



Published in final edited form as:

Foot Ankle Int. 2021 February ; 42(2): 192–199. doi:10.1177/1071100720959017.

Associations Between Baseline PROMIS Scores, Patient-Provider Communication Factors, and Musculoskeletal Health Literacy on Differences in Patients' and Surgeons' Expectations in Foot and Ankle Surgery

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Abstract

Background: Various factors may affect differences between patient and surgeon expectations. This study aimed to assess associations between patient-reported physical and mental status, patient-surgeon communication, and musculoskeletal health literacy with differences in patient and surgeon expectations of foot and ankle surgery.

Methods: Two hundred two patients scheduled to undergo foot or ankle surgery at an academic hospital were enrolled. Preoperatively, patients and surgeons completed the Hospital for Special Surgery Foot & Ankle Surgery Expectations Survey. Patients also completed Patient-Reported Outcomes Measurement Information System (PROMIS) scores in Physical Function, Pain Interference, Pain Intensity, Depression, and Global Health. Patient-surgeon communication and musculoskeletal health literacy were assessed via the modified Patients' Perceived Involvement in Care Scale (PICS) and Literacy in Musculoskeletal Problems (LiMP) questionnaire, respectively.

Results: Greater differences in patient and surgeon overall expectations scores were associated with worse scores in Physical Function ($p = 0.003$), Pain Interference ($p = 0.001$), Pain Intensity ($p = 0.009$), Global Physical Health ($p < 0.001$), and Depression ($p = 0.009$). A greater difference in the number of expectations between patients and surgeons was associated with all of the above ($p \leq 0.003$) and with worse Global Mental Health ($p = 0.003$). Patient perceptions of higher surgeons' partnership building were associated with a greater number of patient than surgeon expectations ($p = 0.017$). There were no associations found between musculoskeletal literacy and differences in expectations.

Conclusion: Worse baseline patient physical and mental status and higher patient perceptions of provider partnership building were associated with higher patient than surgeon expectations. It may be beneficial for surgeons to set more realistic expectations with patients who have greater disability and in those whom they have stronger partnerships with. Further studies are warranted to understand how modifications in patient and surgeon interactions and patient health literacy affect agreement in expectations of foot and ankle surgery.

Level of Evidence: II

Keywords

patient and surgeon expectations; foot and ankle surgery; PROMIS; health literacy; communication; orthopaedics

INTRODUCTION

Aligning patient and surgeon expectations is a crucial component of preoperative discussions in orthopaedic surgery, as it is a requirement for informed and shared decision-making and may improve postoperative outcomes.⁶ It has previously been shown that patients' postoperative satisfaction and improvement in patient-rated outcomes are associated with their preoperative expectations.^{1,9–11,17,19} However, many factors can affect patient expectations of surgery and differences in patient and surgeon expectations. Prior studies have investigated the effects of baseline patient physical and mental status on differences between patient and surgeon expectations of orthopaedic surgery.^{5,7,13,15} A previous study assessed differences in expectations of foot and ankle surgery between patients and their surgeons and the effects of major or minor surgery, patients' demographic and clinical characteristics, and individual surgeon on differences in patients' and surgeons' expectations.¹⁸ Few studies have assessed the roles of provider and patient communication factors^{12,31} or of patient health literacy⁸ on discrepancies in these expectations. Moreover, no prior studies have evaluated the roles of these factors on patient-surgeon differences in expectations of foot and ankle surgery. An understanding of these modifiable factors is important in order to increase agreement between patients and surgeons regarding these expectations.

The aims of this study were to assess associations between baseline patient-reported physical and mental status, patient-surgeon communication factors, and patient musculoskeletal health literacy with differences between patient and surgeon expectations of foot and ankle surgery. Our hypotheses were that worse baseline patient physical and mental status, patient-surgeon communication, and patient musculoskeletal health literacy would be associated with greater expectations in patients compared to surgeons.

