Impact of expectations on functional recovery in individuals with chronic shoulder pain

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ABSTRACT

Study Design: Retrospective cohort

Objectives: To examine general expectations for treatment by physical therapists and specific expectations for common interventions in patients with shoulder pain. A secondary objective was to assess the extent to which patients' general and specific expectations for treatment affect clinical outcomes.

Methods: We performed a secondary analysis of data from a clinical trial of interventions for shoulder pain. Prior to beginning treatment for shoulder pain, 140 patients were asked their general expectations of benefit and their specific expectations for individual interventions. Next we examined how these expectations related to the patients' ratings of the success of treatment at one and six months after treatment.

Results: Patients had positive general expectations for treatment by a physical therapist. Specific manual therapy interventions of range of motion and strengthening had the highest proportion of patients who expected these interventions to significantly improve shoulder pain. Seventy-two patients (58%) reported themselves to be improved using the global rating of change (GROC) at one month and six months. In the full model predicting one-month GROC, only the expectation of moderate relief ($p = 0.012$) and body mass index (BMI) ($p = 0.013$) had significant effects. Overall, the Shoulder Pain and Disability Index (SPADI) significantly decreased over time ($p = 0.004$); however, a significant interaction did occur between time and BMI ($p = 0.021$).

Discussion: Patients expect common interventions used by physical therapists to be effective to manage shoulder pain. In conclusion, patients with shoulder pain had high general expectations for physical therapy.

Level of Evidence: Prognosis, level 2b

KEYWORDS

Shoulder pain; patient expectation

Introduction

Literature has demonstrated that clinical outcomes may be influenced by multiple factors including, patient specific factors (gender, education, psychological factors) and additional contextual factors (environment and previous exposure) [1]. A growing body of evidence suggests a link between patient expectation for benefit and outcomes associated with rehabilitation [1–4]. In general, patients reporting to physical therapy (PT) tend to have relatively high expectations for the effectiveness of their treatment [5]. A number of clinical studies have specifically examined expectations for effectiveness and outcomes related to the management of patients with neck pain [3,6], low back pain [2,4,7,8], total joint arthroplasty [9,10], and whiplash associated disorder [11]. Wertli et al. [12] reported that individuals with low back pain (LBP) receiving outpatient physical therapy who had a lower positive treatment expectation were less likely to experience a minimal clinically important difference (MCID) in disability, and there was a similar trend in individuals

with neck pain. In a systematic review by Mondloch et al., positive treatment expectations were associated with improved outcomes [13]. In individuals with shoulder disorders, O'Malley et al. demonstrated a relationship between outcome expectancies and changes in overall shoulder function [14]. The expectations were relative to treatments provided by orthopedic surgeons yet patients with high expectancies for treatment had at least an MCID improvement in function compared to patients with low expectancies [14]. Similar investigations have yet to be performed in a population of individuals with shoulder pain seeking physical therapy services.

Patient expectations have been defined as the belief that a specific outcome will occur and expectations can be further categorized and defined as ideal, normative, unformed or predicted [15]. Ideal expectations are what the individual ideally wants or hopes will occur [15,16]. Normative expectations are defined as what an individual believes should occur and therefore these expectations have the ability to influence outcomes, including patient satisfaction [15,16]. Unformed expectations are those the

individual has not formed or is unable to express [15]. Predicted expectations are what an individual believes might occur and thus these expectations have been measured prior to clinical influence through communication and intervention and are frequently compared to clinical outcomes after intervention [15,16]. Predicted expectations were the focus of this current investigation. The interplay between patient expectations, evidence supported interventions, and the influence and messaging of the clinician can potentially enhance treatment effect and likelihood of a positive response to treatment.

In a recent randomized controlled trial of rehabilitation interventions for shoulder pain, we found that patients who received manipulation and exercise or exercise alone had greater improvement in patient perception of whether change has occurred (global rating of change scale) and disability as measured by the Shoulder Pain and Disability Index (SPADI) at four weeks and six months [17]. The purpose of this secondary analysis was twofold. First, we examined patient expectations for treatment effectiveness of interventions provided by a PT for shoulder pain, then we assessed specific patient expectations for treatment effectiveness of individual interventions utilized by PTs to manage individuals with shoulder pain. Evaluation of these data was performed to further clarify information about general expectations for treatment effectiveness held by individuals prior to initiation of treatment by a PT. Second, we assessed the extent to which patients' expectation of treatment effectiveness impacted the clinical outcomes of individuals enrolled in a clinical trial utilizing a subset of these interventions for individuals with shoulder pain.

