Title

Self-reported Mental Disorders Negatively Influence Surgical Outcomes After Arthroscopic Treatment of Femoroacetabular Impingement

Journal

Orthopaedic Journal of Sports Medicine, 6(5)

ISSN

2325-9671

Authors

Lansdown, Drew A
Ukwuani, Gift
Kuhns, Benjamin
et al.

Publication Date

2018-05-01

DOI

10.1177/2325967118773312

Peer reviewed

Self-reported Mental Disorders Negatively Influence Surgical Outcomes After Arthroscopic Treatment of Femoroacetabular Impingement

Drew A. Lansdown,*† MD, Gift Ukwuani,‡ MD, Benjamin Kuhns,§ MD, Joshua D. Harris,‖ MD, and Shane J. Nho,‡ MD, MS

Investigation performed at Rush University Medical Center, Chicago, Illinois, USA

Background: Femoroacetabular impingement (FAI) is responsible for hip pain and dysfunction, and surgical outcomes depend on multiple factors. The presence of mental disorders negatively influences outcomes of multiple orthopaedic conditions, although the impact on FAI surgery is unclear.

Hypothesis: The authors hypothesized that a preoperative self-reported history of mental disorders would negatively influence patient-reported outcome measures after FAI surgery.

Study Design: Cohort study; Level of evidence, 3.

Methods: A matched-cohort study was performed by reviewing a prospectively collected database of cases of arthroscopic management of FAI with a single surgeon over a 2-year period. Demographics and radiographic parameters were recorded for all patients. Patients completed the Hip Outcome Score–Activity of Daily Living Subscale (HOS-ADL), Hip Outcome Score–Sport-Specific Subscale (HOS-SSS), and modified Harris Hip Score (mHHS) prior to surgery and 2 years after surgery. Unpaired and paired *t* tests were used to compare results between and within cohorts at baseline and follow-up. Statistical significance was defined as $P < .05$.

Results: The cohort included 301 patients, with 75 and 226 patients reporting and not reporting a history of mental disorders, respectively. Before treatment, all patient-reported outcome measures were significantly lower among patients reporting a history of mental disorders ($P < .01$ for HOS-ADL, HOS-SSS, and mHHS). Patients in both groups demonstrated significant improvements ($P < .0001$) in HOS-ADL, HOS-SSS, and mHHS when preoperative outcome measures were compared with follow-up. Patients with reported mental disorders had significantly lower scores after surgery as compared with patients without mental disorders ($P < .0001$ for HOS-ADL, HOS-SSS, and mHHS).

Conclusion: The presence of a reported mental disorder is associated with lower patient-reported outcomes before and after surgical management of FAI. Statistically significant and clinically relevant improvements were observed for patients who reported mental disorders. The magnitude of these improvements was not as large as that for an age- and sex-matched control group without a self-reported mental disorder.

Keywords: femoroacetabular impingement; mental disorders; hip arthroscopy outcomes

Femoroacetabular impingement (FAI) is an increasingly recognized entity responsible for hip pain and impaired hip function.[20] Advances in diagnostics, surgical techniques, and rehabilitation protocols have greatly improved postoperative outcomes and have allowed a high level of return to activities.[13,18] Despite these improvements, surgical results remain variable and influenced by completeness of impingement correction, degree of arthritis, capsular integrity, and patient age.[6,16,24] Utilization of hip arthroscopy for management of FAI continues to rise, emphasizing the importance of clarifying which patient-specific preoperative factors influence surgical outcomes.[2,17]

Mental disorders are quite common, with an estimated worldwide incidence of 29.2% of people experiencing any mental disorder at some point in their lifetimes.[27] These conditions have a profound effect on function, with major depressive disorder among the leading causes of disability.[15] High levels of psychiatric distress portend inferior pre- and postoperative pain, function, and patient-reported outcomes in several conditions in

The Orthopaedic Journal of Sports Medicine, 6(5), 2325967118773312
DOI: 10.1177/2325967118773312

musculoskeletal medicine, including low back pain,[1,4,7,28] arthritis,[9,14] chronic shoulder pain,[25,26] and chronic hand problems.[30] Potter et al[23] demonstrated that increasing levels of psychiatric distress, as measured by the Distress Risk Assessment Method, were associated with lower preoperative self-assessment of hip function. Patients with psychiatric distress were also found to require postoperative regional anesthesia (fascia iliaca nerve block) at a higher rate than patients without psychiatric distress, suggesting that initial postoperative pain may be influenced by psychiatric comorbidities.[22]

The purpose of this study was to determine if the presence of mental disorders negatively affects patient-reported outcomes among those undergoing arthroscopic treatment of FAI at 2-year follow-up. We hypothesized that a self-reported history of a mental disorder would negatively affect patient-reported outcome measures 2 years after arthroscopic treatment of FAI.