MATERIALS AND METHODS

Study Design

This prospective cohort study was approved by the Institutional Review Board at our institution and required no funding. Adult patients who were scheduled for foot or ankle surgery between February and July of 2019 by one of seven fellowship-trained foot and

ankle surgeons at an academic hospital were enrolled. There was a range of experience among the surgeons, with each having been in practice for 1 to 28 years (mean, 11.9 ± 8.6 years). Inclusion criteria included patient age 18 or older and a scheduled foot or ankle surgery. Exclusion criteria included inability to speak English, inability to provide informed consent, and removal of hardware as the only procedure. All patients were enrolled preoperatively one to two weeks prior to surgery and provided informed consent. Research assistants contacted and enrolled patients by telephone, and surveys were sent via email after enrollment. If patients could not be reached after multiple phone calls, their surgeons attempted to reach them by telephone and email. Surgeons obtained informed consent for surgery, and research assistants and surgeons obtained informed consent for the study.

All enrolled patients completed the 23-item Hospital for Special Surgery Foot and Ankle Expectations Survey preoperatively between the time of enrollment and surgery. Each item is scored on a Likert scale with five answer choices ranging from 0 (“I do not have this expectation, or this expectation does not apply to me”) to 4 (“Back to normal or complete improvement”). Scores are obtained by summing responses to each item, dividing by the maximum score (92), then multiplying by 100. Scores thus range from 0 to 100, with higher scores indicating higher expectations. The survey has previously been validated in a broad cohort of foot and ankle patients.³ Surgeons also completed the survey for each patient either after the preoperative visit or one day prior to surgery and were blinded to patients’ responses. The surgeons’ version of the survey was modified such that it read, “How much improvement do you expect your patient to receive in the following areas as a result of his/her foot or ankle surgery?”

In addition, patients completed Patient-Reported Outcomes Measurement Information System (PROMIS) scores in Physical Function, Pain Interference, Pain Intensity, Depression, and Global Health; the modified Patients’ Perceived Involvement in Care Scale (PICS); and the Literacy in Musculoskeletal Problems (LiMP) questionnaire. PROMIS scores are based on computer-adaptive tests and range from 0–100. Higher scores indicate a greater degree of the concept being evaluated. For example, higher scores in Physical Function, Global Health, and Pain Intensity indicate better physical function and global health and more pain intensity, respectively.¹⁴ The Physical Function, Pain Interference, and Pain Intensity PROMIS scores have previously been validated in foot and ankle patients.^{14,30}

The PICS is a patient questionnaire that was originally developed to assess patients’ perceptions of doctor and patient behaviors that occur during a routine medical visit.¹⁶ The version used in this study, which was previously used in a cohort of patients undergoing evaluation for total knee arthroplasty (TKA), uses 5 items to assess patient involvement, 3 items to assess provider partnership building, and 5 items to assess provider information giving. Items are scored on a 5-point Likert scale with response options ranging from 0 (strongly disagree) to 4 (strongly agree). Subscores are calculated based on the sum of responses in each of the 3 categories.³¹

The Literacy in Musculoskeletal Problems (LiMP) questionnaire is a 9-item, multiple-choice, musculoskeletal-specific health literacy assessment tool. It was developed in order to identify patients with poor orthopaedic surgery-related health literacy, and items were based

on the most common themes in internet-based patient education materials produced by the American Academy of Orthopaedic Surgeons (AAOS), including anatomy, musculoskeletal conditions, diagnosis, and treatment. A score of ≥ 6 reflects adequate musculoskeletal literacy, and a score < 6 reflects limited musculoskeletal literacy. The LiMP has been validated in patients with various musculoskeletal conditions.^{27,28}

Subjects

Of the 313 patients eligible for the study, 58 patients (18.5%) were unwilling to participate and 53 patients (16.9%) could not be reached preoperatively. The final cohort consisted of 202 patients (64.5% of those eligible). Complete demographic data has been described previously.¹⁸ In brief, the mean age was 52.4 years (range, 18.4 to 85.3 years), 68.8 % of subjects (139/202) were female, and the mean BMI was $27.0 \text{ kg/m} \pm 5.6 \text{ kg/m}^2$. Primary diagnoses and procedures are shown in Table 1. All enrolled patients completed expectations surveys, and 166 (82.2%) had complete PROMIS scores. Thirty patients (14.9%) did not complete any PROMIS scores, 6 patients (3.0%) had incomplete PROMIS scores, 1 patient (0.5%) did not complete the LiMP questionnaire, and 2 patients (1.0%) did not complete the modified PICS questionnaire. The remainder of the data collected in these patients was complete, so they were included in the analyses.

