Importance of Outcome Domain for Patients With Musculoskeletal Pain: Characterizing Subgroups and Their Response to Treatment

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Background. Patient-centered care models allow for the ability to tailor treatment to outcomes of importance to patients.

Objective. The purposes of this study were to (1) define patient subgroups based on outcomes of importance; (2) determine whether patient subgroups based on outcomes of importance differed in demographic, clinical, and psychological measures; and (3) determine whether outcome domain subgroups differed in treatment responses.

Design. This was a prospective, longitudinal observational study.

Methods. This was a secondary analysis of the Optimal Screening for Prediction of Referral and Outcome study. Patients in the development phase completed the Patient Centered Outcome Questionnaire (PCOQ) and questionnaires related to negative mood, fear avoidance, and positive coping, as well as region-specific questionnaires. Patients in the validation cohort completed the PCOQ, measures of treatment satisfaction and region-specific questionnaires at 4 weeks, 6 months, and 1 year. A hierarchical agglomerative cluster analysis identified profiles based on importance outcomes as determined by the PCOQ. Analysis of variance and chi-squared assessed baseline subgroup differences in demographics, psychological factors, and clinical outcomes. Repeated-measure analysis of variance considered subgroup differences in outcomes longitudinally.

Results. Cluster analysis identified 3 subgroups: (1) “Multiple Outcome Domains Important” subgroup characterized by high importance attached to improvement in all domains, (2) “Pain and Function Outcomes Important” subgroup characterized by high importance attached to improvement in pain and interference, and (3) “Pain Important” subgroup characterized by greatest importance attached to improvement in pain.

Limitations. Our sample included patients from outpatient physical therapy and may not be representative of patients in other settings.

Conclusion. Patients can be characterized by the importance attached to improvement in outcome domains. The identified subgroups differed in baseline measures as well as response to treatment.
Importance of Outcomes in Patients With Pain

Nearly one-third of individuals in the United States develop chronic pain, with annual costs exceeding those of cancer, heart disease, and diabetes. Despite advances in medical technology, the burden of chronic pain is not lessening, and pharmacological approaches and specifically opioid prescription have increased in well-intentioned efforts to manage chronic pain. However, these approaches have not only been ineffective but also carry risks, including addiction and death. Currently, nonpharmacological approaches are recommended as the initial treatment option for chronic pain. While inarguably safer than opioids, nonpharmacological treatment approaches have limitations as individual interventions have small to moderate effect sizes. A patient-centered delivery system focused on mutuality or shared decision-making may represent an effective nonpharmacological intervention for individuals experiencing pain by increasing treatment effects and maximizing outcomes through active patient involvement.

Patient-centered care is an integral part of a biopsychosocial approach to treatment accounting for the patient's perspectives as the centerpiece in clinical decision-making. Both the practitioner and the patient are active participants in directing treatment in patient-centered care, contrasting the traditional model in which patients are expected to rely on the practitioner to drive the treatment decision-making. Patient-centered care focuses on “informed choice” rather than the conventional practice of informed consent and, when applied in such a manner, is associated with a number of positive outcomes, including improved patient knowledge and decision-making, overall satisfaction with care, and quality of life. Subsequently, a patient-centered approach to nonpharmacological pain management could result in larger treatment effects than have been observed to date from clinical trials.

Patient-centered care models include consideration of the patient's goals for treatment; however, health care providers do not consistently follow these models. Historically, practitioners have often assumed patient goals for treatment are similar. However, many patients may have individualized preferences for treatment outcomes. For example, patients with low back pain who sought physical therapist intervention endorsed goals in both physical and psychological outcome domains, and their specified recovery goals were not related to conventional rehabilitation treatment targets such as pain, strength, and range of motion. Subsequently, traditional clinical outcome measures often favored by health care practitioners may not align with outcomes of importance to the patient. The traditional, one-size-fits-all approach to clinical outcomes is not ideal for personalizing treatment to specific outcomes valued by the patient. Subsequently, a better understanding of characterizing patients by outcome domains of importance may further inform the clinical decision-making process for delivering patient-centered care.

The objective of this secondary analysis of patients seeking outpatient physical therapy care for musculoskeletal pain was threefold: (1) to define patient subgroups based on importance of improvement for selected outcome domains; (2) to determine whether outcome domain subgroups differed in key demographic, clinical, and psychological measures; and (3) to determine whether these subgroups differed in treatment outcomes from a physical therapy episode.

Methods

This was a secondary analysis involving participants from the development phase (cross-sectional) and validation phase (longitudinal) of the Optimal Screening for Referral and Outcome (OSPRO) cohort study. The OSPRO cohort study is a specific project within the Orthopaedic Physical Therapy Investigative Network designed to develop standardized tools to assist physical therapists in clinical assessments. The OSPRO cohort study was approved by the University of Florida Human Subjects Institutional Review Board (IRB-01), and all participants provided informed consent to participate in the study.

A convenience sample was recruited from patients with complaints of neck, shoulder, low back, or knee pain seeking care from outpatient physical therapist clinics, including 330 individuals from the development phase and 440 participants recruited from the validation phase. The OSPRO development cohort was recruited from 3 outpatient physical therapy clinics in the University of Florida Health system in Gainesville, Florida, and 8 outpatient physical therapy clinics in the Brooks Rehabilitation health system in Jacksonville, Florida. Sites were selected to represent different socioeconomic strata as well as urban and rural communities. The OSPRO validation was recruited from 9 outpatient physical therapy clinics representing multiple health systems from the Mideast, Southeast, Great Lakes, Rocky Mountain states, and Far West regions of the United States. The development and validation phases used the same inclusion criteria. Inclusion criteria included patients: (1) aged between 18 and 70 years old, (2) seeking outpatient physical therapy for musculoskeletal pain, and (3) able to read and understand the English language. Exclusion criteria were patients: (1) diagnosed with a chronic pain syndrome (eg, fibromyalgia or Crohn Disease), (2) who had neuropathic pain syndrome (eg, complex regional pain syndrome), (3) with psychiatric history (either under the care of a mental health provider or using psychiatric prescriptions), (4) who had active cancer, and (5) with neurological disorders (eg, Parkinson’s or spinal cord injury).
At the initial intake physical therapist session, patients completed a demographic questionnaire that included age, sex, race, ethnicity, employment, whether in litigation due to current situation, marital status, educational level, insurance provider, self-reported health status, and surgical history. Additionally, patients were instructed to complete questions on historical data based on current symptoms. These questions included symptom duration, anatomical location of pain, symptom onset, previous treatment intervention, and number of prior incidents of pain.

Patients completed the Patient Centered Outcome Questionnaire (PCOQ) (Appendix). The PCOQ is a 5-item questionnaire. Separate 101-point numeric rating scales (NRS) from 0 = none to 100 = worst imaginable assess usual, desired, successful, and expected levels of pain, fatigue, emotional distress, and interference. A 101-point NRS (0 = not at all important to 100 = most important) assesses the importance of improvement in each domain.26 The PCOQ has shown sufficient test-retest reliability over a 48-hour period with correlation coefficients of 0.84 to 0.90 for usual levels of pain, fatigue, distress, and interference with daily activities, as well as 0.62 to 0.82 for importance ratings for pain, emotional distress, and interference.27,28 Additionally, the PCOQ has demonstrated good concurrent validity with measures associated with pain and disability, including visual analog scale measures of pain intensity (r = 0.52–0.78) and pain unpleasantness (r = 0.64–0.73) as well as the Pain Disability Index (r = 0.75) and Roland Disability Questionnaire (r = 0.69).27,28

Patients in the developmental phase completed well-established and commonly used questionnaires related to depression (Patient Health Questionnaire [PHQ-9]), fear of movement (Fear Avoidance Belief Questionnaire [FABQ]), Tampa Scale of Kinesiophobia [TSK-11], Pain Catastrophizing Scale [PCS], anxiety (Pain Anxiety Symptom Scale [PASS]), pain and rehabilitation self-efficacy (Pain Self Efficacy Questionnaire [PSE], Self-efficacy for Rehabilitation Outcome Scale [RSE]), and anger (State-Trait Anger Expression Inventory [STAXI]) as well as region specific questionnaires (ie, Oswestry Disability Index: low back; Neck Disability Index: cervical spine; Quick Disability of Arm Shoulder and Hand: shoulder; and International Knee Documentation Committee Subjective Knee Form: knee). Patients in the validation (longitudinal) cohort completed the same associated region-specific disability questionnaires (Tab. 1).

