Shoulder Pain, Disability and Psychosocial Dimensions Across Diagnostic Categories: Profile of Patients Attending Shoulder Physiotherapy Clinics

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ABSTRACT

Patient-reported shoulder pain, function and psychosocial status inform physiotherapy intervention. Central nervous system sensitisation may also need to be considered. The aim of this retrospective chart review was to establish and compare patient-reported outcome measures and psychosocial factors across diagnostic categories for people with shoulder symptoms attending two shoulder physiotherapy specialist clinics. We analysed data of 445 patients including demographics, duration of pain and patient-reported outcome measures for shoulder pain and disability, central sensitivity and psychosocial factors. The physiotherapists defined diagnostic groups following the clinical assessment. The Instability group had lower pain scores (Shoulder Pain and Disability Index) compared to the Subacromial Pain ($p < 0.001$) and the Stiff Shoulder ($p < 0.001$) groups. The Stiff Shoulder group had worse disability scores than all other groups (Subacromial Pain group, $p < 0.001$; Instability group, $p < 0.001$; Acromioclavicular group, $p < 0.001$; Other group, $p = 0.044$). The Stiff Shoulder group had higher 'Optimal Screening for Prediction of Outcome' scores (pain-associated psychological distress) than the Instability group ($p = 0.040$). The two-item 'Pain Self-efficacy Questionnaire' scores were lower for the Other group than for the Subacromial Pain group ($p = 0.035$). Physiotherapists should screen psychosocial factors as part of their assessment of patients with shoulder pain, regardless of diagnostic category.

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INTRODUCTION

Musculoskeletal conditions are the most significant contributors to the global burden of disability (Briggs et al., 2021; Vos et al., 2016). The shoulder is one of the most common causes of musculoskeletal pain, with increasing prevalence with age (Tekavec et al., 2012; Thorpe et al., 2016). The data from the Accident Compensation Corporation (ACC) for tendon and ligament claims (2010 to 2016) showed that shoulder injuries accounted for 33% of these, and 40% of all costs for such claims (Clark et al., 2020). There was an increase of 36% for costs for shoulder injuries across those six years (Clark et al., 2020). Treatment for patients with insidious onset shoulder pain is usually not covered by ACC. Thus, those figures underestimate the true burden of direct and indirect health costs attributed to shoulder pain. Besides tendon-related injuries, other frequent diagnostic categories include acromioclavicular joint injuries, stiff shoulders (frozen shoulder or osteoarthritis), instabilities, as well as fractures and nerve-related injuries. People with persistent pain (duration ≥ 3 months) contribute towards most of the health costs related to shoulder pain. True costs are compounded by high costs of sick leave, which can be as high as 80% of the total costs for society (Virta et al., 2012).

Earlier pathoanatomic medical models aimed at identifying pathologic or morphological tissues changes, and may not provide a basis for effective decision-making for some people with shoulder pain (McClure & Michener, 2015). Farmer and Schilstra (2012) formulated diagnostic categories into six groups: shoulder impingement, symptomatic rotator cuff and the long head of the biceps tears or pathology, acromioclavicular joint pathology, superior labral tear from anterior to posterior (SLAP), glenohumeral joint instability and adhesive capsulitis. The STaged Approach for Rehabilitation (STAR) classification system was developed specifically to guide physiotherapy rehabilitation interventions (McClure & Michener, 2015). This system

combines impingement, rotator cuff and biceps pathology and SLAP lesions into 'subacromial pain syndrome', with adhesive capsulitis, glenohumeral instability and 'other' forming a total of four categories (McClure & Michener, 2015). The addition of acromioclavicular joint disorders in a separate category has been used to develop consensus guidelines on patient care pathways for shoulder conditions (Kulkarni et al., 2015, Appendix A). While diagnostic categories have been established for people with shoulder pain, little is known regarding the differences in these categories in self-reported pain, disability or psychosocial status.

Use of patient-reported outcomes measures (PROMs) forms part of comprehensive assessments, informing clinical interventions and screening patients for psychosocial status. Lower emotional and mental health function were associated with initial pain and function in patients with rotator cuff tears (Coronado et al., 2018; Wylie et al., 2016) and those with chronic shoulder pain (Martinez-Calderon et al., 2018). Apprehension or fear of re-injury or pain is common following glenohumeral dislocations (Olds & Webster, 2021) and for patients with higher levels of pain (Lentz et al., 2009). Such fear or fear-avoidance beliefs can influence persistence of pain and disability (Gottlieb & Springer, 2021; Martinez-Calderon et al., 2018) and influence decisions for return to work, sports or recreational activities (Lädermann et al., 2016; Olds & Webster, 2021). High levels of self-efficacy and higher patient expectations are associated with improved clinical outcomes for shoulder pain (Chester et al., 2018; Chester et al., 2019) and with lower levels of pain and disability (Martinez-Calderon et al., 2018). In contrast, specific structural diagnoses were not associated with patient-rated outcomes in patients with persistent shoulder symptoms referred for physiotherapy treatment (Chester et al., 2018; Wylie et al., 2016).

A wide range of validated PROMs are available to assess or screen clinical and psychosocial domains. The Shoulder Pain and Disability Index (SPADI) focuses on levels of pain and disability during daily activities (MacDermid et al., 2006). The Örebro Musculoskeletal Pain Questionnaire (MSKPQ) screens for psychosocial factors and risk of future work absenteeism (Linton & Boersma, 2003; Linton et al., 2011). A more recent questionnaire, the Optimal Screening for Prediction of Outcome (OSPRO), assesses negative mood, fear avoidance and positive affect or coping skills (Lentz et al., 2016). The Tampa Scale for Kinesiophobia (TSK-11) also assesses fear of movement (Bot et al., 2005; Woby et al., 2005). The Brief Resilience Scale (BRS) assesses the ability to recover from stress (Smith et al., 2008). Shorter questionnaires are available to screen patients, such as the 2-item Pain Self-Efficacy Questionnaire (PSEQ-2) (Nicholas, 2007) and the Patient Health Questionnaire-2 (PHQ-2) to screen for depression (Kroenke et al., 2003).

Central sensitisation is defined as the "amplification of neural signalling within the central nervous system that elicits pain hypersensitivity" (Nijs et al., 2021, p. e383). Psychosocial factors and, specifically, fear of pain have been found to be associated with central sensitisation in patients with shoulder pain (Sanchis et al., 2015). Central sensitisation can predict poor treatment outcomes, and levels vary within different pain conditions (Nijs et al., 2021). Whether such levels differ between diagnostic categories for shoulder pain has not been established.

