. doi: [10.1177/2325967115587861](https://doi.org/10.1177/2325967115587861).
3. Jancuska J, Matthews J, Miller T, Kluczynski MA, Bisson LJ. A systematic summary of systematic reviews on the topic of the rotator cuff. *Orthop J Sports Med.* 2018;6(9):2325967118797891. doi: [10.1177/2325967118797891](https://doi.org/10.1177/2325967118797891).
4. Tashjian RZ. Epidemiology, natural history, and indications for treatment of rotator cuff tears. *Clin Sports Med.* 2012;31(4):589-604. doi: [10.1016/j.csm.2012.07.001](https://doi.org/10.1016/j.csm.2012.07.001).
5. Ata AM, Tuncer B, Kara O, Başkan B. The relationship between kinesiophobia, balance, and upper extremity functions in patients with painful shoulder pathology. *PM R.* 2024;16(10):1088-94. doi: [10.1002/pmrj.13145](https://doi.org/10.1002/pmrj.13145).
6. Luque-Suarez A, Martinez-Calderon J, Falla D. Role of kinesiophobia on pain, disability and quality of life in people suffering from chronic musculoskeletal pain: a systematic review. *Br J Sports Med.* 2019;53(9):554-9. doi: [10.1136/bjsports-2017-098673](https://doi.org/10.1136/bjsports-2017-098673).
7. Cho CH, Jung SW, Park JY, Song KS, Yu KI. Is shoulder pain for three months or longer correlated with depression, anxiety, and sleep disturbance? *J Shoulder Elb Surg.* 2013;22(2):222-8. doi: [10.1016/j.jse.2012.04.001](https://doi.org/10.1016/j.jse.2012.04.001).
8. Heikkinen J, Honkanen R, Williams L, Leung J, Rauma P, Quirk S, et al. Depressive disorders, anxiety disorders and subjective mental health in common musculoskeletal diseases: a review. *Maturitas.* 2019;127:18-25. doi: [10.1016/j.maturitas.2019.05.011](https://doi.org/10.1016/j.maturitas.2019.05.011).
9. Jaggi A, Lambert S. Rehabilitation for shoulder instability. *Br J Sports Med.* 2010;44(5):333-40. doi: [10.1136/bjism.2009.059311](https://doi.org/10.1136/bjism.2009.059311).
10. Cho CH, Seo HJ, Bae KC, Lee KJ, Hwang I, Warner JJ. The impact of depression and anxiety on self-assessed pain, disability, and quality of life in patients scheduled for rotator cuff repair. *J Shoulder Elb Surg.* 2013;22(9):1160-6. doi: [10.1016/j.jse.2013.02.006](https://doi.org/10.1016/j.jse.2013.02.006).
11. Luime JJ, Koes BW, Hendriksen IJ, Burdorf A, Verhagen AP, Miedema HS. Prevalence and incidence of shoulder pain in the general population: a systematic review. *Scand J Rheumatol.* 2004;33(2):73-81. doi: [10.1080/03009740310004667](https://doi.org/10.1080/03009740310004667).

12. Gyllensten AL, Skär L, Miller M, Gard G. Embodied identity - a deeper understanding of body awareness. *Physiother Theory Pract.* 2010;26(7):439-46. doi: [10.3109/09593980903422956](https://doi.org/10.3109/09593980903422956).
13. İnal HS. Body awareness. 1st ed. In: İnal HS, editor. *Body biomechanics in sports and exercise*. Nobel Publishing, Ankara, Turkey; 2013.
14. Akkaya N, Akkaya S, Atalay NS, Balci CS, Sahin F. Relationship between the body image and level of pain, functional status, severity of depression, and quality of life in patients with fibromyalgia syndrome. *Clin Rheumatol.* 2012;31(6):983-8. doi: [10.1007/s10067-012-1965-9](https://doi.org/10.1007/s10067-012-1965-9).