METHODS

A matched-cohort study was performed that included patients undergoing hip arthroscopy between January 1, 2012, and December 31, 2014. Data were prospectively collected as part of an institutional database and then retrospectively reviewed. Inclusion criteria consisted of a diagnosis of FAI syndrome, a history of arthroscopic surgical treatment, and an ability to complete all requested questionnaires prior to surgery and at 2 years after surgery. Exclusion criteria included patients undergoing revision surgery and having incomplete survey data at baseline or 2-year follow-up time point. Patients who underwent revision surgery or conversion to total hip arthroplasty were excluded from comparison of outcome scores. All procedures were approved by an institutional review board, and all patients provided informed consent to participate in the data registry.

Cohort Identification

Patients with a history of a mental disorder were matched at a 1:3 ratio to patients without a history of mental disorders. Mental disorder was defined as a history of depression, anxiety, bipolar disorder, posttraumatic stress disorder, or attention-deficit/hyperactivity disorder, as self-reported by patients on intake surveys. In total, 84 patients with a history of mental disorders were identified over the duration of the study. Nine patients were lost to follow-up, leaving 75 (89.3%) with 2-year follow-up. A total of 252 patients who did not report a history of mental disorders were identified through age (±3 years) and sex matching, with 226 (89.7%) completing 2-year follow-up surveys.

Demographic information was recorded for each patient, including age, sex, body mass index, and any patient-reported history of smoking. Additionally, for all patients, the alpha angle was measured on a 90° Dunn lateral radiograph, and the lateral center-edge angle was recorded from a standing anteroposterior radiograph.

Surgical Treatment

All patients were treated with hip arthroscopy by the senior surgeon (S.J.N.). Postoperatively, all patients were prescribed protected weightbearing for 6 weeks and a standardized physical therapy program.

Postoperative Evaluation

Patients completed electronic survey instruments prior to surgical treatment and at 2 years after surgery. Surveys obtained at both time points included the Hip Outcome Score–Activity of Daily Living Subscale (HOS-ADL), Hip Outcome Score–Sport-Specific Subscale (HOS-SSS), and modified Harris Hip Score (mHHS). At the 2-year follow-up point, patients completed a visual analog scale (VAS) for pain and satisfaction (each 0-100 mm).

Statistical analyses were performed with Stata (v 14; StataCorp). Unpaired t tests were used to compare means of continuous variables, and Fisher exact tests were used to compare categorical variables. Paired t tests were used to compare means of matched outcome measures from presurgery to follow-up. Statistical significance was defined as $P < .05$. Clinical relevance was defined as meeting or exceeding the minimal clinically important difference (MCID) for HOS-ADL, HOS-SSS, and mHHS scores (8.3, 8.2, and 14.5 points, respectively).[19]

RESULTS

The final study cohort included 301 patients: 75 with a self-reported history of mental disorders and 226 who did not report a history of mental disorders. The cohort reporting a history of mental disorders included 57 patients with depression (76%), 27 with anxiety (36%), 6 with attention deficit/hyperactivity disorder (8%), 3 with posttraumatic stress disorder (4%), and 2 with bipolar disorder (3%). The

*Address correspondence to Drew A. Lansdown, MD, UCSF Department of Orthopaedic Surgery, 1500 Owens Street, Suite 170, San Francisco, CA 94158, USA (email: drew.lansdown@ucsf.edu).
†Division of Sports Medicine, Department of Orthopaedic Surgery, University of California, San Francisco, San Francisco, California, USA.
‡Division of Sports Medicine, Department of Orthopaedic Surgery, Rush University Medical Center / Midwest Orthopedics, Chicago, Illinois, USA.
§Department of Orthopaedic Surgery, University of Rochester, Rochester, New York, USA.
‖Houston Methodist Orthopedic and Sports Medicine, Houston, Texas, USA.