Methods

We performed a secondary analysis of data from a randomized clinical trial (NCT01571674) of interventions for patients with shoulder pain.

Participants

Participants with a primary report of shoulder pain (defined as pain between the neck and the elbow at rest or during movement of the arm) were recruited from 1 of 6 physical therapy clinics across the United States (University of Colorado Anschutz Medical Campus, Aurora, CO; University of Colorado Wardenburg Health Center, Boulder, CO; Cherry Creek Wellness Center, Denver, CO; Temple Faculty Physical Therapy Clinic, Temple University, Philadelphia, PA; Northern Navajo Medical Center, Shiprock, NM; and Gundersen Health Sports Medicine Clinic, Onalaska, WI) between March 2012 and March 2014. Inclusion criteria required participants to be between the ages of 18 and 65 years, and have a baseline Shoulder Pain and Disability Index (SPADI) score of 20% or greater.

Participants were excluded if there were any contraindications to manipulative therapy or serious pathology (tumor, fracture, metabolic diseases, rheumatoid arthritis, osteoporosis, history of prolonged steroid use) identified during the physical examination or in the individuals' medical intake form. Specific exclusion criteria included recent trauma to the cervical or thoracic region, acute fracture in the shoulder and/or thoracic region, diagnosis of cervical spinal stenosis, bilateral upper extremity symptoms, prior surgery to the cervical or thoracic spine, adhesive capsulitis, evidence of central nervous system (CNS) involvement (2 or more positive neurologic signs consistent with nerve root compression), or the inability to comply with treatment and follow-up schedule. Institutional Review Boards at each clinic approved the study, and all eligible participants provided informed consent prior to their enrolment in the study.

Measures

All participants completed a demographic survey that included questions about age, gender, employment status, past medical history, mode of onset, number of days since onset, location and nature of the patient's symptoms, aggravating and relieving factors, number of previous episodes of shoulder pain, and treatment for previous episodes.

Participants also completed a modified fear avoidance beliefs questionnaire (FABQ) where the term 'back' was replaced with 'shoulder.' This questionnaire contains two subscales – physical activity and work – and was originally developed for patients with low back pain. Recent work however, has indicated that the FABQ can be used in body regions other than the back, including the shoulder [18,19].

Expectations

At the first visit, we asked patients about their *general* overall expectations of treatment. Specifically, patients responded to a series of questions related to the results they expected from treatment. Possible responses ranged from 'definitely yes' to 'definitely no' using a five-point Likert scale. The questions of general overall expectations included:

- (1) Complete relief from symptoms
- (2) Moderate relief from symptoms
- (3) To do more every day household or yard activities
- (4) To sleep more comfortable
- (5) To go back to my usual job
- (6) To exercise and do more recreational activities
- (7) To prevent future disability

We also asked about *specific* expectations for individual treatments by asking them to consider the following statement: 'I believe _____ will significantly help to improve this episode of my shoulder pain.' Participants

used a 5-point likert scale anchored at one end with 'completely disagree' and at the other with 'completely agree' to rate 10 interventions routinely used to manage shoulder dysfunction: aerobic exercise, manipulation, massage, medication, modalities, range of motion exercises, rest, traction, strengthening exercises, and surgery.

Primary outcomes

Participants completed the global rating of change scale (GROC) to determine whether the intervention was successful from the participant's perspective. This served as the overall measure of how the patient viewed the outcome of their participation in the intervention. The GROC is a 15-point scale anchored at one end with 'very much worse' (−7) and at the other with 'very much improved' (+7). GROC scales are commonly used in clinical research [20]. The scale is recommended for improving the applicability of information from clinical trials to clinical practice [21]. In the current analysis, patients who rated themselves 'quite a bit better' or higher (+5 or greater) were considered to have had a successful intervention. According to Jaeschke et al., a score of +4 (moderately better) is a suggested cut-off to dichotomize improved vs. not improved [22]. In our recent randomized controlled trial of rehabilitation interventions for shoulder pain, we chose to use +5 (quite a bit better) to determine if substantial change had occurred therefore the same convention was utilized in the secondary analysis [17]. These data were analyzed based on response at the four-week and six-month follow-up visits.

