


# Factors associated with high pain catastrophizing in patients undergoing hip arthroscopy for femoroacetabular impingement syndrome

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## ABSTRACT

The purpose of this study was to determine if physical, mental health and patient-specific factors are associated with increased Pain Catastrophizing in patients undergoing hip arthroscopy for femoroacetabular impingement syndrome (FAIS). Patients who underwent primary hip arthroscopy for FAIS were retrospectively analyzed. Patients were included if they completed a standard pre-operative questionnaire which included the Pain Catastrophizing Scale (PCS), VAS and 12-Item Short Form Survey (SF-12) Physical and Mental Composite Scores. Patient-specific variables including age, gender, BMI, tobacco use, number of allergies, pre-operative opioid use and diagnosis of depression or anxiety were recorded. Multiple linear regression was performed to assess for a relationship between physical and mental health scores, patient-specific variables, and a 'High Catastrophizing' PCS score. One-hundred and sixty-eight patients were included in this study. Patients with a PCS score of 22 or above were categorized as 'High Catastrophizing'. The variables included in the multiple linear regression model statistically significantly predicted high pain catastrophizing,  $F(10,149) = 4.75$ ,  $P < 0.001$ ,  $R^2 = 0.4$ . SF-12 Physical and Mental Composite Scores and a mental health illness diagnosis added statistically significantly to the prediction,  $P < 0.005$ . Pre-operative hip arthroscopy patients with better general physical and mental health, as measured by the SF-12, and those without mental health illness are less likely to having higher pain catastrophizing scores. Age, gender, BMI, visual analog pain scale (VAS), tobacco use, number of allergies and pre-operative opioid use were not independently associated with elevated pain catastrophizing scores. These findings may be helpful when interpreting PCS scores and counseling patients prior to arthroscopic hip surgery.

## INTRODUCTION

Hip arthroscopy for the treatment of femoroacetabular impingement syndrome (FAIS) has demonstrated good early to mid-term outcomes in patients presenting without advanced osteoarthritis [1–3]. The number of hip arthroscopy procedures performed has rapidly grown in recent years [4]. Appropriate patient understanding of post-operative expectations have been touted as critical factors for success after hip arthroscopy [5, 6]. Patient mental health and psychological state has been recognized as a factor associated with both pre-operative pain and functional status as well as post-operative outcomes for a variety of

orthopedic procedures, including hip arthroscopy [1, 7–12]. Of interest when examining various components of patient's psychological state is the presence of pain catastrophizing tendencies. Pain catastrophizing has been described as an exaggerated negative mental state in response to an actual or anticipated painful experience, and has been associated with increased levels of pre- and post-operative pain, as well as decreased patient reported, health related, quality of life scores and poorer surgical outcomes [1, 13–16]. The most widely used and validated measure of pain catastrophizing is the Pain Catastrophizing Scale (PCS) [16, 17]. Several studies have assessed whether

other measurable patient-specific factors may be associated with elevated pain catastrophizing in specific patient populations [18, 19]. The purpose of this study was to determine if patient-specific factors are associated with elevated scores on the PCS for patients undergoing primary hip arthroscopy for the treatment of FAIS.

## METHODS

This study was granted exempt approval by the University of South Carolina institutional review board. This was a retrospective—cross sectional study. Data from all consecutive patients who underwent primary hip arthroscopy for symptomatic labral tears and/or femoroacetabular impingement by a single surgeon (G.D.D.) from May 2018 to October 2019 was retrospectively analyzed. Patients were included if they underwent primary hip arthroscopy for symptomatic labral tears and/or femoroacetabular impingement and completed a standardized pre-operative patient-reported outcome measure (PROM) questionnaire at their pre-operative orders visit. Patients were excluded if they underwent revision hip arthroscopy or hip arthroscopy for non-labral and/or FAIS pathologies. The questionnaire included the PCS as well as the 12-Item Short Form Survey (SF-12) Mental Composite (MCS-12) and Physical Composite Scores (PCS-12).