One or more of the authors has declared the following potential conflict of interest or source of funding: D.A.L. receives research support from Arthrex and Smith & Nephew. J.D.H. is a paid consultant for Applied Biologics, NIA Magellan, and Smith & Nephew; receives research support from DePuy and Smith & Nephew; receives educational support from MedInc; is a paid speaker/presenter for Ossur and Smith & Nephew; and receives royalties from SLACK Inc. S.J.N. receives research support from Allosource, Arthrex, Athletico, DJ Orthopaedcs, Linvatec, Miomed, Smith & Nephew, and Stryker; receives royalties from Ossur and Springer; is a paid consultant for Ossur and Stryker; and receives educational support from Stryker.
Ethical approval for this study was obtained from Rush University Medical Center Office of Research Affairs.

TABLE 1
Preoperative Demographics

	Self-reported History of Mental Disorders, n (%) or Mean ± SD		
	No	Yes	*P*
Patients	226 (75.1)	75 (24.9)	
Sex			.46
Female	143 (63.3)	51 (68.0)	
Male	83 (36.7)	24 (32.0)	
Smoker			.001
No	214 (94.7)	62 (82.7)	
Yes	12 (5.3)	13 (17.3)	
Tönnis grade			.09
0	211 (93.4)	65 (86.7)	
1	15 (6.6)	10 (13.3)	
Age, y	35.3 ± 10.6	36.6 ± 12.9	.36
Body mass index, kg/m^2	25.0 ± 4.6	26.9 ± 6.4	.01
Lateral center-edge angle, deg	33.1 ± 6.6	32.9 ± 6.8	.84
Alpha angle, deg	61.5 ± 9.8	60.6 ± 11.5	.48

mean number of psychiatric diagnoses in this group was 1.3 (range, 1-3).

There were no differences between patients who did and did not report mental disorders in age ($P = .36$) or sex ($P = .46$), although body mass index was significantly higher in the group reporting a history of mental disorders (mean ± SD: 26.9 ± 6.4 vs 25.0 ± 4.6, $P = .009$) (Table 1). As compared with patients not reporting a mental disorder, those reporting a mental disorder were significantly more likely to have a history of smoking (17.3% vs 5.3%, $P = .001$). Labral repair was performed in 93% (280 of 301) of patients and labral debridement in 7% (21 of 301). A mean 2.3 ± 0.9 anchors were used for labral fixation. Femoral osteochondroplasty was performed in 95% (287 of 301) of patients and microfracture in 2% (6 of 301). Complications (infection, neuropathy, deep vein thrombosis, need for revision surgery, or conversion to total hip arthroplasty) were noted for 6% (18 of 301). Revision surgery was performed in 0.9% (2 of 226) of patients who did not report a mental disorder and 2.7% (2 of 75) who did report a mental disorder ($P = .24$). Four patients (1.8%) not reporting a history of mental disorders went on to total hip arthroplasty in the study time frame, as opposed to 2 in the self-reported mental disorder group (2.7%, $P = .63$) (Table 2).

No differences were observed between the groups with regard to preoperative alpha angle ($P = .48$) or lateral center-edge angle ($P = .84$). No differences were observed in terms of rates of labral repair ($P = .69$), femoral osteochondroplasty ($P = .34$), or microfracture ($P = .64$), and there was no difference between the groups in the frequency of complications ($P = .17$) (Table 2).

Prior to surgical treatment, all patient-reported outcome measures were significantly lower for patients reporting a history of mental disorders: HOS-ADL, 10 points lower (59.2 ± 20.7 vs 69.2 ± 15.2, $P < .0001$); HOS-SSS, 9.3 points lower (35.9 ± 24.5 vs 45.2 ± 20.7, $P = .003$); and mHHS, 7.1 points lower (53.0 ± 15.2 vs 60.1 ± 12.0, $P = .0003$).

