

The impact of mental health disorders on outcomes following hip arthroscopy for femoroacetabular impingement syndrome: a systematic review

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ABSTRACT

Hip arthroscopy for femoroacetabular impingement syndrome (FAI) has been shown to be beneficial in the short- to medium-term though outcomes vary between individuals. Multiple factors have been suggested to affect outcomes including pre-operative mental health disorders. We undertook a systematic review to assess the evidence relating to the effect of pre-existing mental health disorders on the outcomes following hip arthroscopy for FAI. Following PRISMA guidelines, a multi-database search was undertaken using three key concepts: 'mental health', 'FAI' and 'hip arthroscopy'. Results were screened and data extracted from relevant studies. A total of six studies met the inclusion criteria including 2248 hips, all published between 2017 and 2019. All studies were of evidence level III or IV with reasonable methodological quality. One study demonstrated pre-operative depression to be related to altered pain reduction in the short-term following surgery. Three studies reported inferior outcomes in the medium-term (1–2 years) in those with worse mental health. One study demonstrated an increased risk of persistent pain 2 years following surgery and one a reduced chance of returning to active military service following surgery in those with worse mental health. Despite inferior outcomes individuals with mental health disorders did still benefit from surgery in general. In conclusion, the presence of pre-existing poor mental health is associated with inferior outcomes in the medium-term following arthroscopic surgery for FAI. Surgeons should consider screening patients for mental health disorders before surgery and counselling them appropriately as to the potential for less satisfactory surgical outcomes.

INTRODUCTION

Hip and groin pain in young adults has been heavily researched over the last 20 years resulting in significant improvements in the understanding of its causes and treatment [1]. Hip pain in young adults is a relatively common problem with an annual incidence of presentation to primary care reported as 0.44% [2]. Femoroacetabular impingement syndrome (FAI) has emerged as a leading cause of hip pain in young adults. FAI was first described in 2001 as aberrant anatomical morphology of the proximal femur resulting in abnormal contact between the bones resulting in injury to the acetabular labrum or joint cartilage [3]. Hip pain in young adults can be severe and can significantly affect individual's quality of leisure, parenting

and work activities [4]. Treatment of FAI usually consists of initial non-operative management with activity modification, physiotherapy and non-steroidal anti-inflammatories [5]. Individuals who fail to achieve adequate improvement in symptoms with non-operative measures may be considered for surgical intervention. FAI is the most common indication for hip arthroscopy—modern techniques allow for bone reshaping and repair of injured soft tissues via an arthroscopic approach [6].

Outcomes following hip arthroscopy for FAI are good in the short to medium term with two recent multi-centre randomized controlled trials reporting improved outcomes at 8–12 months compared with physiotherapy [7, 8].

There is a recognized variability in the outcomes following hip arthroscopy [5]. A number of potential factors have been associated with poorer outcomes including patient characteristics such as increasing age and length of preoperative symptoms; joint characteristics such as the presence of established joint damage; and surgical characteristics such as the use of acetabular microfracture [9].

Mental health problems are common amongst the UK population. The UK Adult Psychiatric Morbidity Survey 2014 found 15.7% of the population reported having symptoms of one of the common mental disorders (CMDs: depression and anxiety) within the past week [10]. A recent study reported a prevalence of anxiety and depression of 35% amongst pre-operative patients with FAI [11]. Patients with some mental health problems have previously been found to have worse outcomes following certain types of orthopaedic surgery [12, 13]. Recent studies have suggested that outcomes following hip arthroscopy for FAI may be worse in those with moderate/severe depression on the Beck Depression Index as compared with minimal/minimal/mild depression [14] or a self-declared history of depression, anxiety, bipolar disorder, posttraumatic stress disorder or attention-deficit/hyperactivity disorder as compared with those with no known mental health problem [15].

The aim of this systematic review is to assess what the effect is on the outcomes of hip arthroscopy for FAI of patients having pre-existing mental health disorders. The hypothesis is that those with mental health problems may benefit less from hip arthroscopy than those without.

MATERIALS AND METHODS

Search strategy

The guidelines described in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement were followed throughout the process of undertaking the systematic review [16]. An electronic search was performed using PubMed, Cochrane library, Web of Science, EMBASE, CINAHL, Scopus and PsychINFO to locate relevant indexed articles in English between 01 January 1998 and 01 May 2019. The start date was chosen as it predates the first report of using hip arthroscopy to treat FAI. A further search was undertaken using Google Scholar to attempt to include any grey literature. The reference lists for all identified papers were also screened for potentially relevant studies.