Statistics

Descriptive statistics are expressed as means and standard deviations and categorical and binary variables are expressed as frequencies. Differences between surgeon and patient expectations were evaluated in terms of 1) overall expectations score, 2) number of expectations (number of survey items for which at least “A little improvement” was expected), and 3) number of expectations with complete improvement expected (rated as “Back to normal or complete improvement”). A difference of ≥ 10 points was considered a clinically important difference based on an estimate from results of a previous study using this survey in 352 foot and ankle patients.² Three levels of agreement were defined: patient expectations lower than their surgeon’s (a score at least 10 points lower than the surgeon’s score), patient expectations concordant with their surgeon’s (a score within 9 points of the surgeon’s score), and patient expectations higher than their surgeon’s (a score at least 10 points higher than the surgeon’s score).

Pearson correlation coefficients were used to assess correlations between PROMIS, modified PICS, and LiMP scores with differences between patient and surgeon expectations. Correlations of < 0.20 were considered weak; 0.21–0.40, fair; 0.41–0.60, moderate; 0.61–0.8, strong; and 0.81–1.00, very strong.¹⁵ Student’s t-tests were used to compare differences in patient-surgeon overall expectations score and numbers of expectations, and Mann Whitney U tests were used to compare patient-surgeon differences in numbers of expectations with complete improvement expected between those with adequate and those with limited musculoskeletal literacy. Comparisons were made across the three levels of agreement (patient expectations higher, concordant with, or lower than surgeon expectations) using analysis of variance for continuous variables (PROMIS, modified PICS, and LiMP scores) with Tukey’s post hoc tests when significant, and chi-squared tests for

binary variables (adequate vs. limited musculoskeletal literacy). All analyses used a significance level of $\alpha = 0.05$.

RESULTS

Complete results of the expectations survey have been described in a separate study.¹⁸ In brief, 66.3% of patients (134/202) had higher expectations, 21.3% of patients (43/202) had concordant expectations, and 12.4% of patients (25/202) had lower expectations compared to their surgeons. On average, patients had a higher overall expectations score than surgeons (70 ± 20 vs. 52 ± 20 points; $p < 0.001$). There was no difference in the mean number of expectations between patients and surgeons (19 ± 4 vs. 19 ± 5 , $p = 0.875$). Patients expected complete improvement in a greater number of items than surgeons (11 ± 7 vs. 1 ± 3 , $p < 0.001$).

Greater differences between patient and surgeon overall expectations scores were fairly correlated with worse Physical Function ($p = 0.003$), greater Pain Interference ($p = 0.001$), greater Pain Intensity ($p = 0.009$), worse Global Physical Health ($p < 0.001$), and greater Depression ($p = 0.009$). A greater difference in the number of expectations between patients and surgeons was fairly correlated with all the above ($p \leq 0.003$) and with worse Global Mental Health ($p = 0.003$), and was moderately correlated with worse Global Physical Health ($p < 0.001$) (Table 2). No correlations were found between PROMIS scores and number of expectations with complete improvement expected.

There were several differences found in baseline PROMIS scores between patients in the three levels of agreement (Table 3 and Figure 1). Patients with discordantly higher expectations than surgeons had worse Physical Function and greater Pain Intensity than patients with discordantly lower expectations ($p < 0.001$ for both), and worse Pain Interference and Global Physical Health than patients with discordantly lower ($p < 0.001$ and $p = 0.002$, respectively) and those with concordant expectations ($p = 0.031$ and $p = 0.002$, respectively). Moreover, patients with discordantly lower expectations had less Pain Intensity than those with concordant expectations ($p = 0.040$).

