

A Qualitative Assessment of Return to Sport After Hip Arthroscopy for Femoroacetabular Impingement

Vehniah K. Tjong,^{*†} MD, Charles J. Cogan,[†] BA, Brett D. Riederman,[†] BS, and Michael A. Terry,[†] MD

Investigation performed at Northwestern University, Feinberg School of Medicine, Chicago, Illinois, USA

Background: Hip arthroscopy for femoroacetabular impingement (FAI) is known to produce excellent outcomes, yet some patients do not return to their preinjury level of sport participation. Much literature on return to sport has revolved around anterior cruciate ligament reconstruction and even shoulder instability, but none to date have used qualitative, semistructured patient interviews on patients with hip labral tears.

Purpose: To understand the factors influencing the decision to return to sport after arthroscopic hip surgery for FAI.

Study Design: Case series; Level of evidence, 4.

Methods: An experienced interviewer conducted qualitative, semistructured interviews of patients aged 18 to 60 years who had arthroscopic hip surgery for FAI. All had preinjury participation in sport and a minimum 2-year follow-up with no revision surgery. Qualitative analysis was then performed to derive codes, categories, and themes. An assessment of preinjury and current sports participation by type, level of competition, and frequency along with patient-reported hip function was also obtained. In addition, current modified Harris Hip Score (mHHS), international Hip Outcome Tool (iHOT-12), Hip Outcome Score–sports-specific sub-scale (HOS-SSS), and a coping mechanism evaluation (Brief COPE) were also recorded.

Results: A total of 23 patients were interviewed to reveal the overarching themes of internal motivation, external encouragement, and resetting expectations as the predominant factors influencing a patient's decision to return to preinjury sport. Subjective outcome measurements (mHHS, iHOT-12, patient satisfaction) showed significant differences between patients who did and did not return to sport. Interestingly, the adaptive and maladaptive coping mechanisms matched and supported our themes in those patients who described fear and self-motivation as defining features influencing their cessation of or return to play, respectively.

Conclusion: Self-motivation, aging, pain, encouragement from others, and adapting to physical limitations can largely affect a patient's decision to return to sport after arthroscopic hip surgery for FAI. Innate coping mechanisms may also help to predict the course of and subsequently aid in a patient's postoperative recovery.

Keywords: qualitative interview; hip arthroscopy; return to sport; femoroacetabular impingement

Femoroacetabular impingement (FAI) is a condition gaining increased recognition within younger athletes of all levels of competition.⁸ Although impingement can originate from either the femoral side (cam-type impingement) or the

acetabular side (pincer-type impingement), the majority of patients experience a combination of these pathologies. From a biomechanical standpoint, once either the pincer or cam lesion is present, the reactive forces on the contacting bone create a stress response that may produce more sclerotic bone, delaminate articular cartilage, and damage the labrum as the hip cycles through its functional range of motion.^{8,41,52}

Approximately 10% to 74% of the population have positive radiographic signs of FAI despite having no symptoms of hip or groin pain,^{25,27} yet there is limited evidence to suggest that prophylactic surgery to treat asymptomatic FAI is indicated to prevent articular cartilage damage.¹⁶ Surgical success has been reported in patients with symptomatic FAI, and numerous systematic reviews have reported return-to-play rates after arthroscopic hip surgery averaging between 87% and 92%.^{1,33-35} In comparison to

*Address correspondence to Vehniah K. Tjong, MD, Department of Orthopaedic Surgery, Northwestern University Feinberg School of Medicine, 259 East Erie Street, 13th Floor, Chicago, IL 60611, USA (email: vehniah.tjong@northwestern.edu).

[†]Department of Orthopaedic Surgery, Northwestern University Feinberg School of Medicine, Chicago, Illinois, USA.

The authors declared that they have no conflicts of interest in the authorship and publication of this contribution.

preinjury return-to-play rates after anterior cruciate ligament (ACL) reconstruction (approximately 63%) and shoulder stabilization (approximately 48%-100%) surgery, athletes who have had arthroscopic treatment for FAI appear to have a higher propensity to resume presurgery activities.^{4,49} Despite the abundance of literature on return to sport and FAI, the reasons behind these differences have yet to be studied.