TABLE 2
Operative Procedures and Complications[a]

	Self-reported History of Mental Disorders, n (%) or Mean ± SD		
	No	Yes	*P*
Labral repair			.69
No	15 (6.6)	6 (8.0)	
Yes	211 (93.4)	69 (92.0)	
Anchors, n	2.32 ± 0.9	2.42 ± 1.0	.39
Femoral osteochondroplasty			.34
No	9 (4.0)	5 (6.7)	
Yes	217 (96.0)	70 (93.3)	
Microfracture			.64
No	221 (97.8)	74 (98.7)	
Yes	5 (2.2)	1 (1.3)	
Complications			.17
No	215 (95.1)	68 (90.7)	
Yes	11 (4.9)	7 (9.3)	
DVT	1 (0.4)	2 (2.7)	.15
Infection	2 (0.9)	2 (2.8)	.24
Neuropathy	2 (0.9)	3 (4.0)	.07
Revision	2 (0.9)	2 (2.7)	.24
THA	4 (1.8)	2 (2.7)	.63

[a]DVT, deep venous thrombosis; THA, total hip arthroplasty.

At 2-year follow-up, patients reporting a history of mental disorders had significantly lower scores for the HOS-ADL (78.6 ± 21.0 vs 91.8 ± 10.2, $P < .0001$), HOS-SSS (59.6 ± 31.7 vs 81.7 ± 20.3, $P < .0001$), and mHHS (71.1 ± 20.5 vs 84.0 ± 11.8, $P < .0001$) (Figure 1). The 2-year VAS satisfaction score was significantly lower for patients reporting a history of mental disorders (70.0 ± 31.4 mm vs 88.0 ± 16.7 mm, $P < .0001$), while the 2-year VAS pain score was significantly higher for patients reporting mental disorders (28.8 ± 28.3 mm vs 8.7 ± 10.7 mm, $P < .0001$). Patients in both groups demonstrated significant improvements in HOS-ADL, HOS-SSS, and mHHS scores ($P < .0001$ for all) when preoperative and follow-up outcome measures were compared (Figure 2).

DISCUSSION

Patients reporting mental disorders had statistically significant and clinically relevant improvements in patient-reported outcome scores, pain, and satisfaction 2 years following hip arthroscopy for FAI syndrome. The magnitude of improvement and the absolute value of outcome scores of patients reporting a mental disorder were significantly lower than an age- and sex-matched cohort of patients who did not report a mental disorder. Preoperative patient-reported outcome scores were significantly lower for patients reporting a mental disorder than those not reporting such history. Highlighting the influence of mental health in postoperative outcomes after hip arthroscopy may allow surgeons to better counsel patients before proceeding with surgical treatment of FAI.

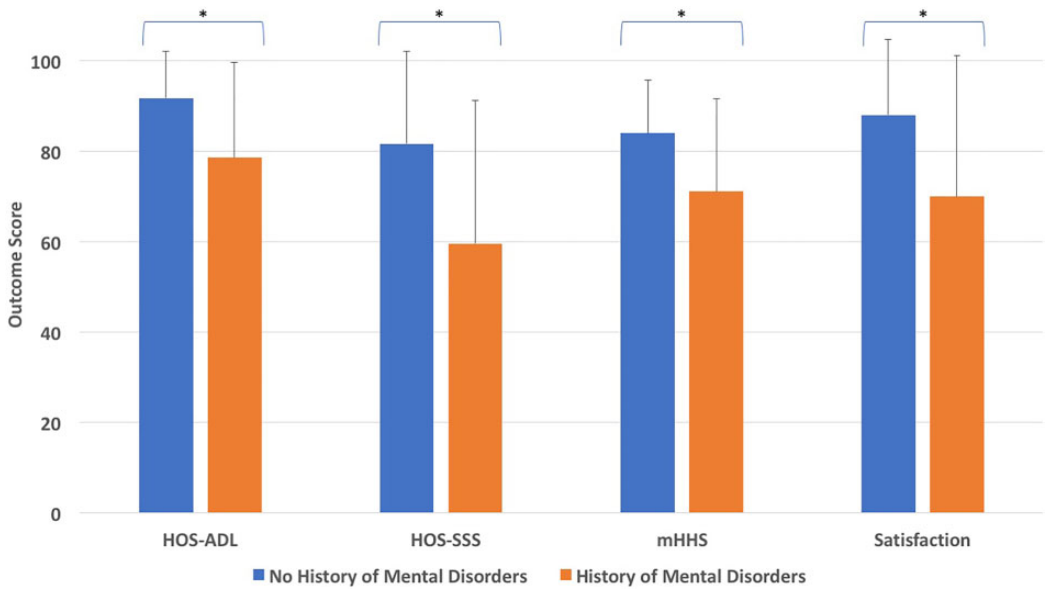

Figure 1. Two-year postoperative outcome scores for Hip Outcome Score–Activity of Daily Living Subscale (HOS-ADL), Hip Outcome Score–Sport-Specific Subscale (HOS-SSS), modified Harris Hip Score (mHHS), and visual analog scale for satisfaction. All outcome scores were significantly higher for patients who did not report a history of mental disorders. Values are presented as mean ± SD. *$P < .0001$.

