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# Preoperative Psychosocial Factors and Short-term Pain and Functional Recovery After Hip Arthroscopy for Femoroacetabular Impingement Syndrome

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***Context:*** Low mental health scores, depression, and anxiety are associated with worse pain and functional outcomes after hip arthroscopy for patients with femoroacetabular impingement syndrome (FAIS). Preoperative screening of psychosocial factors such as self-efficacy, kinesiophobia, and pain catastrophizing may further aid in identifying patients at risk for poorer outcomes.

***Objective:*** To compare preoperative function and psychosocial factors between patients with and those without elevated postoperative pain 3 months after hip arthroscopy for FAIS.

***Design:*** Prospective cohort study.

***Setting:*** University health center.

***Patients or Other Participants:*** Fifty-one individuals with FAIS (41 women, 10 men; age = 37.6 ± 12.3 years, body mass index = 27.1 ± 4.1 kg/m$^2$).

***Main Outcome Measure(s):*** Preoperatively, participants completed the Pain Self-Efficacy Questionnaire (PSEQ), Tampa Scale for Kinesiophobia (TSK), Pain Catastrophizing Scale (PCS), 12-Item International Hip Outcome Tool (iHOT-12), and a 10-point visual analog scale (VAS) for hip pain at rest and during activity. Three months postoperatively, they completed the PSEQ, TSK, PCS, iHOT-12, and VAS. Preoperative scores were compared between those with (VAS $\geq$ 3) and those without (VAS $<$ 3) elevated postoperative pain using Mann-Whitney U tests, and odds ratios were calculated to determine the odds of having elevated postoperative pain and lower postoperative function.

***Results:*** Participants with elevated postoperative pain at rest and during activity had worse preoperative psychosocial health ($P \leq .04$). Those with elevated postoperative pain at rest had worse preoperative function ($P < .001$). The odds of having elevated postoperative pain at rest were 45 times and 4.5 times higher for those with low self-efficacy and high pain catastrophizing, respectively ($P$ values $\leq .03$). The odds of having elevated postoperative pain during activity were 7.1, 6.2, and 3.5 times higher for those with low self-efficacy, high kinesiophobia, and high pain catastrophizing, respectively ($P$ values $\leq .04$). The odds of having lower postoperative iHOT-12 scores were 7.5 and 14.0 times higher for those with high kinesiophobia and pain catastrophizing, respectively ($P$ values $\leq .03$).

***Conclusions:*** Poor preoperative psychosocial health increased the odds of elevated pain and worse function 3 months after hip arthroscopy for FAIS. This is a first step in identifying the psychosocial factors that may contribute to poorer long-term hip arthroscopy outcomes.

***Key Words:*** pain catastrophizing, kinesiophobia, hip function

**Key Points**

- Preoperative screening of self-efficacy, kinesiophobia, and pain catastrophizing in individuals undergoing hip arthroscopy for femoroacetabular impingement syndrome may be useful, as these psychosocial constructs are associated with worse pain and poorer functional outcomes 3 months after surgery.
- The majority of patients met the minimal clinically important difference for pain at rest, pain during activity, and function 3 months after hip arthroscopy for femoroacetabular impingement syndrome. However, most had not reached the patient-acceptable symptomatic state for pain or function.
- Though self-efficacy, kinesiophobia, and pain catastrophizing improved from before to 3 months after hip arthroscopy, 20.8% had low self-efficacy, 52.1% had high kinesiophobia, and 10.4% of patients still had high pain catastrophizing 3 months after surgery.

Previous researchers provided mounting evidence that measures of psychosocial health such as depressive symptoms and mental health diagnosis (ie, depression and anxiety) are important determinants of long-term postoperative outcomes for patients with femoroacetabular impingement syndrome (FAIS).[1,2] Questions remain regarding the clinical prognostic factors, including specific psychosocial constructs, that contribute most to persistent pain and functional disability after hip arthroscopy. Once they are identified, evidence-based interventions can be developed to mitigate these modifiable factors preoperatively or in the early postoperative period to prevent a

