Psychological Distress Negatively Affects Self-assessment of Shoulder Function in Patients With Rotator Cuff Tears

Michael Q. Potter MD, James D. Wylie MD,
Patrick E. Greis MD, Robert T. Burks MD,
Robert Z. Tashjian MD

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Abstract

Background In many areas of orthopaedics, patients with greater levels of psychological distress report inferior self-assessments of pain and function. This effect can lead to lower-than-expected baseline scores on common patient-reported outcome scales, even those not traditionally considered to have a psychological component.

Questions/purposes This study attempts to answer the following questions: (1) Are higher levels of psychological distress associated with clinically important differences in baseline scores on the VAS for pain, the Simple Shoulder Test, and the American Shoulder and Elbow Surgeons score in patients undergoing arthroscopic rotator cuff repair? (2) Does psychological distress remain a negative predictor of baseline shoulder scores when other clinical variables are controlled?

Methods Eighty-five patients with full-thickness rotator cuff tears were prospectively enrolled. Psychological distress was quantified using the Distress Risk Assessment Method questionnaire. Patients completed baseline self-assessments including the VAS for pain, the Simple Shoulder Test, and the American Shoulder and Elbow Surgeons score. Age, sex, BMI, smoking status, American Society of Anesthesiologists classification, tear size, and tear retraction were recorded for each patient. Bivariate correlations and multivariate regression models were used to assess the effect of psychological distress on patient self-assessment of shoulder pain and function.

Results Distressed patients reported higher baseline VAS scores (6.7 [95% CI, 4.4–9.0] versus 2.9 [95% CI, 2.3–3.6], $p = 0.001$) and lower baseline Simple Shoulder Test (3.7 [95% CI, 2.9–4.5] versus 5.7 [95% CI 5.0–6.4], $p = 0.001$) and American Shoulder and Elbow Surgeons scores (39 [95% CI, 34–45] versus 58 [95% CI, 53–63], $p < 0.001$). Distress remained associated with higher VAS scores ($p = 0.001$) and lower Simple Shoulder Test ($p < 0.001$) and American Shoulder and Elbow Surgeons scores ($p < 0.001$) when age, sex, BMI, American Society of Anesthesiologists classification, smoking status, tear size, and tear retraction were controlled.

Conclusions Higher levels of psychological distress are associated with inferior baseline patient self-assessment of shoulder pain and function using the VAS, the Simple Shoulder Test, and the American Shoulder and Elbow Surgeons score. Longitudinal followup is warranted to clarify the relationship between distress and self-perceived disability and the effect of distress on postoperative outcomes after arthroscopic rotator cuff repair.

Level of Evidence Level I, prognostic study. See the Instructions for Authors for a complete description of levels of evidence.

Each author certifies that he or she, or a member of his or her immediate family, has no funding or commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research*® editors and board members are on file with the publication and can be viewed on request. Each author certifies that his or her institution approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

M. Q. Potter, J. D. Wylie, P. E. Greis, R. T. Burks,
R. Z. Tashjian (✉)
Department of Orthopaedics, University of Utah,
590 Wakara Way, Salt Lake City, UT 84108, USA
e-mail: Robert.tashjian@hsc.utah.edu

Introduction

Musculoskeletal disorders are a common cause of pain and disability. Psychosocial factors play an important role in mediating between objective pathophysiology and patients' subjective experience of pain and disability [28]. Higher levels of psychological distress predict greater self-perceived pain and decreased self-perceived function in patients with low back pain [2, 8], surgical spine conditions [1, 3, 26, 27], hip and knee arthritis [9, 11, 12], femoroacetabular impingement [17, 18], shoulder disorders [4, 21, 22], and orthopaedic hand and elbow conditions [13, 19, 28, 29].

Patients who undergo shoulder arthroscopy for treatment of full-thickness rotator cuff tears commonly are assessed preoperatively with general and shoulder-specific measures of pain and function, including the VAS for pain, the Simple Shoulder Test [10], and the American Shoulder and Elbow Surgeons score [15]. Minimal clinically important differences for the VAS [24], Simple Shoulder Test [23], and American Shoulder and Elbow Surgeons score [23] previously have been reported. Scores on the Simple Shoulder Test have been shown to correlate with psychosocial variables in patients with various shoulder disorders [22]. Baseline preoperative scores on the VAS for pain and the American Shoulder and Elbow Surgeons score correlate with scores on the Hospital Anxiety and Depression Scale in patients with rotator cuff disease [4]. However, to our knowledge, there has been no similar investigation regarding whether psychological distress as measured by the Distress Risk Assessment Method similarly correlates with baseline VAS for pain, Simple Shoulder Test, and American Shoulder and Elbow Surgeons scores in patients with full-thickness rotator cuff tears.