First, the preoperative HOS-ADL and HOS-SSS scores observed in this investigation were similar to those reported by Potter and colleagues[23] (HOS-ADL: 59.2 vs 62 for patients with psychiatric conditions and 69.2 vs 72 for those without; HOS-SSS: 35.9 vs 36 for patients with psychiatric conditions and 45.2 vs 47 for those without). The mean improvement in both groups in the current study was greater than the MCID for FAI surgery for HOS-ADL, HOS-SSS, and mHHS (8.3, 8.2, and 14.5 points, respectively).[19] Given that both groups noted improvement beyond the MCID following surgical treatment, these results indicate that arthroscopic management of FAI is beneficial for patients irrespective of mental health history. Importantly, surgeons should preoperatively counsel patients with mental health conditions that their results may not be as successful relative to those without a psychiatric history. Additionally, if surgeons are evaluated or reimbursed according to patient-reported outcome measures, these results emphasize the importance of incorporating mental health status into these assessments.

A link between mental health and physical outcomes before and after surgical treatment has been well described for multiple other conditions. Lavernia et al[14] reported that lower 36-Item Short Form Health Survey (SF-36) mental health scores were negatively correlated with lower patient-reported outcome scores following total hip and knee arthroplasty. Hossain et al,[11] however, reported that patients with psychologic distress, as indicated by an SF-36 mental health score <56, had high satisfaction rates after total hip arthroplasty, similar to those without psychologic distress. For patients undergoing lumbar discectomy, preoperative depression and anxiety were associated with a lower likelihood of reaching the MCID for improvements in disability and quality-of-life measures.[5] Lumbar spine fusion results have also been linked to depression, anxiety, and emotional health.[28,29] As with these other conditions, we observed that functional outcomes after FAI surgery are affected by preoperative mental health.

There are multiple potential ways that psychiatric conditions affect physical conditions and may influence postsurgical outcomes. Psychiatric stressors create an upregulation of inflammatory pathways.[8] Increases in interleukin 1β, tumor necrosis factor α, and other cytokines, as well as modulation of the cyclo-oxygenase 2 pathway, are encountered in depression and inflammatory diseases.[3,21] Patients with a mental disorder may therefore experience an increased inflammatory response to surgery, contributing to the observed difference in postoperative outcome scores. Additionally, pain is a highly subjective experience, with variable patient perceptions of intensity. Pain and depression act synergistically, resulting in more severe levels when experienced in combination as opposed to individually.[10] These effects may contribute to the differences between the cohorts that we observed before and after surgical treatment in terms of perception of symptoms, although we are unable to establish causation with the current study design.

The results of this study should be considered with an understanding of its limitations. First, previous diagnoses of psychiatric comorbidity were used rather than a more quantitative measure of psychiatric well-being. This inclusion criterion introduces error with self-identification of prior diagnoses. Patients may be hesitant to disclose a history of a mental disorder or may self-diagnose a condition that does not meet true diagnostic criteria. However, this methodology allows for direct clinical application of the