Examination of the nature and prevalence of psychosocial factors and central sensitisation in people seeking care at shoulder physiotherapy clinics will provide insights into the presence and extent of psychosocial and pain sensitivity factors. People with high levels of psychosocial modifiers may be at risk of developing persistent pain and disability (Chester et al., 2018). Knowledge of these factors may inform future studies to define early tailored psychologically informed interventions, such as cognitive-behavioural approaches, as part of physiotherapy management. In the longer term, such analysis will provide baseline values to determine tailored interventions for patients with shoulder pain.

Thus, the primary aim of this study was to establish and compare the nature of PROMs relating to pain, disability, central sensitivity and psychosocial factors that are known to be associated with outcomes of interventions for shoulder pain across common diagnostic categories. The secondary aim was to compare such PROMs between the diagnostic sub-groups within each primary group.

METHODS

We undertook a retrospective chart review of de-identified data from consecutive patients who presented to two private shoulder physiotherapy clinics, in Auckland and Christchurch, New Zealand. Both practices accept patients via direct access (no referral) and those referred by other physiotherapists, general practitioners or orthopaedic surgeons. The practices include registered specialist physiotherapists in musculoskeletal physiotherapy (with a focus on shoulder disorders) and registered as general scope physiotherapists by the Physiotherapy Board of New Zealand.

Ethics approval was granted by the University of Otago Human Ethics Committee (reference number HD20/032). The ethical review committee approved a waiver of written consent from patients because the study was a retrospective chart audit and only non-identifiable data were extracted from patient notes.

Inclusion criteria

Data were included if patients were ≥ 18-years of age, enrolled between October 2019 and June 2020, and presented with shoulder pain.

Exclusion criteria

Data were excluded from the study if the person had any of the following: widespread chronic pain, complex regional pain syndrome, neuropathic pain, receiving treatment for active cancer, pain derived from the cervical region, or neurological disorder.

Data collection

The clinics' usual processes include online completion of PROMs by the patients prior to their initial appointment. The clinic administrator sent the online form link to patients. After the initial consultation, the physiotherapists added the diagnostic categories based on the clinical assessment to the online form (Table 1). The primary diagnostic criteria were based on existing international guidelines for diagnosis of shoulder conditions (e.g., Kulkarni et al., 2015; McClure & Michener, 2015). The secondary diagnostic criteria were achieved by correlating clinical findings with imaging results, where available. Pain

type was determined by the physiotherapist at the time of examination in accordance with the International Association for the Study of Pain definitions and clinical algorithms for neuropathic, nociceptive and nociplastic pain (Kosek et al., 2021). Referred pain from the cervical spine was determined when the predominant shoulder and upper limb symptoms were reproduced primarily with cervical spine movement testing.

Clinic administrative staff downloaded the results from the online questionnaire to a Microsoft Excel® spreadsheet and collated the de-identified data. De-identified data from the two practices were collated and analysed by the first author (RW).

Variables

Data included demographic data (age, gender, ethnicity), date of injury or onset of pain, PROMs and diagnostic criteria. Duration of symptoms was calculated from the date of injury (or onset of pain) to the date of initial consultation. PROMs included those specifically related to the SPADI, generic questionnaires for central sensitisation (CSI) and multiple psychosocial dimension (Örebro MSKPQ; OSPRO; resilience, BRS; depression, PSQ-2; self-efficacy, PSEQ-2; and kinesiophobia, TSK-11, Appendix B).

Statistical analyses

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 26 (IBM Corporation, Armonk, NY). Data distribution was assessed through histograms. Duration since onset of symptoms or injury was recorded in days, and categorised into acute (< 3 months) and chronic (> 3 months). Descriptive statistics were performed, reported as means and standard deviations unless stated otherwise. For nominal variables, numbers and percentages are given. For normally distributed data for PROMs, the differences between diagnostic categories were analysed using ANOVAs. The Levene statistic was used to assess homogeneity of variances between diagnostic categories. Where equal variance or homogeneity between diagnostic categories could not be assumed, the Brown-Forsyth F-ratio was used. If significant between-group differences were found, post-hoc independent *t*-tests were performed with Bonferroni corrections to explore differences between specific diagnostic groups. The Tamhane T2 correction was used for comparisons with unequal variance. For non-normal distributed data, the differences between groups were analysed using the Kruskal-Wallis test and post hoc analyses with Mann Whitney U-test with Bonferroni corrections were conducted, when appropriate. The alpha level was defined as p value of < 0.05.

RESULTS

Demographics

Data of 445 patients were included (mean age 43.6 years, SD 15.9; 186 women, 41.8%, Table 1). There was a significant effect for age across the diagnostic groups ($p < 0.001$). Post hoc analyses showed that, on average, patients in the Stiff Shoulder group were older than those in all other diagnostic categories ($p < 0.001$). Those in the Instability group were younger than all

Table 1

Demographic Data of Patients Across the Primary Diagnostic Classifications

Demographic characteristic	Group					
	Subacromial pain	Instability	Stiff shoulder	ACJ	Other	Total
Gender						
Men, *n* (%)	96 (21.9)	64 (14.6)	27 (6.1)	33 (7.4)	39 (8.8)	259 (58.2)
Women, *n* (%)	85 (19.4)	26 (5.9)	32 (7.3)	17 (3.8)	26 (5.8)	186 (41.8)
Total	181 (40.7)	90 (20.2)	59 (13.3)	50 (11.2)	65 (14.6)	445 (100)
Age (mean, SD)	46.9 (15.3)	29.9 (10.2)	58.2 (11.4)	40.5 (11.6)	42.6 (14.9)	43.6 (15.9)
Ethnicity, *n* (%)						
New Zealand European	106 (23.8)	58 (13.0)	34 (7.6)	34 (7.6)	38 (8.5)	270 (60.7)
Māori	7 (1.6)	7 (1.6)	4 (0.9)	2 (0.4)	1 (0.2)	21 (4.7)
Pasifika	2 (0.4)	1 (0.2)	2 (0.4)	0 (0)	0 (0)	5 (1.1)
European	24 (5.4)	10 (2.2)	8 (1.8)	6 (1.3)	9 (2)	57 (12.8)
Asian	17 (3.8)	7 (1.6)	3 (0.7)	2 (0.4)	3 (0.7)	32 (7.2)
Other	10 (2.2)	2 (0.4)	2 (0.4)	0 (0)	3 (0.7)	17 (3.8)
Not declared	15 (3.4)	5 (1.1)	6 (1.3)	7 (1.3)	11 (2.5)	43 (9.7)
Duration of symptoms (days) [a]	126 (230)	144 (265)	151 (209)	189 (165)	165 (420)	144 (245)
Acute pain (< 3 months), *n* (%)	62 (14.9)	30 (7.2)	19 (4.6)	9 (2.2)	19 (4.6)	139 (31.2)
Chronic pain (> 3 months), *n* (%)	119 (25.9)	60 (13.9)	36 (8.6)	38 (9.3)	37 (8.8)	306 (68.8)
Treated by						
Physiotherapy specialist, *n* (%)	89 (20.1)	57 (12.9)	28 (6.3)	28 (6.3)	30 (6.8)	232 (52.5)
Physiotherapy general scope, *n* (%)	91 (20.6)	33 (7.5)	31 (7.0)	22 (5.0)	33 (7.5)	210 (47.5)