Therefore, we aimed to answer the following questions: (1) Are higher levels of psychological distress associated with clinically important differences in baseline scores on the VAS for pain, the Simple Shoulder Test, and the American Shoulder and Elbow Surgeons score in patients undergoing arthroscopic rotator cuff repair? (2) Does psychological distress remain a negative predictor of baseline shoulder scores when other clinical variables are controlled?

Patients and Methods

Study Design and Setting

This was a prospective cohort study of patients undergoing shoulder arthroscopy for pain secondary to full-thickness rotator cuff tears. Approval was obtained from our institutional review board before beginning patient enrollment. Patients underwent arthroscopic rotator cuff repair with

one of three surgeons (PEG, RTB, RZT) between October 2011 and December 2013.

Participants/Study Subjects

Inclusion criteria identified patients who were 18 years old or older and scheduled a shoulder arthroscopy for a primary symptom of shoulder pain secondary to a reparable full-thickness rotator cuff tear. Indications for surgery included shoulder pain and weakness in patients who had MRI consistent with a reparable full-thickness rotator cuff tear. The exclusion criterion was inability to complete all questionnaires (Distress Risk Assessment Method, VAS, Simple Shoulder Test, and American Shoulder and Elbow Surgeons score). Between October 2011 and December 2013, 89 patients were approached for inclusion and consented to participate in the study. Four of 89 patients (4%) did not complete all the questionnaires, leaving 85 of 89 patients (96%) who were included in the analysis. During the study period, the three participating surgeons performed 269 arthroscopic rotator cuff repairs. Age at the time of surgery, sex, BMI, smoking status, American Society of Anesthesiologists classification, tear size on sagittal MRI, and tear retraction on coronal MRI were recorded for all enrolled patients. There were no statistically significant differences in age, sex, BMI, smoking status, American Society of Anesthesiologists classification, tear size, or tear retraction between patients who did and did not complete all the questionnaires.

Description of Experiment, Treatment, or Surgery

Patients completed paper questionnaires in the office at the time they scheduled surgery. These questionnaires then were collected, scored, and entered in a database by a study coordinator (EG) who was not involved in patient care. Patients were classified in "normal" and "distressed" groups based on their responses to the Distress Risk Assessment Method questionnaire [14], which is described in greater detail below. Patients categorized as "at-risk," "distressed-depressive," or "distressed-somatic" were considered to be distressed and were treated as a single group that was compared with normal patients in the statistical analysis. The treating physicians and all others involved in patient care remained blinded to enrolled patients' Distress Risk Assessment Method classifications during treatment and clinical followup. Authors who were not involved in the clinical care of enrolled patients (MQP, JDW) performed data entry and statistical analyses.

All patients underwent shoulder arthroscopy by one of three surgeons (PEG, RTB, RZT) at an orthopaedic-specialty

Table 1. Demographic and surgical characteristics by Distress Risk Assessment Method group

Demographic characteristic	Normal (n = 50)	Distressed (n = 35)	p value
Age (years)	62 ± 1 (95% CI, 59–64)	59 ± 1 (95% CI, 56–62)	0.20
Sex	12 females/38 males	9 females/26 males	0.86
BMI (kg/m ²)	30 ± 1 (95% CI, 29–32)	28 ± 1 (95% CI, 26–29)	0.03
Smoking status	4/50 (8%)	4/35 (11%)	0.59
American Society of Anesthesiologists classification	Class I, 10 (20%) Class II, 29 (58%) Class III, 11 (22%)	Class I, 5 (14%) Class II, 23 (66%) Class III, 7 (20%)	0.82
Tear size (cm)	2.4 ± 0.2 (95% CI, 2.0–2.8)	2.4 ± 0.2 (95% CI, 2.0–2.8)	0.98
Tear retraction (cm)	2.2 ± 0.2 (95% CI, 1.8–2.6)	2.3 ± 0.2 (95% CI, 1.9–2.7)	0.73
Double-row cuff repair	26/50 (52%)	17/35 (49%)	0.72
Number of suture anchors	3 ± 0.2 (95% CI, 3–4)	3 ± 0.3 (95% CI, 3–4)	0.62
Subacromial decompression	26/50 (52%)	17/35 (49%)	0.76
Biceps tenotomy or tenodesis	Tenotomy, 13 (26%) Tenodesis, 16 (32%)	Tenotomy, 10 (29%) Tenodesis, 12 (34%)	0.90
Distal clavicle resection	2/50 (4%)	1/35 (3%)	0.78
Other procedure	7/50 (14%)	10/35 (29%)	0.10