Three key concepts in the research question were defined as ‘mental health’, ‘FAI’ and ‘hip arthroscopy’. A search strategy was developed to include multiple key words related to the concepts as well as truncated stems

and MeSH terms. The three concepts were searched for using Boolean operators and the asterisk (*) symbol was used as a wildcard character to include all potential words based on word roots.

The full electronic search strategy for PubMed was:

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(“Mental Disorders”[Mesh] OR “Mental Health”[Mesh] OR depression[Mesh] OR mental disorders OR depress* OR anxiety[Mesh] OR anxiety OR psychiat* OR psycholo*)
AND
((“Femoracetabular Impingement”[Mesh]) OR (“femoracetabular” OR “femoroacetabular” OR “femoro-acetabular” OR “femoro acetabular”) AND (impingement OR “impingement syndrome”))
AND
(Arthroscopy[Mesh] OR arthroscop* OR surger* OR surgical* OR operative* OR procedure)

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Identification of eligibility

Inclusion and exclusion criteria were defined to limit the included studies to those relevant to answering the research question (see Table I). To be included studies had to include individuals aged 18–50 undergoing hip arthroscopy for FAI with a known pre-operative mental health status (based on either the reported presence or absence of an International Statistical Classification of Diseases and Related Health Problems – 10th revision (ICD-10) mental health diagnosis or a validated pre-operative mental health score) and appropriate validated outcome measures [e.g. patient-reported outcome measures (PROMs)]. Studies were excluded if they involved non-human subjects, involved non arthroscopic surgery or were not published in English.

The results from all the database searches were compiled together with any studies identified from the reference lists and the grey literature. Duplicates were removed and the titles and abstracts of the papers screened by two investigators (A.G.D. and C.S.), followed by review of full manuscripts against the inclusion/exclusion criteria.

Data extraction

A data extraction template was used to record relevant details from all included studies. Data collected included study design, number of hips included, mental health criteria, outcome measures, follow-up period and results pertinent to the research question.

Table I. Inclusion and exclusion criteria

<i>Inclusion criteria</i>	<i>Exclusion criteria</i>
Studies on humans	Animal studies
Age 18–50	Cadaveric studies
Known diagnosis of femoroacetabular impingement syndrome	Individuals undergoing non-arthroscopic surgery
Known preoperative mental health status <ul style="list-style-type: none"> • No mental health diagnosis • ICD-10 mental health diagnosis or • Score on validated scale suggestive of mental health symptoms 	Studies not in English
Hip arthroscopic surgery	
Appropriate outcome measures <ul style="list-style-type: none"> • PROMs (eg iHOT-33, mHHS, HOS) • Visual analogue scales • Other relevant measures 	

iHOT-33, 33-item International Hip Outcome Tool.

Assessment of methodological quality

An abridged version of Downs and Black's [17] criteria as modified by Newman *et al.* [18] was used to quantitatively assess the quality of each included study. The level of evidence as per the Oxford Centre for Evidence-based medicine was also determined for each study [19]. Disagreements between assessors were resolved through discussion with any ongoing disputes referred to the senior author for final arbitration.

RESULTS

A total of 112 articles were identified following the electronic search of which 63 were unique. Fifty-one articles were excluded following review of the title and abstract; the full text was downloaded for the remaining 12 articles. A total of six articles were included in the systematic review after evaluation by the investigators. Six papers were excluded for the following reasons: three included patients undergoing non-arthroscopic surgery, two did not describe any specific mental health disorder amongst any of the patients, one studied a paediatric population. [Figure 1](#) shows the PRISMA flow diagram for the systematic review. A total of 2248 hips were included in the six studies included [14, 15, 20–23]. All of the papers were published within the last 2 years. A summary of the included studies is shown in [Table II](#).

Assessment of methodological quality of included studies

The results of the modified Downs and Black's scoring system are shown in [Table III](#). One study scored 13/15, three scored 12/15, one 11/15 and one 10/15 suggestive of overall reasonable methodological quality of the studies included. [Table III](#) shows the modified Downs and Black's scores and evidence level for each study.

Definition of mental health disorder

Two studies relied on retrospective review of case notes assessing for known psychiatric diagnoses [20, 23]. One study relied on patient self-reporting of one or more of: depression, anxiety, bipolar, posttraumatic stress disorder or attention-deficit/hyperactivity disorder. Three studies used scores on different pre-operative mental health questionnaires to define levels of pre-operative symptoms of depression [14, 21, 22].