Note. Nominal variables are reported as numbers and (%). Continuous data are reported as means (SD). ACJ = acromioclavicular joint.

[a] Duration of symptoms is reported as median (interquartile range, IQR).

other groups ($p < 0.001$). Those in the Subacromial Pain group were older than patients in the Acromioclavicular joint (ACJ) group ($p = 0.028$).

Of the 412 patients with recorded duration of symptoms, 306 (68.8%) had experienced pain for more than 3 months. There was no significant effect for self-reported duration of symptoms across the diagnostic groups ($p = 0.903$).

PROMS across primary diagnostic group

Table 2 summarises the PROMS across the diagnostic categories. Results of post hoc analyses performed for significant effects for PROM scores across groups are presented in Appendix C.

SPADI

Significant differences were found across diagnostic groups for SPADI-Pain, SPADI-Disability and SPADI-Total (Table 2). Post hoc between-group comparisons showed that the Instability group also had significantly lower SPADI-Pain scores than the Stiff Shoulder group ($p < 0.001$) (Appendix C). The Stiff Shoulder group had significantly higher SPADI-Disability scores (indicating worse functional limitations) than all other groups (Subacromial Pain, $p < 0.001$; Instability, $p < 0.001$; ACJ, $p < 0.001$; Other, $p = 0.044$). The SPADI-Total was higher (worse) for the Stiff Shoulder group compared to the Subacromial Pain, Instability and ACJ groups ($p < 0.001$ respectively). The SPADI-Total was lower for the Instability group compared to all other groups (Subacromial Pain, $p = 0.047$; Stiff Shoulder, $p < 0.001$; ACJ, $p < 0.001$; Other, $p < 0.001$).

CSI

There was no statistically significant effect for diagnostic categories for the CSI. Of the 348 patients completing the CSI, 35 (10.1%) patients had scores higher than the cut-off above 40 that has been found to be suggestive of central sensitivity syndrome (Neblett et al., 2013). For specific diagnostic groups, frequencies for scores above 40 ranged from 3 patients (7.1% of 42) in the ACJ group to 17 (12.2% of 139) for the Subacromial Pain group.

Psychosocial screening and outcome measures

No significant differences were found between diagnostic categories for the Örebro MSKPQ, the BRS, PHQ-2 and the TSK-11. Only one patient had a high-risk score for the Örebro MSKPQ (> 50), classified as ACJ dysfunction. Nineteen of 291

Table 2

Patient-reported Outcome Measures Across Primary Diagnostic Groups

Outcome measure	Group						
	Subacromial pain	Instability	Stiff shoulder	ACJ	Other	Total	*p*
Pain and function dimension							
SPADI-Pain	52.2 (22.2) *n* = 167	40.6 (22.8) *n* = 83	58.2 (16.7) *n* = 56	49.7 (20.4) *n* = 47	51.3 (22.8) *n* = 63	49.5 (22.3) *n* = 416	< 0.001
SPADI-Disability	29.4 (22.4) *n* = 167	22.7 (19.3) *n* = 83	46.3 (20.0) *n* = 56	25.9 (19.1) *n* = 47	35.9 (24.8) *n* = 63	30.9 (22.7) *n* = 416	< 0.001*
SPADI-Total	35.1 (22.3) *n* = 167	27.0 (20.0) *n* = 83	49.7 (18.9) *n* = 56	32.7 (19.2) *n* = 47	41.3 (23.4) *n* = 63	36.1 (22.3) *n* = 416	< 0.001
Central sensitisation							
CSI	25.3 (13.0) *n* = 139	22.1 (14.2) *n* = 73	26.5 (11.2) *n* = 41	23.6 (13.1) *n* = 42	26.4 (11.4) *n* = 53	24.7 (12.9) *n* = 348	0.259
Psychosocial dimensions							
Örebro MSKPQ	27.0 (8.2) *n* = 38	25.9 (6.6) *n* = 13	23.8 (7.8) *n* = 17	28.1 (10.7) *n* = 14	28.0 (7.4) *n* = 34	27.5 (7.8) *n* = 116	0.999
OSPRO	28.0 (10.1) *n* =128	26.1 (9.9) *n* = 68	32.8 (11.4) *n* = 30	26.7 (8.7) *n* = 30	28.6 (10.3) *n* = 21	28.0 (10.2) *n* = 277	0.044
BRS [a]	3.3 (2–5) *n* = 104	3.3 (2–5) *n* = 57	3.3 (3–5) *n* = 27	3.4 (2–5) *n* = 26	3.0 (2–4) *n* = 19	3.3 (2–5) *n* = 233	0.203
PHQ-2 [a]	0 (0–6) *n* = 124	0 (0–6) *n* = 66	0 (0–4) *n* = 37	0.5 (0–5) *n* = 31	1 (0–5) *n* = 33	0 (0–6) *n* = 291	0.395
PSEQ-2 [a]	11 (0–12) *n* = 131	10 (3–12) *n* = 69	10 (4–12) *n* = 42	10 (5–12) *n* = 37	10 (3–12) *n* = 47	10 (0–12) *n* = 326	0.012
TSK-11	23.8 (6.1) *n* = 126	24.1 (6.5) *n* = 81	24.8 (6.4) *n* = 33	24.6 (5.4) *n* = 32	24.4 (4.8) *n* = 29	24.1 (6.0) *n* = 301	0.897

Note. Presenting mean (SD), ANOVA or [a] median, (range) using the Kruskal Wallis test. ACJ = acromioclavicular joint; BRS = Brief Resilience Scale; CSI = Central Sensitization Inventory; OSPRO = Optimal Screening for Prediction of Outcome; PHQ-2 = 2-item Patient Health Questionnaire; PSEQ = Pain Self-efficacy Questionnaire; SPADI = Shoulder Pain and Disability Index; TSK-11 = Tampa Scale of Kinesiophobia short form.