An athlete's psychological readiness to return to sport may often be affected by a fear of reinjury and loss of confidence.^{2,50} Sports psychologists have studied this factor at great length, with evidence that both external and internal forces influence the decision to return to preinjury level of play.^{15,39} It is not uncommon for athletes to experience depression and anxiety at the time of injury.³ However, the persistence of negative moods and attitudes has been shown to predict worse outcomes of rehabilitation and recovery and may ultimately affect the decision to return to sport altogether.⁴⁰ Furthermore, evidence of maladaptive coping strategies, such as denial, wishful thinking, and venting of emotions, has been positively correlated with increased levels of reinjury anxiety.⁵¹ Assessing these potentially maladaptive behaviors and their impact on the rehabilitation process is an important step in understanding an athlete's decision to return to sport. Recent literature has highlighted the use of qualitative methods to delineate themes and patient-derived outcomes pertaining to this phenomenon.^{39,49} The goal of this study was to understand the factors that contribute to a patient's decision to return to play after arthroscopic hip surgery for FAI.

METHODS

Participants

Patients between 18 and 60 years of age who had undergone primary arthroscopic hip surgery for FAI with a minimum 2-year follow-up and preinjury participation in sport were eligible for the study. Surgery was performed at a single, university-affiliated hospital by a single orthopaedic surgeon between 2009 and 2014. Patients with need for revision surgery were excluded from the study to eliminate confounding factors. Hospital ethics board approval was granted before study commencement.

Recruitment and Data Collection

Recruitment was performed in 2 phases. Eligible patients were initially contacted by email, followed by a telephone inquiry. Interviews were scheduled and informed consent was obtained. Thirty- to 45-minute audio-recorded telephone interviews by a single trained interviewer (V.K.T.) were conducted using a study-specific question guide. These open-ended questions were distilled from a previous review of qualitative studies pertaining to sport injury. The interviewer used the method of active passivity²⁹ by not interrupting patients unless the discussion deviated significantly from the aim of the interview. Semistructured interviews were used to elucidate patient-derived concepts and themes regarding the decision to return to sport after hip arthroscopy.

As a supplement to the interviews, validated patient-reported outcomes were collected using the modified Harris Hip Score (mHHS), International Hip Outcome Tool (iHOT-12), the sport-specific subscale of the Hip Outcome Score (HOS-SSS), and a modified coping mechanism psychology score (Brief COPE). In accordance with previous studies using the Brief COPE to measure athlete coping mechanisms, results were stratified into 2 large groups: adaptive (self-distraction, active coping, use of emotional support, use of instrumental support, positive reframing, planning, humor, acceptance, religion) and maladaptive (denial, substance use, behavioral disengagement, venting, self-blame).¹¹ In addition, preinjury and current sport participation as well as current patient-perceived visual analog pain scores were obtained. The validated patient-reported outcome measures were administered and collected using the REDCap electronic data capture tool.²²

Sport participation was defined by 3 categories: type of sport, level of competition (recreational, varsity high school, varsity college/university, professional), and frequency of activity. Only those patients who had identical preinjury and current values in all 3 categories were classified as having successfully returned to their preinjury level of play. The sample size was determined once data saturation was obtained.³⁰ In other words, data collection was stopped once new concepts, themes, and explanations no longer emerged from the interviews.

Data Analysis

Anonymity was preserved during transcription using an alphanumeric identifier for each patient. Throughout data collection, iterative adaptations of the interview question guide took place to capture aspects of patients' responses that were not previously evident. This process occurred between each interview and allowed for more thorough data capture and analysis. Three members of the research team (V.K.T., C.J.C., M.A.T.) applied the method used by Strauss and Corbin⁴⁴ of open coding, axial coding, and selective coding to each of the transcribed interviews.²⁸ Line-by-line coding of the data was then grouped into commonalities that reflected categories. Connections between these categories were then classified as themes. These themes became the overarching, patient-derived explanations for the factors influencing a patient's decision to return to sport after hip arthroscopy for FAI. Secondary outcome measures were statistically analyzed using Student *t* test analysis.