Patients in the validation phase completed follow-up at 4 weeks, 6 months, and 1 year that included the same questionnaires. Furthermore, satisfaction with treatment was assessed at 6 months and 1 year through the following questions: (1) “If you had to spend the rest of your life with the symptoms you have right now, how would you feel about it?” (1, very dissatisfied to 5, very satisfied); (2) “Would you have the same physical therapy treatment again if you had the same condition?” (1, definitely not to 5, definitely yes); and (3) “How would you rate the overall results of your physical therapy treatment?” (1, terrible to 6, excellent).26 The first question is suggested to reflect satisfaction with treatment outcomes while the latter 2 questions reflect satisfaction with the treatment process.27

All initial and follow-up data collection occurred online and was deidentified. All responses were self-report and completed electronically in a web-based electronic records database (REDCap; Vanderbilt University, Nashville, TN, USA) by the patients.

Data Analysis
All data analyses were performed using SPSS, version 24.0 (IBM Corp, Armonk, NY, USA).

Identification and Characterization of Domain Importance Subgroups
Cluster analysis is a statistical approach allowing categorization of individuals into distinct groups. We conducted an exploratory hierarchical agglomerative cluster analysis using Ward clustering method and squared Euclidean distances to identify unique subgroups based on outcome domains of importance as identified by the PCOQ from the development phase of the OSPRO study. The cluster solution was identified based on statistical and theoretical criteria informed by our prior studies of the PCOQ.23,26 We examined the resultant dendrogram and schedule of agglomeration coefficients to determine the optimal solution between 2 and 4 clusters based on percent change between cluster solutions as well as the plot characteristics. Once the number of clusters was identified, we performed a one-way analysis of variance (ANOVA) with Bonferroni post hoc correction to descriptively identify the composition of the cluster groups from the domains of importance.

ANOVA models for continuous measures and chi-squared levels for categorical measures were used to assess subgroup-related baseline differences in demographic factors, type of medical insurance, psychological factors, expectations for treatment, success criteria for treatment, and usual levels of pain, fatigue, emotional distress, and interference.

Cluster Validation Across Samples
There are several ways statistically to determine the validity of a cluster solution when only 1 sample is available (eg, holdout, k-fold, or leave-one-out cross validation methods).29 For this study, we had access to 2 independent samples and had an a priori plan to reproduce cluster solutions across these 2 separate samples. Subsequently, we performed the same cluster analysis for PCOQ outcome domains of importance for the
Table 1. Outcome Measures Questionnaires Completed in the Developmental Phase

| Questionnaires                                   | Description                                                                 | Scale                      | Reliability               |
|--------------------------------------------------|-----------------------------------------------------------------------------|----------------------------|---------------------------|
| Negative mood questionnaires                     |                                                                             |                            |                           |
| Patient Health Questionnaire                      | Assesses level of depressive symptoms                                        | 0–27 (Higher scores signify increased depressive symptoms) | α = 0.84<sup>29</sup>     |
| State-Trait Anger Expression Inventory            | Assesses level of anxiety symptoms                                           | 20–80 (Higher scores signify increased anxiety levels) | α > 0.89<sup>30,31</sup> ICC = 0.86 to 0.95<sup>31,32</sup> |
| Fear avoidance questionnaires                     |                                                                             |                            |                           |
| Fear-Avoidance Belief Questionnaire               | Assesses level of fear-avoidance beliefs                                     | 0–24: FABQ-PA 0–42: FABQ-W (Higher scores signify increased fear avoidance beliefs in both subscales) | FABQ-PA α = 0.70<sup>33</sup> ICC = 0.77<sup>34</sup> FABQ-W α = 0.88<sup>33</sup> ICC = 0.90<sup>14</sup> |
| Tampa Scale of Kinesiophobia                      | Assesses level of pain-related fear of movement                              | 11 items (Higher scores signify increased pain-related fear of movement and fear of injury) | α = 0.79<sup>35</sup> ICC = 0.81<sup>35</sup> |
| Pain Catastrophizing Scale                        | Assesses pain catastrophizing ("an exaggerated orientation towards pain") | 13 items (Higher scores signify higher levels of pain catastrophizing) | α = 0.87<sup>36</sup> ICC = 0.93<sup>37</sup> |
| Pain anxiety Symptoms Scale                       | Assesses pain-related anxiety                                                | 20 items (Higher scores signify increased levels of pain-related anxiety) | α = 0.91<sup>38,39</sup> |
| Positive affect/coping questionnaires             |                                                                             |                            |                           |
| Pain Self-Efficacy Questionnaire                  | Assesses strength and generality of patient’s beliefs about their ability to accomplish activities despite pain | 10 items (Higher scores signify stronger self-efficacy beliefs) | α = 0.93<sup>40</sup>     |
| Self-Efficacy for Rehabilitation Outcome Scale   | Assesses self-efficacy associated with performing various rehabilitation tasks | 12 items (Higher scores signify higher elevated levels of self-efficacy during rehabilitation) | α = 0.94<sup>41</sup>     |
| Region-specific disability questionnaires         |                                                                             |                            |                           |
| Oswestry Disability Index                         | Assesses low back dysfunction on individual’s pain and functional activities  | 10 items 6-point rating scale (Higher scores increased low back dysfunction) | α = 0.71–0.83<sup>42,43</sup> ICC = 0.84–0.91<sup>44–48</sup> |
| Neck Disability Index                             | Assesses disability in patients with neck pain                              | 10 items 6-point rating scale (Higher scores related to greater neck disability) | α = 0.80<sup>49</sup> ICC = 0.50<sup>49</sup> |
| Quick Disability of Arm Shoulder and Hand         | Assesses ability of individuals to perform upper extremity activities        | 11 items 5-point rating scale (Higher scores signify greater level of upper extremity disability) | α = 0.92<sup>51</sup> ICC ≥ 0.94<sup>51</sup> |
| International Knee Documentation Committee         | Assesses an individual’s knee function                                       | 18 items (Higher scores signify increased knee function) | ICC = 0.94<sup>53,54</sup> |
Table 2.
Characteristics of Clusters Derived From OSPRO Developmental Study