* Equal variance not assumed; Brown-Forsyth F.

patients (4.3%) had PHQ-2 scores indicating depression (> 3). Significant differences were found between the diagnostic categories for the OSPRO and the PSEQ-2. For the OSPRO, higher scores were reported in the Stiff Shoulder group than the Instability group (p = 0.040, Appendix C). For the PSEQ-2, the Other group had significantly lower scores than the Subacromial Pain group (p = 0.035).

PROMS across secondary diagnostic group

For the Instability group, the only significant difference between the traumatic and atraumatic sub-groups was for the Örebro MSKPQ, with the atraumatic group having higher scores (traumatic instability, mean (SD): 22.3 (5.7); atraumatic instability, mean (SD): 30.0 (5.3); mean difference 7.7, 95% CI 0.9 to 14.5, p = 0.029). No significant differences were found between the Subacromial Pain sub-groups (atraumatic rotator cuff related pain versus traumatic rotator cuff tears), and between those of the Stiff Shoulder (frozen shoulder versus glenohumeral osteoarthritis) for all PROMs.

DISCUSSION

The aim of this study was to establish and compare the patient-reported outcomes measures, psychosocial factors and central sensitivity across common shoulder diagnostic categories, thereby providing a profile of patients with shoulder pain presenting to two New Zealand private shoulder physiotherapy practices. There were significant differences across diagnostic groups for shoulder pain and function (SPADI), and two psychological outcomes, the OSPRO and PSEQ-2. People with stiff shoulders had higher pain and disability levels (SPADI) compared to other diagnostic groups and higher OSPRO scores than the Instability group. The PSEQ-2 for the Other group had significantly lower scores, thus lower pain-related self-efficacy, than the Subacromial Pain group.

Two-thirds of the patients presented with chronic symptoms (> 3 months' duration). The higher proportion of patients with chronic symptoms may be reflected by the specialist physiotherapy status of the two clinics in that they may attract patients who have persistent or recurrent symptoms, perhaps following unsuccessful treatment or rehabilitation elsewhere. The high proportion for patients with symptom duration of more than 3 months may also reflect international findings: Most of the health care costs associated with shoulder pain were for persistent pain (Virta et al., 2012).

Diagnostic categories and demographics

The Subacromial Pain group was the most frequently reported diagnostic category, as also reported elsewhere (van der Windt et al., 1996). The mean age for the Subacromial Pain group (47 years) and the equal women-to-men ratio was similar to a group of patients with rotator cuff disease (Yamaguchi et al., 2006). The SPADI-Pain and -Disability scores were similar to those reported for participants with rotator cuff disease in earlier randomised controlled trials (Bennell et al., 2010).

The mean age (29 years) for the Instability group in this study was younger than those of a previous study (37 years) that described patients with shoulder instability who required closed reduction (Leroux et al., 2013). Both studies had a higher proportion of men than women (Leroux et al., 2013). Other authors have reported increased frequency of first-time glenohumeral dislocations in young men (aged 15–24) (Shields et al., 2018). In general, the younger age groups have the highest prevalence of repeated dislocations and, consequently, may seek physiotherapy intervention. Interestingly, there was no difference for the mean duration since injury between the atraumatic instability (median 137 days) and the traumatic instability (median 138 days, p = 0.505) sub-groups seen at these clinics.

The Stiff Shoulder group mean age was 58 years, consistent with frozen shoulder and glenohumeral osteoarthritis being more common for middle aged and older adults (Hand et al., 2008). In contrast to earlier findings of higher ratio for women (61%) (Hand et al., 2008), the patients with stiff shoulders in our cohort had a relatively equal gender ratio. The SPADI-Total for this group was lower than reported in a previous study with patients with frozen shoulder (SPADI-Total ~ 60/100) (Sharma et al., 2017).

Māori comprised 5.3% of the patient population (5.4% in the Auckland and 3.4% in the Christchurch clinics). In the Auckland-based clinic, 1.7% of patients were Pasifika. Māori and Pasifika comprise 16.5% and 8.1% respectively of the New Zealand population (Stats NZ, 2018). The distribution of ethnicities varies across geographical areas – for example, in Christchurch, Māori and Pasifika comprise 7% and 5% of the local population, respectively (Stats NZ, 2018). We do not know why these clinics attract comparatively fewer Māori and Pasifika. In terms of general persistent pain, Māori, Pasifika and Asian patients have reported higher pain levels and disability, yet those ethnicities were under-represented at persistent pain services (Lewis & Upsdell, 2018). Possible factors could be lower awareness of the role of physiotherapy for patients with shoulder pain, geographic location of the clinics, or challenges with affordability of co-payments for general scope physiotherapy. There are no co-payments for specialist physiotherapy for ACC claimants; thus, the financial barrier is removed for access to these services.

If people do not access general scope physiotherapy services (possibly due to financial barriers) or a general practitioner, they may not enter the pathway to specialist physiotherapy referral. Referral of Māori and Pasifika to these pathways may need to be considered and improved. It is also possible that experiences of pain of diverse ethnic groups need to be considered, for example, by ensuring that for Māori, Māori holistic views of health are included to a greater extent in the rehabilitation (Hoeta et al., 2020). Lower health care use by people of specific ethnic groups represents a major challenge, and health care providers should explore and implement strategies to improve equity of access for Māori and Pacific peoples.

SPADI and CSI

Patients in this study had significant differences in SPADI-Pain, -Disability and -Total scores between diagnostic groups. The Instability group comprised both traumatic and atraumatic instabilities. In the acute phase, patients with traumatic instabilities are likely to present with high levels of pain (SPADI-Pain) and disability (SPADI-Disability). Significant improvements are expected by 6 months (SPADI-Pain) and 9

months (SPADI- Disability) (Olds et al., 2020). The low SPADI-Pain score for the Instability group in this study is possibly due to the late presentation to physiotherapy (mean symptom duration > 3 months) at these clinics. The SPADI questionnaire may also not be sufficiently responsive for individuals with shoulder instabilities, as the questionnaire only explores disability regarding activities of daily living. The SPADI and the Disabilities of the Arm, Shoulder and Hand questionnaire (DASH), specifically the shortened version, the QuickDASH, are similarly responsive for patients with shoulder pain undergoing physiotherapy (Chester et al., 2017). The QuickDASH may, however, be more relevant with individuals with glenohumeral dislocations as that PROM includes sections related to work- and sports-related disability. Other PROMs frequently reported for individuals with glenohumeral instabilities are the Western Ontario Shoulder Instability Index and the Oxford Instability Shoulder Score (Şahinoğlu et al., 2019).