Perceived shoulder disability was assessed with the SPADI, a 13-item, self-administered questionnaire consisting of a pain domain with 5 questions and a disability domain with 8 questions. Each section is scored from 0 to 100%, and sections are combined for a total score of 0% (no pain and disability) to 100% (maximum pain and disability). Test–retest reliability of the SPADI has been reported to range from 0.84 to 0.91 and the minimal clinically important difference (MCID) from 8 to 13.2 points [23].

Interventions

The interventions are described in detail elsewhere [17,24]. Briefly, participants in both groups were treated twice weekly for four weeks for a total of eight sessions. Participants were randomly assigned to a package of cervicothoracic manipulation plus thoracic range of motion exercises or an exercise only group (thoracic range of motion) during the first two visits. During visits 3–8, both groups performed the same comprehensive stretching and strengthening exercise program that has been previously described [17,24].

Data analysis

First we determined patients' general expectations of benefit from treatment by a PT as well as their specific

expectations for individual interventions. Consistent with our prior studies [1,3,25], the general expectations, the categories 'definitely' and 'somewhat' were collapsed resulting in three categories of response for each general expectation (yes, neutral, and no).

Similarly, for analyses of specific expectations for an individual intervention, the categories 'completely' and 'somewhat' were collapsed so that there were categories for high (agree), neutral and low expectations (disagree) of benefit from treatment. Proportions (and 95% confidence intervals(CI)) were calculated based on the frequencies of responses for each category within each expectation and the categories ranked. No inferential statistics were performed as we had no *a priori* hypotheses.

Next, we examined how matching the intervention received with the intervention expected to produce benefit would be related to the outcomes of treatment for shoulder pain. For manipulation, 'high' expectations that manipulation would benefit were recoded as 'believe manipulation will help' and neutral and low expectations for manipulation coded as 'do not believe manipulation will help'. For exercise, 'high' expectations for at least two of the three exercise interventions (stretching, strengthening or aerobic) were operationally defined as 'believe exercise will help'. Any other combination of expectations for exercise was coded as 'do not believe exercise will help'.

These new variables were then cross-referenced with the assigned intervention to determine if a patient received an intervention that matched his or her expectation; for example, the patient believed manipulation would help and was assigned to the manipulation + exercise group. This process resulted in 33% of the patients expecting manipulation to help and being assigned to the group receiving manipulation + exercise as the intervention being matched on expectation.

Association of expectations to patients' perception of outcome

We used the GROC reported by patients one month after commencing treatment and also at six months in the first set of analyses. The time points were chosen to be consistent with our prior studies of the influence of expectations on outcomes [2,3,25]. We used multivariate logistic regression to test the association among successful outcome using the GROC (dependent variable) and intervention received, intervention matched to specific expectation and the general expectation of pain relief from physical therapy (independent variables). We used a hybrid process of purposeful and theoretical model building strategies to choose covariate variables. We chose to include variables with a univariate association at the liberal $p < 0.1$ level to ensure that potential contributing variables were not overlooked. Associations were assessed between GROC and demographic,

psychological, expectation and intervention variables using chi-squares, *t*-tests, Mann–Whitney U as appropriate. Each model also included age, gender, race, duration of symptoms and body mass index (BMI). These variables were included based on reported stereotypic attributions of pain sensitivity based on sex, race, age, and BMI [26,27]. We also included variables with univariate associations with the GROC.

Association of expectations to changes in disability

We also performed a mixed model analysis of co-variance with a repeated factor – time (baseline, one month, six month). Self-report of disability from shoulder pain was the dependent variable. Between subjects factors were intervention and expectation for benefit. The same model building strategy was used as indicated above; i.e. gender, duration of symptoms, and body mass index (BMI) were added, in addition to any variables found to have correlations (Pearsons, Spearmans rho or bi-serial depending on the underlying distribution) with SPADI score at one or six months post treatment. All two-way interactions were added to the model. Any significant effects were decomposed using *t*-tests and Bonferroni corrections. Sphericity was assessed with Mauchly's Test.