| Characteristic                  | OSPRO Developmental Study (n = 330) | Cluster 1: PFI (n = 93) | Cluster 2: MDI (n = 155) | Cluster 3: PI (n = 82) |
|--------------------------------|-------------------------------------|------------------------|-------------------------|------------------------|
|                                | Mean ± (SD)                          | Mean ± (SD)            | Mean ± (SD)             | Mean ± (SD)            |
| Affected region                |                                     |                        |                         |                        |
| Neck                           | 21.5%                               | 20.4%                  | 21.9%                   | 26.8%                  |
| Low back                       | 27.5%                               | 28.0%                  | 25.2%                   | 31.7%                  |
| Shoulder                       | 25%                                 | 21.5%                  | 27.1%                   | 19.5%                  |
| Knee                           | 26%                                 | 30.1%                  | 25.8%                   | 22.0%                  |
| Duration (d)                   | 382.50 (993.63)                     | 381.01 (962.47)        | 297.41 (724.74)         | 499.04 (1210.78)       |
| Surgical status (% surgical)   | 24%                                 | 20.7%                  | 28.4%                   | 25.6%                  |
| Age                            | 44.62 (15.54)                       | 42.34 (16.05)          | 46.45 (14.65)           | 44.74 (15.06)          |
| Sex (% female)                 | 60.5                                | 55.9                   | 61.3                    | 56.1                   |
| Race                           |                                     |                        |                         |                        |
| American Indian or Alaska Native | 0.5%                             | 0.0%                   | 0.7%                    | 1.2%                   |
| Asian                          | 3.1%                                | 3.3%                   | 2.6%                    | 1.2%                   |
| Black or African American      | 21.7%                               | 14.1%                  | 22.5%                   | 26.8%                  |
| White                          | 74.7                                | 82.6%                  | 74.2%                   | 70.7%                  |
| Education                      |                                     |                        |                         |                        |
| Less than high school          | 4.7%                                | 2.2%                   | 5.2%                    | 7.3%                   |
| Graduated from high school     | 13.3%                               | 16.1%                  | 15.5%                   | 7.3%                   |
| Some college                   | 32.6%                               | 22.6%                  | 36.1%                   | 34.1%                  |
| Graduated from college         | 26.0%                               | 24.7%                  | 22.6%                   | 29.3%                  |
| Some post graduate course work | 7.0%                                | 8.6%                   | 5.2%                    | 6.1%                   |
| Completed post graduate degree | 16.4%                               | 25.8%                  | 15.5%                   | 15.9%                  |
| Income                         |                                     |                        |                         |                        |
| <$20,000                       | 23.4%                               | 21.3%                  | 20.3%                   | 28.0%                  |
| $20,000–$35,000                | 13.7%                               | 10.1%                  | 17.0%                   | 13.4%                  |
| $35,001–$50,000                | 11.1%                               | 15.7%                  | 9.8%                    | 11.0%                  |
| $50,001–$70,000                | 14.0%                               | 6.7%                   | 18.3%                   | 14.6%                  |
| >$70,000                       | 37.8%                               | 46.1%                  | 34.6%                   | 32.9%                  |
| Insurance                      |                                     |                        |                         |                        |
| Private                        | 60.1%                               | 77%                    | 54.1%                   | 60.2%                  |
| Medicare                       | 14.2%                               | 9.8%                   | 14.5%                   | 16.3%                  |
| Medicaid                       | 11.8%                               | 1.6%                   | 13.4%                   | 15.3%                  |
| Workers Compensation           | 3.6%                                | 4.9%                   | 4.1%                    | 2.0%                   |
| Disability                     | 0.9%                                | 0.0%                   | 1.2%                    | 1.0%                   |
| Uninsured                      | 1.5%                                | 1.6%                   | 1.7%                    | 1.0%                   |
| Other                          | 7.9%                                | 4.9%                   | 11.0%                   | 4.1%                   |
| PHQ-9                          | 4.96 (5.53)                         | 3.59 (4.36)            | 6.04 (5.92)             | 4.36 (5.95)            |
| FABQ-pa                        | 13.86 (6.09)                        | 13.68 (5.80)           | 14.64 (5.90)            | 12.24 (6.06)           |

(Continued)
Table 2. Continued

| Characteristic | OSPRO Developmental Study (n = 330) | Cluster 1: PFI (n = 93) | Cluster 2: MDI (n = 155) | Cluster 3: PI (n = 82) |
|---------------|------------------------------------|------------------------|------------------------|------------------------|
|               | Mean ± (SD)                         | Mean ± (SD)            | Mean ± (SD)            | Mean ± (SD)            |
| FABQ-w        | 10.98 (11.94)                       | 9.29 (11.30)           | 12.83 (12.84)          | 8.90 (11.04)           |
| PCS           | 13.06 (12.32)                       | 10.81 (10.89)          | 14.89 (13.14)          | 11.33 (13.11)          |
| TSK-11        | 22.38 (6.70)                        | 22.10 (6.36)           | 23.19 (6.59)           | 21.46 (7.39)           |
| PASS          | 24.44 (20.41)                       | 22.13 (17.21)          | 27.59 (22.02)          | 20.26 (20.80)          |
| PSEQ          | 43.23 (14.26)                       | 45.38 (13.48)          | 39.99 (14.82)          | 45.98 (15.18)          |
| SER           | 104.71 (20.30)                      | 106.82 (18.08)         | 102.56 (21.52)         | 107.06 (20.22)         |
| STAXI         | 15.31 (4.81)                        | 15.58 (4.89)           | 15.83 (4.98)           | 14.83 (5.29)           |
| PCOQ usual    |                                   |                        |                        |                        |
| Pain          | 43.68 (28.36)                       | 46.25 (26.87)          | 45.51 (28.35)          | 37.09 (29.28)          |
| Fatigue       | 33.32 (28.57)                       | 31.91 (28.06)          | 38.77 (29.14)          | 24.33 (26.24)          |
| Emotional distress | 22.28 (28.00) | 17.87 (25.46)          | 28.15 (30.36)          | 15.59 (23.91)          |
| Interference  | 35.89 (31.92)                       | 36.42 (28.28)          | 41.21 (32.88)          | 25.67 (32.13)          |
| PCOQ % Success|                                   |                        |                        |                        |
| Pain          | 61.41 (68.43)                       | 66.08 (28.49)          | 57.52 (92.98)          | 63.12 (40.31)          |
| Fatigue       | 53.19 (56.76)                       | 54.01 (64.68)          | 48.07 (46.89)          | 54.78 (45.86)          |
| Emotional distress | 49.23 (85.23) | 50.95 (98.61)          | 43.97 (47.72)          | 47.27 (66.77)          |
| Interference  | 63.26 (41.77)                       | 64.29 (43.46)          | 61.85 (42.56)          | 65.63 (38.03)          |
| PCOQ % Expected|                                   |                        |                        |                        |
| Pain          | 65.02 (67.38)                       | 71.40 (33.96)          | 67.75 (39.10)          | 52.25 (120.08)         |
| Fatigue       | 61.62 (44.10)                       | 62.29 (43.22)          | 59.09 (48.80)          | 61.94 (43.58)          |
| Emotional distress | 68.59 (49.91) | 62.50 (68.20)          | 70.69 (38.39)          | 75.64 (34.41)          |

*MDI = Multiple Outcome Domain Important; OSPRO = Optimal Screening for Prediction of Referral and Outcome; PFI = Pain and Function Outcome Important; PI = Pain Outcome Important.

Importance of Outcomes in Patients With Pain

Outcome Importance Subgroup Response to Treatment

Cluster solutions from the validation cohort were then used to create “outcome importance” subgroups. Repeated-measure ANOVA considered subgroup-related differences in clinical outcomes from baseline to 4 weeks, 6 months, and 12 months. Chi-square considered subgroup-related difference in treatment satisfaction at 6 months and 12 months.

Role of the Funding Source

The funder played no role in the design, conduct, or reporting of this study.

Results

Identification and Characterization of Subgroups

A total 330 patients enrolled in the OSPRO development cohort and completed the PCOQ. Demographic, psychological, insurance type, and clinical measures are presented in Table 2. A 3-cluster solution was observed for importance of outcome domains (Fig. 1).

Cluster 1 (n = 93) was labeled Pain and Function Outcomes Important (PFI) and was characterized by high scores for the improvement of pain and interference. Cluster 2 (n = 155) was labeled Multiple Outcome Domains Important (MDI) and was characterized by high scores for the importance of...
Importance of Outcomes in Patients With Pain

Figure 1.
Cluster ratings of importance for different domains of pain from the OSPRO developmental study. Y axis = importance attributed to improvement in each domain of pain with 0 (not at all important) to 100 (most important). MDI = multiple domains important cluster; PFI = pain and function important cluster; PI = pain important cluster.

improvement in all domains. Cluster 3 (n = 82) was labeled Pain Outcome Important (PI) and was characterized by generally low scores for the importance of improvement in all domains with the highest importance attached to pain (Fig. 2).