Patient perceptions of higher surgeons' partnership building were weakly correlated with a greater number of patient than surgeon expectations ($p = 0.017$). There were no associations between patients' perceptions of their own involvement or surgeon information giving and differences in patient and surgeon expectation overall scores, number of expectations, or number of expectations with complete improvement expected (Table 2). There were no differences in modified PICS scores between patients in the three levels of agreement (Table 3).

Sixty-nine patients (34.3%) had limited musculoskeletal literacy and 133 patients (66.2%) had adequate musculoskeletal literacy. There were no differences between patients with limited and those with adequate musculoskeletal literacy in differences between patient and surgeon overall expectation scores (17.7 ± 25.0 vs. 18.7 ± 24.6 points, $p = 0.789$), number of expectations (0.0 ± 6.6 vs. -0.1 ± 5.9 , $p = 0.854$), or number of expectations with complete improvement expected (9.1 ± 7.5 vs. 10.2 ± 8.0 , $p = 0.304$). There were no differences in

LiMP scores or rates of musculoskeletal literacy between patients in the three levels of agreement (Table 2).

DISCUSSION

In this study, we evaluated associations between baseline patient-reported physical and mental status, patient-surgeon communication factors, and patient musculoskeletal health literacy with differences between patient and surgeon expectations of foot and ankle surgery. We found that worse baseline patient physical and mental status and higher patients' perceptions of provider partnership building were associated with patient expectations being higher than those of their surgeons.

This study had several limitations. Only 63% of eligible patients were enrolled, making response bias possible. However, this is similar to the enrollment rate of 67% in another study comparing surgeon and patient expectations of TKA and THA,⁵ but lower than that of 77% in one assessing surgeon and patient expectations of THA.¹² In addition, there was no power analysis performed, as the sample size was based on a power analysis for a previous study in this cohort assessing differences in surgeon and patients expectations of foot and ankle surgery.¹⁸ Thus, it is possible that this study was underpowered to detect some associations between patient-surgeon communication and musculoskeletal health literacy with differences in patient and surgeon expectations of foot and ankle surgery. Although we utilized a validated, patient-derived foot and ankle surgery expectations survey,³ it excluded patient and/or surgeon expectations that were not on the survey. The modified PICS questionnaire has been previously utilized in orthopaedic patients,³¹ but it has not been validated in this population. And the study took place at an academic tertiary care hospital, so the findings may not be generalizable to other clinical settings. However, we included surgical patients of seven fellowship-trained foot and ankle surgeons that comprised a large patient cohort, making our results potentially more generalizable to other foot and ankle surgeons.

The associations of worse baseline physical and mental status with discordantly higher patient than surgeon expectations suggest that surgeons should better inform such patients regarding expected foot and ankle surgical outcomes. Similarly, Cody et al. found that worse function, pain, quality of life, and mental health were associated with higher expectations in foot and ankle patients, although they did not compare these with surgeon expectations.² Previous studies have also shown that total hip arthroplasty (THA) patients with higher expectations than their surgeons tended to have worse physical and mental health and quality of life.^{5,12}

Patients who perceived their surgeons to have greater partnership building tended to have a greater number of expectations than their surgeons. It is possible that in these cases, patients were overly optimistic due to an increased sense of partnership with their surgeons. Although such partnership is likely beneficial, it is important for surgeons to ensure that their expectations are aligned with their patients'. A study by Street et al. in TKA patients found that greater patient-perceived provider partnership building was associated with greater patient-surgeon agreement regarding the severity of the patient's osteoarthritis, but

not expected benefits of TKA or concern about surgical complications. However, their assessment of expectations was limited to one question.³¹ Within foot and ankle surgery, it is unclear how physician partnership building relates to patients' understanding of the severity of their condition, which may affect differences between patient and surgeon expectations. Thus, this finding requires further investigation with larger patient cohorts.