Short-term outcomes

Cunningham *et al.* [21] (including 62 hips) assessed the associations between the pre-operative level of depression and outcomes at 2 and 6 weeks post-surgery. The study reports lower levels of depression to be associated with greater patient perception of post-operative swelling resolution at 6 weeks post-surgery. Lower depression levels were associated with a higher likelihood of meeting a minimal clinically important difference in pain reduction, defined as a 10% reduction on a visual analogue scale

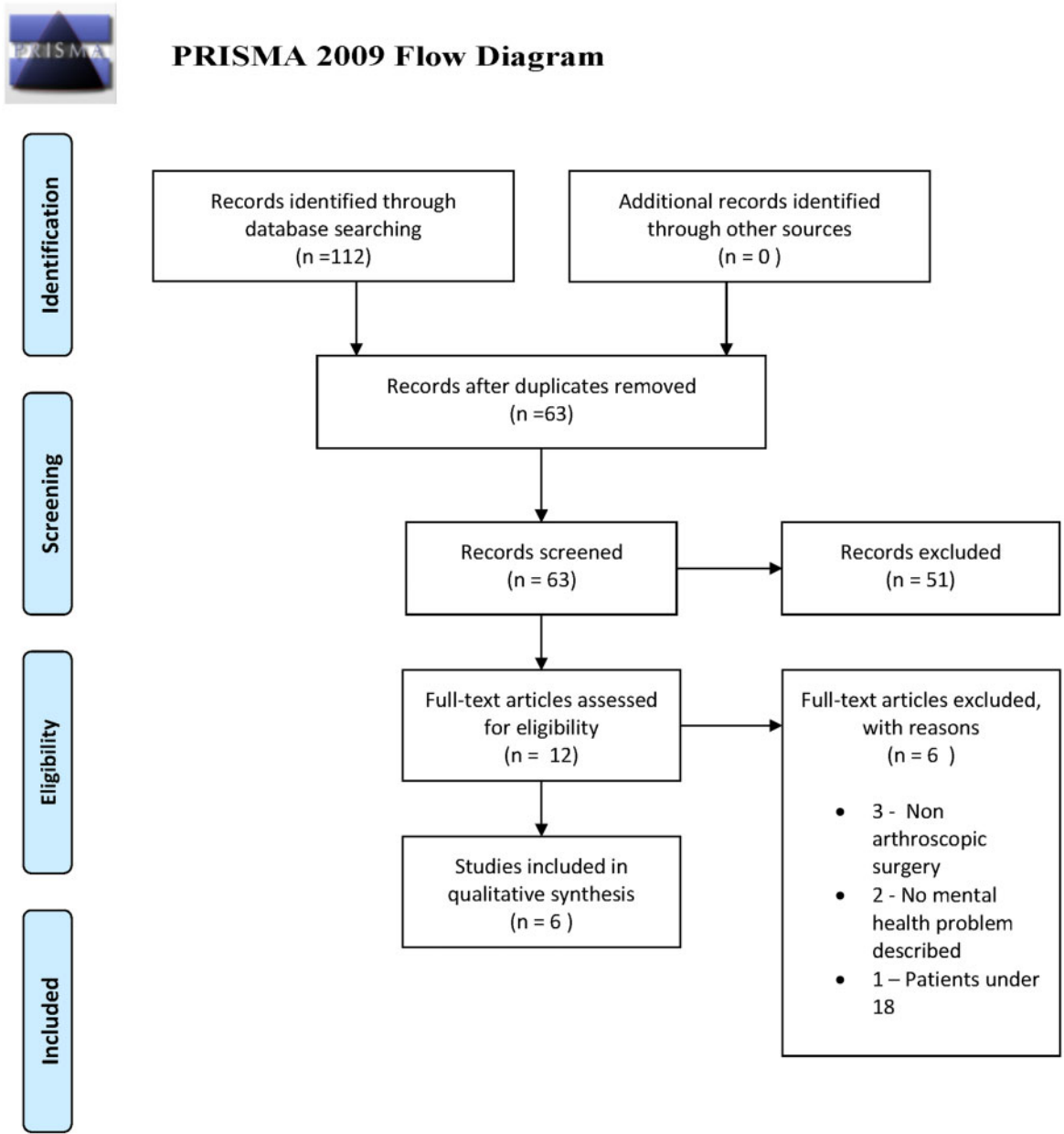


Fig. 1. PRISMA flow chart.