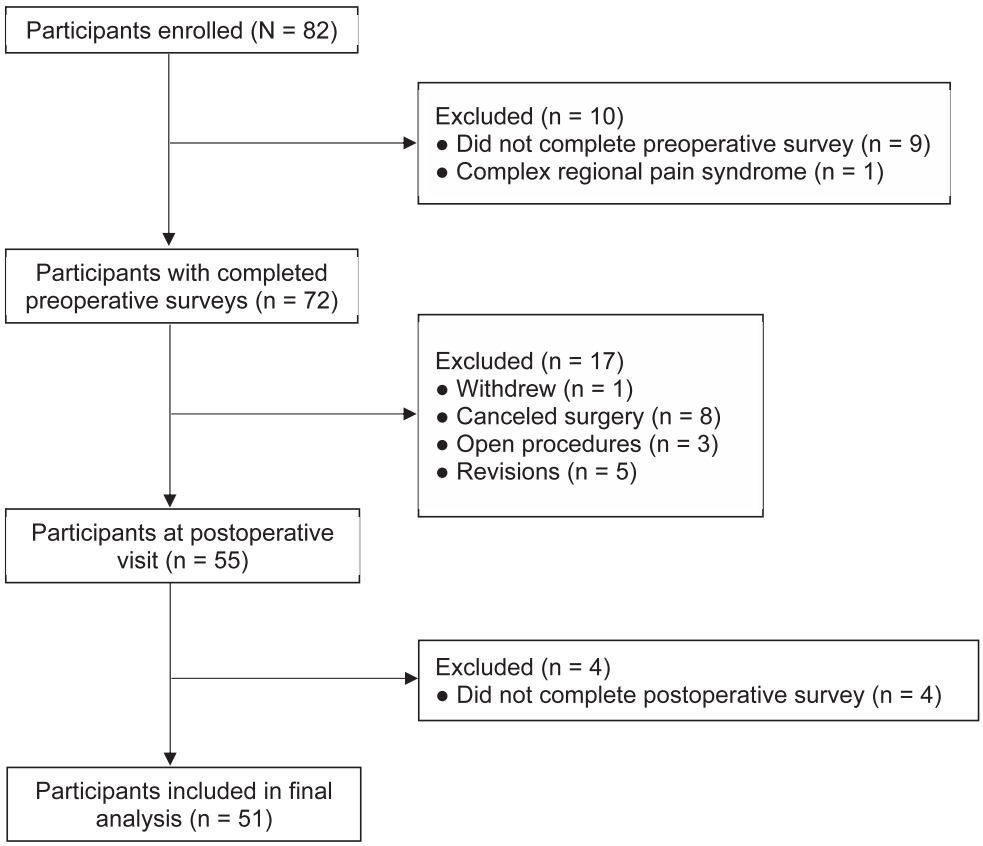


**Figure. Flow diagram detailing enrollment and attrition.**

transition to a chronic pain state and poor postoperative outcome.[3]

Unlike mental health diagnoses, psychosocial constructs such as self-efficacy, kinesiophobia, and pain catastrophizing capture specific negative beliefs about pain that are amendable with individualized evidence-based interventions.[4–6] Given the presence of long-standing pain in patients with FAIS, these psychosocial constructs warrant examination.[7,8] *Pain self-efficacy* reflects a patient's confidence in his or her ability to complete tasks despite the current pain and is a barrier to rehabilitation due to hypervigilance and perpetual disuse.[15,16] *Pain catastrophizing*, an exaggerated, negative response to pain, is associated with more severe, persistent pain in many orthopaedic conditions.[9–12] Patients with high *kinesiophobia*, a fear of painful movement, believe that they should avoid moving their body to avoid or minimize painful situations.[13,14] Low self-efficacy and high kinesiophobia predict increased disability and persistent pain in patients with orthopaedic conditions.[10,17–19]

It is important to examine the effects of these factors in patients with FAIS, as they may highlight opportunities for targeted early postoperative intervention to optimize long-term outcomes. As such, we compared the preoperative presentations of patients with and those without elevated hip pain 3 months after hip arthroscopy in terms of self-reported function and psychosocial health. We hypothesized that participants with elevated postoperative hip pain would have poorer preoperative function and psychosocial health and that poor preoperative psychosocial health would independently result in increased odds of having elevated hip pain 3 months after hip arthroscopy.