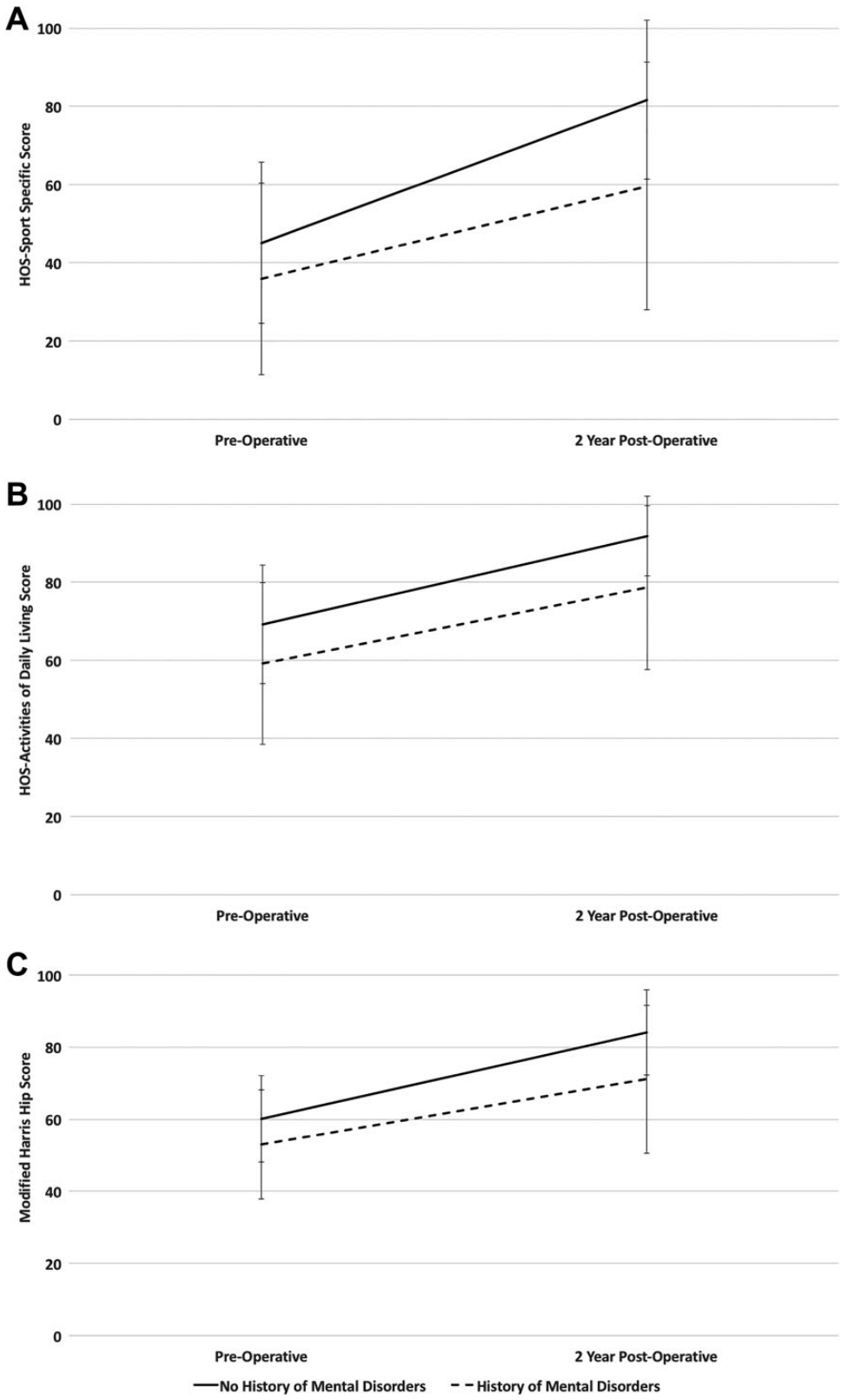

Figure 2. Pre- and postoperative outcome scores are shown for patients who did and did not report a history of mental disorders for the (A) Hip Outcome Score–Sport-Specific Subscale (HOS-SSS), (B) Hip Outcome Score–Activity of Daily Living Subscale (HOS-ADL), and (C) modified Harris Hip Score (mHHS). Differences were significant over time for all scores and for both groups ($P < .001$). The magnitude of improvement was significantly greater for patients who did not report a history of mental disorders for the HOS-ADL and mHHS ($P < .01$).

findings, as the associations that we include here are based on a patient's self-reporting these conditions rather than a formal diagnosis or specific outcome score.