The original trial randomly assigned patients using concealed allocation and blind assessors collected outcome data. We also followed intent-to-treat principals and used maximum likelihood estimation to account for missing data. These data were used in the current analysis. All data were analyzed using IBM SPSS Statistics for Windows (Version 24.0. Armonk, NY: IBM Corp).

Results

One hundred forty patients (mean $\pm$ SD age, 42.7 $\pm$ 12.4; 54.3% female), were enrolled in the primary study. Seventy patients were randomly assigned to receive manipulation and exercise, and 70 patients were randomly assigned to receive exercise only. One hundred twenty participants completed the assessments at 1 month and 113 participants (81.4%) completed follow-up at 6 months. No statistical differences in demographic variables and baseline outcome measures were identified between groups as shown in Table 1.

Patient expectations

Generally, patients had positive expectations for treatment by a PT with more than 47% (95%CI 39, 56) of patients expecting to have complete relief and 89% (95%CI 83, 94) expecting moderate relief of symptoms as shown in Table 2. In addition, patients expected to have the ability to do more exercise (90%; 95%CI 84, 94) work activities (87%; 95%CI 80, 92) and household activity (82%; 95%CI 75, 88) as well as get more sleep (90%; 95%CI 84, 94) and prevent disability (86%; 95%CI 80, 91).

The specific expectations of significant improvement in pain for the individual interventions are summarized in Figure 1. The exercise interventions of range of motion (89%; 95%CI 83, 94) and strengthening (86%; 95%CI 79, 91) had the highest proportion of patients expecting these interventions to significantly improve shoulder pain. These were followed by massage (75%; 95%CI 66, 82) and manipulation (64%; 95%CI 55, 72). Less than half the patients expected rest, medication, aerobic exercise,

Table 1. Baseline Demographic and Self-Reported Variables for treatment groups.

	All participants (n = 140)	Manipulation group (n = 70)	Manipulation + Exercise group (n = 70)
Age	42.7 (12.4)	40.5 (11.6)	44.8 (12.9)
Gender (female)	76 (54.3%)	40 (57.1%)	36 (51.4%)
Weeks since onset	122.7 (249.8)	130.7 (268.1)	114.2 (230.6)
Medication use for shoulder pain	87 (62.1%)	44 (62.9%)	43 (61.4%)
FABQPA	14.1 (5.1)	13.4 (5.1)	14.8 (5.0)
FABQW	8.9 (9.6)	8.4 (9.0)	9.4 (10.2)

Notes: FABQPA = Fear-Avoidance Beliefs Physical Activity Subscale (range 0–24); FABQW = Fear-Avoidance Beliefs Work Subscale (range 0–42); n = sample size; SD = standard deviation.

Table 2. Proportions of participants responding to the question, 'What do you expect from treatment?' Values represent the proportion and 95% confidence interval around that proportion.

	Agree	Neutral	Disagree
Complete relief from symptoms	47.1 (39,56)	34.5 (26,45)	18 (12,27)
Moderate relief from symptoms	89.7 (83,94)	10.3 (6,17)	0.0 (0,3)
To do more every day household or yard activities	82.1 (75,88)	13.8 (9,21)	4.1 (2,9)
To sleep more comfortable	90.0 (84,94)	9.0 (5,15)	1.0 (0,5)
To go back to my usual job	87.7 (80,92)	10.8 (7,18)	1.5 (0,6)
To exercise and do more recreational activities	90.4 (84,94)	8.1 (4,14)	1.5 (0,6)
To prevent future disability	86.3 (80,91)	10.1 (6,17)	2.1 (1,6)

Figure 1. Participants' expectations for benefit from specific interventions. ROM –range of motion or flexibility exercises.

Table 3. Parameter estimates for the model predicting self-reported improvement using global rating of change at 4-weeks post intervention (Nagelkerke $R^2 = 0.165$).