## METHODS

### Power Analysis

An interim power analysis was performed using G*Power (version 3.1.9.6; SAS Institute Inc),[20] a Fisher exact model, and data from the first 16 participants. We conducted an interim power analysis as these data were unique to the literature, and as such, a fully informed a priori power analysis could not be performed. The $\alpha$ level was set at .05, and power was set at 0.80. Of the 16 participants, 7 had elevated postoperative pain at rest and 5 of those had high preoperative pain catastrophizing. To determine if participants with high preoperative pain catastrophizing had increased odds of having elevated postoperative pain, a total sample of 50 was required.

### Participants

From April 2017 to August 2018, patients scheduled for primary hip arthroscopy for FAIS were enrolled in this prospective cohort study (Figure). A single surgeon performed all hip arthroscopies. Patients were included if they had closed growth plates (confirmed by radiography) and attempted but failed to improve with nonoperative treatment including intra-articular cortisone injections, physical therapy, and activity modification. Patients with worker's compensation cases, fibromyalgia or complex

regional pain syndrome, or revision arthroscopies were excluded.

### Variables of Interest

Preoperatively, participants reported their demographics and duration of symptoms (DOS); self-reported anxiety or depression (*yes* or *no*); and completed the Pain Self-Efficacy Questionnaire (PSEQ), Tampa Scale for Kinesiophobia (TSK), Pain Catastrophizing Scale (PCS), International Hip Outcome Tool-12 (iHOT-12), and a 10-point visual analog scale (VAS) for hip pain at rest and during activity. Three months postoperatively, they completed the PSEQ, TSK, PCS, iHOT-12, and VAS for hip pain at rest and during activity. We chose 3 months postarthroscopy because (1) it was clinically feasible in the context of the standard of postoperative care and (2) if the data supported the need for future interventions, these could feasibly be incorporated in the standard of preoperative or postoperative care.

Psychosocial health questionnaires (PSEQ, TSK, and PCS) have good test-retest reliability (0.73–0.76) and internal consistency (Cronbach $\alpha$; 0.82–0.93).[9,21,22] The PSEQ has 10 items, and a cut-off score $\leq$40 indicates low self-efficacy.[21] The TSK has 17 items, and a cut-off score $\geq$37 categorizes patients as having high movement-related fear.[23] The PCS has 13 items, and a cut-off score of $\geq$19 categorizes patients with high catastrophizing.[9] These psychosocial health questionnaires focus predominantly on pain as well as the fear and anxiety of injury.

The VAS is a 10-point scale used to measure pain. In this study, participants were asked to "please rate your hip pain, on average, on a scale from zero to ten where zero indicates no pain and ten indicates the worst pain imaginable." Elevated postoperative pain was defined as a VAS of $\geq$3. This threshold has been used by Stone et al[1] to identify patients with persistent pain after hip arthroscopy. The VAS *patient-acceptable symptomatic state* (PASS), the symptomatic threshold beyond which patients consider themselves well, is 3.[1] The VAS *minimal clinically important difference* (MCID), the smallest change that is clinically significant to patients, is 2.[24]

The iHOT-12 is a reliable and valid patient-reported outcome measure that gauges perceived hip function and quality of life in patients with hip disorders.[25] Higher scores on the iHOT-12 indicate higher levels of self-reported function, whereas lower scores indicate poorer self-reported function.[25] The PASS for the iHOT-12 is 63, and a change of 13 points is clinically meaningful.[26]

### Statistical Analysis

We dichotomously categorized patients by using cut-off scores for the PSEQ, TSK, and PCS and by using the PASS scores for the iHOT-12 and VAS. Mann-Whitney U tests were used to identify differences between those with (VAS $\geq$ 3) and those without (VAS $<$ 3) elevated postoperative pain for all variables that did not meet the assumptions of Shapiro-Wilk tests for normality. Age, body mass index (BMI), and iHOT-12 scores were normally distributed and compared between groups using independent *t* tests. All variables were also compared between participants with and those without poor postoperative self-reported function by calculating the appropriate Mann-Whitney *U* or independent *t* test. We conducted Fisher exact tests to examine the odds of having elevated postoperative pain at rest or during activity and of not achieving the iHOT-12 PASS based on preoperative psychosocial health status.