Age, BMI, tear size, tear retraction, and number of suture anchors are reported as mean ± standard error of the mean with 95% CIs.

ambulatory surgery center. Arthroscopic rotator cuff repair was performed with the patient in the beach chair position and under a general anesthetic. Additional procedures performed included subacromial decompression, biceps tenotomy or tenodesis, glenohumeral débridement, and/or distal clavicle resection at the surgeon's discretion. Normal and distressed patients had similar proportions of single- versus double-row repair, mean number of suture anchors used, and frequency of additional procedures performed (Table 1).

Variables, Outcome Measures, Data Sources, and Bias

The Distress Risk Assessment Method is a 45-item patient questionnaire that frequently is used to quantify psychological distress in patients presenting for orthopaedic care [2, 5, 6, 16, 26]. It includes the modified Zung Depression Scale and the Modified Somatic Perception Questionnaire, and the scores on these two questionnaires are combined to stratify patients in normal, at-risk, and distressed groups, which represent increasing levels of depressive and somatic symptomatology [14]. The Distress Risk Assessment Method has been validated and shown to correlate with worsening psychological distress as measured by the more comprehensive Minnesota Multiphasic Personality

Inventory [7, 14]. As such, it represents a parsimonious method to stratify patients in groups of lower or higher psychological distress.

The Simple Shoulder Test and American Shoulder and Elbow Surgeons score are commonly used outcomes measures in shoulder surgery. The Simple Shoulder Test contains 12 yes or no questions that assess a patient's shoulder pain, function, and ability to perform activities of daily living. It is scored on a scale of 0 to 12 with higher scores correlating with decreased pain and increased function [10]. The minimal clinically important difference on the Simple Shoulder Test for patients with rotator cuff disease is 2 points [23]. The American Shoulder and Elbow Surgeons score is a validated, reliable, and responsive measure of shoulder function and pain. Fifty percent of the score is determined by a VAS of pain from 0 to 10 with 0 representing "no pain at all" and 10 representing "pain as bad as it can be." The remaining 50% of the score is determined by 10 questions that assess sports participation and activities of daily living on a Likert scale. The total score ranges from 0 (debilitating pain, poor function) to 100 (no pain, normal function) [15]. The minimal clinical important difference on the American Shoulder and Elbow Surgeons score is approximately 17 points [23]. The VAS for pain (range, 0–10) also is reported; for patients with

rotator cuff disease, the minimal clinically important difference for this scale is 1.4 points [24].

Statistical Analysis and Study Size

Student's t-tests were used to evaluate the difference in means between normal and distressed groups and 95% CIs were calculated. Pearson correlation coefficients were calculated to test the correlation between continuous variables. The Mann-Whitney U test was used to compare the distribution of American Society of Anesthesiologists classification between groups. For multivariate modeling, preliminary data analysis targeted applicability of linear assumptions. Age, BMI, and sex were chosen as important risk adjusters in all medical studies. The American Society of Anesthesiologists classification was chosen as a risk adjuster to account for medical comorbidity, which has been shown to affect shoulder-specific health-related quality of life [25, 30]. Patient smoking status, tear size, and tear retraction also were selected as potential predictors of shoulder scores. Regression was implemented using general linear regression models with continuous and categorical predictors and visual analysis of frequency distributions. Continuous variables (age, BMI, tear size, tear retraction, VAS, Simple Shoulder Test, American Shoulder and Elbow Surgeons score) were entered as their numeric values. Categorical variables were entered as dummy variables (sex: female = 0, male = 1; Distress Risk Assessment Method category: normal = 0, at-risk/distressed = 1; smoking status: nonsmoker = 0, smoker = 1). American Society of Anesthesiologists classification was entered as an ordinal variable from 1 to 4). Final analysis was implemented using ordinary least square linear regression. All variables were entered in the model and kept as important risk adjusters selected a priori. Regression coefficients for each variable and the percent of variability explained for each model are reported. Probability values less than 0.05 were considered significant. Calculations were done using SPSS 17.0 (SPSS Inc, Chicago, IL, USA).