RESULTS

A total of 23 patients were interviewed: 13 (57%) returned to preinjury level of sport while 10 (43%) did not. There were patients who received bilateral hip surgery in both groups (6 returned to sport vs 3 who did not). All but 1 patient participated in recreational-level sports, with 1 patient who swam at the collegiate level. Demographic data are presented in Table 1.

Patient-reported outcome scores are presented in Table 2, with statistical significance ($P < .05$) between

TABLE 1
Patient Demographics^a

	Patients Who Returned to Preinjury Sport (n = 13)	Patients Who Did Not Return to Preinjury Sport (n = 10)
Age group, y		
18-39	5 (62)	3 (38)
40-60	8 (53)	7 (47)
Mean age, y ^b	44.0	43.7
Sex		
Male	6 (75)	2 (25)
Female	7 (47)	8 (53)
Mean time since surgery, y ^c	2.65	2.91
Bilateral hips	6 (67)	3 (33)
Level of play		
Recreational	13 (59)	9 (41)
Varsity collegiate	0 (0)	1 (100)
Total	13 (57)	10 (43)

^aData are expressed as n (%) unless otherwise indicated.

^bP = .96.

^cP = .34.

TABLE 2
Patient-Reported Outcomes^a

Outcome Measure	Patients Who Returned to Preinjury Sport	Patients Who Did Not Return to Preinjury Sport	P
mHHS	88.3	70.6	<.01
iHOT-12	78.7	56.9	.02
HOS-SSS	86.4	66.3	.07
Patient satisfaction	9.36	6.30	.03

^aHOS-SSS, Hip Outcome Score—sports-specific subscale; iHOT-12, International Hip Outcome Tool; mHHS, modified Harris Hip Score.

groups for mHHS and iHOT-12 scores as well as patient satisfaction, where mean values were greater in patients who returned to their preinjury level of play. There was no statistically significant difference between groups on HOS-SSS scores, but scores did trend toward having more favorable outcomes in those who returned to play.

Scores from the Brief COPE survey ranged from a minimum of 2 to a maximum of 8, with a score of 6 or greater indicating a substantial reliance on a particular coping mechanism. Table 3 outlines the results of these scores as they apply to patients and their return-to-sport status. Of the 23 patients, 14 (61%) demonstrated substantial reliance on at least 1 of the adaptive coping mechanisms, with the greatest overall reliance on active coping (11/23; 48%), followed by acceptance (10/23; 43%), reframing (8/23; 35%), planning (8/23; 35%), humor (8/23; 35%), use of instrumental support (7/23; 30%), self-distraction (6/23; 26%), use of emotional support (5/23; 22%), and positive religion (2/23; 9%). Among the maladaptive coping mechanisms, 4 of 23 patients (17%) demonstrated substantial reliance on at least 1 mechanism, with the greatest overall reliance on

TABLE 3

Reliance on Adaptive and Maladaptive Coping Strategies From the Brief COPE Survey

	Patients Who Returned to Preinjury Sport, n	Patients Who Did Not Return to Preinjury Sport, n
Adaptive mechanisms		
Active coping	9	2
Acceptance	5	5
Reframing	7	1
Planning	8	0
Humor	4	4
Instrumental support	4	3
Self-distraction	4	2
Emotional support	4	1
Positive religion	2	0
Maladaptive mechanisms		
Venting	1	1
Self-blame	0	1
Behavioral disengagement	0	1
Substance abuse	0	0
Denial	0	0

venting (2/23; 9%), followed by self-blame (1/23; 4%), behavioral disengagement (1/23; 4%).

Patient-Derived Themes

There were 3 distinct themes generated from the semi-structured interviews that described the motivators that prevented or allowed return to play after surgery: self-efficacy, social support, and resetting expectations.

Self-Efficacy. Almost all patients who returned to their preinjury level of activity cited their driven personalities as key motivators in their successful recovery. They described this sense as “a force from within” (patient A13), “determined to be a success story” (A12), “predictable Type A, motivated personality” (A9), “focused on 1 goal of playing again” (A4), “dormancy is unacceptable” (B2), and “mind over matter” (A6). One unique example was from a recovering alcoholic and substance abuser who had relied on cycling as his primary outlet: “I’ve been clean for 13 years now and on the road since, hence my sheer motivation to get back as soon as I could” (A2). Another patient attributed her return to the nature of her sport of running: “Marathons aren’t an easy thing. People have to believe in themselves, and they usually find themselves alone while doing this. Success in this sport comes from within” (A3).