Separate multivariate logistic regressions with forward conditional variable entry were performed to determine if any individual or combinations of variables predicted elevated postoperative hip pain at rest or pain during activity (VAS $\geq$ 3, VAS $<$ 3). We calculated Mann-Whitney *U* or independent *t* tests to compare all variables of interest, including demographics, between the dichotomized pain groups; the 5 variables with the smallest *P* values were added to the regression. For both models, the variables with the smallest *P* values were BMI and 4 preoperative questionnaire scores, namely, PSEQ, TSK, PCS, and iHOT-12. Therefore, these 5 variables were entered in the regression. We found expected collinearity between psychosocial health measures, as overlap in these constructs has been documented. The conditions for entry and removal were 0.05 and 0.10, respectively. All analyses were performed using SPSS (version 25; IBM Corp).

**Table 1. Participant Demographics and Questionnaires**

| Variable | Measure | n | Mean ± SD[a] |
|---|---|---|---|
| Age, y | | 51 | 37.6 ± 12.3 |
| Sex, females/males | | 51 | 41/10 |
| Body mass index, kg/m$^2$ | | 51 | 27.1 ± 4.1 |
| Duration of symptoms, mo | | 51 | 35.3 ± 34.9 |
| Self-reported anxiety or depression, no/yes | | 51 | 32/19 |
| Preoperative score | | | |
| | PSEQ | 48 | 38.2 ± 13.6 |
| | TSK | 48 | 42.6 ± 6.9 |
| | PCS | 51 | 19.5 ± 13.0 |
| | iHOT-12 | 47 | 25.6 ± 16.0 |
| | Pain: rest | 49 | 4.0 ± 2.2 |
| | Pain: activity | 49 | 7.4 ± 2.1 |
| Postoperative score | | | |
| | PSEQ | 48 | 47.8 ± 14.1 |
| | TSK | 48 | 36.5 ± 6.9 |
| | PCS | 48 | 6.6 ± 10.3 |
| | iHOT-12 | 45 | 53.4 ± 21.8 |
| | Pain: rest | 51 | 1.5 ± 1.7 |
| | Pain: activity | 51 | 3.4 ± 2.5 |

Abbreviations: iHOT-12, 12-item International Hip Outcome Tool; PCS, Pain Catastrophizing Scale; PSEQ, Pain Self-Efficacy Questionnaire; TSK, Tampa Scale for Kinesiophobia.

[a] Except where otherwise indicated.

## RESULTS

Fifty-one participants were included in the final analysis (Figure). The average DOS was 35.3 ± 34.9 months, and the average time from study enrollment to surgery was 47.3 ± 40.8 days. More than one-third of participants (37.3%) self-reported anxiety or depression (Table 1). Indicators of poor psychosocial health were present in nearly one-half of participants (low self-efficacy = 47.9% [23/48], high kinesiophobia = 83.3% [40/48], high pain catastrophizing = 51.0% [26/51]).

Participants with elevated postoperative pain (VAS $\geq$ 3) did not differ in terms of sex, age, BMI, DOS, or self-reported anxiety or depression (*P* values $\geq$ .07; Tables 2 and 3). Three months after hip arthroscopy (77.9 ± 31.5

**Table 2. Comparison Between Participants With and Those Without Elevated Pain At Rest 3 Months After Hip Arthroscopy**

| Variable | Measure | Postoperative Visual Analog Scale Score | | *P* Value[a] |
|---|---|---|---|---|
| | | ≥3 (n = 16) | <3 (n = 35) | |
| Sex, females/males | | 12/4 | 29/6 | .71 |
| Age, y | | 40.9 ± 9.9 | 36.0 ± 13.1 | .15 |
| Body mass index, kg/m$^2$ | | 28.6 ± 3.9 | 26.5 ± 4.1 | .09 |
| Duration of symptoms, mo | | 40.1 ± 34.4 | 33.1 ± 35.4 | .32 |
| Self-reported anxiety or depression, no/yes | | 7/9 | 25/10 | .07 |
| Preoperative score | | | | |
| | PSEQ | 28.0 ± 8.6 | 43.2 ± 12.9 | **<.001** |
| | TSK | 44.7 ± 6.1 | 41.6 ± 7.1 | **.03** |
| | PCS | 24.7 ± 12.6 | 17.1 ± 12.7 | **.03** |
| | iHOT-12 | 15.7 ± 10.7 | 30.7 ± 15.9 | **<.001** |
| | Pain: rest | 5.3 ± 2.3 | 3.4 ± 1.9 | **.002** |
| | Pain: activity | 8.4 ± 1.9 | 6.8 ± 2.0 | **.009** |
| Postoperative score | | | | |
| | PSEQ | 37.2 ± 14.5 | 52.6 ± 11.1 | **<.001** |
| | TSK | 38.5 ± 7.1 | 35.6 ± 6.7 | .10 |
| | PCS | 16.1 ± 13.7 | 2.3 ± 3.4 | **<.001** |
| | iHOT-12 | 37.9 ± 17.4 | 61.0 ± 19.8 | **<.001** |