The clusters differed significantly in terms of importance attached to changes in the domain of pain (P < .01), with PFI (P < .01) and MDI (P < .01) both indicating this as significantly more important than PI. The clusters differed significantly in terms of importance attached to changes in the domain of fatigue (P < .01), with PFI rating this significantly more important than PI (P < .01) and MDI rating this as significantly more important than PFI (P < .01) and PI (P < .01). The clusters differed significantly in terms of importance attached to changes in the domain of emotional distress (P < .01), with PFI rating this significantly more important than PI (P < .01) and MDI rating this as significantly more important than PFI (P < .01) and PI (P < .01). The clusters differed significantly in terms of importance attached to changes in the domain of interference (P < .01), with PFI rating this significantly more important than PI (P < .01) and MDI rating this as significantly more important than PFI (P < .01) and PI (P < .01).

Characterization of Subgroups by Demographic and Psychological Factors
The clusters did not differ in terms of demographic and type of insurance variables. Significant differences were observed in PHQ-9 (P < .01), with MDI reporting significantly higher levels than PFI (P < .01); FABQ-pa (P = .01) with MDI reporting significantly higher levels than PI (P = .01); PCS (P = .02) with MDI reporting significantly higher levels than PFI (P = .04); PASS (P = .02) with MDI reporting significantly higher levels than PI (P = .03); and PSEQ (P < .01) with MDI significantly lower than PFI (P = .02) and PI (P = .01).

Cluster Validation Across Samples
A total 440 participants enrolled in the OSPRO validation cohort completed the PCOQ. Demographic and clinical measures are presented in Table 3.

Cluster Reproduction
A similar 3-cluster solution was observed (Fig. 3). Cluster 1 (n = 165) was labeled PFI and was characterized by high scores for the importance of improvement in the domains of pain and interference. Cluster 2 (n = 178) was labeled MDI and was characterized by high scores for the importance of improvement in all domains. Cluster 3
Importance of Outcomes in Patients With Pain

Figure 2. PCOQ importance of outcome clusters for patients seeking outpatient physical therapy.

- Pain and Function Important (PFI) n = 93
  - Mean Rating
  - Pain: 94.57 (95% CI 88.78–100.35)
  - Fatigue: 20.43 (95% CI 14.90–25.95)
  - Emotional Distress: 14.00 (95% CI 10.08–17.92)
  - Interference: 94.47 (95% CI 90.89–98.05)

- Multiple Domains Important (MDI) n = 155
  - Mean Rating
  - Pain: 96.59 (95% CI 93.13–100.05)
  - Fatigue: 88.69 (95% CI 84.53–92.85)
  - Emotional Distress: 88.86 (95% CI 85.91–91.81)
  - Interference: 96.06 (95% CI 93.92–98.20)

- Pain Important (PI) n = 82
  - Mean Rating
  - Pain: 60.75 (95% CI 56.14–63.30)
  - Fatigue: 36.69 (95% CI 29.75–43.64)
  - Emotional Distress: 2.56 (95% CI 2.35–7.51)
  - Interference: 16.08 (95% CI 13.24–18.93)

(n = 97) was labeled PI and was characterized by generally low scores for the importance of improvement in all domains, with the highest importance attached to pain.

Clinical Outcomes for Outcome Importance Subgroups

The clusters differed in terms of average pain rating at baseline ($P < .01$), with MDI reporting significantly higher levels than PFI ($P < .01$) and PI ($P < .01$). Clusters differed significantly in disability ($P < .01$), with MDI reporting higher disability at baseline than PFI and PI.

A main effect for pain was observed ($F_{(3, 250)} = 56.65$; $P < .01$, partial eta squared = 0.41) with significant improvements observed between baseline and 4 weeks ($P < .01$) and 4 weeks and 6 months ($P < .01$). Cluster dependent differences in pain response were not observed ($F_{(6, 502)} = 2.00$; $P = .07$, partial eta squared = 0.02).

An interaction was observed for disability ($F_{(6, 498)} = 2.89$; $P = .01$, partial eta squared = 0.03). Deconstruction of the interaction observed significant differences from baseline to 4 weeks between PI and both PFI ($P < .01$) and MDI ($P < .01$).

A greater percentage of PFI ($P = .02$) expressed being somewhat satisfied to very satisfied at 6 months to the questions “If you had to spend the rest of your life with the symptoms you have right now, how would you feel about it?” The clusters did not differ in response to this question at 12 months ($P = .56$). A greater percentage of
Table 3. Characteristics of Clusters From OSPRO Longitudinal Study

| Characteristic            | OSPRO Longitudinal Study (n = 440) Mean ± (SD) | Cluster 1: PFI (n = 165) Mean ± (SD) | Cluster 2: MDI (n = 178) Mean ± (SD) | Cluster 3: PI (n = 97) Mean ± (SD) |
|---------------------------|-----------------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|
| Affected region           |                                               |                                      |                                      |                                    |
| Neck                      | 26.8%                                         | 26.7%                                | 23.0%                                | 34.0%                              |
| Low back                  | 22.3%                                         | 17.6%                                | 25.3%                                | 24.7%                              |
| Shoulder                  | 24.3%                                         | 27.9%                                | 23.6%                                | 19.6%                              |
| Knee                      | 26.6%                                         | 27.9%                                | 28.1%                                | 21.6%                              |
| Duration (days)           | 398.58 (1715.80)                              | 238.38 (440.05)                      | 379.62 (1200.57)                     | 713.32 (3242.97)                   |
| Surgical status (% surgical) | 18.9%                                         | 13.9%                                | 21.9%                                | 21.6%                              |
| Age                       | 45.06 (15.82)                                 | 43.60 (15.55)                        | 47.53 (15.42)                        | 42.95 (16.58)                      |
| Sex (female)              | 62.6%                                         | 56.7%                                | 70.2%                                | 58.8%                              |
| Race                      |                                               |                                      |                                      |                                    |
| American Indian or Alaska Native | 0.7%                                         | 1.3%                                | 0.6%                                | 0.0%                               |
| Asian                     | 5.8%                                          | 6.3%                                | 5.1%                                | 6.2%                               |
| Black or African American | 14.3%                                         | 5.6%                                | 19.3%                                | 19.6%                              |
| White                     | 79.2%                                         | 86.9%                                | 75%                                  | 74.2%                              |
| Education                 |                                               |                                      |                                      |                                    |
| Less than high school     | 2.5%                                          | 1.2%                                | 3.4%                                | 3.1%                               |
| Graduated from high school| 8.8%                                          | 4.3%                                | 10.3%                               | 13.5%                              |
| Some college              | 25.8%                                         | 21.5%                                | 26.9%                                | 31.3%                              |
| Graduated from college    | 27.6%                                         | 27.6%                                | 29.1%                                | 25.0%                              |
| Some post graduate course work | 12.9%                                         | 17.8%                                | 10.3%                                | 9.4%                               |
| Completed post graduate degree | 22.4%                                         | 27.6%                                | 20.0%                                | 17.7%                              |
| Income                    |                                               |                                      |                                      |                                    |
| <$20,000                  | 15.8%                                         | 10.1%                                | 18.2%                                | 22.1%                              |
| $20,000–$35,000           | 14.2%                                         | 12.1%                                | 12.8%                                | 20.8%                              |
| $35,001–$50,000           | 13.4%                                         | 16.1%                                | 11.5%                                | 11.7%                              |
| $50,001–$70,000           | 15.0%                                         | 16.8%                                | 14.2%                                | 13.0%                              |
| >$70,000                  | 41.7%                                         | 45.0%                                | 43.2%                                | 32.5%                              |
| Insurance                 |                                               |                                      |                                      |                                    |
| Private                   | 65.9%                                         | 79.0%                                | 58.3%                                | 57.3%                              |
| Medicare                  | 12.6%                                         | 10.8%                                | 12.5%                                | 15.7%                              |
| Medicaid                  | 4.6%                                          | 0.6%                                | 8.9%                                 | 3.4%                               |
| Workers compensation      | 3.4%                                          | 0.6%                                | 4.2%                                 | 6.7%                               |
| Disability                | 1.0%                                          | 0.6%                                | 1.2%                                 | 1.1%                               |
| Uninsured                 | 1.7%                                          | 1.3%                                | 2.4%                                 | 1.1%                               |
| Other                     | 10.9%                                         | 7.0%                                | 12.5%                                | 14.6%                              |