One variant on this theme was that of strong optimism. Personalities were considered to be “extremely positive” (A6), “eager beavers” (A10), “resilient and persistent” (B1), “always high on the happiness scale” (A1), or “glass half full” (A11). This group of individuals had corresponding adaptive coping mechanisms and was found to score high on the active coping and self-distraction components of the Brief COPE survey. One patient noted that he “visualized the end result [I] wanted, then worked backwards

from there" (A13). This example highlights active coping in patients who returned to sport.

Social Support. The most prominent external influence on patients who returned to sport was their relationship with health care providers, families, and teammates. Physical therapists and surgical teams were credited for supportive recoveries and transitions to sport. Patients felt "prioritized in rehab" (A5), "encouraged to progress at my own pace" (A12), and "going to PT became almost social for me and helped me to re-engage in a team-like atmosphere" (A9). Clear communication and stepwise progression was another quality found to be important among patients: "He was like a strict school teacher with clear expectations at certain time points. It really kept me going" (A11); "My needs were carefully attended to. I have EDS, so it was extremely helpful to have attentive people around me for every milestone" (B6); "It's encouraging to know that people do listen and want to help take away pain" (B8); "Good rapport with my surgeon allowed me to trust him and feel confident in taking steps forward" (B4).

Support from teammates and families was also mentioned: "Without my husband, I couldn't have done it. He took the kids while I was at PT and never made me feel guilty about it" (A7); "Tons of support and encouragement came from the team. They're like family" (A12). Overall, these patients identified with emotional dependence, maladaptive venting, and religion as coping strategies in their postoperative phase.

Resetting Expectations. Adaptive coping strategies such as acceptance, reframing, and planning domains were matched most closely to those patients who set new activity expectations and limitations after surgery. Patients in both groups used this approach. However, it was most applicable to those who did not return to their preinjury level of sport. For example, "I know that my hip won't ever feel like it's 20 again, but that doesn't stop me from being active. I've stopped running but I picked up swimming" (A10); "Certain flexion positions I just avoid altogether, but I am still able to do yoga every day" (B7); "I have found a new normal" (A1); "Just because I'm not in college anymore, doesn't mean I have to stop skiing. I know I can't be as competitive anymore, and that's ok" (A7). While some patients changed their type of activity, others rearranged their schedules to prioritize sport: "Now, I wake up at 5:30 AM to train since I can't carve time in the afternoon. I call it rebalancing" (A4); "Kids take up most of my time now, but when they're sleeping I can still exercise" (B4).

Another important yet less prevalent theme after labral repair was fear of reinjury, leading to avoidance behavior: "I just don't do flip turns because I'm scared to tear again" (B9). In patients who had bilateral hip arthroscopy for FAI, postoperative rehabilitation and recovery after the second hip surgery was found to be much easier and with less fear of surgery, pain, and reinjury. Financial constraints were also a concern for those patients wanting additional support and physical therapy. Two separate patients mentioned persistent knee pain from arthritis as the reason for not returning to sport.

DISCUSSION

Return to sport after injury and postoperative recovery has been a widely investigated topic. While the majority have focused on quantitative outcomes, there are several studies that emphasize the importance of psychological factors in a patient's decision to return to sport.^{39,49-51} The patient-derived themes from this study of patients with FAI also support this phenomenon.