Abbreviations: iHOT-12, 12-item International Hip Outcome Tool; PCS, Pain Catastrophizing Scale; PSEQ, Pain Self-Efficacy Questionnaire; TSK, Tampa Scale for Kinesiophobia.
[a] Bold text denotes significant *P* values.

days), pain at rest (before hip arthroscopy [pre] = 4.0 ± 2.2, 3 months after [3 mo] = 1.5 ± 1.7, $P < .001$) and during activity (pre = 7.4 ± 2.1, 3 mo = 3.4 ± 2.5, $P < .001$) decreased. Thirty-one percent of participants (16/51) did not meet the PASS for pain at rest, and more than one-half did not meet the PASS for pain during activity (57.7%, 30/51). Nearly 1 in 3 participants (30.6%) did not meet the MCID (Δ2 points) for pain at rest, and 1 in 4 (24.5%) did not meet the MCID for pain during activity. Participants with elevated postoperative pain at rest had worse preoperative psychosocial health and function than those without ($P \leq .03$; Table 2). Those with elevated postoperative pain during activity had worse preoperative psychosocial health ($P \leq .04$); however, they did not have worse preoperative function ($P = .06$; Table 3).

Participants with poor postoperative function (iHOT-12 < 63) did not differ in terms of sex, age, BMI, DOS, or self-reported anxiety or depression (*P* values ≥ .06; Table 4). Scores on the iHOT-12 improved postoperatively (pre = 25.57 ± 16.68, 3 mo = 52.54 ± 21.73, $P = .01$); however, more than one-half (64.4%) of participants did not meet the PASS (iHOT-12 ≥ 63), and 28.6% did not achieve the MCID (Δ13 points). Individuals with elevated postoperative pain at rest and during activity had worse postoperative function ($P < .001$). Worse postoperative iHOT-12 scores were seen in those with low self-efficacy (low PSEQ = 45.5 ± 22.7, high PSEQ = 59.2 ± 18.9, $P = .04$), high preoperative kinesiophobia (high TSK = 50.2 ± 22.4, low TSK = 64.5 ± 12.7, $P = .03$), or high preoperative pain

**Table 3. Comparison Between Participants With and Those Without Elevated Pain During Activity 3 Months After Hip Arthroscopy**

| Variable | Measure | Postoperative Visual Analog Scale Score | | *P* Value[a] |
|---|---|---|---|---|
| | | ≥3 (n = 30) | <3 (n = 21) | |
| Sex, females/males | | 22/8 | 19/2 | .17 |
| Age, y | | 38.6 ± 10.5 | 36.1 ± 14.6 | .51 |
| Body mass index, kg/m$^2$ | | 27.9 ± 3.3 | 26.0 ± 4.9 | .13 |
| Duration of symptoms, mo | | 40.9 ± 38.0 | 27.4 ± 29.0 | .17 |
| Self-reported anxiety or depression, no/yes | | 17/13 | 15/6 | .38 |
| Preoperative score | | | | |
| | PSEQ | 32.3 ± 12.7 | 47.0 ± 10.0 | **<.001** |
| | TSK | 44.6 ± 6.2 | 39.7 ± 6.9 | **.02** |
| | PCS | 22.5 ± 13.6 | 15.2 ± 11.1 | **.041** |
| | iHOT-12 | 21.7 ± 13.6 | 31.3 ± 17.8 | .06 |
| | Pain: rest | 4.5 ± 2.3 | 3.4 ± 2.0 | **.05** |
| | Pain: activity | 7.7 ± 1.9 | 7.0 ± 2.3 | .34 |
| Postoperative score | | | | |
| | PSEQ | 40.8 ± 14.7 | 57.7 ± 3.2 | **.003** |
| | TSK | 39.0 ± 7.0 | 33.1 ± 5.0 | **<.001** |
| | PCS | 10.0 ± 12.1 | 1.9 ± 3.5 | **.001** |
| | iHOT-12 | 42.9 ± 18.5 | 69.8 ± 15.7 | **<.001** |