(VAS) for pain between pre-operative and 6 weeks post-operative. Lower depression levels were also associated with a lower likelihood of patients reporting their pre-operative pain complaint to have improved.

Medium-term outcomes

All included studies reporting medium-term follow-up post hip arthroscopy for FAI (five studies, 2186 hips) suggest inferior outcomes in those with mental health disorders or worse scores on pre-operative mental health scales [14, 15, 20, 22, 23]. At 2 years following surgery, two studies

[15, 22] (including 952 hips) report significantly lower PROMs in those with mental health disorders or worse scores on pre-operative mental health scales as compared with those without known mental health disorders or better pre-operative mental health scores. One study (including 77 hips) reports significantly lower PROMs at 1 year following surgery in those with moderate/severe depression symptoms as compared with those with mild/moderate depression symptoms [14]. One study (including 688 hips) reports patients with a history of psychiatric conditions to be 84% more likely to have persistent pain 2 years

Table II. Summary of included studies

Author, year and location	Study design	No of hips	Mental health criteria	Outcome measures	Follow-up period	Results
Thomas <i>et al.</i> , 2017, USA [20]	Retrospective case series	469	Axis I or II psychiatric diagnosis	Return to active military duty VAS pain SANE	2.5 years	OR 0.46 (95% CI 0.3–0.7) for return to duty for patients with Axis I psychiatric diagnosis
Cunningham <i>et al.</i> , 2017, USA [21]	Prospective observational study	62	PHQ-8	iHOT 12, Hip flexion VAS pain Resolution of swelling Improvement in pre-operative pain complaint	2, 6 weeks	Lower depression associated with greater swelling reduction Higher depression associated with higher likelihood of pre-op pain complaint improvement Lower depression associated with higher likelihood of meeting MCID pain reduction
Lansdown <i>et al.</i> , 2018, USA [15]	Retrospective cohort study	301 (75 with mental disorder)	Patient self-reporting on pre-op survey	HOS-ADL, HOS-SSS, mHHS, VAS pain, VAS satisfaction	2 years	Pre-op HOS-ADL, HOS-SSS and mHHS significantly lower in mental disorder group 2 year HOS-ADL, HOS-SSS and mHHS significantly lower in mental disorder group 2-year VAS satisfaction significantly lower in mental disorder group 2-year VAS pain significantly higher in mental disorder group Both groups had significant improvement in HOS-ADL, HOS-SSS and mHHS between pre and post-op
Sochacki <i>et al.</i> , 2018, USA [14]	Retrospective case control	77	BDI-II	HOS-ADL, HOS-SSS, iHOT-33	1 year	Minimal/mild depression significantly higher HOS-ADL, HOS-SSS and iHOT-33 pre-op and post-op than moderate/severe depression Greater magnitude of improvement in HOS-ADL, HOS-SSS and iHOT-33 in minimal/mild depression than moderate/severe depression

(continued)

Table II. (continued)

Author, year and location	Study design	No of hips	Mental health criteria	Outcome measures	Follow-up period	Results
Martin <i>et al.</i> , 2018, USA [22]	Retrospective cohort study	651	SF-12 MCS	iHOT-12, VAS pain, surgical satisfaction scale	2 years	Weak negative correlation between BDI-II and iHOT-33 pre-op + at 1 year Moderate negative correlation between BDI-II and HOS-ADL score pre-op, no correlation at 1 year No correlation between BDI-II and HOS-SSS pre-op, moderate negative correlation at 1 year iHOT-12, VAS pain significantly worse pre-operatively in patients with depression or severe depression
Stone <i>et al.</i> , 2019, USA [23]	Retrospective case control	688	History of psychiatric condition(s)	VAS pain	2 years	iHOT-12, VAS pain and surgical satisfaction all significantly worse at 2 years in patients with depression or severe depression OR 1.844 (95% CI 1.02–3.32) for persistent post-operative pain with history of psychiatric condition(s)

BDI-II, Beck Depression Inventory II; NAHS, non-arthritic hip score; PHQ-8, abbreviated patient health questionnaire 8; SANE, single assessment numeric evaluation; SF-12 MCS, 12-item Short Form Health Survey Mental Component Summary; OR, odds ratio; CI, confidence interval.