The PCS is a 13-item psychometric instrument used for assessment of pain catastrophizing thoughts and emotions in patients. In the assessment, 13 thoughts, such as 'I become afraid that the pain will get worse' are presented. Patients are instructed to reflect upon past painful experiences and indicate the degree to which they experienced each of the 13 items on a scale of 0 ('not at all') to 4 ('all the time'). A total PCS score, ranging from 0 to 52 is then calculated by summing the responses to all 13 items [17].

The SF-12 is a 12-item generic assessment of patient-reported health-related quality of life. Scoring the SF-12 results in two sub-scores, MCS-12 and PCS-12. These sub-scores, each ranging from 0 to 100, reflect a patient's general mental and physical health, respectively with '0' being extremely ill and '100' being extremely healthy [18]. A total SF-12 score is the average of all 12 questions.

Electronic medical records (EMRs) were queried and patient-specific variables including age, gender, BMI, tobacco use, number of allergies, pre-operative opioid use, diagnosis of depression or anxiety were recorded and medication use for depression or anxiety were recorded. Diagnosis and medication use for depression and anxiety were recorded, if either self-reported by the patient and/or presently existing in the EMR.

Patients were dichotomized according to their PCS scores as either 'High Catastrophizing' or 'Not High

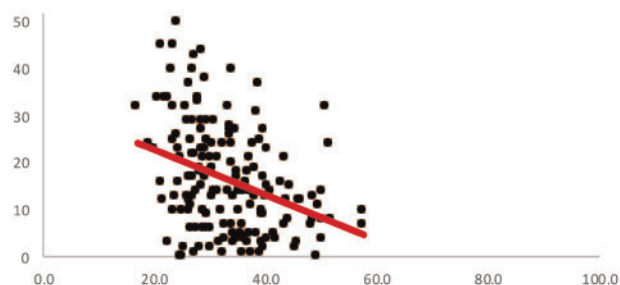


Fig. 1. PCS versus SF-12 Physical Component Score.

'Catastrophizing'. Patients with a PCS score greater than or equal to the 70th percentile of scores recorded in this study were categorized as 'High Catastrophizing'. SPSS Statistics (Version 26, IBM SPSS, Armonk, NY, USA) was used for statistical analysis. Multiple linear regression analysis was performed to identify variables associated with 'High Catastrophizing'.

## RESULTS

One-hundred and sixty-eight patients in our series met inclusion criteria for this study, including 119 females and 49 males. The mean age was  $35.7 \pm 13.6$  years (range of 15–77). The mean pre-operative PCS score was  $16.5 \pm 11.3$  (range 0–50). A PCS score of 22/52 corresponded to the 70th percentile in this series. Fifty-two of one-hundred sixty-eight (30%) of patients were classified as high pain catastrophizers. The mean pre-operative SF12 PCS score was  $33.2 \pm 8.2$  (range 16.8–57.4). The mean pre-operative SF12 MCS score was  $53.8 \pm 9.7$  (range 18.36–69.7). PCS scores exhibited a positively skewed normal distribution as illustrated in Fig. 1. Figure 1 shows PCS scores relative to SF-12 PCS scores. Figure 2 shows PCS scores relative to SF-12 MCS scores. Forty-nine of one-hundred and sixty-eight (29.2%) patients had a diagnosis of depression or anxiety. Forty-eight of one-hundred and sixty-eight (28.6%) patients were taking a medication for treatment of depression or anxiety. In total, 62/168 (36.9%) patients were either diagnosed with or taking a medication for anxiety or depression, and thus categorized as having depression or anxiety. The variables included in the multiple linear regression model statistically significantly predicted high pain catastrophizing,  $F(10, 149) = 4.75$ ,  $P < 0.001$ ,  $R^2 = 0.24$ . SF-12, PCS-12 and MCS12 and a diagnosis or treatment of depression or anxiety added statistically significantly to the prediction,  $P < 0.005$ . Age, gender, BMI, VAS, tobacco use, number of allergies and pre-operative opioid use were not independently associated with elevated pain catastrophizing scores.