Demographics and Description of Study Population

Fifty patients (59%) were classified as normal and 35 patients (41%) were classified as distressed. The average age of the patients was 62 years (range, 36–82 years) in the normal group and 59 years (range, 42–75 years) in the distressed group ($p = 0.20$). The normal group contained 76% male patients versus 74% male patients in the distressed group ($p = 0.86$). The normal group contained 8% active smokers

Table 2. Preoperative scores by Distress Risk Assessment Method group

Distress Risk Assessment Method group	Normal (n = 50)	Distressed (n = 35)	p value
VAS for pain	3 ± 0.3 (95% CI, 2–4)	7 ± 1 (95% CI, 4–9)	0.001
Simple Shoulder Test	6 ± 0.4 (95% CI, 5–6)	4 ± 0.4 (95% CI, 3–5)	0.001
American Shoulder and Elbow Surgeons score	58 ± 3 (95% CI, 53–63)	39 ± 3 (95% CI, 34–45)	< 0.001

Scores are reported as mean ± SEM with 95% CIs.

Table 3. Bivariate correlations between distress scales and baseline shoulder pain and function scores

Baseline scores	Modified Zung Depression Scale	Modified Somatic Perceptions Questionnaire
VAS pain	R = 0.334 p = 0.002	R = 0.247 p = 0.03
Simple Shoulder Test	R = −0.314 p = 0.003	R = −0.188 p = 0.09
American Shoulder and Elbow Surgeons score	R = −0.406 p < 0.001	R = −0.252 p = 0.02

versus 11% active smokers in the distressed group ($p = 0.59$). The distribution of American Society of Anesthesiologists scores was not significantly different between groups ($p = 0.82$). The average BMI was 30 kg/m² (range, 22–45 kg/m²) in the normal group and 27 kg/m² (range, 19–45 kg/m²) in the distressed group ($p = 0.03$). The mean size of the cuff tear measured on sagittal MR images was 2.4 cm (95% CI, 2.0–2.8 cm) in the normal group and 2.4 cm (95% CI, 2.0–2.8 cm) in the distressed group ($p = 0.98$). The mean retraction of the cuff from its footprint measured on coronal MR images was 2.2 cm (95% CI, 1.8–2.6) in the normal group and 2.3 cm (95% CI, 1.9–2.7) in the distressed group ($p = 0.73$; Table 1).

Results

Patients with psychological distress had higher baseline scores on the VAS for pain and lower baseline scores on the Simple Shoulder Test and the American Shoulder and Elbow Surgeons score. The mean preoperative VAS for pain was 2.9 (95% CI, 2.3–3.6) in the normal group versus 6.7 (95% CI, 4.4–9.0) in the distressed group ($p = 0.001$). The mean preoperative Simple Shoulder Test was 5.7 (95% CI, 5.0–6.4) in the normal group versus 3.7 (95% CI, 2.9–4.5) in the distressed group ($p = 0.001$). The mean

Table 4. Psychological distress, patient factors, and baseline shoulder pain and function scores

Patient factors	Distress Risk Assessment Method	Age	Sex	BMI	Smoking status	American Society of Anesthesiologists classification	Tear size	Tear retraction
VAS for pain	$\beta = 4.30$ $p = 0.001$	$\beta = 0.08$ $p = 0.26$	$\beta = 1.19$ $p = 0.39$	$\beta = 0.15$ $p = 0.23$	$\beta = 0.34$ $p = 0.87$	$\beta = -1.50$ $p = 0.18$	$\beta = -0.46$ $p = 0.52$	$\beta = 0.60$ $p = 0.40$
Simple Shoulder Test	$\beta = -2.24$ $p < 0.001$	$\beta = -0.05$ $p = 0.13$	$\beta = 0.94$ $p = 0.18$	$\beta = 0.02$ $p = 0.80$	$\beta = -0.54$ $p = 0.58$	$\beta = -0.12$ $p = 0.83$	$\beta = -0.74$ $p = 0.04$	$\beta = 0.37$ $p = 0.29$
American Shoulder and Elbow Surgeons score	$\beta = -20.5$ $p < 0.001$	$\beta = -0.24$ $p = 0.31$	$\beta = -4.0$ $p = 0.41$	$\beta = -0.49$ $p = 0.24$	$\beta = -2.2$ $p = 0.76$	$\beta = -0.94$ $p = 0.81$	$\beta = -0.13$ $p = 0.96$	$\beta = -0.74$ $p = 0.76$