Previous studies have cited the characteristic of self-efficacy as a key element in achieving postoperative sport goals after ACL reconstruction, shoulder stabilization, major athletic injury, and even adherence to rehabilitation.^{5,18,20,21} A recent review by Christino et al¹⁴ illustrated how self-efficacy can have as equivalent an impact as knee stability in return to sport after ACL reconstruction. Defined as "the belief in one's ability to succeed...persevere through challenges, and maintain commitment to a cause,"¹⁴ an athlete's degree of self-efficacy dictates their perceived quality of life and overall general wellness. On the other hand, patients found to have less motivation or low self-efficacy tend to concentrate on negative results and find themselves amidst seemingly insurmountable challenges.¹⁴ A positive correlation between postoperative self-efficacy and higher physical activity levels has been shown in the ACL population as well as in nonoperative athletic injury.^{37,46,47} Furthermore, one's level of preoperative self-efficacy was found to significantly increase return to sport and health-related quality of life.⁴⁸ Although these examples of internal motivation and resolve have been predominantly applied to the ACL reconstruction population, this study has shown that a patient's level of self-efficacy may also positively affect the decision to return to sport after FAI surgery.

Support from teammates, family, friends, and health care providers throughout the rehabilitation and recovery process was highly valued among the patients interviewed in this study. Mitchell et al³² suggested that an athlete's perceived level of social support closely correlates with a player's self-esteem, emotional stability, and feelings of belonging. This sense of support provides a buffer to stress from injury, which thereby allows for better coping mechanisms.³² One study compared 2 groups of athletes (postconcussion and post-orthopaedic injury), both of whom relied heavily on family for social support for successful return to play.¹⁷ Another study from the ACL literature reported that strong social support in adult patients was one of the major driving forces for compliance with physical therapy.⁷ Furthermore, Podlog et al³⁸ examined return to sport after injury and rehabilitation and found that some of the most common issues facing athletes are feelings of isolation and insufficient social support. The role of support and encouragement from coaches, teammates, spouses, physicians, physical therapists, and athletic trainers alike should not be underestimated in the recovery of an athlete. This concept of burden sharing positively affects groups who share common goals and provides a healthy environment that fosters recovery and the eventual return to sport.

The final theme of resetting expectations highlights the importance of adaptability after a hiatus from sport. While some patients chose another less-demanding activity than their preinjury sport due to age, other joint issues, or lack of time in their schedule, others have learned to avoid certain motions or decrease the intensity level of play. These patients with effective goal-setting strategies were most likely to return to preinjury sport. Patients from another study showed greater compliance to rehabilitation and awareness of recovery once realistic goals were set between the physical therapist and the patient.⁴⁵ The same study found that this level of acceptance of their injury and need for rehabilitation allowed patients to feel personal growth, become devoted to therapy, and allow for easier transition to return to competitive performance.⁴⁵ Although some of these patients did not return to their preinjury level of sport, their measure of surgical success was pain relief and the ability to still remain active with realistic expectations. In the setting of what has been previously coined as active “copers,” patients who are known to undergo transition points, adapt to new limitations, and overcome minor setbacks have higher global quality of life scores and are more likely to return to sport.^{13,24,43}

Interestingly, fear of reinjury was a less prevalent theme throughout this patient population as compared with ACL reconstruction and Bankart repair groups.^{49,50} The traumatic mechanism by which ACLs are ruptured and shoulder labra are torn may attribute to this difference, since FAI and its sequelae are not typically traumatic. Kinesiophobia has been linked to flashbacks where individuals recount the exact moment of their injury, thereby causing fear and hesitation to reengage in the same environment.^{26,50}

Of the 23 patients who were interviewed, 13 (57%) returned to their preinjury sport whereas 10 (43%) did not. A recent systematic review noted that 82% of patients return to play after hip arthroscopy for FAI; however, this population focused on professional and collegiate-level athletes,¹² whereas all but 1 of the patients in this current study participated at a recreational level. This discrepancy could be explained by the underlying themes found in this study. Higher-level athletes may have access to increased support from their coaches, athletic trainers, and teammates. Furthermore, professional athletes have been found to display a heightened level of self-efficacy as their motivation to return to play is also influenced by financial gains.³⁹ There was no significant difference in age between those who returned to preinjury sport and those who did not ($P = .96$), with a greater proportion of males (75%) who returned to sport. Literature on age is currently mixed. McCormick et al³¹ found that age is a prognostic factor after hip arthroscopy, as patients younger than 40 years have improved outcomes compared with older patients. On the other hand, Philippon et al³⁶ and Ben Tov et al⁶ have shown comparably improved postoperative outcomes in patients aged 50 years and older. The relationship between age and sex with respect to return to sport has not been thoroughly investigated after hip arthroscopy.