There were no statistically significant differences in the CSI between diagnostic groups. Thirty-four patients (10.1%) across all diagnostic groups were above the cut-off score that may indicate the presence of central sensitivity syndrome (≥ 40) (Neblett et al., 2013). Although we did not undertake a comprehensive sensory assessment for central sensitisation, based on CSI scores, our findings support previous reports of a sub-group of shoulder patients with central sensitisation regardless of diagnostic criteria (Sanchis et al., 2015). A post hoc analysis of symptom duration demonstrated no significant differences between those who had high CSI scores (≥ 40) and those with low. Thus, duration of symptoms, in isolation, was also unlikely to identify those who have high risk for central sensitisation.

Central sensitisation predicts worse outcomes in patients with lateral epicondylalgia (Jespersen et al., 2013), whiplash (Hendriks et al., 2020), osteoarthritis (Kim et al., 2015) and low back pain (Aguilar Ferrándiz et al., 2016). Such patients need treatment approaches that target desensitisation of the nervous system (Nijs et al., 2016). Interventions may comprise pain neuroscience education, lifestyle management (such as nutrition, stress and sleep), psychologically informed interventions and graded activity exposure programmes (Elma et al., 2020; Nijs et al., 2020; Nijs et al., 2016). Patients with high CSI scores may also benefit from considerations for pharmacological interventions (Nijs et al., 2021). Identifying patients with higher sensitisation is important to inform tailored, relevant interventions for the individual. The CSI score may identify those at risk, but further evaluation is required to confirm the presence of central sensitisation.

Psychosocial outcome measures

The main purpose of psychosocial screening is to identify factors that are likely to adversely influence treatment outcome and present a risk of long-term pain and disability (Chester et al., 2018; Struyf et al., 2016). An earlier study with patients with rotator cuff tears showed that mental health (assessed with the SF-36 Mental Component Score) had a stronger association with patient-reported shoulder pain, function and shoulder-specific health-related quality of life than morphological tear severity (Wylie et al., 2016). Thus, identifying those patients who have psychosocial risk factors is important to guide rehabilitation, as well as to estimate prognosis for recovery (Chester et al., 2018).

The Örebro MSKPQ was originally developed for use in the low back pain population (Linton & Boersma, 2003). This score indicates risk for future absenteeism due to sickness in people with low back pain (Linton & Boersma, 2003), and is also one of the criteria of the ACC to refer patients to the pain management service regardless of area of pain (Accident Compensation Corporation, 2021). In the current study, the Örebro MSKPQ identified only one patient above the cut-off score of 50. Close to 70% of patients already could be classified as having chronic pain, that is, self-reported duration longer than 3 months. Whether higher Örebro MSKPQ scores for people with persistent shoulder pain also predicts future absenteeism or long-term functional disability has not yet been confirmed. In this study, the OSPRO discriminated between diagnostic categories of people with shoulder pain. The construct validity of the OSPRO with unidimensional questionnaires has been explored for people with shoulder pain, indicating strong relationships (Razmjou et al., 2021). Further work is required to increase clinical utility of the tool and develop validated cut-points, before this tool can be recommended for clinical practice (George et al., 2017). The PHQ-2 found that 4.3% of patients completing this questionnaire had signs for depression. These patients were found across diagnostic groups.

Self-efficacy has been described as the confidence a person has in their own ability to achieve a desired outcome (Bandura, 1977; Nicholas, 2007). Chester et al. (2019) found that patients with shoulder pain with low baseline pain and low self-efficacy scores had similar or worse outcomes to patients with high baseline pain and high pain self-efficacy. Thus, high levels of pain self-efficacy may mediate outcomes of those with high levels of pain. Caution is needed when comparing outcomes of the 10-item PSEQ (used by Chester et al., 2019) to the 2-item PSEQ (Chiarotto et al., 2016). While the Subacromial Pain group in our study had higher self-efficacy (11/12) than those included by Chester et al. (2019), a wide range, as low as 0/10, was found in our study. We suggest that it remains important for physiotherapists to screen patients with shoulder pain so that those with low self-efficacy (≤ 5/10) can be identified and receive targeted rehabilitation support.

In a previous study (Olds et al., 2019), similar TSK-11 scores (26/44) were reported for people with glenohumeral dislocations within 12 weeks of their dislocation. Kinesiophobia scores did not demonstrate a significant change across time (Olds et al., 2020) and have been shown not to differ in primary or recurrent instability (Eshoj et al., 2019). Either kinesiophobia does not differ between traumatic and atraumatic instability and primary or recurrent instability, or current measures of kinesiophobia are not responsive in people with shoulder instability. More recent PROMs, such as the Shoulder Return to Sport after Injury scale, may be more relevant to assess fear of re-injury, confidence and emotions, for people with glenohumeral dislocations (Olds & Webster, 2021).

The Other shoulder group had significantly lower PSEQ-2 scores compared to the Subacromial Pain group. The Other diagnostic

group included patients with post-operative conditions, muscle strains and fractures. These findings indicate that patients with those diagnoses may benefit from formal assessment of self-efficacy to determine appropriate management options. Patients with low levels of self-efficacy need support to improve self-management, confidence and motivation, and to decrease reliance on pain medication (Picha & Howell, 2018). Similar to those with high CSI scores, a multicomponent exercise programme and psychologically informed interventions may be relevant to encourage physical activity and exercise for patients with low self-efficacy (Martinez-Calderon et al., 2020).

Clinical implications

Lin et al. (2020) included psychosocial screening as one of 11 recommendations to improve the quality of care for musculoskeletal pain. Such screening allows identification of people at risk of developing persistent disability, and prioritisation of early relevant person-centred care and interventions. It is unlikely that physiotherapists can predict risk of chronicity for patients with musculoskeletal pain based only on their patient interview and physical examination, compared to results of screening tools such as the Örebro MSKPQ (Wassinger & Sole, 2021). Our findings suggest that such risk can be present, regardless of the diagnostic category of the patient. Thus, psychosocial screening is recommended to be used in conjunction with a clinical interview for patients with musculoskeletal pain in general (Kendall et al., 2009; Singh et al., 2021; Wassinger & Sole, 2021). Our results reinforce the importance for physiotherapists to routinely include psychosocial screening and assessment of factors that contribute to persistent pain presentations (e.g., central sensitivity) as part of their assessment of people with shoulder pain for longer than three months, across all diagnostic categories.