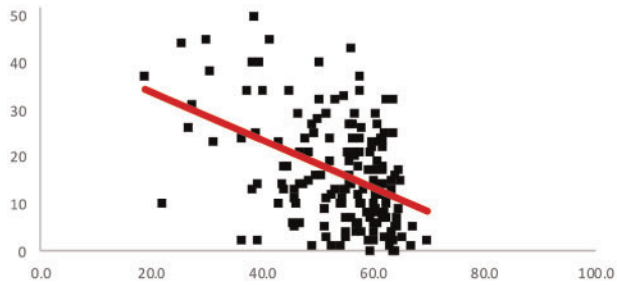


Fig. 2. PCS versus SF-12 Mental Component Score.

## DISCUSSION

This study sought to identify patient-specific variables associated with elevated pain catastrophizing scores in patients undergoing primary hip arthroscopy for the treatment of FAIS. Our results show that patients with lower physical and mental health, as assessed by SF-12 PCS and MCS scores, as well as those with a diagnosis or being treated for depression or anxiety were more likely to have high levels of pain catastrophizing. Other patient-specific variables including age, gender, BMI, VAS, tobacco use, number of allergies and pre-operative opioid use were not independently associated with elevated pain catastrophizing scores in our series.

A cutoff PCS score based on the 70th percentile of scores in the series was utilized to define 'High Catastrophizing', which was equivalent to a PCS score of 22/52. Previous studies have suggested that it is clinically useful to determine a cutoff value for PCS scores when considering elevated PCS as a risk factor for outcomes and that this cutoff for clinical significance varies with patient population. A cutoff at the 70th percentile has previously been used in similar assessments [17, 20]. Though many individual patient-specific factors in our series were not correlated with pain catastrophizing tendencies, it remains possible that these factors contribute to the overall physical and mental health status of patients, which is reflected in the PCS and MCS subscales of the SF-12.

An understanding of individual patients' pain catastrophizing tendencies may offer an opportunity for improved pre-operative counseling regarding expectations of surgery and post-operative course. A patient's level of pain catastrophizing is not a static, but rather a dynamic quality that may be impacted by current mental or physical well-being. It is plausible that the treatment and subsequent improvement of a painful condition may enable a patient's level of pain catastrophizing to decrease [21]. This study did not examine changes in pain catastrophizing in the post-operative period.

Elevated levels of pain catastrophizing have previously been correlated with relatively poorer surgical outcomes in

other surgical procedures, however are not intended to be treated as contraindication to an otherwise clinically indicated surgical treatment [22]. Previous studies have also linked depression with poorer pre- and post-operative patient-reported outcomes in the context of hip arthroscopy [11, 23]. Our study also noted that the diagnosis or current treatment of depression or anxiety was associated with higher pain catastrophizing in patients with FAIS.

Adding the PCS to general health and hip-specific PROM may help guide the surgeon's pre-operative discussion with patients and also help set appropriate expectations for post-operative recovery.

## Limitations

This study has limitations including its retrospective nature and small size. Additionally, patient willingness to answer questions regarding psychological state may vary. The identification and diagnosis of mental illness remains a challenge and the study relied on patient self-reporting of these diagnoses and/or medical record accuracy regarding prescribed medications for diagnosed mental health illness. This study did not evaluate the impact of pain catastrophizing on outcomes of treatment, which yield valuable information.

## CONCLUSION

Pre-operative hip arthroscopy patients with better general physical and mental health, as measured by the SF-12, and those without mental health illness are less likely to having higher pain catastrophizing scores. Age, gender, BMI, VAS, tobacco use, number of allergies and pre-operative opioid use were not independently associated with elevated pain catastrophizing scores. These findings may be helpful when interpreting PCS scores and counseling patients prior to arthroscopic hip surgery.

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## CONFLICT OF INTEREST STATEMENT

None declared.

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