(Continued)
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Table 3. Continued

| Characteristic | OSPRO Longitudinal Study (n = 440) Mean ± (SD) | Cluster 1: PFI (n = 165) Mean ± (SD) | Cluster 2: MDI (n = 178) Mean ± (SD) | Cluster 3: PI (n = 97) Mean ± (SD) |
|----------------|---------------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| PCOQ usual     |                                             |                                    |                                    |                                    |
| Pain           | 43.54 (28.56)                               | 42.09 (24.85)                      | 50.81 (30.57)                      | 32.66 (27.01)                      |
| Fatigue        | 36.21 (28.84)                               | 36.17 (25.69)                      | 42.86 (31.70)                      | 24.09 (24.37)                      |
| Emotional distress | 24.63 (28.29)                              | 22.78 (21.3)                       | 32.56 (2.05)                       | 13.20 (2.78)                       |
| Interference   | 37.39 (30.73)                               | 37.53 (26.42)                      | 47.53 (33.17)                      | 18.53 (23.40)                      |
| Average pain   | 4.22 (1.98)                                 | 3.91 (1.82)                        | 4.69 (1.22)                        | 3.90 (1.81)                        |
| Baseline disability (z-score) | 0.00 (1.00)                                 | −0.06 (.87)                        | 0.20 (1.08)                        | −0.27 (.97)                        |
| PCOQ% success  |                                             |                                    |                                    |                                    |
| Pain           | 69.30 (26.83)                               | 68.28 (23.59)                      | 73.40 (26.24)                      | 63.62 (32.00)                      |
| Fatigue        | 60.13 (33.59)                               | 55.47 (33.73)                      | 66.31 (29.94)                      | 57.38 (38.19)                      |
| Emotional distress | 54.68 (61.46)                              | 52.66 (35.86)                      | 57.76 (83.57)                      | 51.68 (41.91)                      |
| Interference   | 66.37 (49.89)                               | 67.53 (41.34)                      | 69.89 (39.62)                      | 55.43 (80.03)                      |
| PCOQ% expected |                                             |                                    |                                    |                                    |
| Pain           | 62.45 (52.04)                               | 63.20 (51.14)                      | 61.23 (59.07)                      | 63.43 (37.88)                      |
| Fatigue        | 59.01 (47.04)                               | 59.10 (37.71)                      | 58.49 (57.49)                      | 59.81 (40.30)                      |
| Emotional distress | 47.14 (91.42)                              | 50.49 (47.17)                      | 44.66 (127.35)                     | 45.63 (51.43)                      |
| Interference   | 64.30 (66.95)                               | 69.16 (41.17)                      | 60.12 (90.23)                      | 63.12 (47.03)                      |
| PCOQ importance|                                             |                                    |                                    |                                    |
| Pain           | 84.66 (29.43)                               | 93.68 (9.49)                       | 97.91 (5.13)                       | 44.99 (41.28)                      |
| Fatigue        | 63.12 (39.41)                               | 51.94 (33.20)                      | 97.38 (5.74)                       | 19.25 (28.68)                      |
| Emotional distress | 54.58 (43.41)                              | 33.33 (33.25)                      | 98.38 (3.94)                       | 10.35 (19.77)                      |
| Interference   | 75.18 (37.20)                               | 88.81 (14.15)                      | 98.57 (3.94)                       | 9.05 (14.28)                       |

PFI (P = .01) indicated probably yes to definitely yes to the question, “Would you have the same PT treatment again if you had the same condition?” at 6 months. The clusters did not differ in response to this question at 12 months (P = .22). The clusters did not differ at 6 months (P = .23) or 12 months (.19) in their responses to “How would you rate the overall results of your PT treatment?”

Discussion

Patient-centered care requires a collaborative approach to both treatment options and goals.20 Subsequently, understanding which outcomes are important to patients seeking care for pain is an important consideration for shared decision-making. We identified 3 subgroups of individuals presenting for physical therapy with musculoskeletal pain based on the importance attributed to different domains of pain. Prior studies using similar methodology have identified pain-focused and multi-dimension-focused subgroups based on the importance attributed to improvements in outcome domains in patients attending physical therapy and seeking care from a chronic pain clinic.26 Our findings are similar and add to these by identifying a third subgroup citing both improvement in pain and function as important. Importantly, this 3-group cluster structure was relatively consistent across 2 separate samples with clusters of similar subgroup composition and frequency distribution in each. Future research is needed to confirm these findings and to refine what the expected frequencies are for each of the cluster subgroups. Overall, the PCOQ appears to be a reliable and valid measure for determining the importance of different outcomes domains for patients seeking care for musculoskeletal pain.

Our findings characterize subgroups based on the importance attached to improvements in key outcomes domains. We observed subgroup-related differences in baseline pain, disability, demographic factors, and psychological factors. Specifically, the cluster considering improvement in all domains of pain important (MDI) reported higher baseline levels of pain, disability,
depression, fear, catastrophizing, and anxiety as well as lower levels of self-efficacy. These findings added credibility to the derived subgroups as those with the higher levels of pain-related fear and emotional distress valued improvements in related domains. Furthermore, the identification of this subgroup demonstrated psychological factors are associated with both pain and disability.60–62 However, the patients themselves indicated high importance in resolving the psychological component along with pain and function.

The derived subgroups did not differ statistically in the 4-week and 6-month pain intensity responses. This was an interesting finding because 1 of the subgroups (PI) was characterized by the importance of pain improvements, but this subgroup did not have larger pain intensity change scores after receiving physical therapy. This finding could question the clinical utility of these subgroups if the sole interest was in predicting pain intensity responses. Our findings indicate that these subgroups may not be useful in distinguishing pain intensity outcomes, but there may be other ways in which their clinical utility can be expressed. For example, knowledge of a particular subgroup could facilitate shared decision-making and give the clinician an idea of which outcome domains should be emphasized during a given treatment episode.

The derived subgroups did differ in other areas of treatment response. The subgroup considering improvements in pain as most important (PI) displayed a worsening in function over the first 4 weeks following the initiation of physical therapy. This effect was negated at 6 months and 1 year. The importance attached by our PI subgroup to improvements in pain do not align with current treatment recommendations advocating for a focus on lessening the impact of pain on function and suffering rather than pain intensity.63 We did not control for nor document individual physical therapy treatment approaches and are therefore unable to determine the role that any specific treatment approach or modality may play. We observed that patients with a sole focus on lessening of pain intensity had worse short-term functional outcomes than those valuing improvement in multiple dimensions. It is beyond the purposes of this study to determine if matching treatment emphasis with outcome domain importance results in better clinical outcomes for function and patient satisfaction. Future studies are required to replicate these findings and also use designs that allow for better determination of the impact on clinical outcomes of matching treatment approach with outcome domain importance subgroup characteristics.