preoperative American Shoulder and Elbow Surgeons score was 58 (95% CI, 53–63) in the normal group versus 39 (95% CI, 34–45) in the distressed group ($p < 0.001$; Table 2). With all three scores, the differences in group means exceeded the reported minimal clinically important difference for each scale. The component questionnaires used to determine Distress Risk Assessment Method categories correlated with the VAS for pain, the Simple Shoulder Test, and the American Shoulder and Elbow Surgeons score with one exception (Table 3).

Higher levels of psychological distress were correlated with inferior baseline scores after accounting for age, sex, BMI, smoking status, American Society of Anesthesiologists classification, tear size, and tear retraction. Distress Risk Assessment Method scores outside the normal range correlated with higher VAS for pain scores ($\beta = 4.3$; $p = 0.001$) and lower Simple Shoulder Test ($\beta = -2.2$; $p < 0.001$) and American Shoulder and Elbow Surgeons scores ($\beta = -20.5$; $p < 0.001$). The multivariate model incorporating psychological distress, age, sex, BMI, smoking status, American Society of Anesthesiologists classification, tear size, and tear retraction explained 17% of the variability in VAS for pain scores, 18% of the variability in Simple Shoulder Test scores, and 28% of the variability in American Shoulder and Elbow Surgeons scores. Age, sex, BMI, smoking status, American Society of Anesthesiologists classification, and tear retraction did not correlate with any of the baseline scores. Tear size was negatively correlated with the Simple Shoulder Test ($\beta = -0.74$; $p = 0.04$) (Table 4).

Discussion

Psychosocial factors play an important role in mediating between objective pathophysiology and patients' subjective experience of pain and disability [28]. Scores on commonly used upper extremity orthopaedic outcome scales depend heavily on psychosocial variables [4, 13, 19, 20, 22, 28] and medical comorbidities [25, 30]. We aimed to investigate (1) whether psychological distress is associated with

worse baseline VAS for pain, Simple Shoulder Test, and American Shoulder and Elbow Surgeons scores; and (2) whether greater psychological distress would continue to correlate with worse scores when age, sex, BMI, smoking status, and American Society of Anesthesiologists classification were controlled for.

Our study has several limitations. First, our results are based on questionnaires given to a prospective cohort at a single time, preventing us from drawing conclusions regarding the direction of the relationship between psychological distress and patient-perceived shoulder function or regarding the effect of distress on postoperative outcomes. Second, patients were enrolled at the time they scheduled shoulder arthroscopy rather than as they presented to the clinic, excluding patients treated conservatively without surgery and potentially introducing selection bias. Third, only 89 of 269 total patients who underwent cuff repairs during the study period consented to enroll. In most cases, nonenrollment resulted from the physician not discussing the study with the patient or offering enrollment, another potential source of selection bias. Fourth, psychological distress was evaluated only with a self-administered questionnaire rather than a structured psychological interview, which could have led to misclassification of patients. However, structured interviews are impractical in an outpatient orthopaedic clinic, and the Distress Risk Assessment Method questionnaire is a validated [7, 14] and widely used [2, 5, 6, 16, 26] instrument to assess psychological distress without overly burdening the patient or clinician. Fifth, surgical treatment was not standardized, and patients had additional arthroscopic procedures performed at the discretion of the treating surgeon. However, the tear size, tear retraction, number of anchors used, frequency of double-row repairs, and frequency of additional procedures did not differ substantially between groups (Table 1), suggesting that degree of shoulder disorders was similar between groups. Finally, although we considered several common clinical variables in the multivariate analysis, we did not collect data regarding the socioeconomic status of the patients, and it is possible that this represents a potential confounding source or cause of psychological distress.

