Low Self-Efficacy and High Kinesiophobia Are Associated With Worse Function in Patients With Femoroacetabular Impingement Syndrome

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Context: Femoroacetabular impingement syndrome (FAIS) is a painfully debilitating hip condition disproportionately affecting active individuals. Mental health disorders are an important determinant of treatment outcomes for individuals with FAIS. Self-efficacy, kinesiophobia, and pain catastrophizing are psychosocial factors that have been linked to inferior outcomes for a variety of orthopedic conditions. However, these psychosocial factors and their relationships with mental health disorders, pain, and function have not been examined in individuals with FAIS. **Objective:** (1) To examine relationships between self-efficacy, kinesiophobia, pain catastrophizing, pain, and function in patients with FAIS and (2) to determine if these variables differ between patients with and without a self-reported depression and/or anxiety. **Design:** Cross-sectional. **Setting:** University health center. **Participants:** Fifty-one individuals with FAIS (42 females/9 males; age 35.7 [11.6] y; body mass index 27.1 [4.9] kg/m²). **Main Outcome Measures:** Participants completed the Pain Self-Efficacy Questionnaire, Tampa Scale for Kinesiophobia, Pain Catastrophizing Scale, visual analog scale for hip pain at rest and during activity, and the 12-item International Hip Outcome Tool. Self-reported depression and/or anxiety were recorded. The relationships between psychosocial factors, pain, and function were examined using Spearman rank-order correlations. Independent *t* tests and Mann–Whitney *U* tests were used to evaluate the effect of self-reported depression and/or anxiety on psychosocial factors, pain and function. **Results:** The 12-item International Hip Outcome Tool was correlated with pain during activity ($\rho = -.57, P \leq .001$), Tampa Scale for Kinesiophobia ($\rho = -.52, P \leq .001$), and Pain Self-Efficacy Questionnaire ($\rho = .71, P \leq .001$). The Pain Self-Efficacy Questionnaire was also correlated with pain at rest ($\rho = -.43, P = .002$) and pain during activity ($\rho = -.46, P = .001$). Individuals with self-reported depression and/or anxiety (18/51; 35.3%) had worse self-efficacy and pain catastrophizing ($P \leq .01$). **Conclusion:** Self-reported depression and/or anxiety, low self-efficacy, and high kinesiophobia were associated with more hip pain and worse function for patients with FAIS. These findings warrant further examination including psychosocial treatment strategies to improve the likelihood of a successful clinical outcome for this at-risk population.

Keywords: pain catastrophizing, psychosocial factors, hip pain, depression, anxiety

Femoroacetabular impingement syndrome (FAIS) primarily affects young active individuals and is comprised of limited motion and painful daily activities in the presence of variant hip morphology.^{1–3} Individuals with FAIS often experience hip pain and dysfunction for years prior to receiving the correct diagnosis.^{4–6} Though many patients report improved pain and function following intervention; currently, both surgical and conservative treatments for FAIS are falling short of providing sustained benefit.^{7–9} Conservative treatment including therapy and intraarticular hip injections can improve pain and function in the short term.¹⁰ However, the vast majority of patients have relapsing pain and

functional impairments and thus progress to surgical intervention.^{11,12} At an average of 2 years following hip arthroscopy, 1 in 4 individuals report persistent hip pain and 1 in 3 report unacceptable sports function.^{13,14} One potential barrier to decreasing pain and improving functional outcomes for individuals with FAIS is poor mental health.

Mental health is an important determinant of pain and functional outcomes for individuals with FAIS.^{13–18} Recent cohort studies of 500 and 688 patients, respectively, found self-reported depression and/or anxiety to be a predictor for not achieving acceptable sports function and for persistent postoperative pain 2-year posthip arthroscopy.^{13,14} Additional psychosocial factors such as pain catastrophizing, self-efficacy, and kinesiophobia are key contributors to pain and functional outcomes in orthopedic conditions of the shoulder and knee.^{19–21} However, very limited work has explored their relationships with self-reported depression and anxiety, pain, and functional outcomes for individuals with FAIS.