Parameter	<i>B</i>	Std. Error	<i>p</i>	<i>e^B</i>	95% CI	
					Lower	Upper
Body mass index	0.10	0.04	0.018	1.10	1.02	1.19
Moderate relief – neutral	2.06	0.84	0.014	7.87	1.51	41.02
Female (vs. male)	0.21	0.54	0.696	1.23	0.43	3.55
Manipulation (vs. exercise)	−0.49	0.52	0.347	0.61	0.22	1.67
Age	0.01	0.02	0.620	1.01	0.97	1.06
Days since onset	<0.0001	0.0001	0.982	1.00	1.00	1.00

Table 4. Parameter estimates for the model predicting self-reported improvement using global rating of change at six months post intervention (Nagelkerke $R^2 = 0.140$).

Parameter	<i>B</i>	Std. Error	<i>p</i>	<i>e^B</i>	95% CI	
					Lower	Upper
Moderate relief (neutral vs agree)	1.56	0.79	0.050	4.75	1.00	22.51
Female (vs. male)	−0.20	0.44	0.637	0.82	0.34	1.93
Manipulation (vs. exercise)	0.65	0.64	0.314	1.92	0.55	6.76
Age	−0.01	0.02	0.547	0.99	0.95	1.03
Body mass index	0.03	0.03	0.381	1.03	0.96	1.10
Days since onset	>0.001	0.0001	0.073	1.00	1.00	1.00
Expected manipulation to help and received manipulation	0.20	0.68	0.760	1.23	0.33	4.62

or modalities to result in significant improvement and few thought surgery would improve their shoulder pain (12%; 95%CI 7, 19).

Effect of expectation on outcome – patient rating of improvement

Seventy-two patients (58%) reported themselves to be improved using the GROC at one month. Only the expectation of moderate relief and the type of intervention had univariate associations with the one-month GROC. In the full model, having neutral expectations of moderate

relief significantly increased the odds of rating oneself improved compared to having high expectations (OR 7.87, 95%CI 1.51, 41.02; $p = 0.012$). The effect for intervention was not significant. Among the covariates, only BMI (OR 1.10, 95%CI 1.02, 1.19; $p = 0.018$) had a significant effect (Table 3). In this case, increasing BMI was associated with better odds of patients rating themselves improved.

The proportion of patients rating themselves improved at six months remained unchanged (58%). Similar to the one-month rating, expectation of moderate relief and the type of intervention were associated with the six-month GROC rating. In addition, there was

an association between expecting manipulation to help and receiving manipulation and the six-month GROC rating. In the full model, only the expectation of moderate relief (OR 4.75 95%CI 1.00, 22.51; $p = 0.05$) remained a significant predictor of reporting improvement at six months (Table 4). Similar to the results at one month having neutral expectations increased the odds of rating as improved. Neither the type of intervention nor matching intervention to the expectation of benefit from that intervention were significant. No covariates were significant predictors.

Effect of expectation on outcome – self-report of disability

Significant univariate associations were noted between several variables and SPADI scores (Table 5). Age and FABQ-W were positively correlated with disability at each time point. BMI was positively associated with disability at one month, and the expectation for complete relief was positively associated with disability at baseline and one month. These variables were added to the ANCOVA model examining differences in SPADI over time.

Mauchley's test was significant suggesting violation of the sphericity assumption. Violation of sphericity is when the variances of the *differences* between all combinations of related groups are not equal. Sphericity can be thought of as the homogeneity of variances in a between-subjects analysis. Consequently, the most stringent criterion (lower bound) was used to correct degrees of freedom for the F -test. In general, SPADI decreased over time ($F_{1, 108} = 8.72, \eta^2 = 0.11, p = 0.004$) with a significant change from baseline to one month as shown in Table 6. The six-month SPADI remained significantly different from baseline but was not different from one month. No significant interactions were noted with type of intervention or for expectations of general recovery (Table 7). However, a significant interaction did occur between time and BMI ($F_{1, 108} = 5.78, \eta^2 = 0.05, p = 0.021$). This interaction suggests that the effect of BMI differed

at least at one assessment point. Follow-up analysis suggested that each unit increase in BMI increased the SPADI score by 0.67 points at one-month follow-up ($t = 2.46, p = 0.016$).