We found no associations between patients' perceptions of their own involvement in care on differences in patient and surgeon expectations. Similarly, Street et al. found no associations between patients' perceptions of their own involvement and patient-physician agreement on the severity of osteoarthritis, benefits of TKA, or concern about complications.³¹ However, another study in orthopaedic patients found a low degree of observed patient involvement in care compared to a moderate to high degree of patient-perceived involvement as measured by the PICS.²² Thus, it is possible that in our study the modified PICS was unable to capture variations in patient involvement that may have affected discussion with the surgeon, which may have accounted for differences in expectations between patients and surgeons. For future studies, it would be useful to assess patient involvement in care using a more objective quantification with outside observers.⁴

We also found no associations between patients' perception of provider information giving and differences in patient and surgeon expectations. This suggests that patients perceived that their surgeons were giving them adequate information. However, it is possible that in cases with greater discrepancies between patient and surgeon expectations, patients were less informed, but were unaware of this. To better understand how patients' perceptions of provider information giving aligns with information provided and understanding of that information, it would be useful for future studies to assess patients' understanding of information conveyed during such encounters. Street et al. found that greater patient-perceived physician information giving was associated with greater patient-surgeon agreement on expected benefits of TKA but less agreement on the severity of osteoarthritis.³¹ These conflicting findings highlight that informing patients involves multiple aspects, including both the content and manner of communication.

About one third of the patients in our cohort had limited musculoskeletal literacy. This is comparable to prior studies, which have reported rates of 32% to 57% of limited health literacy among foot and ankle patients.^{23,29} Within hand surgery, patients with limited health literacy have been found to ask fewer questions and spend less time with their surgeons at preoperative clinic visits,^{20,21} perceive themselves to have a more passive role in decision-making,²⁴ and have lower treatment adherence and poorer satisfaction.^{25,26} In our study, the lack of associations between musculoskeletal literacy and differences in patient and surgeon expectations suggests that such differences may not be attributed to a lack of patient understanding of information provided. Rather, it is possible that surgeons are not discussing all patients' expectations, leading to discrepancies that are not addressed. A prior study in TKA and THA patients found that those with inadequate health literacy had lower expectations regarding walking after surgery, but not regarding pain or running, compared to those with adequate health literacy.⁸

In conclusion, we found that worse baseline patient physical and mental status and higher patient perceptions of provider partnership building were associated with greater patient to surgeon differences in expectations of foot and ankle surgery. It may be beneficial for surgeons to have more thorough discussions with patients who have greater disability in order to increase agreement regarding expectations. Moreover, it may be particularly important for surgeons to set realistic expectations with patients whom they have a strong partnership with. Further studies are warranted to understand how modifications in patient and surgeon interactions affect agreement in their expectations of foot and ankle surgery, the role of musculoskeletal literacy on these interactions, and whether there are differences in these associations between patients receiving acute trauma or elective surgery of the foot and ankle.