Secondary outcome measures such as the mHHS, iHOT-12, HOS-SSS, Brief COPE, and patient satisfaction scores

provided added insight to help support the qualitative themes derived from patient interviews. The values obtained were similar to outcomes after hip arthroscopy for FAI^{1,8-10,33,42} and were expectedly higher for those who returned to sport (see Table 2). The most satisfying correlation was between coping mechanisms and specific patient responses on their individual pathway to return to sport. The use of adaptive coping mechanisms and positive reframing techniques allowed some patients to overcome obstacles of fear and promote internal motivators,^{11,51} while maladaptive copers trended toward the inability to return to sport. Ivarsson et al²³ used the Brief COPE score on a series of Swedish soccer players and found that positive coping mechanisms contributed to overall mental well-being postinjury. Although patients with torn ACLs have been previously categorized as copers and noncopers with respect to tolerance for nonoperative management, these studies also suggest that personality characteristics and emotional stability may enable some patients to return to sport.^{13,19} Given the results from this study, the classification of copers and noncopers may be further extended to include these psychological components.

This mixed-methods approach to understanding return to sport after hip arthroscopy for FAI highlights the importance and usefulness of qualitative methodology. While numerous studies compare patient-reported outcomes and absolute values for return to sport, this study uncovers patient perspectives on their postoperative recovery and current activity. However, this study has multiple limitations. The design of qualitative interviews allows for data saturation at the discretion of the research team. This creates a responder and interviewer bias that is intrinsic to the methodology. Those patients who volunteered to be interviewed may also have recall and social desirability bias, which may lead to falsely elevated results. Although this study gained strength in using both qualitative and quantitative means, the limited number of patients required to achieve data saturation using qualitative methods detracts from the statistical significance of the secondary outcome quantitative measures. In addition, there were no preoperative scores collected for this population so as to report a delta value. Furthermore, this cohort of patients may not adequately encompass all levels of athletic participation, as all but 1 patient participated in sports at a recreational level.

CONCLUSION

Psychological readiness to return to sport may not always coincide with subjective outcomes after surgery for FAI among recreational athletes. The mechanism by which individuals adapt to new physical challenges in the rehabilitation phase can have an underlying influence on their return to sport. Innate tendencies of self-efficacy and resilience act as strong internal motivators in recovery after surgery. Encouragement and social support from external sources may have a positive impact on returning to preinjury activity levels, preventing emotional isolation and abandonment. An awareness of these factors can aid in the

rehabilitation phase as well as during presurgical education in appropriately setting patient expectations for post-operative recovery and return to sport.