15. Baskan E, Yagci N, Cavlak U. Factors affecting body awareness in older adults with chronic musculoskeletal pain. *Arch Med Sci.* 2019;17(4):934-9. doi: [10.5114/aoms.2019.86614](https://doi.org/10.5114/aoms.2019.86614).
16. Heller G, Manuguerra M, Chow R. How to analyze the Visual Analogue Scale: myths, truths and clinical relevance. *Scand J Pain.* 2016;13(1):67-75. doi: [10.1016/j.sjpain.2016.06.012](https://doi.org/10.1016/j.sjpain.2016.06.012).
17. Otman SA, Köse N. Basic evaluation principles in therapeutic exercises. Pelikan Publishing, Ankara, Turkey; 2015.
18. Celik D, Atalar AC, Demirhan M, Dirican A. Translation, cultural adaptation, validity and reliability of the Turkish ASES questionnaire. *Knee Surg Sports Traumatol Arthrosc.* 2013;21(9):2184-9. doi: [10.1007/s00167-012-2183-3](https://doi.org/10.1007/s00167-012-2183-3).
19. Shields SA, Mallory ME, Simon A. The body awareness questionnaire: reliability and validity. *J Pers Assess.* 1989;53(4):802-15. doi: [10.1207/s15327752jpa5304_16](https://doi.org/10.1207/s15327752jpa5304_16).
20. Karaca S, Bayar B. Turkish version of body awareness questionnaire: validity and reliability study. *Turk J Physiother Rehabil.* 2017;32(1):44-50. doi: [10.21653/tjpr.660186](https://doi.org/10.21653/tjpr.660186).
21. Hovardaoğlu S. Vücut algısı ölçeği. *Psikiyatri Psikol Psikofarmakol (3P) Derg. Testler Özel Eki.* 1993;1(1):26-7.
22. Miller RP, Kori SH, Todd DD. The tampa scale: a measure of kinesiophobia. *Clin J Pain.* 1992;7(1):51. doi: [10.1097/00002508-199103000-00053](https://doi.org/10.1097/00002508-199103000-00053).
23. Tunca Yılmaz Ö, Yakut Y, Uygur F, Uluğ N. Tampa Kinezyofobi Ölçeği'nin Türkçeversiyonu ve test-tekrar test güvenirliği. *Fizyoter Rehabil.* 2011;22(1):44-50. Available from: <https://izlik.org/JA25TG59YR>.
24. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983;67(6):361-70. doi: [10.1111/j.1600-0447.1983.tb09716.x](https://doi.org/10.1111/j.1600-0447.1983.tb09716.x).
25. Aydemir O, Güvenir T, Küey L, Kültür S. Hastane anksiyete ve depresyon ölçeği Türkçe formunun geçerlilik ve güvenirliği. *Turk Psikiyatri Derg.* 1997;8(4):280-7.
26. Çınar Ö, Nuriye M, Gul O. Turkish version of the Rotator Cuff Quality of Life questionnaire in rotator cuff-impaired patients. *Knee Surg Sports Traumatol Arthrosc.* 2015;23(2):591-5. doi: [10.1007/s00167-014-3290-0](https://doi.org/10.1007/s00167-014-3290-0).
27. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Routledge, New York, NY, USA; 1988. doi: [10.4324/9780203771587](https://doi.org/10.4324/9780203771587).
28. Wong WK, Li MY, Yung PS, Leong HT. The effect of psychological factors on pain, function and quality of life in patients with rotator cuff tendinopathy: a systematic review. *Musculoskelet Sci Pract.* 2020;47:102173. doi: [10.1016/j.msksp.2020.102173](https://doi.org/10.1016/j.msksp.2020.102173).

29. Edgar N, Clifford C, O'Neill S, Pedret C, Kirwan P, Millar NL. Biopsychosocial approach to tendinopathy. *BMJ Open Sport Exerc Med*. 2022;8:e001326. doi: [10.1136/bmjsem-2022-001326](https://doi.org/10.1136/bmjsem-2022-001326).