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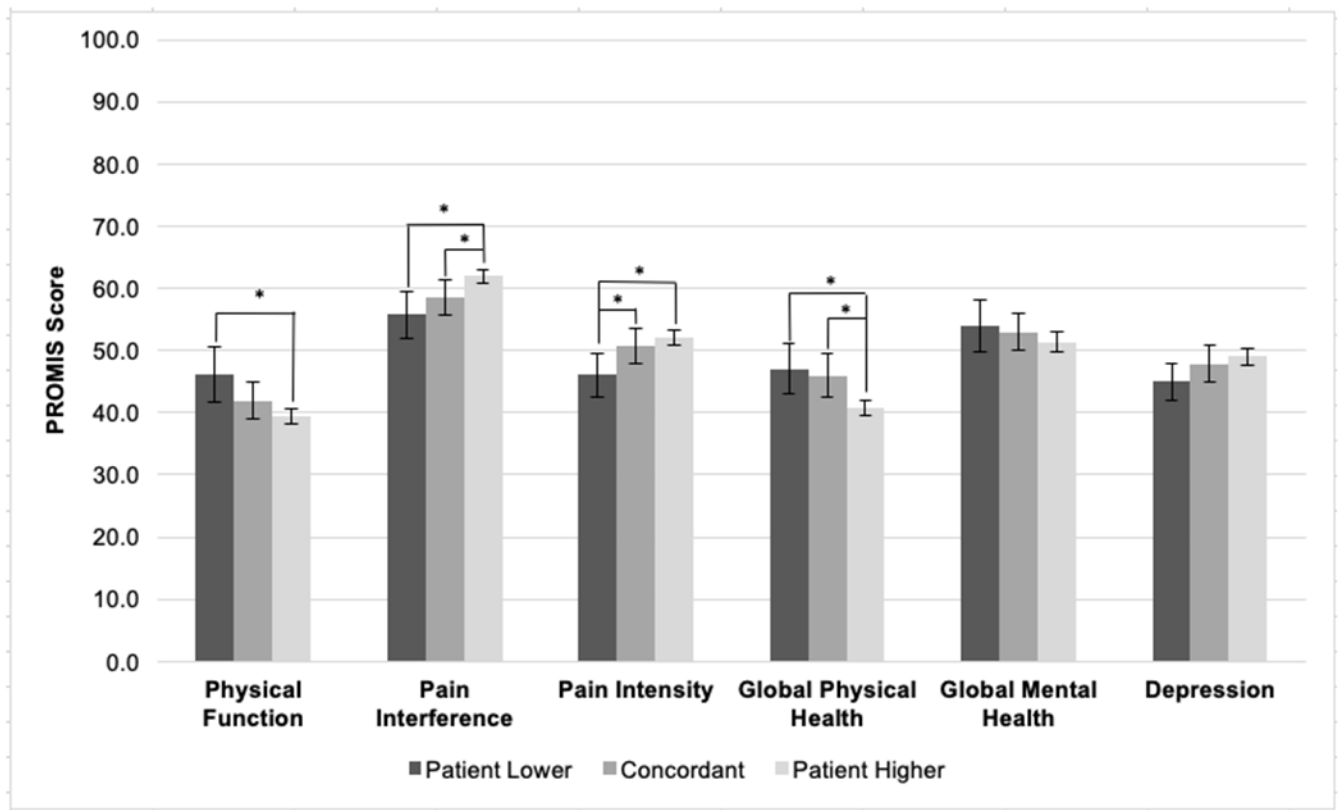


Figure 1.
Differences in PROMIS scores by patient to surgeon expectations score agreement groups.
Errors bars represent 95% confidence intervals. *Significant difference with $p < 0.05$.

Table 1.**Primary Diagnoses and Procedures ***

Primary Diagnosis or Procedure	Frequency¹
Primary Diagnosis	
Hallux valgus	41 (20.3%)
Other	34 (16.8%)
Ankle arthritis	30 (14.9%)
Hallux rigidus	29 (14.4%)
Flatfoot	19 (9.4%)
Chronic tendon injury ²	16 (7.9%)
Midfoot/hindfoot arthritis	12 (5.9%)
Acute trauma	11 (5.4%)
Ankle instability/OCL	10 (5.0%)
Primary Procedure	
Lapidus bunionectomy	31 (15.3%)
Total ankle replacement	25 (12.4%)
Other	24 (11.9%)
Midfoot/hindfoot/ankle fusion	17 (8.4%)
Tendon repair/reconstruction	17 (8.4%)
1st MTPJ fusion	15 (7.4%)
Flatfoot reconstruction	13 (6.4%)
Cheilectomy ± Moberg osteotomy	12 (5.9%)
Bunionectomy (1 st MT osteotomy)	9 (4.5%)
1 st MTPJ synthetic cartilage implant	9 (4.5%)
Hammertoe correction	7 (3.5%)
Ankle stabilization	7 (3.5%)
Neuroma resection	6 (3.0%)
Sesamoidectomy	5 (2.5%)
Ankle ORIF	4 (2.0%)
Excision soft tissue mass	4 (2.0%)
Lesser metatarsal osteotomy	2 (1.0%)
OCL debridement/microfracture	2 (1.0%)
Revision total ankle replacement	2 (1.0%)

* OCL = osteochondral lesion. MTPJ = metatarsophalangeal joint. MT = metatarsal. ORIF = open reduction internal fixation.