Pain catastrophizing is a psychosocial factor that involves ruminating on painful experiences, feeling helpless in overcoming painful situations, and magnifying the circumstances surrounding pain or injury.²² Pain catastrophizing has been identified as an important mediator between pain and function.^{23,24} In addition, it is related to worse orthopedic outcomes such as increased disability and persistent pain.^{25,26} Pain self-efficacy is a task- and situation-

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specific psychosocial factor that gauges an individual's confidence in completing tasks despite their current pain.²⁷ Self-efficacy is an important determinant of long-term success following total hip arthroplasty and is a mediator in the relationship between pain and disability.^{28,29} Kinesiophobia, or a fear of movement, is associated with not returning to preinjury levels of activity in individuals postanterior cruciate ligament reconstruction.³⁰ Moreover, fear has been identified as one of the most common reasons individuals do not return to sport following hip arthroscopy for FAIS.^{31,32}

To date, self-efficacy has not been described in patients with FAIS; however, pain catastrophizing and kinesiophobia have been briefly characterized.^{11,33} The first study to examine pain catastrophizing in individuals with FAIS reported a mean Pain Catastrophizing Scale (PCS) score of 23.7 (11.8) in patients with FAIS.¹¹ PCS scores range from 0 to 52 with higher scores representing higher levels of pain catastrophizing.²² This mean score of 23 is above that of healthy individuals (14.5 [9.3]) and the cutoff for clinically relevant pain catastrophizing (≥ 19).^{22,34} Unfortunately, the authors did not examine the relationships between pain catastrophizing, pain, and hip-specific outcome scores. The second study reported a mean PCS score of 17.81 (10.13) and a mean Tampa Scale for Kinesiophobia-11 of 26.22 (5.99).³³ Tampa Scale for Kinesiophobia-11 scores range from 11 to 44 with higher scores representing higher levels of fear.³⁵ Patients who failed to achieve a minimally clinically important difference on a hip-specific outcome score 1 year postoperatively had higher pain catastrophizing, but not kinesiophobia, preoperatively.³³ Collectively, findings from these 2 studies suggest pain catastrophizing may be an important psychosocial factor to consider when treating individuals with FAIS; however, more work needs to be done before clinical recommendations can be made.

The consequences of pain catastrophizing behaviors, deficits in self-efficacy, and increased kinesiophobia on health outcomes in patients with musculoskeletal injuries can be described by the fear-avoidance model by Woby et al.³⁶ This model postulates that patients respond to pain in 1 of 2 ways: avoidance or confrontation. Psychosocial factors influence whether patients will display avoidance behaviors or confront their pain and rehabilitation. For example, high levels of pain catastrophizing and kinesiophobia may lead the patient down an avoidant path resulting in greater disuse and worse function. Contrarily, low levels of pain catastrophizing and kinesiophobia may lead the patient down a confrontational path resulting in greater engagement in rehabilitation and better function. Self-efficacy has been found to serve as a mediator between kinesiophobia and both pain and functional disability.³⁶ Exploring the relationships between pain catastrophizing, self-efficacy, kinesiophobia, pain, and function in individuals with FAIS may shed light on potentially modifiable barriers to optimal recovery.

Current estimates on the prevalence of mental health disorders in individuals with FAIS suggest greater than 1 in 3 patients have comorbid depression and/or anxiety.^{15,37} A 2019 systematic review and meta-analysis of 12 studies concluded that individuals with mental health disorders have significantly worse pain and functional outcomes following hip arthroscopy.¹⁸ Depression has been associated with higher levels of pain catastrophizing in individuals with chronic pain,³⁸ and greater anxiety and depression symptoms are related with worse self-efficacy in individuals with knee osteoarthritis.³⁹ However, in individuals with FAIS, psychosocial factors have not been compared between patients with and without self-reported depression and/or anxiety. It is critically important for rehabilitation specialists to examine these differences in order to understand factors influencing treatment responsiveness. In addition,

it is an important step in developing effective targeted rehabilitation interventions that motivate interdisciplinary relationships to optimize patient outcomes.