Table III. Modified Down and Black's criteria to assess quality of included studies and Oxford evidence level

	Objective described	Outcome described	Exclusion criteria described	Intervention described	Main findings reported	Adverse events	Random variability	Probability values	Representative sample invited to participate	Representative sample included	Lack of data dragging	Use of appropriate statistics	Accurate outcome measure for	Confounders accounted for	Power calculation	Number of criteria Met	Evidence level
Thomas <i>et al.</i> [20]	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	Y	Y	Y	N	12	IV
Cunningham <i>et al.</i> [21]	Y	Y	N	Y	Y	N	Y	Y	N	N	N	Y	Y	Y	Y	10	IV
Lansdown <i>et al.</i> [15]	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	12	III
Sochacki <i>et al.</i> [14]	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	12	IV
Martin <i>et al.</i> [22]	Y	Y	Y	N	Y	N	Y	N	Y	Y	Y	Y	Y	Y	N	11	III
Stone <i>et al.</i> [23]	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	13	III

following surgery than those without [23]. One study (including 469 hips) reports military personnel with an Axis I psychiatric diagnosis [defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM) IV as all psychological diagnostic categories except intellectual disability and personality disorder [24]] to be 46% less likely to return to active military duty 2.5 years following surgery than those without [22].

Of three studies [14, 15, 22] (including 1029 hips) comparing pre-operative and post-operative PROMs between those with mental health disorders or worse scores on pre-operative mental health scores and those without mental health disorders or better scores, all three demonstrated lower average pre-operative PROMs amongst those with worse mental health. Two studies [14, 15] showed a greater average absolute change in PROMs between pre-operative and post-operative in those with better mental health, one [22] showed a similar absolute change in PROMs between those with depression symptoms and those without. One study reported that all patients had improved 12-item International Hip Outcome Tool (iHOT-12) and VAS between pre and post-operative assessment [22].

DISCUSSION

The aim of this systematic review was to assess what the effect is on the outcomes of hip arthroscopy for FAI of patients having pre-existing mental health disorders. The evidence supports the hypothesis that patients with mental health disorders report inferior improvements from hip arthroscopy for FAI compared with those without.

One study, Cunningham *et al.* [21] focused on the short-term period following hip arthroscopy and found a number of associations between pre-operative depression level and short-term outcomes. Patients with lower depression levels were more likely to achieve clinically relevant reduction in their pain at 6 weeks post operation. This finding is similar to that of Potter *et al.* [25] who assessed post-operative pain control following hip arthroscopy and found patients with higher levels of pre-operative psychological distress (as defined by the DRAM questionnaire) received higher levels of intra-operative opioids and were more likely to request post-operative fascia iliaca nerve blocks. Conversely Cunningham *et al.* also found less severe depression levels to be associated with a lower likelihood of patients reporting their pre-operative pain complaint to have improved. The authors felt this could be partly explained by patients experiencing pain from the surgery as a separate entity from their pre-operative pain. A further possible explanation may relate to the degree of fulfilment of

pre-operative expectations of surgery. Mannion *et al.* [26] studied the relationship between patient-reported pre-operative expectations for the outcome of either arthroscopic or mini open surgery for FAI and the actual post-operative outcomes finding that having one's pre-operative expectations met was an important factor for a patient-reported good outcome.

All five studies reporting medium-term outcomes (including over 2000 hips) suggest inferior outcomes amongst patients with pre-existing mental health disorders or worse scores on pre-operative depression scales. Three studies compared pre- and post-operative PROMs and found these to be significantly lower both pre-operatively and post-operatively in those with worse mental health. The reported lower pre-operative PROMs are in keeping with previous studies. Jacobs *et al.* [27] demonstrated in patients undergoing hip arthroscopy for FAI that pre-operative PROMs (HOOS symptoms and HOOS pain) were more closely correlated with pre-operative mental health scores than with other patient factors or hip anatomical factors including degree of bony abnormality and severity of labral tear. Westermann *et al.* [28] reported worse mental health scores (VR-12 MCS) to be associated with inferior pre-operative PROMs in a cohort of patients undergoing hip arthroscopy for FAI. Potter *et al.* [29] found that pre-operative psychological distress (quantified with the DRAM questionnaire) was significantly associated with reduced pre-operative PROMS [modified Harris Hip Score (mHHS), Hip Outcome Score—Activity of Daily Living Subscale (HOS-ADL) and Hip Outcome Score—Sport Specific Subscale (HOS-SSS)] in a cohort of 146 patients undergoing hip arthroscopy for FAI. Diaz-Ledezma *et al.* [30] assessed the effects of FAI on health-related quality of life (HRQoL) in a cohort of 108 patients undergoing mini-open surgery. They found FAI to cause a distinguishable pattern of impact on HRQoL with current or past psychiatric comorbidity being associated with accentuated compromise of the mental component summary of HRQoL.