Patient satisfaction is a core measure in many patient-centered approaches, as it a reflection of treatment
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delivery or treatment outcome.\textsuperscript{77} Furthermore, satisfaction is associated with pain perception\textsuperscript{65,66} and risk of being disabled 6 to 12 months\textsuperscript{67} after injury. Patient satisfaction has been recommended as a core outcome measure for chronic pain,\textsuperscript{64} although distinction between treatment delivery and outcome is not part of that recommendation. Making such a distinction is important because levels of patient satisfaction will vary substantially whether the focus is on treatment delivery or treatment outcomes.\textsuperscript{57,58}

In this analysis, patients valuing improvement in both pain and function expressed greater satisfaction with both treatment outcomes as well as treatment delivery at 6 months. These findings add to this body of knowledge by suggesting patients valuing improvement in pain and function may have overall greater 6-month satisfaction with physical therapy treatment delivery and outcomes, suggesting that the alignment with pain and function as treatment goals works particularly well for this patient subgroup. Physical therapists traditionally emphasize outcomes related to functional restoration\textsuperscript{68} and may not be as comfortable in addressing other domains such as fatigue and emotional distress.\textsuperscript{69–71} In this analysis, the multidimensional subgroup did not have as high 6-month satisfaction ratings, and we speculate that focus on broader treatment approaches (eg, psychologically informed physical therapy) may be necessary to see higher 6-month satisfaction ratings in treatment delivery and treatment outcomes for this patient subgroup.\textsuperscript{80}

Clinical Implications

Our findings have clinical implications for physical therapists treating patients seeking care for musculoskeletal pain. Patient-centered care may add value to the treatment process for patients presenting with pain; however, physical therapists do not routinely include the patient in the decision-making process.\textsuperscript{72,73} Subsequently, a structured approach is likely necessary for shared decision-making to be successfully implemented into routine clinical practice. The PCOQ provides a standardized manner to determining outcomes identified as important to the patient. For clinical application, a patient presenting to physical therapy would complete the PCOQ and allow the therapist to determine which outcomes are important and what desired, expected, and successful outcome levels are for the patient. Treatment goals aligned with these outcomes could then be discussed, agreed on, and targeted through the collaborative interaction of practitioner's expertise and patient's preference for identified outcomes.\textsuperscript{11,15,74} Additional research is needed to determine the best manner to identify PCOQ importance subgroup membership in routine clinical practice. Future studies should also consider whether such approaches using the PCOQ are more effective in producing shared decision-making and subsequently result in improved outcomes. Furthermore, patients support changes in multiple domains of pain as important when seeking physical therapy for pain. Physical therapists do not consistently assess domains such as emotional distress in their patients with pain\textsuperscript{75,76} and may lack confidence in addressing these domains.\textsuperscript{69–73} Moreover, accurate assessment of emotional distress requires a systematic approach and cannot be done accurately based on instinct.\textsuperscript{77–79} Psychologically informed physical therapist practice has recently been advocated as a more effective management strategy for patients in pain.\textsuperscript{80} Our findings suggest a shared decision-making approach to managing patients presenting to physical therapy with pain may necessitate measuring factors such as emotional distress as well as addressing this domain with treatment as outcomes in this domain are important to a subgroup of patients.

This study has several limitations when interpreting the results. Our results are representative of outpatient orthopedic and sports medicine population and may not be representative or arbitrarily applied to other physical therapy populations. Additionally, our data were collected by means of convenience sampling and may not be indicative of all individuals seeking rehabilitation. In particular, we did not characterize the total relevant patient population from which this convenience sample was derived and are unable to determine what role response bias played for those deciding to participate in this study. We only assessed importance at baseline. Patient-specific factors such as their success criteria for treatment change over time,\textsuperscript{57,58} and our approach does not allow us to determine if the importance in change patients attach to different outcome domains changes over an episode of care as well. This is an area for future studies utilizing the PCOQ to develop cut-off scores to determine patient classification-based outcomes of importance and how cut-off scores could be used to drive treatment and changing expectations.

Additionally, despite the highest ratings for importance attached to improvements in pain, our PI subgroup expressed relatively low importance for this domain compared with the other subgroups. The PI subgroup also had the lowest importance ratings for the other domains of the PCOQ (ie, fatigue, emotional distress, and interference) and while they had comparable pain intensity ratings at baseline, they also had correspondingly lower ratings on the region-specific disability scores (Tab. 2). Collectively these data support the notion that while the PI subgroup places the highest importance on pain improvement, there are low levels of concurrent distress, interference, and disability. We speculate that the PI subgroup may be seeking care for pain relief, and this is why it is important to them. However, because there are overall low levels of distress, interference, and disability, the overall importance ratings are lower than the other subgroups. An alternative explanation to consider is that the domains of the PCOQ were based on expert consensus for key outcome domains
in patients with pain. While indicating the highest importance for improvements in pain, patients in our PI subgroup may place great value and be better identified by the importance attached to change in other domains not reflected by the 4 domains of the PCOQ. Future research is needed to better characterize the PI subgroup and determine how this subgroup influences provider clinical decision-making on treatment approaches.

Conclusion
Grouping patients by the importance of improvement in outcome domains may lead to alternative models of delivering patient-centered care. The MDI, PFI, and PI subgroups identified in this cohort differed in key psychological measures, pain and disability at baseline, as well as in treatment response. These findings suggest the patient's perspectives on importance of outcome domain may influence clinical decision-making for patients seeking care of musculoskeletal pain conditions.

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Ethics Approval

The Institutional Review Board at The University of Florida approved this study.

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The authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest.

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References

1. Johannes CB, Le TK, Zhou X, et al. The prevalence of chronic pain in United States adults: results of an internet-based survey. J Pain. 2010;11:1230–1239.
2. Institute of Medicine (U.S.) Committee On Advancing Pain Research Care and Education. Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research. Washington, DC, USA: National Academies Press; 2011. XVII:364.
3. Kenan K, Mack K, Paulozzi L. Trends in prescriptions for oxycodone and other commonly used opioids in the United States, 2000–2010. Open Med. 2012;6:e14–e17.
4. Deyo RA, Von Korff M, Duhkoop D. Opioids for low back pain. BMJ. 2015;350:g3680.
5. Rudd RA, Aleshire N, Zibbell JE, Gladden RM. Increases in drug and opioid overdose deaths—United States, 2000–2014. MMWR Morb Mortal Wkly Rep. 2016;64:1378–1382.
6. Koboly A, Courtwright DT, Hwang CS, et al. The prescription opioid and heroin crisis: a public health approach to an epidemic of addiction. Annu Rev Public Health. 2015;36:559–574.
7. Dowell D, Haegerich TM, Chou R. CDC guideline for prescribing opioids for chronic pain—United States, 2016. JAMA. 2016;315:1624–1645.
8. Keller A, Hayden J, Bombardier C, van Tulder M. Effect sizes of non-surgical treatments of non-specific low-back pain. BMJ. 2007;334:1770–1788.
9. Machado LA, Kamper SJ, Herbert RD, et al. Analgesic effects of treatments for non-specific low back pain: a meta-analysis of placebo-controlled randomized trials. Rheumatology (Oxford England). 2009;48:520–527.
10. Flynn D, Knoedler MA, Hess EP, et al. Engaging patients in health care decisions in the emergency department through shared decision-making: a systematic review. Acad Emerg Med. 2012;19:959–967.
11. Schulman-Green D, Naik AD, Bradley EH, et al. Goal setting as a shared decision making strategy among clinicians and their older patients. Patient Educ Couns. 2006;63:145–151.
12. Bensig J. Bridging the gap. The separate worlds of evidence-based and patient-centered medicine. Patient Educ Couns. 2006;59:17–25.
13. Yong SK, Cheing GL, Chan F, et al. Motivational enhancement therapy in addition to physical therapy improves motivational factors and treatment outcomes in people with low back pain: a randomized control trial. Arch Phys Med Rehabil. 2011;92:176–183.
Importance of Outcomes in Patients With Pain

14 Charles C, Gafni A, Whelan T. Shared decision-making in the medical encounter: what does it mean? (or it takes at least two to tango). Soc Sci Med. 1997;44:681–692.