Unlike depression and anxiety which require specialized care from a mental health professional, low self-efficacy, kinesiophobia, and pain catastrophizing are amendable with allied health interventions including pain neuroscience education and goal setting. Currently, these evidence-based interventions are precluded by our gap in knowledge regarding the individual or combined roles psychosocial factors play on clinical outcomes in individuals with FAIS. Therefore, the purposes of this study were to (1) examine the relationships between pain catastrophizing, self-efficacy, and kinesiophobia, pain, and function in patients with FAIS and (2) determine if these variables differ between patients with and without self-reported depression and/or anxiety. We hypothesized that higher pain catastrophizing, lower self-efficacy, and higher kinesiophobia would be related with more severe pain and lower function. In addition, we hypothesized that patients with self-reported depression and/or anxiety would have worse psychosocial health, pain, and function. Because of the high prevalence of comorbid mental health disorders and maladaptive pain coping strategies seen in patients with FAIS patients, identifying the predominant factors associated with pain and functional deficits is necessary in order to develop multidisciplinary strategies to improve the likelihood of successful clinical outcomes.

Methods

Study Design and Participants

This project had appropriate approval from the University of Kentucky Institutional Review Board. This cross-sectional study enrolled 82 consecutive patients who provided both oral and written consent. Patients were included if they were diagnosed with FAIS; had closed epiphyseal plates; read and spoke fluent English; and had attempted some type of conservative treatment such as intraarticular cortisone injection, physical therapy, and lifestyle modification. Patients were recruited in person from a single fellowship trained hip preservation surgeon from March 2017 to November 2018. Though treatment decision is not an outcome of interest in this study, it is important to note that some patients went on to surgical intervention, while others continued varied courses of conservative care. Patients who previously underwent hip arthroscopy ($n=5$) were excluded to create a homogenous population. In addition, as pain was a primary variable of interest, patients with fibromyalgia or complex regional pain syndrome were excluded ($n=1$). In total, 51 participants had complete data and met all inclusion criteria (Figure 1).

Variables of Interest

Demographic data and duration of symptoms (months) were recorded. Next, participants completed the PCS, Pain Self-Efficacy Questionnaire (PSEQ), Tampa Scale for Kinesiophobia (TSK), a 10-point visual analog scale (VAS) for hip pain both during rest and activity, and the 12-item International Hip Outcome Tool (iHOT-12). Participants also answered a yes/no question regarding their self-reported mental health (ie, "Do you suffer from anxiety or depression?")

Pain catastrophizing was measured via the 13-item PCS. Participants rated each of the 13 statements on a scale from 0 (not at all) to 4 (all the time). The total PCS score ranges from 0 to

Figure 1 — A flow diagram of participant enrollment and attrition. iHOT-12 indicates 12-item International Hip Outcome Tool.

52, with higher scores demonstrating more frequent or severe catastrophizing.²² The PCS has good internal consistency (Cronbach alpha) of .87 and a test–retest reliability of 0.93.^{22,40} The PSEQ asks participants to rate their confidence on a scale from 0 (not at all confident) to 6 (completely confident) in completing tasks despite their current pain. Scores range from 0 to 60 with higher scores representing higher self-efficacy.²⁷ The PSEQ has an internal consistency (Cronbach alpha) of .92 and a test–retest reliability of 0.73.^{27,41,42} Finally, fear of movement, or kinesiophobia, was measured with the TSK, which has an internal consistency (Cronbach alpha) of .76 and a test–retest reliability of 0.82.³⁵ The TSK is a 17-item scale. Participants read each of the statements and rate them on a scale from 1 (strongly disagree) to 4 (strongly agree). Higher scores indicate greater fear. Self-reported hip function was measured using the iHOT-12. Participants read each of the 12 statements regarding hip-related function and quality of life on a 100-mm VAS. On this scale, 0 represents the worst function and quality of life, and 100 represents the best possible function and quality of life. Lower scores indicate more significant impairment. The iHOT-12 is reliable, valid, and responsive to change with a test–retest reliability of 0.89.⁴³

Measures of hip joint morphology (lateral center-edge angle [LCEA] of Wiberg and alpha angle) were included so that the authors could account for the potential relationships between more severe hip joint morphology and psychosocial health, pain, and function. Anteroposterior pelvis and frog leg lateral radiographs were used to measure LCEAs and alpha angles using McKesson computer-assisted radiographic measurement software (Emageon Inc, Birmingham, AL).⁴⁴ Radiographic analysis was performed by 1 author (K.N.J.). Training on radiographic measurements was provided by co-author and board-certified orthopedic surgeon (S.T.D.). Intraobserver variability was established using 15 sets of hip radiographs unrelated to this study. The author (K.N.J.) measured LCEAs and alpha angles on all 15 sets of radiographs at 2 different time points prior to the start of the study. Intraclass correlation coefficients were established with an intraclass correlation coefficients for intraobserver variability from .89 to .91.