¹ Data expressed as n (% of cohort).

² Chronic tendon injuries included chronic tendon tears or tendinopathy of the Achilles, peroneal, or posterior tibial tendons.

Table 2.Relationships Between Baseline Scores and Patient to Surgeon Differences in Expectations¹

Variable	Difference in patient compared to surgeon expectations					
	Overall score		Number of expectations		Number of expectations with complete improvement expected	
	Pearson correlation coefficient	p-value	Pearson correlation coefficient	p-value	Pearson correlation coefficient	p-value
PROMIS scores						
Physical Function	-0.222	0.003 *	-0.338	< 0.001 *	0.000	0.999
Pain Interference	0.246	0.001 *	0.321	< 0.001 *	0.002	0.981
Pain Intensity	0.202	0.009 *	0.233	0.003 *	0.042	0.593
Global Physical Health	-0.307	< 0.001 *	-0.443	< 0.001 *	-0.009	0.904
Global Mental Health	-0.132	0.093	-0.229	0.003 *	0.093	0.237
Depression	0.200	0.009 *	0.272	< 0.001 *	-0.038	0.623
Modified PICS scores						
Patient involvement	-0.009	0.897	0.043	0.552	-0.092	0.198
Provider partnership building	0.086	0.228	0.170	0.017 *	-0.058	0.417
Provider information giving	-0.001	0.989	-0.007	0.925	0.011	0.880
LiMP score	-0.008	0.907	-0.035	0.627	0.054	0.445

¹ PROMIS = Patient-Reported Outcomes Measurement Information System. PICS = Patients' Perceived Involvement in Care Scale. LiMP = Literacy in Musculoskeletal Problems.

* p-value < 0.05.

Table 3.

Patient Baseline Scores by Patient to Surgeon Agreement Level

Patient to surgeon expectation score agreement level				
Score	Patient lower (n = 25)	Concordant (n = 43)	Patient higher (n = 134)	p-value
PROMIS scores ^a				
Physical Function	46.1 ± 9.8	41.9 ± 8.6	39.4 ± 8.1	< 0.001 [*]
Pain Interference	55.8 ± 8.6	58.5 ± 8.1	62.0 ± 6.1	< 0.001 [*]
Pain Intensity	46.1 ± 7.8	50.8 ± 7.9	52.0 ± 6.4	0.002 [*]
Global Physical Health	47.0 ± 9.1	46.0 ± 9.8	40.8 ± 6.7	< 0.001 [*]
Global Mental Health	54.0 ± 9.3	53.0 ± 8.7	51.4 ± 8.3	0.320
Depression	45.0 ± 6.6	47.9 ± 8.2	49.0 ± 7.6	0.077
Modified PICS scores ^a				
Patient involvement	18.5 ± 2.3	17.5 ± 3.2	18.2 ± 3.5	0.348
Provider partnership building	9.7 ± 2.6	10.7 ± 2.8	10.8 ± 2.6	0.195
Provider information giving	18.5 ± 2.0	18.9 ± 2.0	19.1 ± 2.3	0.496
LiMP score ^a	6.4 ± 1.7	5.8 ± 1.7	6.3 ± 1.6	0.158
Limited musculoskeletal health literacy ^b	8 (32.0%)	20 (47.6%) ³	41 (30.6%)	0.155

Abbreviations: LiMP, literacy in musculoskeletal problems; PICS, Patients' Perceived Involvement in Care Scale; PROMIS, Patient-Reported Outcomes

Measurement Information System.

^aValues given as mean ± standard deviation.

^bDefined as a LiMP score < 6. Values given as n (% of group).

^cAccounts for one patient in group missing LiMP questionnaire.

^{*}P < .05 for difference between the 3 groups.