The processes used in the two practices indicate that it is possible to collect such data from patients prior to their first assessment. This allows the physiotherapist to integrate their clinical interviews and physical examination with findings of the screening tools, to identify factors with the potential to influence treatment outcomes, or who may need further assessment or referral. However, the burden on the patient in completing multiple questionnaires must be considered in the clinical setting. There may be a limit to the number of factors that can be assessed using pre-appointment questionnaires. Anecdotally, some patients questioned the relevance of some questions in the pre-appointment questionnaires, as also reported in other studies with patients with musculoskeletal disorders (Singh et al., 2021). The risk of adverse influence on the clinical encounter from a large number of questionnaires, or those that patients perceive to be personal or sensitive information, must be considered. The OSPRO appears to be associated with unidimensional psychological PROMs (such as the TSK-11 and PSEQ) (Lentz et al., 2016; Razmjou et al., 2021). Pre-appointment questionnaires could be limited to such multidimensional questionnaires, and unidimensional domains be explored during and following the first appointment, as determined by the assessing physiotherapist. Further work is required to investigate the prognostic capacity of these outcomes, specifically for people with shoulder pain, and the most efficient administration, considering the person and clinician burden.

Methodological considerations

A strength of this study is that a large group of patients (> 400) was included in this study. However, the PROMs were not consistently completed by all patients, as these differed across time and between clinics. The main limitation of this study was the retrospective design. As an exploratory study, we undertook a number of statistical analyses, which increases the risk of Type 1 errors. We also did not adjust comparisons between diagnostic categories for confounding factors. For example, age may confound outcomes of the PROMs. However, age and diagnostic categories may be inter-dependent, in which case adjusting for age would not be appropriate. Caution is needed with interpreting and applying the outcomes of this study. We did not include the follow-up examination nor number and frequency of physiotherapy treatments. Factors that could influence pain and disability are not reported, for example, comorbidities, smoking and alcohol status, socioeconomic status and employment status or type (Dunn et al., 2014; Plachel et al., 2019; Tashjian et al., 2004; Wærsted et al., 2020; Wylie et al., 2010). Finally, this study did not assess factors that predict outcomes and cost of physiotherapy.

CONCLUSION

The Subacromial Pain group had the highest frequency of patients in this retrospective study of two shoulder physiotherapy practices. The Stiff Shoulder group had the highest levels of pain and disability, as defined by the SPADI, as well as the highest risk of long-term disability, defined by the OSPRO. The highest and lowest levels of pain self-efficacy were reported in the Subacromial Pain group and Other group, respectively. People with shoulder pain across all diagnostic groups can present with high levels of pain, disability, features of central sensitisation and psychosocial distress, as well as low levels of pain self-efficacy. We suggest that physiotherapists should routinely include questionnaires that measure psychosocial factors in order to provide a comprehensive assessment of individual patients with shoulder pain.

KEY POINTS

1. The SPADI differed across diagnostic groups and was highest for pain and disability for the Stiff Shoulder group.
2. People with shoulder pain across all diagnostic groups can present with high levels of pain, disability, features of central sensitisation and psychosocial distress, as well as low levels of pain self-efficacy.
3. Physiotherapists should routinely include questionnaires that measure psychosocial factors and central sensitivity as part of a comprehensive assessment of people with shoulder pain.

DISCLOSURES

No funding was provided for this study. Margie Olds, Angela Cadogan and Sarah Betteridge were provider physiotherapists and contributed to the interpretation of results and revision of the manuscript. Roger White and Gisela Sole were responsible

for data processing and analysis and writing of the first manuscript draft. All authors approved the final draft. There are no conflicts of interest that may be perceived to interfere with or bias this study.

PERMISSIONS

Ethics approval was granted by the University of Otago Human Ethics Committee (reference number HD20/032). The ethical review committee approved a waiver of written consent from patients because the study was a retrospective chart audit and only non-identifiable data were extracted from patient notes.

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Appendix A

SHOULDER DIAGNOSTIC CRITERIA

Pre-requisite for all diagnoses below is full range of motion of the cervical spine, with no reproduction of the patient's primary symptom.

Primary diagnostic categories	Clinical diagnostic criteria	Secondary diagnostic categories	Specific diagnostic criteria
Shoulder instability	Glenohumeral joint subluxation or dislocation	Traumatic instability	Clinical History of subluxation or dislocation associated with trauma/high force Imaging May have imaging evidence for: Glenohumeral dislocation Hill Sachs /glenoid fracture (X-ray) Capsuloligamentous or labral tear (MRI/A)
		Atraumatic instability	Clinical History of subluxation/dislocations without trauma, or with low-force trauma only Imaging If available, normal with no structural instability lesion
Stiff shoulder	Loss of passive ROM of the glenohumeral joint	Primary frozen shoulder	Clinical Insidious onset pain/stiffness Loss of passive ROM in external rotation and in 2 other directions Imaging Normal X-ray (except calcium or osteopaenia) required to confirm diagnosis (to exclude other cause of stiffness)
		Secondary frozen shoulder	Clinical Post-trauma/surgery or associated with resorptive calcific tendinosis or other shoulder pathology Loss of passive ROM in external rotation and in 2 other directions Imaging Normal X-ray (except calcium or osteopaenia) required to confirm diagnosis (to exclude other cause of stiffness)
		Glenohumeral osteoarthritis	Clinical Loss of passive ROM in external rotation Imaging X-Ray or computerised tomography required to confirm diagnosis of glenohumeral joint osteoarthritis
Subacromial pain	Pain in deltoid region Full passive external rotation Pain and variable weakness with resisted abduction and/or external rotation	Calcific tendinopathy	Clinical RCRP (above) plus Imaging X-ray and/or ultrasound confirmation of calcium in rotator cuff (except linear calcium)
		Atraumatic RCRP	Clinical No significant trauma (may be mild trauma)