Abbreviations: iHOT-12, 12-item International Hip Outcome Tool; PCS, Pain Catastrophizing Scale; PSEQ, Pain Self-Efficacy Questionnaire; TSK, Scale for Kinesiophobia.
[a] Bold text denotes significant *P* values.

**Table 4. Comparison Between Participants With and Those Without Poor Self-Reported Function 3 Months After Hip Arthroscopy**

| Variable | Measure | Postoperative iHOT-12 Score | | *P* Value[a] |
|---|---|---|---|---|
| | | <63 (n = 29) | ≥63 (n = 16) | |
| Sex, females/males | | 22/7 | 14/2 | .46 |
| Age, y | | 38.7 ± 11.7 | 40.1 ± 13.1 | .71 |
| Body mass index, kg/m$^2$ | | 27.2 ± 4.0 | 27.2 ± 4.9 | .99 |
| Duration of symptoms, mo | | 35.1 ± 31.5 | 35.2 ± 39.6 | .48 |
| Self-reported anxiety or depression, no/yes | | 15/14 | 13/3 | .06 |
| Preoperative score | | | | |
| | PSEQ | 35.4 ± 12.9 | 44.5 ± 13.1 | **.05** |
| | TSK | 44.8 ± 5.6 | 37.8 ± 6.7 | **.002** |
| | PCS | 23.2 ± 13.5 | 10.8 ± 6.6 | **.003** |
| | iHOT-12 | 25.0 ± 16.4 | 28.1 ± 17.4 | .58 |
| | Pain: rest | 4.1 ± 2.4 | 3.6 ± 2.1 | .56 |
| | Pain: activity | 7.2 ± 2.0 | 7.4 ± 2.5 | .61 |
| Postoperative score | | | | |
| | PSEQ | 41.8 ± 14.5 | 57.0 ± 7.4 | **<.001** |
| | TSK | 39.2 ± 6.7 | 31.7 ± 4.4 | **<.001** |
| | PCS | 9.8 ± 11.9 | 1.7 ± 3.6 | **.001** |
| | Pain: rest | 2.1 ± 1.7 | 0.5 ± 1.0 | **.001** |
| | Pain: activity | 4.6 ± 2.4 | 1.5 ± 1.4 | **<.001** |

Abbreviations: iHOT-12, 12-item International Hip Outcome Tool; PCS, Pain Catastrophizing Scale; PSEQ, Pain Self-Efficacy Questionnaire; TSK, Scale for Kinesiophobia.

[a] Bold text denotes significant *P* values.

catastrophizing (high PCS = 42.7 ± 17.8, low PCS = 63.3 ± 20.7, $P = .001$).

Scores on the PCS (preoperative = 19.5 ± 13.0, 3 mo = 6.6 ± 10.3, $P \leq .001$), PSEQ (pre = 38.2 ± 13.6, 3 mo = 47.8 ± 14.1, $P \leq .001$), and TSK (pre = 42.6 ± 6.9, 3 mo = 36.5 ± 6.9, $P \leq .001$) improved postoperatively; however, 20.8% had low self-efficacy, 52.1% had high kinesiophobia, and 10.4% had high pain catastrophizing 3 months after hip arthroscopy. Low preoperative self-efficacy and high preoperative pain catastrophizing independently increased the odds of having elevated postoperative pain at rest and during activity ($P \leq .04$; Table 5). High preoperative kinesiophobia increased the odds of having elevated postoperative pain during activity ($P = .04$) but not at rest ($P = .20$). The odds of not achieving the iHOT-12 PASS were higher for participants with high preoperative pain catastrophizing and kinesiophobia ($P \leq .03$) but not for participants with low preoperative self-efficacy.