15 Kashaf S, McGill ET, Berger ZD. Shared decision-making and outcomes in type 2 diabetes: a systematic review and meta-analysis. Patient Educ Couns. 2017;100:2159–2171.

16 Boss EF, Mehta N, Nagarajan N, Links A, et al. Shared decision making and choice for elective surgical care: a systematic review. Otolaryngol Head Neck Surg. 2016;154:405–420.

17 Shay LA, Lafate JA. Where is the evidence? A systematic review of shared decision-making and patient outcomes. Med Decis Making. 2015;35:114–131.

18 Turner-Stokes L, Rose H, Ashford S, Singer B. Patient engagement and satisfaction with goal planning: impact on outcome from rehabilitation; a process evaluation. Int J Ther Rehabil. 2015;25:210–216.

19 Kashaf MS, McGill E. Does shared decision making in cancer treatment improve quality of life? A systematic literature review. Med Decis Making. 2015;35:1037–1048.

20 Elwyn G, Durand MA, Song J, et al. A three-talk model for shared decision making: multistage consultation process. BMJ. 2017;359:j1891.

21 Zeppieri G Jr, George SZ. Patient-defined desired outcome, success criteria, and expectation in outpatient physical therapy: a longitudinal assessment. Health Qual Life Outcomes. 2017;15:29.

22 Gardner T, Refshaugue K, Mcauley J, et al. Patient lead goal setting in chronic low back pain—What goals are important to the patient and are they aligned to what we measure? Patient Educ Couns. 2015;98:1035–1038.

23 Zeppieri G Jr, Lentz TA, Atchison JW, et al. Preliminary results of patient-defined success criteria for individuals with musculoskeletal pain in outpatient physical therapy settings. Arch Phys Med Rehabil. 2012;93:434–440.

24 Lentz TA, Beneciuk JM, Bialosky JE, et al. Development of a yellow-flag assessment tool for orthopaedic physical therapists: results from the optimal screening for prediction of referral and outcome (OSPRO) cohort. JOSPT. 2016;46:327–345.

25 George SZ, Beneciuk JM, Lentz TA, et al. Optimal screening for prediction of referral and outcome (OSPRO) for musculoskeletal pain conditions: results from the validation cohort. JOSPT. 2018;48:460–474.

26 Robinson ME, Brown JL, George SZ, et al. Multidimensional success criteria and expectations for treatment of chronic pain: the patient perspective. Pain Med. 2005;6:356–345.

27 Brown JL. Patient-centered outcomes for chronic spine pain: multidimensional success criteria and treatment matching. A dissertation presented to the graduate school of the University of Florida in partial fulfillment of the requirements for the degree of Doctor of Philosophy. University of Florida Gainesville. 2000.1–55.

28 O’Brien EM, Staud RM, Hassinger AD, et al. Patient-centered perspective on treatment outcomes in chronic pain. Pain Med. 2010;11:6–15.

29 Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. J Gen Intern Med. 2001;16:606–613.

30 Gros DF, Antony MM, Simms LJ, McCabe RE. Psychometric properties of the state–trait inventory for cognitive and somatic anxiety (STICS): comparison to the state–trait anxiety inventory (STAI). Psychol Assess. 2007;19:369–381.

31 Barnes LL, Harp D, Jung WS. Reliability generalization of scores on the Spielberger State–Trait Anxiety Inventory. Educ Psychol Meas. 2002;62:603–618.

32 Spielberger CD. State–Trait Anxiety Inventory: A Comprehensive Bibliography. 2nd ed. Palo Alto CA, USA: Consulting Psychologists Press; 1989.

33 Waddell G, Newton M, Henderson I, et al. A fear-avoidance beliefs questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. Pain. 1993;52:157–168.

34 Cleland JA, Fritz JM, Childs JD. Psychometric properties of the fear-avoidance beliefs questionnaire and Tampa Scale of Kinesiophobia in patients with neck pain. Arch Phys Med Rehabil. 2010;91:1128–1136.

35 Woby SR, Roach NK, Urmston M, Watson PJ. Psychometric properties of the TSK-11: a shortened version of the Tampa Scale for Kinesiophobia. Pain. 2005;117:137–144.

36 Sullivan MJ, Bishop SR, Pikiv J. The pain catastrophizing scale: development and validation. Psychol Assess. 1995;7:524–532.

37 George SZ, Valencia C, Beneciuk JM. A psychometric investigation of fear-avoidance model measures in patients with chronic low back pain. J Orthop Sports Phys Ther. 2010;40:197–205.

38 Roelofs J, McCracken L, Peters ML, et al. Psychometric evaluation of the pain anxiety symptoms scale (PASS) in chronic pain patients. J Behav Med. 2004;27:167–183.

39 McCracken LM, Dhintra LA. A short version of the pain anxiety symptoms scale (PASS-20): preliminary development and validity. Pain Res Manage. 2002;7:45–50.

40 Asghari A, Nicholas MK. Pain self-efficacy beliefs and pain behaviour: a prospective study. Pain. 2001;94:85–100.

41 Waldrop D, Lightsey OR, Ethington CA, Cooke AL. Self-efficacy, optimism, health competence, and recovery from orthopedic surgery. J Osteopathic Med. 2001;48:233–238.

42 Fairbank JC, Pynsent PB. The Oswestry disability index. Spine. 2000;25:2940–2952.

43 Roland M, Fairbank J. The Roland-Morris disability questionnaire and the Oswestry disability questionnaire. Spine. 2000;25:3115–3124.

44 Chiarotto A, Maxwell LJ, Terwee CB, et al. Roland-Morris disability questionnaire and Oswestry disability index: which has better measurement properties for measuring physical functioning in nonspecific low back pain? Systematic review and meta-analysis. Phys Ther. 2016;96:1620–1637.

45 Davidson M, Keating JL. A comparison of five low back disability questionnaires: reliability and responsiveness. Phys Ther. 2002;82:8–24.

46 Grobe M, Brox JI, Vollestad NK. Cross-cultural adaptation of the Norwegian versions of the Roland-Morris disability questionnaire and the Oswestry disability index. J Rehabil Med. 2003;35:241–247.

47 Maughan EF, Lewis JS. Outcome measures in chronic low back pain. Eur Spine J. 2010;19:1484–1494.

48 Mousavi SJ, Parnianpour M, Mehdi H, et al. The Oswestry disability index, the Roland-Morris disability questionnaire, and the Quebec Back pain disability scale: translation and validation studies of the Iranian versions. Spine. 2006;31:E454–E459.

49 Vernon H, Mior S. The neck disability index: a study of reliability and validity. J Manipulative Physiol Ther. 1992;14:409–415.

50 Cleland JA, Childs JD, Whitman JM. Psychometric properties of the neck disability and numeric pain rating scale in patients with mechanical neck pain. Arch Phys Med Rehabil. 2008;89:69–74.

51 Beaton DE, Wright JG, Katz JN. Development of the QuickDASH: comparison of three item-reduction approaches. J Bone Joint Surg Am. 2005;87:1038:1046.

52 Prugh J, Zeppieri G Jr, George SZ. Impact of psychosocial factors, pain, and functional limitations on throwing athletes who return to sport following elbow injuries: a case series. Physiother Theory Pract. 2012;28:633–640.
Importance of Outcomes in Patients With Pain

53 Irrgang JJ, Anderson AF, Boland AL, et al. Development and validation of the international knee documentation committee subjective knee form. Am J Sports Med. 2001;29:600–613.