Primary diagnostic categories	Clinical diagnostic criteria	Secondary diagnostic categories	Specific diagnostic criteria
Subacromial pain		Traumatic rotator cuff tear	Clinical History of significant trauma/load (e.g., fall, heavy lifting, high velocity load) Significant weakness May have positive (cannot exclude if these are negative): Pseudoparalysis (supraspinatus) Positive lag signs (drop arm test, external rotation lag sign, internal rotation lag sign, lift-off test) Positive belly press test (subscapularis) Imaging Ultrasound/MRI evidence of acute rotator cuff tear required to confirm diagnosis
		Massive (chronic) rotator cuff tear	Clinical RCRP plus atrophy of the supra/infraspinatus Imaging X-Ray – superior migration humeral head and/or decreased acromio-humeral distance OR Ultrasound or MRI – confirmation of rotator cuff tear > 5cm (anterior-posterior dimension) OR 2 or more tendons involved
		ACJ ligament injury/instability	Clinical History of trauma Physical examination with or without deformity Imaging X-Ray may confirm ACJ disruption and can help grade injury
ACJ pain	Full passive external rotation Predominant pain is in superior shoulder/ supraclavicular/ suprascapular region No significant weakness with rotator cuff tests ACJ tenderness to palpation (provocative of typical pain) Provocative tests for ACJ (none diagnostic in isolation): Cross body adduction test Scapula elevation/ depression/ retraction/ protraction End range pain in elevation Active compression (O'Briens) test ACJ resisted extension test	ACJ arthropathy	Clinical No significant trauma, or mild/low-force trauma only Acromioclavicular joint may appear thickened Imaging X-Ray: acromioclavicular joint arthropathy or osteolysis Ultrasound: capsular hypertrophy/cortical irregularity/ capsular hyperaemia MRI: marrow oedema (acromion or clavicle or both)
			Clinical Sternoclavicular joint Long head of biceps pain Labral tear Post-operative pain Fracture
Other shoulder	Primary shoulder pain that is not included in any of the above diagnostic categories		

Note. ACJ = acromioclavicular joint; MRA = magnetic resonance angiography; MRI = magnetic resonance imaging; ROM = range of motion; RCRP = rotator cuff related pain.

Appendix B

SELF-REPORTED OUTCOME MEASURES

Dimension and outcome measure	Description and psychometric properties
Pain and function dimensions	
Shoulder pain and Disability Index (SPADI)	The Shoulder Pain and Disability Index (SPADI) has been shown to be a valid and reliable measure of shoulder pain and function across a variety of shoulder diagnostic categories (Paul et al., 2004). It consists of 2 subscales based on the domains of pain (5 items) and function (8 items). The sub-scales and total scale are converted to a maximum score of 100, with the higher the score indicating higher levels of pain and reduced function (Dabija et al., 2019; MacDermid et al., 2006)
Central sensitization	
Central Sensitization Inventory (CSI)	The Central Sensitization Inventory (CSI) consists of 2 parts: Part A. consists of 25 questions that are scored on a Likert scale of 0 (never) to 4 (always) to give a total score of 100. Part B. seeks to determine if the patient has been diagnosed by a medical doctor with several disorders that are linked to central sensitisation. Higher scores indicate higher levels of central sensitisation. A cut-off score of 40 has been established as distinguishing patients with central sensitisation (Neblett et al., 2013). The psychometric strength of the CSI has been established in a population with chronic musculoskeletal pain (Mayer et al., 2012) but, to our knowledge, not specifically in patients with shoulder pain
Psychosocial dimensions	
Örebro Musculoskeletal Pain Questionnaire (MSKPQ)	The Örebro Musculoskeletal Pain Questionnaire (MSKPQ) identifies psychosocial factors and risk of future work absenteeism and has been demonstrated to be a reliable tool (Linton & Boersma, 2003). The short-form Örebro MSKP, used in this study, consists of 10 questions. A correlation of 0.91 has been reported between the short form and the original scores. A cut-off score of 50 has been identified for predicting 14 days of accumulated sick leave for people with low back pain (Linton et al., 2011). The questionnaire has been validated for persistent low back and neck pain (Langenfeld et al., 2018). While this PROM has not been formally validated specifically for shoulder pain populations, it has been used as secondary outcomes for such patients (Butera et al., 2020; Warby et al., 2016)
Optimal Screening for Prediction of Outcome (OSPRO)	The 10-item Optimal Screening for Prediction of Outcome (OSPRO) measures the domains of negative mood, fear avoidance and positive affect/coping (Robarts et al., 2021) and is applicable to a variety of musculoskeletal conditions including the shoulder (Lentz et al., 2016). The OSPRO has been reported to be a reliable and valid multidimensional psychosocial assessment tool (Butera et al., 2020)
Brief Resilience Scale (BRS)	The Brief Resilience Scale (BRS) is a reliable measure of assessing resilience, defined as the ability to bounce back from stress. The BRS consists of 6 questions to give a score ranging from 1 to 5 with 1–2.99 indicating low resilience, 3–4.3 normal resilience and 4.31–5 high resilience (Smith et al., 2008)
2-Item Patient Health Questionnaire (PHQ-2)	The 2-item Patient Health Questionnaire (PHQ-2) consists of the first two questions of the original 9 item version and is a measure of depression screening (Kroenke et al., 2003) and is able to detect changes with treatment (Staples et al., 2019). Scores range from 0 to 6 with a score of 3 or greater indicating depression (Kroenke et al., 2003)
2-Item Pain Self-efficacy Questionnaire (PSEQ-2)	The 2-item Pain Self-efficacy Questionnaire (PSEQ-2) is a reliable and valid measure of the ability of a patient to lead a normal life despite pain. It is a shortened version of the original questionnaire consisting of 2 questions measured on a 0 to 6 scale, with 0 not at all confident and 6 completely confident. A cut-off score of 5 or less is thought to indicate that a patient will need help in improving their confidence in functioning with pain (Nicholas, 2007)
Tampa Scale of Kinesiophobia (TSK-11)	The Tampa Scale of Kinesiophobia (TSK-11) has been used to measure fear of movement in patients with shoulder pain (Bot et al., 2005; Mintken et al., 2010) and has demonstrated similar psychometric properties to the original longer version (Woby et al., 2005). The TSK-11 is scored on a 4-point scale from 1 (strongly disagree) to 4 (strongly agree) to give a total score between 11 and 44; the higher the score the higher the fear of movement