Additionally, the level of treatment or control of psychiatric disease burden was not assessed. Thus, the modifiability of mental disorders could not be assessed in this investigation. The symptoms of psychiatric disorders, similar to musculoskeletal conditions, may wax and wane over time. We did not evaluate the current state of mental disorders, which may differentially influence patient-reported outcomes. We investigated a limited number of mental disorders in this study; that is, we did not analyze disorders such as autism spectrum, conduct disorder, eating disorder, intellectual disability, mild neurocognitive disorder, obsessive-compulsive disorder, personality disorder, schizophrenia, sleep-wake disorder, learning disorder, somatic symptom disorder, and substance-related and addictive disorder. Given the numbers available, we were not able to analyze differences among patients with different mental disorders or perform a multivariate analysis to control for potential confounding variables, such as smoking status, body mass index, or history of alcohol or substance abuse. Future research should investigate if certain mental disorders have a greater impact on outcomes after treatment of FAI.

The duration of mental disorder disease burden was also not assessed. This is important because it is feasible that some patients with chronic hip and/or groin pain who have been evaluated by multiple care providers, have undergone multiple diagnostic imaging tests, and have attempted multiple treatments prior to diagnosis may have incurred depression, anxiety, and/or stress owing to their hip problem and not a de novo mental disorder.[12] We did not monitor patients for increased postoperative inflammatory response and therefore cannot clearly link inferior outcomes to this potential mechanism. We also excluded from analysis patients requiring revision surgery, although there was no significant difference in complications or conversion to total hip arthroplasty between the groups evaluated. Finally, surgical treatment was performed by a single surgeon fellowship trained in sports medicine, with extensive experience in hip arthroscopy. Thus, the results of this investigation might not be extrapolated to all surgeons.

CONCLUSION

A self-reported history of a mental disorder was associated with lower self-reported patient-reported outcomes before and after surgical management of FAI syndrome. Nevertheless, statistically significant and clinically relevant improvements were observed for patients reporting a mental disorder. The magnitude of these improvements was not as large as that in an age- and sex-matched control group that did not report a mental disorder. Future research should evaluate whether preoperative hip arthroscopy treatment of any concomitant mental disorder can improve postoperative outcomes.

REFERENCES

1. Block AR, Ohnmeiss DD, Guyer RD, Rashbaum RF, Hochschuler SH. The use of presurgical psychological screening to predict the outcome of spine surgery. *Spine J*. 2001;1(4):274-282.
2. Bozic KJ, Chan V, Valone FH 3rd, Feeley BT, Vail TP. Trends in hip arthroscopy utilization in the United States. *J Arthroplasty*. 2013; 28(suppl 8):140-143.
3. Bufalino C, Hepgul N, Aguglia E, Pariante CM. The role of immune genes in the association between depression and inflammation: a review of recent clinical studies. *Brain Behav Immun*. 2013;31: 31-47.
4. Carragee EJ, Alamin TF, Miller JL, Carragee JM. Discographic, MRI and psychosocial determinants of low back pain disability and remission: a prospective study in subjects with benign persistent back pain. *Spine J*. 2005;5(1):24-35.
5. Chaichana KL, Mukherjee D, Adogwa O, Cheng JS, McGirt MJ. Correlation of preoperative depression and somatic perception scales with postoperative disability and quality of life after lumbar discectomy. *J Neurosurg Spine*. 2011;14(2):261-267.
6. Frank RM, Lee S, Bush-Joseph CA, Kelly BT, Salata MJ, Nho SJ. Improved outcomes after hip arthroscopic surgery in patients undergoing T-capsulotomy with complete repair versus partial repair for femoroacetabular impingement: a comparative matched-pair analysis. *Am J Sports Med*. 2014;42(11):2634-2642.
7. Gatchel RJ, Polatin PB, Mayer TG. The dominant role of psychosocial risk factors in the development of chronic low back pain disability. *Spine*. 1995;20(24):2702-2709.
8. Ghoneim MM, O'Hara MW. Depression and postoperative complications: an overview. *BMC Surg*. 2016;16(1):5.
9. Giesinger JM, Kuster MS, Behrend H, Giesinger K. Association of psychological status and patient-reported physical outcome measures in joint arthroplasty: a lack of divergent validity. *Health Qual Life Outcomes*. 2013;11(1):64.
10. Gureje O. Treating chronic pain in the context of comorbid depression. *Pain*. 2008;134(1):3-4.
11. Hossain M, Parfitt DJ, Beard DJ, et al. Does pre-operative psychological distress affect patient satisfaction after primary total hip arthroplasty? *BMC Musculoskelet Disord*. 2011;12(1):122.
12. Kahlenberg CA, Han B, Patel RM, Deshmane PP, Terry MA. Time and cost of diagnosis for symptomatic femoroacetabular impingement. *Orthop J Sports Med*. 2014;2(3):2325967114523916.
13. Kemp JL, Collins NJ, Makdissi M, Schache AG, Machotka Z, Crossley K. Hip arthroscopy for intra-articular pathology: a systematic review of outcomes with and without femoral osteoplasty. *Br J Sports Med*. 2012;46(9):632-643.
14. Lavernia CJ, Alcerro JC, Brooks LG, Rossi MD. Mental health and outcomes in primary total joint arthroplasty. *J Arthroplasty*. 2012; 27(7):1276-1282.
15. Mathers C, Loncar D. *Updated Projection of Global Mortality and Burden of Disease, 2002-2030: Data Sources, Methods and Results*. Geneva, Switzerland: World Health Organization; 2005.
16. McCormick F, Nwachukwu BU, Alpaugh K, Martin SD. Predictors of hip arthroscopy outcomes for labral tears at minimum 2-year follow-up: the influence of age and arthritis. *Arthroscopy*. 2012;28(10): 1359-1364.
17. Montgomery SR, Ngo SS, Hobson T, et al. Trends and demographics in hip arthroscopy in the United States. *Arthroscopy*. 2013;29(4): 661-665.
18. Nho SJ, Magennis EM, Singh CK, Kelly BT. Outcomes after the arthroscopic treatment of femoroacetabular impingement in a mixed group of high-level athletes. *Am J Sports Med*. 2011;39: 14S-19S.
19. Nwachukwu BU, Fields K, Chang B, Nawabi DH, Kelly BT, Ranawat AS. Preoperative outcome scores are predictive of achieving the minimal clinically important difference after arthroscopic treatment of femoroacetabular impingement. *Am J Sports Med*. 2017;45(3): 612-619.