Statistical Analysis

Participant demographics, clinical characteristics, and patient-reported outcome scores were reported. Shapiro–Wilk tests were used to assess the normality of the variables of interest. The

majority of variables (age, body mass index [BMI], duration of symptoms, VAS-pain during activity, PCS, PSEQ, and LCEA) followed a nonnormal distribution. As such, the relationships between PCS, PSEQ, TSK, VAS-pain, and iHOT-12 were examined using Spearman rank-order correlations. Clinically meaningful correlations were considered as a rho of .5 or greater.⁴⁵ Independent *t* tests were used to compare VAS-pain at rest, TSK, alpha angle, and iHOT-12 between individuals with and without self-reported depression and/or anxiety (Bonferroni correction; $P \leq .01$). Mann–Whitney *U* tests were used to compare age, BMI, duration of symptoms, VAS-pain during activity, PCS, PSEQ, and LCEA between individuals with and without self-reported depression and/or anxiety (Bonferroni correction; $P \leq .01$). Hedge *g* effect sizes and 95% confidence intervals were included for comparisons between groups. An effect size of 0.8 was considered large, 0.5 was medium, and 0.2 was small.⁴⁵ All analyses were performed using SPSS Statistics (version 24; IBM Corp, Armonk, NY).

Results

Approximately 35% of the 51 participants self-reported depression and/or anxiety (18/51; 35.3%; Table 1). No demographics, measures of joint morphology, or patient-reported outcome measures differed between men and women ($P \geq .13$). Clinically meaningful correlations ($\rho \geq .5$) were found between the iHOT-12 and pain during activity, PSEQ, and TSK (Table 2). Significant correlations, though just below the cutoff for clinical meaningfulness, were also found between PSEQ and pain at rest and pain during activity. Age, BMI, duration of symptoms, LCEA, and alpha angle were not meaningfully correlated with any of the variables of interest ($\rho \leq -.32$). Participants with self-reported depression and/or anxiety had significantly higher PCS scores and lower PSEQ scores ($P \leq .01$). Differences in PCS and PSEQ scores were supported by large effect sizes (Table 3). They did not differ in terms of sex, age, BMI, or joint morphology. Likewise, they did not report worse pain or function.

Table 1 Participant Demographics and Descriptive Information for Variables of Interest

Variable	N = 51
Age, mean (range)	35.7 (15–56)
Sex, n (%)	
Male	9 (17.6)
Female	42 (82.4)
Self-reported depression and/or anxiety, n (%)	18 (35.3)
BMI	27.1 (4.9)
Duration of symptoms (months), mean (range)	30.5 (1–132)
Pain at rest	4.1 (2.2)
Pain during activity	7.3 (2.0)
PCS	20.1 (13.3)
TSK	42.9 (6.5)
PSEQ	37.8 (13.1)
iHOT-12	25.7 (16.6)
LCEA	30.6° (7.3°)
Alpha angle	60.8° (12.2°)

Abbreviations: BMI, body mass index; iHOT-12, 12-item International Hip Outcome Tool; LCEA, lateral center-edge angle; PCS, Pain Catastrophizing Scale; PSEQ, Pain Self-Efficacy Questionnaire; TSK, Tampa Scale for Kinesiophobia. Note: Values are presented as mean (SD).