Appendix C

BETWEEN-DIAGNOSTIC GROUP COMPARISONS FOR ANALYSES WITH SIGNIFICANT EFFECTS ACROSS GROUPS

Group	Group Mean (95% confidence interval) *p* value				
	Subacromial pain	Instability	Stiff shoulder	ACJ	Other
SPADI-Pain					
Subacromial pain		7.5 (–0.3, 15.2) *p* = 0.066	–9.0 (–18.5, 0.5) *p* = 0.075	0.8 (–9.4, 11.0) *p* = 1.000	–1.1 (–9.8, 7.6) *p* = 1.000
Instability	–7.5 (–15.2, 0.3) *p* = 0.066		–16.5 (–26.8, –6.2) *p* < 0.001	–6.7 (–17.7, 4.3) *p* = 0.865	–18.6 (–18.2, 1.1) *p* = 0.124
Stiff shoulder	9.0 (–0.5, 18.5) *p* = 0.075	16.5 (6.2, 26.8) *p* < *0*.001		9.9 (–2.4, 22.0) *p* = 0.251	7.9 (–3.1, 19.0) *p* = 0.441
ACJ	–0.8 (–11.0, 9.4) *p* = 1.00	6.7 (–4.3, 17.7) *p* = 0.865	–9.9 (–22.0, 2.4) *p* = 0.251		–1.9 (–13.6, 9.8) *p* = 1.000
Other	1.1 (–7.6, -9.8) *p* = 1.00	18.6 (–1.1, 18.2) *p* = 0.124	–7.9 (–19.0, 3.1) *p* = 0.441	1.9 (–9.8, 13.6) *p* = 1.000	
SPADI-Disability*					
Subacromial pain		5.9 (–1.4, 13.2) *p* = 0.217	–17.7 (–27.0, -8,4) *p* < 0.001	4.6 (–4.0, 13.2) *p* = 0.743	–6.0 (–15.8, 3.8) *p* = 0.580
Instability	–5.9 (–13.2, 1.4) *p* = 0.217		–23.6 (–33.2, –14.0) *p* < 0.001	–1.3 (–10.3, 7.8) *p* = 1.000	–11.9 (–22.0, -1.7) *p* = 0.011
Stiff shoulder	17.7 (8.4, 27.0) *p* < 0.001	23.6 (14.0, 33.2) *p* < 0.001		22.3 (11.8, 32.9) *p* < 0.001	11.7 (0.2, 23.2) *p* = 0.044
ACJ	–4.6 (–13.2, 4.0) *p* = 0.743	1.3 (–7.8, 10.3) *p* = 1.000	–22.3 (–32.9, –11.8) *p* < 0.001		–10.6 (–21.7, 0.4) *p* = 0.069
Other	6.0 (–3.8, 15.8) *p* = 0.580	6.0 (–3.8, 15.8) *p* = 0.580	–11.7 (–23.2, -0.2) *p* = 0.044	10.6 (–0.4, 21.7) *p* = 0.069	
SPADI-Total					
Subacromial pain		8.1 (0.1, 16.2) *p* = 0.047	–14.6 (–23.9, –5.3) *p* < 0.001	2.4 (–7.5, 12.4) *p* = 1.000	–6.1 (–15.0, 2.8) *p* = 0.526
Instability	–8.1 (–16.2; –0.1) *p* = 0.047		–22.7 (–33.1, –12.3) *p* < 0.001	–5.7 (–16.6, 5.3) *p* < 0.001	–14.2 (–24.3, –4.2) *p* < 0.001
Stiff shoulder group	14.6 (5.3, 23.9) *p* < 0.001	22.7 (12.3, 33.1) *p* < 0.001		17.0 (5.2, 28.9) *p* < 0.001	8.5 (–2.6, 19.5) *p* = 0.307
ACJ	–2.4 (–12.4, 7.5) *p* = 1.000	5.7 (–5.3, 16.6) *p* = 1.000	–17.0 (–28.9, –5.2) *p* < 0.001		–8.6 (–20.1, 3.0) *p* = 0.375
Other	6.1 (–2.8, 15.0) *p* = 0.526	14.2 (4.2, 24.3) *p* < 0.001	–8.5 (–19.5, 2.6) *p* = 0.307	8.6 (–3.0, 20.1) *p* = 0.375	
OSPRO					
Subacromial pain		1.3 (–2.7, 5.3) *p* = 1.000	–5.1 (–10.9, 0.8) *p* = 0.154	(–4.8, 6.9) *p* = 1.000	–0.1 (–6.0, 2.7) *p* = 1.000
Instability	–1.3 (–5.3, 2.7) *p* = 1.000		–6.4 (–12.6, -0.2) *p* = 0.040	–0.23 (–6.4, 6.0) *p* = 1.000	–1.4 (–7.6, 4.8) *p* = 1.000
Stiff shoulder	5.1 (–0.8, 10.9) *p* = 0.154	6.4 (0.2, 12.6) *p* = 0.040		6.1 (–1.4, 13.6) *p* = 0.624	5.0 (–2.5, 12.5) *p* = 0.624
ACJ	–1.1 (–6.9, 4.8) *p* = 1.000	0.23 (–6.0, 6.4) *p* = 1.000	–6.1 (–13.6, 1.4) *p* = 0.624		–1.2 (–8.7, 6.3) *p* = 0.216
Other	0.1 (–2.7, 6.0) *p* = 1.000	1.4 (–4.8, 7.6) *p* = 1.000	–5.0 (–12.5, 2.5) *p* = 0.624	1.2 (–6.3, 8.7) *p* = 0.216	

Group	Group Mean (95% confidence interval) *p* value				
	Subacromial pain	Instability	Stiff shoulder	ACJ	Other
PSEQ-2**					
Subacromial pain		$p = 1.000$		$p = 1.000$	$p = 0.035$
Instability	$p = 1.000$		$p = 0.480$	$p = 1.000$	$p = 0.345$
Stiff shoulder	$p = 0.060$	$p = 0.480$		$p = 0.265$	$p = 1.000$
ACJ	$p = 1.000$	$p = 1.000$	$p = 0.265$		$p = 0.275$
Other	$p = 0.035$	$p = 0.345$	$p = 1.000$	$p = 0.275$	

Note. ACJ = acromioclavicular joint; OSPRO = Optimal Screening for Prediction of Outcome; PSEQ = Pain Self-efficacy Questionnaire; SPADI = Shoulder Pain and Disability Index.

Post hoc analyses were performed with independent *t*-tests and Bonferroni corrections for SPADI-Pain, SPADI-Total and OSPRO.

* Post hoc analyses were performed with independent *t*-tests and Tamhane T2 corrections due to unequal variance for SPADI-Disability.

** Post hoc analyses were performed with Mann-Whitney U tests with Bonferroni corrections for PSEQ-2 (non-parametric comparison).