Preoperative self-efficacy explained more than one-third of the variance in both elevated postoperative pain at rest and during activity ($R^2 = 0.35$–$0.37$, $P < .001$; Tables 6 and 7). The contribution of PSEQ to the model did not change when TSK and PCS scores were removed, indicating that the collinearity between the psychosocial measures did not affect the overall model.

## DISCUSSION

We compared preoperative function and psychosocial health between patients with and those without elevated pain 3 months after hip arthroscopy. Participants with elevated postoperative pain demonstrated poorer preoperative function and psychosocial health, and poor preoperative psychosocial health independently increased the odds of elevated postoperative pain. Self-efficacy was the strongest psychosocial factor, as it resulted in the greatest odds of having elevated postoperative pain.

The effect of poor psychosocial health on pain and function has been demonstrated in a variety of musculoskeletal conditions. Previous researchers showed that preoperative self-efficacy predicted 6-month walking speed after total knee arthroplasty,[27] and 4-week pain catastrophizing scores were associated with worse pain and function 1 year after traumatic lower extremity injuries.[28] Additionally, high levels of kinesiophobia were associated with poorer functional performance after anterior cruciate ligament reconstruction.[29,30] We noted a similar association between poor psychosocial health, pain, and function.

As hypothesized, all 3 measures of psychosocial health increased the odds of participants having elevated postoperative pain during activity. Only self-efficacy and pain

**Table 5. Odds Ratios (ORs) for Not Meeting Postoperative Pain and Function Patient Acceptable Symptomatic State Scores Based on Preoperative Psychosocial Health**

| Variable | Visual Analog Scale Score ≥3 | | | | iHOT-12 Score <63 | |
|---|---|---|---|---|---|---|
| | Pain: Rest | | Pain: Activity | | | |
| | OR (95% CI) | *P* Value | OR (95% CI) | *P* Value | OR (95% CI) | *P* Value |
| Low PSEQ | 45 (5.1, 396.8) | **<.001** | 7.1 (1.9, 27.3) | **.004** | 2.2 (0.6, 8.3) | .24 |
| High TSK | 4.2 (0.5, 37.6) | .20 | 6.2 (1.1, 35.2) | **.04** | 7.5 (1.2, 45.6) | **.03** |
| High PCS | 4.5 (1.2, 16.8) | **.03** | 3.5 (1.1, 11.2) | **.04** | 14.0 (2.6, 74.0) | **.002** |

Abbreviations: iHOT-12, 12-item International Hip Outcome Tool; PCS, Pain Catastrophizing Scale; PSEQ, Pain Self-Efficacy Questionnaire; TSK, Tampa Scale for Kinesiophobia.

[a] Bold text denotes significant *P* values.

**Table 6. Results of the Multivariate Logistic Regressions to Determine Predictors of Elevated Postoperative Hip Pain at Rest (Visual Analog Scale Score $\geq$ 3)**

| | | | Wald Test | | | Nagelkerke Function | |
|---|---|---|---|---|---|---|---|
| Predictor | β Coefficient | SE | Statistic | *P* Value[a] | Odds Ratio (95% CI) | $R^2$ Value | *P* Value |
| Constant | 2.82 | 1.10 | 6.55 | **.01** | NA | | |
| Preoperative PSEQ score | −0.10 | 0.031 | 9.99 | **.002** | 0.91 (0.85, 0.96) | 0.35 | $\leq$ **.001** |

Abbreviations: NA, not applicable; PSEQ, Pain Self-Efficacy Questionnaire.

[a] Bold text denotes significant *P* values.

catastrophizing increased the odds of having elevated pain at rest. It is unsurprising that kinesiophobia was not associated with pain at rest, as kinesiophobia is a movement-driven fear. Kinesiophobia and pain catastrophizing increased the odds of participants not meeting the iHOT-12 PASS. Poor function and aberrant movement patterns have been associated with poor psychosocial health in patients with orthopaedic conditions of the hip and knee.[31,32] Although we did not assess movement patterns, these findings suggest that future researchers should examine these relationships.