Table 2 Relationships Between PCS Scores, PSEQ scores, TSK Scores, VAS-Pain (at Rest and During Activity), and iHOT-12 Scores Were Examined Using Spearman Rank-Order Correlations

Variable	VAS-pain (rest)	VAS-pain (activity)	iHOT-12	TSK	PSEQ
PCS	.30 (.04)*	.28 (.05)*	-.34 (.02)*	.61 (<.001)*	-.38 (.006)*
PSEQ	-.43 (.002)*	-.46 (.001)*	.71 (<.001)*	-.56 (<.001)*	—
TSK	.07 (.64)	.16 (.28)	-.52 (<.001)*	—	—
iHOT-12	-.37 (.01)*	-.57 (<.001)*	—	—	—
VAS-pain (activity)	.53 (<.001)*	—	—	—	—

Abbreviations: iHOT-12, 12-item International Hip Outcome Tool; PCS, Pain Catastrophizing Scale; PSEQ, Pain Self-Efficacy Questionnaire; TSK, Tampa Scale for Kinesiophobia; VAS, visual analog scale. Note: Bold values signifies a potentially clinically meaningful correlation. Reported as rho (*P* value).

*Significant correlation at the .05 level.

Table 3 Differences Between Demographics, Psychosocial Factors, Pain, and Function Between Participants With and Without Self-Reported Depression and/or Anxiety (Reported as Mean [SD])

Variable	Self-reported depression and/or anxiety	No self-reported depression and/or anxiety	<i>P</i> value	Hedges <i>g</i>	95% CI
Age	37.3 (11.6)	34.8 (11.6)	.43	0.21	-0.36 to 0.79
Sex (M/F)	2/16	7/26	.46	—	—
BMI	27.7 (3.9)	26.9 (5.4)	.20	0.16	-0.41 to 0.74
DOS	34.0 (32.3)	28.7 (31.4)	.26	0.16	-0.41 to 0.74
Pain at rest	4.5 (2.3)	4.0 (2.2)	.42	0.22	-0.35 to 0.80
Pain during activity	8.0 (1.9)	7.0 (2.0)	.10	0.50	-0.08 to 1.09
PCS	27.1 (15.4)	16.3 (10.4)	.01*	0.86	0.27 to 1.47
TSK	45.6 (6.9)	41.4 (5.9)	.04*	0.66	0.08 to 1.26
PSEQ	31.1 (12.1)	41.6 (12.3)	.006*	-0.85	-1.45 to -0.25
LCEA	28.9 (7.5)	31.5 (7.1)	.39	-0.35	-0.94 to 0.22
Alpha angle	60.9 (12.1)	60.7 (12.4)	.95	0.02	-0.56 to 0.59
iHOT-12	20.7 (16.7)	28.4 (16.1)	.12	-0.46	-1.05 to 0.11

Abbreviations: BMI, body mass index; CI, confidence interval; DOS, duration of symptoms; F, female; iHOT-12, 12-item International Hip Outcome Tool; LCEA, lateral center-edge angle; M, male; PCS, Pain Catastrophizing Scale; PSEQ, Pain Self-Efficacy Questionnaire; TSK, Tampa Scale for Kinesiophobia.

*Statistically significant $\leq .01$.

Discussion

This study aimed to examine the relationships between pain catastrophizing, self-efficacy, kinesiophobia, pain, and function in individuals with FAIS. Our hypothesis that higher pain catastrophizing, lower self-efficacy, and higher kinesiophobia would be related with worse pain, and function was partially supported. Lower self-efficacy was related with worse pain and function, and higher kinesiophobia was related with worse function. However, higher pain catastrophizing was not meaningfully related with worse pain or function. In addition, this study identified that participants with self-reported depression and/or anxiety had higher pain catastrophizing and lower self-efficacy than those without self-reported depression and/or anxiety.

Pain is complex and can rarely be explained entirely by a single variable; however, the current study demonstrates the importance of considering self-efficacy when evaluating pain in patients with FAIS. Low self-efficacy is related to a variety of poor outcomes in both nonoperative management and postoperative rehabilitation of musculoskeletal conditions.^{36,46–48} These consequences range from increased pain and disability to reduced function. Though findings from this study cannot be extrapolated to posthip arthroscopy outcomes, the characterizations of poor psychosocial health

provides guidance regarding potential treatment targets in the future. Evidence-based interventions such as goal setting have shown success in improving self-efficacy.^{49–51} Beneficially, goal setting is an intervention accessible to any allied health professionals (ie, athletic trainers, physical therapists, nurses, etc), which extends its applicability in the rehabilitative setting.