30. AlHarthi H, Bilal A, AlMalki H, Alzahrani F, Ibrahim A, Hussein H, et al. Variations in pain, disability, and psychosocial functioning among non-specific chronic low back pain patients with and without anxiety. *Adv Rehab*. 2025;39(1):33-45. doi: [10.5114/areh.2025.146633](https://doi.org/10.5114/areh.2025.146633).
31. Manoso-Hernando D, Elizagaray-García I, Bailón-Cerezo J, Struyf F, Gil-Martínez A. Pain localization and associations with strength and range of motion deficits in rotator cuff-related shoulder pain vs asymptomatic: a cross-sectional case control study. *Musculoskelet Sci Pract*. 2025;78:103354. doi: [10.1016/j.msksp.2025.103354](https://doi.org/10.1016/j.msksp.2025.103354).
32. Manoso-Hernando D, Bailón-Cerezo J, Angulo-Díaz-Parreño S, Reina-Varona Á, Elizagaray-García I, Gil-Martínez A. Shoulder mobility and strength impairments in patients with rotator cuff related shoulder pain: a systematic review and meta-analysis. *Peer J*. 2024;12:e17604. doi: [10.7717/peerj.17604](https://doi.org/10.7717/peerj.17604).
33. Baumer TG, Chan D, Mende V, Dischler J, Zauel R, van Holsbeeck M, et al. Effects of rotator cuff pathology and physical therapy on in vivo shoulder motion and clinical outcomes in patients with a symptomatic full thickness rotator cuff tear. *Orthop J Sports Med*. 2016;4(9): 2325967116666506. doi: [10.1177/2325967116666506](https://doi.org/10.1177/2325967116666506).
34. Nakajima D, Yamamoto A, Kobayashi T, Osawa T, Shitara H, Ichinose T, et al. The effects of rotator cuff tears, including shoulders without pain, on activities of daily living in the general population. *J Orthop Sci*. 2012;17(2):136-40. doi: [10.1007/s00776-011-0186-4](https://doi.org/10.1007/s00776-011-0186-4).
35. Smith-Forbes EV, Moore-Reed SD, Westgate PM, Kibler WB, Uhl TL. Descriptive analysis of common functional limitations identified by patients with shoulder pain. *J Sport Rehabil*. 2015;24(2):179-88. doi: [10.1123/jsr.2013-0147](https://doi.org/10.1123/jsr.2013-0147).
36. Longo UG, De Salvatore S, Piergentili I, Panattoni N, Marchetti A, De Marinis MG, et al. Anxiety and depressive symptoms correlated to patient-reported outcome measures after rotator cuff repair: a prospective study in the perioperative period. *J Clin Med*. 2023;12(8):2999. doi: [10.3390/jcm12082999](https://doi.org/10.3390/jcm12082999).
37. Ng YM, Voo P, Maakip I. Psychosocial factors, depression, and musculoskeletal disorders among teachers. *BMC Public Health*. 2019;19:234. doi: [10.1186/s12889-019-6553-3](https://doi.org/10.1186/s12889-019-6553-3).
38. Mehling WE, Wrubel J, Daubenmier JJ, Price CJ, Kerr CE, Silow T, et al. Body awareness: a phenomenological inquiry into the common ground of mind-body therapies. *Philos Ethics Humanit Med*. 2011;6:6. doi: [10.1186/1747-5341-6-6](https://doi.org/10.1186/1747-5341-6-6).
39. Markey CH, Dunaev JL, August KJ. Body image experiences in the context of chronic pain: an examination of associations among perceptions of pain, body dissatisfaction, and positive body image. *Body Image*. 2020;32:103-10. doi: [10.1016/j.bodyim.2019.11.005](https://doi.org/10.1016/j.bodyim.2019.11.005).