Stone *et al.* [23] found that patients with a history of psychiatric conditions to be 84% more likely to have persistent pain 2 years following hip arthroscopy than patients without. This finding is in keeping with Thomas *et al.* [20] reporting an Axis I psychiatric diagnosis to be a negative predictor of return to duty following hip arthroscopy in a military population.

Ernat *et al.* [31] reported on military patients undergoing mini-open, arthroscopically assisted surgery for FAI. Of the 93 patients included, 39.8% were taking mental health medications (anxiolytics, antidepressants, mood and seizure medication, antipsychotics and ADHD

medications) pre-operatively. At a mean follow-up of 3.6 years those taking mental health medications had significantly lower PROMs (mHHS, WOMAC) than those not. Antipsychotic, antidepressant and multiple mental health medication usage were predictive of medical discharge from the military due to hip pain.

Previous studies have demonstrated inferior outcomes following other orthopaedic procedures in patients with worse mental health, pre-operative psychological distress or anxiety including in total knee arthroplasty [32–40], total hip arthroplasty [13, 41–43], spine surgery [44, 45], lower limb trauma [46] and hand and wrist surgery [47, 48]. Importantly, despite those with worse mental health demonstrating inferior outcomes to those without, two studies of three including pre and post-operative PROMs demonstrated improvement regardless of mental health status [15, 22]. One of these studies reported similar levels of improvement in PROMs regardless of mental health status [22], the other showed reduced levels of improvement, though still improvement beyond the minimal clinically important difference (MCID) [15]. Sochacki *et al.* found that 80% and 50% of patients with moderate/severe depression achieved an MCID for 33-item International Hip Outcome Tool and HOS-SSS respectively [14]. These findings support hip arthroscopy to still be a beneficial intervention for FAI in those with mental health disorders.

Sochacki *et al.* [14] report offering referral to counseling for those individuals found to have moderate or severe depression as part of their clinical care model. Their study does not report on the uptake, or outcome of this intervention for depression. Shin *et al.* [49] advocate the assessment and optimization of mental health in individuals with sub-optimal outcomes following surgery for FAI. Studies in patients with knee arthritis [50] and chronic back pain [51] have shown promising results with behavioural interventions. Pre-operative identification of patients with mental health disorders should allow for them to be addressed prior to undertaking surgery in an attempt to optimize functional gain after surgery [52]. Further research is required to develop optimal strategies for integrating mental health services into treatment pathways for patients with FAI. Initial research targets could include an RCT of individuals with a known mental health condition being randomized to different forms of treatment for their mental health disorders pre-operatively followed by a comparison of post-operative outcomes.

LIMITATIONS

There are a number of limitations to this study. As with all secondary research, the outcomes of a systematic review

are only as valid as those of the primary studies included. There were methodological issues with some of the studies included which could reduce the reliability of the conclusions drawn from the systematic review. The definition of mental health disorder amongst the patients included is extremely broad resulting in a widely heterogeneous population. This heterogeneity makes the results harder to apply to any specific patient and their chances of having an inferior outcome following hip arthroscopy. As with all systematic reviews the risk of publication bias exists. It is possible that studies have been undertaken that demonstrated no difference in outcomes between those with mental health disorders and those without though were not published due to 'negative' results. All of the studies included were undertaken in the USA, and many were single surgeon studies. The results may therefore not necessarily be generalizable to other surgeons practicing in other healthcare systems.

CONCLUSIONS

Reviewing the current literature suggests that the presence of a pre-operative mental health condition, or a pre-operative mental health score suggesting depression, is associated with inferior outcomes in the medium term following arthroscopic hip surgery for the treatment of FAI. The effects on the short term outcomes are less clear with possible altered pain reduction in the initial period following surgery in those with symptoms of depression. Patients with mental health conditions and worse scores on pre-operative depression scales do, however, demonstrate improvements in their symptoms following surgery, just possibly to a lesser extent. Surgeons should consider screening patients for mental health disorders prior to surgery and counselling them appropriately as to the potential for less satisfactory outcomes following surgery. Further research is warranted to assess whether pre-operative treatment of mental health disorders could improve post-operative outcomes.

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CONFLICT OF INTEREST STATEMENT

None declared.

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