Significant main effects were found for age ($F_{1, 108} = 7.28, \eta^2 = 0.07, p = 0.008$), fear avoidance beliefs ($F_{1, 108} = 16.5, \eta^2 = 0.15, p < 0.0001$), and general expectations for complete relief ($F_{1, 108} = 5.12, \eta^2 = 0.08, p = 0.008$). In general, increased age was associated with increased SPADI score, as was FABQ-W score. For the main effect of general expectations, patients with neutral expectations had lower levels of disability at all evaluation time periods.

Discussion

The primary findings from these analyses were (1) a large proportion of patients with shoulder pain enrolled in a randomized clinical trial expected complete or moderate relief from treatment by a PT, (2) those with neutral expectations for moderate relief had higher odds of rating themselves improved compared to those with high expectations for moderated relief, (3) patients expected manual therapy and exercise to be beneficial for their episode of shoulder pain, and (4) increased age, BMI and FABQ-W score were associated with an increase in SPADI score while neutral expectation was associated with the lowest overall SPADI score.

First, patients reported positive *general* expectations for treatment by a PT with 45% of patients expecting to have complete relief and 89% expecting moderate relief of symptoms. Generally, patients had high expectations for their recovery including return to exercise, work, and household activity as well as expectation for improved sleep and less disability. Less than 50% of patients had an overall expectation for complete relief of symptoms and in this subset of individuals with shoulder pain, the average duration of symptoms was 122.7 weeks (± 249.8). According to Myers and colleagues, patients are a good judge of their individual illness and expected

Table 5. Univariate associations (Point Biserial or Pearson correlations) of independent variables and SPADI total score at four weeks and six months.

	4 week	6 month
Age	0.179*	0.193*
FABQ – Work	0.340**	0.214*
FABQ – PA	0.055	0.081
Days_since_onset	0.138	0.069
Complete relief	0.291**	0.082
Moderate Relief	0.011	–0.137
Body mass index	0.251**	0.062
Point Biserial correlations		
Intervention	–0.187*	–0.119
Expected manipulation to help and received manipulation	–0.054	–0.118
Sex	0.012	–0.098

Notes: FABQ-Work: fear avoidance beliefs questionnaire, work subscale.
 FABQ-PA: fear avoidance beliefs questionnaire, physical activity subscale.
 *significantly correlated at $p = 0.05$; **significantly correlated at $p = 0.01$.

improvement of such [4]. Therefore, it may be feasible that individuals with a more chronic presentation may have overall lower expectations or more 'realistic' expectations for their recovery as evidenced by less than half of the individuals reporting an expectation of complete relief.

Expectations for moderate relief were significant predictors of participants' rating of change at both four weeks and six months. In this case, those with neutral expectations had higher odds of rating themselves to be improved. This was counter to our hypotheses, as we had expected those with high expectations of recovery to have the better odds. We believe this effect was the result of lower disability reported by participants with neutral expectations at baseline and across each assessment period. In our opinion, patients presenting with chronic musculoskeletal pain may report overall lower disability and a more neutral expectation for improvement which may result from individuals being accustomed to their chronicity. However, consistent with findings from other studies, the benefit of care is high and individuals pursuing a treatment generally do so because they are hopeful about recovery [28,29].

Specific expectations were high that range of motion (89%) and strengthening (86%) would significantly improve shoulder symptoms. Overall, a large proportion of individuals expected exercise in general to improve their outcome. A study by Marszalek et al. looking at knee osteoarthritis and exercise engagement found

that higher outcome expectations for exercise were associated with higher self-efficacy but not necessarily outcome [30]. Expectations of range of motion and strengthening were followed by massage (75%) and manipulation (64%). Conversely, less than half the patients expected rest, medication, aerobic exercise or modalities to significantly improve their symptoms. Less than 10% of patients expected surgery to improve their shoulder symptoms. This finding is also consistent with our other work [3,25].

Not included in the analysis but an interesting point of discussion is how patients with shoulder pain had similar general and treatment *specific* expectations when compared to patients with neck and back pain. In patients with neck pain (in descending order of frequency), the expectations were that massage, manipulation, strengthening and range of motion exercises would improve their neck pain [3]. In patients with low back pain (in descending order of frequency) the expectations were that strengthening, range of motion exercises, massage and aerobic activity followed by manipulation would improve their episode of low back pain [25]. Combined, these findings indicate that patients seeking care from PTs for the treatment of neck or shoulder pain expect that interventions will be effective.