REFERENCES

- Alradwan H, Philippon MJ, Farrokhyar F, et al. Return to preinjury activity levels after surgical management of femoroacetabular impingement in athletes. *Arthroscopy*. 2012;28:1567-1576.
- Ardern CL, Osterberg A, Tagesson S, Gauffin H, Webster KE, Kvist J. The impact of psychological readiness to return to sport and recreational activities after anterior cruciate ligament reconstruction. *Br J Sports Med*. 2014;48:1613-1619.
- Ardern CL, Taylor NF, Feller JA, Webster KE. A systematic review of the psychological factors associated with returning to sport following injury. *Br J Sports Med*. 2013;47:1120-1126.
- Ardern CL, Webster KE, Taylor NF, Feller JA. Return to sport following anterior cruciate ligament reconstruction surgery: a systematic review and meta-analysis of the state of play. *Br J Sports Med*. 2011;45:596-606.
- Bele S, Ostenberg AH, Sjostrom R, Alicicsson M. Experiences of returning to elite beach volleyball after shoulder injury. *J Exerc Rehabil*. 2015;11:204-210.
- Ben Tov T, Amar E, Shapira A, Steinberg E, Atoun E, Rath E. Clinical and functional outcome after acetabular labral repair in patients aged older than 50 years. *Arthroscopy*. 2014;30:305-310.
- Brewer BW, Cornelius AE, Van Raalte JL, et al. Age-related differences in predictors of adherence to rehabilitation after anterior cruciate ligament reconstruction. *J Athl Train*. 2003;38:158-162.
- Byrd JW. Femoroacetabular impingement in athletes: current concepts. *Am J Sports Med*. 2014;42:737-751.
- Byrd JW, Jones KS. Hip arthroscopy for labral pathology: prospective analysis with 10-year follow-up. *Arthroscopy*. 2009;25:365-368.
- Byrd JW, Jones KS. Hip arthroscopy in athletes: 10-year follow-up. *Am J Sports Med*. 2009;37:2140-2143.
- Carver CS. You want to measure coping but your protocol's too long: consider the brief COPE. *Int J Behav Med*. 1997;4:92-100.
- Casartelli NC, Leunig M, Maffiuletti NA, Bizzini M. Return to sport after hip surgery for femoroacetabular impingement: a systematic review. *Br J Sports Med*. 2015;49:819-824.
- Chmielewski TL, Hurd WJ, Snyder-Mackler L. Elucidation of a potentially destabilizing control strategy in ACL deficient non-copers. *J Electromyogr Kinesiol*. 2005;15:83-92.
- Christino MA, Fantry AJ, Vopat BG. Psychological aspects of recovery following anterior cruciate ligament reconstruction. *J Am Acad Orthop Surg*. 2015;23:501-509.
- Clement D, Arvinen-Barrow M, Fetty T. Psychosocial responses during different phases of sport-injury rehabilitation: a qualitative study. *J Athl Train*. 2015;50:95-104.
- Collins JA, Ward JP, Youm T. Is prophylactic surgery for femoroacetabular impingement indicated? A systematic review. *Am J Sports Med*. 2014;42:3009-3015.
- Covassin T, Crutcher B, Bleecker A, Heiden EO, Dailey A, Yang J. Postinjury anxiety and social support among collegiate athletes: a comparison between orthopaedic injuries and concussions. *J Athl Train*. 2014;49:462-468.
- Czuppon S, Racette BA, Klein SE, Harris-Hayes M. Variables associated with return to sport following anterior cruciate ligament reconstruction: a systematic review. *Br J Sports Med*. 2014;48:356-364.
- Eastlack ME, Axe MJ, Snyder-Mackler L. Laxity, instability, and functional outcome after ACL injury: copers versus noncopers. *Med Sci Sports Exerc*. 1999;31:210-215.
- Everhart JS, Best TM, Flanigan DC. Psychological predictors of anterior cruciate ligament reconstruction outcomes: a systematic review. *Knee Surg Sports Traumatol Arthrosc*. 2015;23:752-762.
- Flanigan DC, Everhart JS, Glassman AH. Psychological factors affecting rehabilitation and outcomes following elective orthopaedic surgery. *J Am Acad Orthop Surg*. 2015;23:563-570.
- Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42:377-381.
- Ivarsson A, Johnson U, Podlog L. Psychological predictors of injury occurrence: a prospective investigation of professional Swedish soccer players. *J Sport Rehabil*. 2013;22:19-26.
- Kaplan Y. Identifying individuals with an anterior cruciate ligament-deficient knee as copers and noncopers: a narrative literature review. *J Orthop Sports Phys Ther*. 2011;41:758-766.
- Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. *J Bone Joint Surg Am*. 2007;89:780-785.
- Kvist J, Ek A, Sporrstedt K, Good L. Fear of re-injury: a hindrance for returning to sports after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc*. 2005;13:393-397.
- Leunig M, Ganz R. Femoroacetabular impingement. A common cause of hip complaints leading to arthrosis [in German]. *Unfallchirurg*. 2005;108:9-10, 12-17.
- Lingard L, Albert M, Levinson W. Grounded theory, mixed methods, and action research. *BMJ*. 2008;337:a567.
- Malterud K. Qualitative research: standards, challenges, and guidelines. *Lancet*. 2001;358:483-488.
- Marshall MN. Sampling for qualitative research. *Fam Pract*. 1996;13:522-525.
- 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;28:1359-1364.
- Mitchell I, Evans L, Rees T, Hardy L. Stressors, social support, and tests of the buffering hypothesis: effects on psychological responses of injured athletes. *Br J Health Psychol*. 2014;19:486-508.
- 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(suppl):14S-19S.
- Philippon M, Schenker M, Briggs K, Kuppersmith D. Femoroacetabular impingement in 45 professional athletes: associated pathologies and return to sport following arthroscopic decompression. *Knee Surg Sports Traumatol Arthrosc*. 2007;15:908-914.
- Philippon MJ, Schenker ML. Arthroscopy for the treatment of femoroacetabular impingement in the athlete. *Clin Sports Med*. 2006;25:299-308.
- Philippon MJ, Schroder ESBG, Briggs KK. Hip arthroscopy for femoroacetabular impingement in patients aged 50 years or older. *Arthroscopy*. 2012;28:59-65.
- Podlog L, Banham S, Wadey R, Hannon J. Psychological readiness to return to competitive sport following injury: a qualitative study. *Sport Psychol*. 2015;29:1-14.
- Podlog L, Dimmock J, Miller J. A review of return to sport concerns following injury rehabilitation: practitioner strategies for enhancing recovery outcomes. *Phys Ther Sport*. 2011;12:36-42.
- Podlog L, Eklund RC. Returning to competition after a serious injury: the role of self-determination. *J Sports Sci*. 2010;28:819-831.
- Rosenberger PH, Jokl P, Ickovics J. Psychosocial factors and surgical outcomes: an evidence-based literature review. *J Am Acad Orthop Surg*. 2006;14:397-405.
- Sampson JD, Safran MR. Biomechanical implications of corrective surgery for FAI: an evidence-based review. *Sports Med Arthrosc*. 2015;23:169-173.
- Sansone M, Ahldén M, Jonasson P, et al. Outcome after hip arthroscopy for femoroacetabular impingement in 289 patients with minimum 2-year follow-up [published online January 21, 2016]. *Scand J Med Sci Sports*. doi:10.1111/sms.12641.
- Schilaty ND, Nagelli C, Hewett TE. Use of objective neurocognitive measures to assess the psychological states that influence return to sport following injury. *Sports Med*. 2016;46:299-303.
- Strauss A, Corbin J. *Basis of Qualitative Research: Grounded Theory Procedures and Techniques*. 1st ed. Newbury Park, CA: Sage; 1990.