20. Philippon MJ, Maxwell RB, Johnston TL, Schenker M, Briggs KK. Clinical presentation of femoroacetabular impingement. *Knee Surg Sports Traumatol Arthrosc*. 2007;15(8):1041-1047.
21. Pollak Y, Yirmiya R. Cytokine-induced changes in mood and behaviour: implications for depression due to general medical condition, immunotherapy and antidepressive treatment. *Int J Neuropsychopharmacol*. 2002;5(4):389-399.
22. Potter MQ, Sun GS, Fraser JA, et al. Psychological distress in hip arthroscopy patients affects postoperative pain control. *Arthroscopy*. 2014;30(2):195-201.
23. Potter MQ, Wylie JD, Sun GS, Beckmann JT, Aoki SK. Psychologic distress reduces preoperative self-assessment scores in femoroacetabular impingement patients. *Clin Orthop Relat Res*. 2014;472(6):1886-1892.
24. Ricciardi BF, Fields K, Kelly BT, Ranawat AS, Coleman SH, Sink EL. Causes and risk factors for revision hip preservation surgery. *Am J Sports Med*. 2014;42(11):2627-2633.
25. Roh YH, Lee BK, Noh JH, Oh JH, Gong HS, Baek GH. Effect of depressive symptoms on perceived disability in patients with chronic shoulder pain. *Arch Orthop Trauma Surg*. 2012;132(9):1251-1257.
26. Roh YH, Noh JH, Oh JH, Baek GH, Gong HS. To what degree do shoulder outcome instruments reflect patients' psychologic distress? *Clin Orthop Relat Res*. 2012;470(12):3470-3477.
27. Steel Z, Marnane C, Iranpour C, et al. The global prevalence of common mental disorders: a systematic review and meta-analysis 1980-2013. *Int J Epidemiol*. 2014;43(2):476-493.
28. Trief PM, Grant W, Fredrickson B. A prospective study of psychological predictors of lumbar surgery outcome. *Spine*. 2000;25(20):2616-2621.
29. Trief PM, Ploutz-Snyder R, Fredrickson BE. Emotional health predicts pain and function after fusion: a prospective multicenter study. *Spine*. 2006;31(7):823-830.
30. Vranceanu A-M, Jupiter JB, Mudgal CS, Ring D. Predictors of pain intensity and disability after minor hand surgery. *J Hand Surg Am*. 2010;35(6):956-960.