When looking further at *specific* expectations compared to other body regions, the frequency of individuals with neck pain vs. shoulder pain expecting strengthening to be beneficial was 70 and 86%, respectively.[3,17] An inverse relationship was noted for the expectation of ROM which was reported to be 54% for individuals with neck pain and 89% for individuals with shoulder pain [3,17]. For manipulation, 75% of patients with neck pain thought it would improve their symptoms, compared to 60% for individuals with low back pain and 64% for individuals with shoulder pain [3,17,25]. Patients across all three body regions had similar expectation regarding the benefit of surgery as a treatment.

Table 6. SPADI scores by intervention group. Values are presented as mean (standard error). No statistical differences were identified at any time point controlling for body mass index (26.7 kg.m⁻¹), Age (42 years), SPADI baseline (34.1270), and fear avoidance beliefs work scale at baseline (8.93).

	Baseline	4-wk	6-mth
SMT	42.94 (1.28)	21.56 (1.59)	19.19 (2.35)
Exercise	41.54 (1.39)	22.85 (1.72)	20.87 (2.55)

Table 7. Summary table of the repeated-measures analysis of co-variance examining changes in self-reported disability over six months.

Source	df	F	p-value	Partial Eta ²	Observed Power
Time	1	8.72	0.004	0.11	0.944
Time × Body mass index	1	5.78	0.027	0.05	0.604
Expectation	2	5.12	0.008	0.08	0.779
Age	1	7.28	0.008	0.07	0.795
FABQ-Work	1	16.50	<0.001	0.15	0.991
Time × Intervention	1	0.41	0.523	0.004	0.097
Time × Expectation	2	1.358	0.261	0.025	0.287
Time × Age	1	2.661	0.106	0.024	0.366
Time × FABQ-Work	1	1.165	0.283	0.011	0.188
Time × Days since onset	1	3.137	0.079	0.028	0.419
Intervention	1	0.812	0.37	0.007	0.145
Body mass index	1	2.513	0.116	0.023	0.349
Days since onset	1	0.331	0.566	0.003	0.088
Error	108				

Notes: df: degrees of freedom.

FABQ-Work: Fear avoidance beliefs questionnaire, work subscale.

Expectation: Expectations for complete relief.

A certain degree of pre-existing disparity of expectations may exist between the clinician and the patient which may further complicate the ability to meet patient expectations. The type of message the clinician conveys to their patient within session may actually alter the patient's expectations of their treatment effectiveness [31,32]. In individuals with shoulder pain who received thoracic manipulation, positive messaging related to the intervention resulted in significant improvement in expectation of treatment outcomes, even though patient reported disability did not improve [32]. In the present study, messaging was kept neutral. However, patient expectations may be more dynamic and require more than an alternation in clinician messaging in a single treatment session [33]. Educating patients to align their expectations may result in a change in overall expectation of outcome, however, this has not been explored extensively.

Our results showed most patients had high expectations for recovery. When comparing our findings of *general* expectations to individuals with low back and neck pain, there are both similarities and differences. Eighty percent of individuals with neck pain expected moderate or greater relief of symptoms compared to 88% of individuals with low back pain and 89% of individuals with shoulder pain [3,25]. We interpret this to mean that the vast majority of individuals expect that physical therapy will provide an improvement in pain and disability. However, in individuals with low back, the expectation of complete relief was much higher at 80% compared to only 45% in individuals with shoulder pain which is similar to the expectation in individuals with neck pain (57%) [3,17,25]. This difference may be accounted for by the chronicity of symptoms of the individuals in our study (>2 years vs. ~2 months in the neck and back pain studies). Another consistent finding among patients with shoulder, neck, or low back pain was over 80% of patients expected to do more activity, exercise more, and sleep better [3,25]. Individuals with shoulder pain had the highest expectation of returning to their usual job (87%) compared to patients with neck pain (69%) and low back pain (62%) [2,3,25].