The psychosocial constructs of self-efficacy, kinesiophobia, and pain catastrophizing are of specific interest as they fall within the fear-avoidance model that is used to conceptualize the process from musculoskeletal injury to chronic pain condition.[16] The fear-avoidance model proposes that the way an individual views pain dictates the trajectory of his or her recovery.[16] When pain is viewed as a threat, maladaptive psychosocial belief patterns increase, leading the patient down a path of depression, disability, and worse pain.[16] The relationship between poor psychosocial health and functional disuse is bidirectional. Poor psychosocial health results in reduced movement,[33] and reduced movement leads to stiffness and dysfunction,[34] which in turn reinforce the original set of beliefs. This process is dynamic and maladaptive to successful rehabilitation.[16] Considering this interrelationship, it seems appropriate that we use a more systematic approach for evaluating outcomes after hip arthroscopy to understand the complexity of the relationships among pain, function, and psychosocial health.

We chose 3 months post-hip arthroscopy as the primary endpoint because patients are still in physical therapy and augmenting care is feasible.[35] With appropriate patient identification, evidence-based interventions targeting poor psychosocial health have the potential to improve long-term postarthroscopy outcomes.[3] Furthermore, Flores et al[36] identified the most significant postoperative improvement as occurring within the first 3 months after hip arthroscopy for FAIS. Contrarily, 3 months postoperatively is too early for definitive determinations regarding long-term pain and functional outcomes. Longer-term studies are necessary to validate the current finding that poor psychosocial health was negatively associated with pain and function. Our findings add to the literature in which researchers[1,37,38] described suboptimal pain and functional outcomes after hip arthroscopy. Additionally, they demonstrated a high prevalence of poor preoperative psychosocial health. Taken together with the existing literature, the results from this study support the need for a deeper, more comprehensive understanding of the risk factors for poor hip arthroscopy outcomes.

## Limitations

This study was fully powered for the Fisher exact comparisons but underpowered for the exploratory logistic regressions. Therefore, those findings should be interpreted with caution. The primary variables were preoperative PCS and postoperative VAS scores. Due to time and personnel constraints at follow-up appointments, other questionnaires were missing for some participants. Attempts to collect these data via phone and email follow-ups were unsuccessful. The missing data were not addressed statistically and, thus, should be considered when interpreting results. The average time to follow-up was 77.9 $\pm$ 31.5 days. Although no relationship was evident between days to follow-up and VAS or iHOT-12 scores (*P* values $\geq$ .19), the variability in this range should be considered when interpreting the results. Most participants reported elevated pain during activity or poor self-reported function (or both) 3 months postoperatively. We expect additional improvements, including decreased pain and improved function, may occur as part of the normal recovery process. Additional studies are necessary to determine if these findings on psychosocial health translate to longer-term pain and functional outcomes. Details regarding rehabilitation protocols and activity level were not available. As the rehabilitation protocol and the patient's activity goals will greatly influence recovery after surgery, future researchers should include this information. All participants were recruited from a single fellowship-trained hip preservation surgeon, which limited the external validity. Lastly, we enrolled a greater percentage of females than reported in

**Table 7. Results of the Multivariate Logistic Regressions to Determine Predictors of Elevated Postoperative Hip Pain During Activity (Visual Analog Scale Score $\geq$ 3)**

| | | | Wald Test | | | Nagelkerke Function | |
|---|---|---|---|---|---|---|---|
| Predictor | β Coefficient | SE | Statistic | *P* Value | Odds Ratio (95% CI) | $R^2$ Value | *P* Value |
| Constant | 4.71 | 1.50 | 10.08 | **.002** | NA | | |
| Preoperative PSEQ score | −0.11 | 0.034 | 9.73 | **.002** | 0.90 (0.84, 0.96) | 0.37 | $\leq$ **.001** |

Abbreviation: PSEQ, Pain Self-Efficacy Questionnaire.

[a] Bold text denotes significant *P* values.

large epidemiologic studies.[7,8] Future investigators should also include a more representative distribution of sexes.

## CONCLUSIONS

Poor preoperative psychosocial health independently increased the odds of having elevated postoperative pain and poor function, with self-efficacy as the single most important determinant. Screening of self-efficacy, kinesiophobia, and pain catastrophizing in individuals before hip arthroscopy for FAIS may be a clinically useful tool to aid in identification of patients at risk for poorer pain and functional outcomes.


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