54 Irrgang JJ, Anderson AF, Boland AL, et al. International Knee Documentation Committee. Responsiveness of the International Knee Documentation Committee subjective knee form. Am J Sports Med. 2006;34:1567–1573.

55 Lentz TA, Zeppieri G Jr, Tillman SM, et al. Return to preinjury sports participation following anterior cruciate ligament reconstruction: contributions of demographic, knee impairment, and self-report measures. J Orthop Sports Phys Ther. 2012;42:893–901.

56 Daltroy LH, Cats-Baril WL, Katz JN, et al. The North American Spine Society lumbar spine outcome assessment instrument: reliability and validity tests. Spine. 1996;21:741–749.

57 George SZ, Hirsh AT. Distinguishing patient satisfaction with treatment delivery from treatment effect: a preliminary investigation of patient satisfaction with symptoms after physical therapy treatment of low back pain. Arch Phys Med Rehabil. 2005;86:1338–1344.

58 George SZ, Robinson ME. Preference, expectation, and satisfaction in a clinical trial of behavioral interventions for acute and sub acute low back pain. J Pain. 2010;11:1074–1082.

59 Hair JF, Anderson RE, Tatham RL, Black WC. Multivariate Data Analysis. 5th ed. Upper Saddle River, NJ, USA: Prentice Hall; 1998.

60 Linton SJ, Bergbom S. Understanding the link between depression and pain. Scand J Pain. 2011;2:47–54.

61 Zale EL, Lange KL, Fields SA, Ditre JW. The relation between pain-related fear and disability: a meta-analysis. J Pain. 2013;14:1019–1030.

62 Martinez-Calderon J, Zamora-Campos C, Navarro-Ledesma S, et al. The role of self-efficacy on the prognosis of chronic musculoskeletal pain: a systematic review. J Pain. 2018;19:9–19.

63 Sullivan MD, Ballantyne JC. Must we reduce pain intensity to treat chronic pain? Pain. 2016;157:65–69.

64 Dworkin RH, Turk DC, Farrar JT, Haythornthwaite JA, et al. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. Pain. 2005;113:9–19.

65 Hurwitz EL, Morgenstern H, Yu F. Satisfaction as a predictor of clinical outcomes among chiropractic and medical patients enrolled in the UCLA low-back study. Spine. 2005;30:2121–2128.

66 Butler RJ, Johnson WG. Satisfaction with low back pain care. Spine J. 2008;8:510–521.

67 Fenton JJ, Jerant AF, Bertakis KD, et al. The cost of satisfaction: a national study of patient satisfaction, health care utilization, expenditures, and mortality. Arch Intern Med. 2012;172:405–411.

68 Physical Therapist Practice and the Human Movement System. In: An American Physical Therapy Association White Paper. Alexandria, VA, USA: American Physical Therapy Association; 2015.

69 Alexanders J, Anderson A, Henderson S. Musculoskeletal physiotherapists’ use of psychological interventions: a systematic review of therapists’ perceptions and practice. Physiotherapy. 2015;101:95–102.

70 Gardner T, Refshauge K, Smith I, et al. Physiotherapists’ beliefs and attitudes influence clinical practice in chronic low back pain: a systematic review of quantitative and qualitative studies. J Physiother. 2017;63:132–143.

71 Synnott A, O’Keeffe M, Bunzl S, et al. Physiotherapists may stigmatise or feel unprepared to treat people with low back pain and psychosocial factors that influence recovery: a systematic review. J Physiother. 2015;61:68–76.

72 topp J, Westonhoffer J, Scholl I, Hahlweg P. Shared decision-making in physical therapy: a cross-sectional study on physiotherapists’ knowledge, attitudes and self-reported use. Patient Educ Couns. 2018;101:346–351.

73 Dierckx K, Deveugele M, Roosen P, Devisch I. Implementation of shared decision making in physical therapy: observed level of involvement and patient preference. Phys Ther. 2013;93:1321–1330.

74 Rose A, Rosewilliam S, Soundy A. Shared decision making within goal setting in rehabilitation settings: a systematic review. Patient Educ Couns. 2017;100:65–75.

75 Roussel NA, Neels H, Kuppens K, et al. History taking by physiotherapists with low back pain patients: are illness perceptions addressed properly? Disabil Rehabil. 2016;38:1208–1279.

76 Oostendorp RA, Elvers H, Mikołajewska E, et al. Manual physical therapists’ use of biopsychosocial history taking in the management of patients with back or neck pain in clinical practice. ScientificWorldJournal. 2015;2015:170463.

77 Brunner E, Dankaerts W, Meichtry A, et al. Physical therapists’ ability to identify psychological factors and their self-reported competence to manage chronic low back pain. Phys Ther. 2018;98:471–479.

78 Beales D, Kendall M, Chang RP, et al. Association between the 10 item Örebro musculoskeletal pain screening questionnaire and physiotherapists’ perception of the contribution of biopsychosocial factors in patients with musculoskeletal pain. Man Ther. 2016;23:48–55.

79 Calley DQ, Jackson S, Collins H, George SZ. Identifying patient fear-avoidance beliefs by physical therapists managing patients with low back pain. J Orthop Sports Phys Ther. 2010;40:774–783.

80 Main CJ, George SZ. Psychologically informed practice for management of low back pain: future directions in practice and research. Phys Ther. 2011;91:820–824.

81 Brown JL, Edwards PS, Atchison JW, et al. Defining patient-centered, multidimensional success criteria for treatment of chronic spine pain. Pain Med. 2008;9:851–862.

82 Turk DC, Dworkin RH, Allen RR, Bellamy N, et al. Core outcome domains for chronic pain clinical trials: IMMPACT recommendations. Pain. 2003;106:337–345.
Importance of Outcomes in Patients With Pain

Appendix.

Patient-Centered Outcome Questionnaire

Many people experience pain, fatigue (i.e., feeling tired), emotional distress (e.g., worries, feeling sad), and interference with daily activities (e.g., not being able to work or do household chores) as a result of their medical condition. We would like to understand how you have been impacted in each of these areas. We would also like to learn more about what you want your treatment to do for you.

First, we would like to know your usual levels of pain, fatigue, emotional distress, and interference.

On a scale of 0 (none) to 100 (worst imaginable), please indicate your usual level (during the past week) of...

• pain ______.
• fatigue (or tiredness) ______.
• emotional distress ______.
• interference with daily activities ______.

Now, we would like to learn about your desired levels of pain, fatigue, emotional distress, and interference. In other words, we would like to understand what your ideal treatment outcome would be.

On a scale of 0 (none) to 100 (worst imaginable), please indicate your desired level of...

• pain ______.
• fatigue (or tiredness) ______.
• emotional distress ______.
• interference with daily activities ______.

Patients understandably want their treatment to result in desired or ideal outcomes like you indicated above. Unfortunately, available treatments do not always produce desired outcomes. Therefore, it is important for us to understand what treatment outcomes you would consider successful.

On a scale of 0 (none) to 100 (worst imaginable), please indicate the level each of these areas would have to be at for you to consider treatment successful.

• pain ______.
• fatigue (or tiredness) ______.
• emotional distress ______.
• interference with daily activities ______.

Now, we would like to know what you expect your treatment to do for you.

On a scale of 0 (none) to 100 (worst imaginable), please indicate the levels you expect following treatment.

• pain ______.
• fatigue (or tiredness) ______.
• emotional distress ______.
• interference with daily activities ______.
Finally, we would like to understand how important it is for you to see improvement in your pain, fatigue, emotional distress, and interference following treatment.

On a scale of 0 (not at all important) to 100 (most important), please indicate how important it is for you to see improvement in your...

- pain _____.
- fatigue (or tiredness) _____.
- emotional distress _____.
- interference with daily activities _____.

Importance of Outcomes in Patients With Pain