When comparing our results to previous work on patient expectations with regard to neck [3] and low back pain [25], fewer patients expect complete recovery from shoulder pain than they do from low back or neck pain. A recent study by Skatteboe et al. compared differences in expectations regarding pain and disability between individuals with neck/low back pain and shoulder pain before and after a physical medicine and rehabilitation consultation. The study found patients with shoulder complaints had a higher level of overall optimism compared to individuals with neck/low back pain [29].

In a systematic review of patients' expectations of the benefits and harms of treatments, screening, and tests, Hoffmann et al. reported that patients overestimate intervention benefit and underestimate harm [34].

Similarly, Waljee et al. reported that patients' perceptions of both disease conditions and surgery tend to be inaccurate and an 'expectancy-discrepancy' may be at play, impacting an individual's ability to evaluate an event [35]. In the present study, patients' may have overestimated the benefit of the interventions. While this may have impacted our outcomes, optimistic expectations may be useful for meeting patient psychological needs including hope, safety, and reassurance [36]. If providers have the ability to harness patient optimism, align patient/provider goals, engage in shared decision-making, and facilitate realistic expectations, we may further observe improvement in patient reported outcomes. Overall, both the similarities and differences in results across body regions leave the authors questioning the interplay of potential characteristics which influence patient expectation. According to Kongsted and colleagues, other, unmeasured and potentially unknown contextual factors including self-efficacy, previous health care experiences, personality and psychological traits could contribute to and affect expectations [37].

Another theme that arose from our analysis was related to the positive associations among age, FABQ-W and disability (as measured by the SPADI) at each time point. The relationship between fear avoidance behavior and disability is well described in the literature and a positive correlation between fear and disability has been reported in low back pain [2,38,39], neck pain [40] as well as shoulder pain [18]. Additionally, younger age has been reported as a predictor of greater improvement in disability in individuals with shoulder problems which is consistent with our findings [41,42].

An additional finding in our data included a relationship between BMI and disability (higher BMI predicted greater disability). According to a longitudinal study on physical exercise, BMI and risk of chronic pain in an adult population, high BMI (overweight BMI 25–29.9 and obese (BMI ≥ 30) and physical inactivity (no activity or less than 1 exercise session per week) are associated with an increased risk of chronic pain in the low back, neck, and shoulders [43]. However, in our analysis, the influence of BMI was only significant at one month so it is possible this was a spurious finding.

As PTs, we have the challenging task of examining and treating musculoskeletal health conditions which impair patient function and overall participation thus impacting quality of living. We may need to adjust the expectations of our patients to have more realistic goals and expectations for their treatments. Expectations may be influenced by the clinician but according to Sherman and colleagues, our influence on formation of expectation occurs over time and is not just isolated to a single within session experience [33,44]. According to Rossi et al., patient improvement is an 'expectation game,' therefore, clinicians may need to look beyond how patient expectation influences patient reported outcome measures [45].

Limitations of this analysis are that the results are only generalizable to individuals with shoulder pain and not other musculoskeletal conditions. Additionally, the retrospective nature of the analysis may impact the external validity of the conclusions drawn from this type of secondary analysis. Also, our models predicting perceived recovery indicated only modest fit at the individual level suggesting other factors than those used in our study are also influential on predicting this perception. Finally, the patient population included in the prospective study we conducted [17] was chronic in nature with a high average duration of symptoms (122.7 weeks $\pm$ 249.8) which could have ultimately affected the results and generalizability. It is possible that the results could have been different in a more acute population of individuals with shoulder pain.

Conclusion

In conclusion, patients with shoulder pain had high general expectations for physical therapy. Most patients had the expectation that manual therapy (massage and manipulation) and exercise (ROM and strengthening) would be beneficial treatments for shoulder pain. We did not, however, find associations between outcomes and matching specific interventions with these specific patient expectations for these treatments. Further research is needed in this area.

IRB oversight

All participants in the primary trial completed the informed consent process and provided written consent.

Disclosure statement

We affirm that we have no financial affiliation (including research funding) or involvement with any commercial organization that has a direct financial interest in any matter included in this manuscript, except as disclosed in an attachment and cited in the manuscript. Any other conflict of interest (i.e. personal associations or involvement as a director, officer, or expert witness) is also disclosed in an attachment.

Funding

This work was supported by the Orthopaedic Section of the American Physical Therapy Association.

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