In the current study, both low self-efficacy and high kinesiophobia were related with worse function in individuals with FAIS ($\rho = .71$ and $-.52$, respectively). However, the authors did not find a clinically meaningful correlation between pain catastrophizing and function ($\rho = -.34$). The mean PCS score in the current study (20.1 [13.3]) falls between the 2 previously reported in individuals with FAIS (23.7 [11.8] and 17.81 [10.13]).^{11,33} Given that Clapp et al³³ found an association between higher baseline PCS scores and not achieving a minimally clinically important difference for a hip-specific outcome score 1 year following hip arthroscopy, the implications of high pain catastrophizing may be found in longitudinal assessments of pain or functional outcomes.

Findings from this study support that patients' perception and their injury influences their pain experience and functional status. This is consistent with Woby's fear-avoidance model, which suggests these psychosocial factors play an integral role in

avoidance or confrontation of injury recovery.³⁶ As such, the current findings have important implications for treating physicians and rehabilitation specialists. Clinicians should be aware of these associations and should consider screening for low self-efficacy or high kinesiophobia in individuals not responding to normal therapeutic interventions. Future studies should examine adjunct allied health interventions aimed at increasing self-efficacy and lowering kinesiophobia. Such treatment interventions (eg, pain neuroscience education, mindfulness, and goal setting) have demonstrated success in increasing self-efficacy and lowering kinesiophobia in other orthopedic populations.^{49–54} The current findings add support to a growing body of literature warranting psychosocial intervention studies in patients with FAIS.

Psychosocial and Mental Health in FAIS

A growing body of literature in patients with FAIS suggests those with self-reported mental health disorders, specifically anxiety or depression, present with worse pain, have worse postoperative pain and function, and an increased prevalence of prolonged opioid use.^{13–18,37} Findings from the current study suggest individuals with self-reported depression and/or anxiety have higher pain catastrophizing and lower self-efficacy. Interestingly they did not report worse pain or function. The authors hypothesize that poor psychosocial health may be the intermediary between mental health disorders and pain and functional outcomes. To support this hypothesis, a 2015 study by Skidmore et al⁴⁶ identified that in patients with chronic low back pain, a change in depressive symptoms predicted changes in pain, and this relationship was mediated by pain self-efficacy. Those patients that were able to increase their confidence to perform activities, despite their current pain, displayed fewer depressive symptoms and reported less pain following a 4-week rehabilitation program. Future work should focus on understanding the complex interactions between mental health disorders, psychosocial factors, and pain and functional outcomes in individuals with FAIS.

Limitations

This study was not without limitations. First, as with any cross-sectional study design, the authors cannot assume cause and effect of poor psychosocial health on pain and function. The lack of a comparison arm is a limitation of these findings, and as such, future studies should include both a group of patients with FAIS who respond favorably to conservative treatment and a control group of healthy age-matched patients. A more thorough comparison could include an asymptomatic group of matched patients with similar hip morphology. The authors are currently performing a longitudinal study to assess the effect of pain catastrophizing, self-efficacy, and kinesiophobia on posthip arthroscopy outcomes; however, at this time, the lack of correlation to long-term outcomes is a notable limitation. Though no demographics, measures of joint morphology, or patient-reported outcome measures (including psychosocial, pain, and functional outcomes) differed between the sexes ($P \geq .13$), the predominantly female cohort is a limitation to the external validity of these results. Depression and/or anxiety were self-reported. Thus, participants in this group may not have met the clinical diagnostic criteria for having depression and/or anxiety. Finally, the heterogeneity of this patient population must be noted. The authors attempted to control for this by excluding patients who did not complete the standard of care nonoperative treatment and those who were undergoing revision arthroscopy.

Conclusion

Low self-efficacy and high kinesiophobia were related with worse function in individuals with FAIS. Furthermore, low-self efficacy and low function were related with worse pain during activity, and low self-efficacy was related with worse pain at rest. About 35.3% of participants self-reported depression and/or anxiety, and those individuals had lower self-efficacy and higher pain catastrophizing. As mental health disorders, low self-efficacy, and high kinesiophobia have been linked to poorer outcomes in other orthopedic populations, future studies should focus on evaluating the effect of self-efficacy and kinesiophobia on longitudinal treatment outcomes as well as on the development of treatment strategies and interventions aimed at improving the likelihood of a successful clinical outcome for these high-risk groups.

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