We confirmed that psychological distress was associated with higher baseline VAS for pain scores and lower baseline Simple Shoulder Test and American Shoulder and Elbow Surgeons scores. These scores traditionally are thought to assess physical dimensions like shoulder pain, stiffness, and function, but based on our results and two other studies, it is becoming increasingly apparent these scales are influenced by psychosocial variables as well. In a population with various shoulder disorders ($n = 132$), Roh et al. [22] reported significant correlation between the Simple Shoulder Test and the Pain Anxiety Symptom Scale and between the DASH questionnaire and the Pain Anxiety Symptom Scale and the Center for Epidemiologic Studies-Depression scale, measures of anxiety and depression similar to the Distress Risk Assessment Method. In patients with partial- or full-thickness rotator cuff tears ($n = 107$), Cho et al. [4] found significant correlations between depression (measured with the Hospital Anxiety and Depression Scale) and inferior baseline scores on the VAS for pain, the American Shoulder and Elbow Surgeons scale, the Korean Shoulder Scale, and the WHO Quality of Life Scale. Cho et al. [4] did not examine differences in baseline scores between high and low distress groups, whereas Roh et al. [22] reported statistically significant differences in VAS for pain scores between groups with low versus high levels of depressive symptoms and in VAS for pain and Simple Shoulder Test scores between groups with mild versus moderate versus severe anxiety symptoms. These statistical differences reached clinical significance only when mean VAS for pain and Simple Shoulder Test scores were compared between patients with mild ($n = 87$) versus severe ($n = 10$) anxiety [22–24]. We saw differences between low and high distress groups on the VAS for pain, the Simple Shoulder Test, and the American Shoulder and Elbow Surgeons score with the difference in intergroup means exceeding the published minimal clinically important difference for all three scales [23, 24]. Other authors have reported similar correlations between psychological distress and poor baseline scores on other common outcomes scales, including the WOMAC [9, 11, 12], the modified Harris hip score [18], and the Hip Outcomes Score [18]. Taken together, these findings suggest a major and perhaps underappreciated negative correlation between psychological distress and baseline scores on multiple orthopaedic outcomes scales, particularly scales (VAS for pain, Simple Shoulder Test, American Shoulder and Elbow Surgeons scale, DASH, WOMAC, modified Harris hip score, and Hip Outcomes Score) that rely heavily or exclusively on patient self-assessment of pain and function. By contrast, the Constant-Murley scale, which bases 65% of its score on physical examination findings and 35% on patient self-assessment, did not correlate significantly with measures of anxiety or depression [22].

We also found that the correlation between greater psychological distress and inferior baseline VAS for pain, Simple Shoulder Test, and American Shoulder and Elbow Surgeons scores persisted when age, sex, BMI, smoking status, and American Society of Anesthesiologists classification were controlled. Some studies have shown that a greater number of medical comorbidities correlate with worse baseline patient self-assessment of shoulder function [25, 30]. To control for this effect, we incorporated patients' American Society for Anesthesiologists classification in our multivariate analysis, but unlike previous authors, we identified no major correlation between comorbidity and baseline scores [25, 30]. Cho et al. [4] and Roh et al. [22] did not consider medical comorbidity in their multivariate models, but similar to our findings, Cho et al. [4] saw no correlation between VAS for pain and American Shoulder and Elbow Surgeons scores and age, sex, BMI, or smoking status. Roh et al. [22] found that a best-fit model that explained the majority of variance in baseline Simple Shoulder Test scores incorporated patient sex, shoulder ROM, pain, and strength in addition to their psychological variables of interest. We saw no correlation between sex and baseline shoulder scores, leading us to question the clinical significance of this prior finding [22]. Finally, the instruments used by Cho et al. [4] and Roh et al. [22] to assess depression and anxiety (Hospital Anxiety and Depression Scale, 14 items [4]; Center for Epidemiological Studies-Depression scale, 20 items [22]; and Pain Anxiety Symptom Scale, 40 items [22]) are briefer than the 45-item Distress Risk Assessment Method we used [14], but they showed weaker correlations with baseline outcome scores. It is possible that the additional burden associated with the Distress Risk Assessment Method questionnaire may be worthwhile if the instrument better distinguishes between normal and distressed groups, although we cannot draw definitive conclusions regarding this issue.

Greater psychological distress independently correlates with lower baseline VAS for pain, Simple Shoulder Test, and American Shoulder and Elbow Surgery scores in two studies [4, 22], but the influence of distress on patient outcomes after shoulder arthroscopy remains uncertain. Postoperative assessment of shoulder outcomes and Distress Risk Assessment Method scores will be required to determine whether normal and distressed patients report differences in outcome or clinical improvement after surgical treatment. Longitudinal followup also may help clarify whether improvements in shoulder pain and function after arthroscopy correlate with decreased psychological distress.

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