45. Tatsumi T. Relationship between adaptation after returning to competition and psycho-behavioral attitudes during injury rehabilitation. *J Phys Ther Sci.* 2014;26:1813-1823.
46. Thomeé P, Währborg P, Börjesson M, Thomeé R, Eriksson BI, Karlsson J. A new instrument for measuring self-efficacy in patients with an anterior cruciate ligament injury. *Scand J Med Sci Sports.* 2006;16:181-187.
47. Thomeé P, Währborg P, Börjesson M, Thomeé R, Eriksson BI, Karlsson J. Self-efficacy, symptoms and physical activity in patients with an anterior cruciate ligament injury: a prospective study. *Scand J Med Sci Sports.* 2007;17:238-245.
48. Thomeé P, Währborg P, Börjesson M, Thomeé R, Eriksson BI, Karlsson J. Self-efficacy of knee function as a pre-operative predictor of outcome 1 year after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc.* 2008;16:118-127.
49. Tjong VK, Devitt BM, Murnaghan ML, Ogilvie-Harris DJ, Theodoropoulos JS. A qualitative investigation of return to sport after arthroscopic bankart repair: beyond stability. *Am J Sports Med.* 2015;43:2005-2011.
50. Tjong VK, Murnaghan ML, Nyhof-Young JM, Ogilvie-Harris DJ. A qualitative investigation of the decision to return to sport after anterior cruciate ligament reconstruction: to play or not to play. *Am J Sports Med.* 2014;42:336-342.
51. Wadey R, Podlog L, Hall M, Hamson-Utley J, Hicks-Little C, Hammer C. Reinjury anxiety, coping, and return-to-sport outcomes: a multiple mediation analysis. *Rehabil Psychol.* 2014;59:256-266.
52. Zadpoor AA. Etiology of femoroacetabular impingement in athletes: a review of recent findings. *Sports Med.* 2015;45:1097-1106.