

Reasons Why Patients Do Not Return to Sport Post ACL Reconstruction: A Cross-Sectional Study

Mohammad Hamdan¹, Bassem I Haddad¹, Saadat Amireh²,
Anas Mohammad Ahmad Abdel Rahman², Hala Almajali², Hazim Mesmar², Christina Naum²,
Mahmud Sameer Alqawasmi¹, Alaa M Albandi², Mohammad Ali Alshrouf^{2,3}

¹Department of Special Surgery, Division of Orthopedics, School of Medicine, The University of Jordan, Amman, 11942, Jordan; ²School of Medicine, The University of Jordan, Amman, 11942, Jordan; ³Special Accident and Joint Surgery, Sportklinik Hellersen, Lüdenschied, 58515, Germany

Correspondence: Mohammad Ali Alshrouf, Special Accident and Joint Surgery, Sportklinik Hellersen, Paulmannshöher Street 17, Lüdenschied, 58515, Germany, Tel +491622462460, Email M.Alshrouf@outlook.com

Background: Patients who incur an anterior cruciate ligament (ACL) injury and undergo ACL reconstruction (ACLR) have the intention of returning to sports at their pre-injury level; however, many do not return to the pre-injury level. This study aims to investigate the common factors that hinder patients from resuming sports activities following ACLR and to assess how these barriers impact their ability to return to sports. We hypothesized that patients' psychological factors, including fear of reinjury, would significantly influence their decision to return to sport after ACL reconstruction.

Methods: In this cross-sectional study, 138 patients who had undergone ACL reconstruction surgery were examined. The research methodology involved conducting interviews to gather comprehensive data on demographic, psychological, and physical factors that impact the resumption of sports activities following ACLR. The factors considered encompassed knee-related symptoms, life-related reasons, and choice-related reasons, such as fear of reinjury.

Results: Among the 138 participants who were included, the mean age was 33.49 ± 9.19 years, with only 39 (28.3%) patients indicated a successful return to their pre-injury activity levels. The obstacles preventing the resumption of sports activities were more commonly attributed to reasons such as fear of reinjury (79.8%) and persistent knee symptoms (78.8%), rather than choice-related reasons (excluding fear of reinjury) (23.2%), such as lack of time or interest, and life-related reasons (18.2%), including work, family, and education. In addition, patients who completed the rehabilitations were 6.277 times more likely to return to the previous level of activity (95% CI 1.801–21.880; $P = 0.001$).

Conclusion: This research places emphasis on the impact of psychological factors, particularly the fear of reinjury, more commonly in male, on the decision to resume sports activities. In addition, persistent knee symptoms and completion of rehabilitation after ACLR is another factors contributing in returning to sport. Psychological evaluation and counseling may identify those less likely to return to sport, allowing for more targeted interventions to further improve ACLR outcomes.

Keywords: anterior cruciate ligament, ACL, rehabilitation outcomes, reconstruction, fear of reinjury, return to sport

Introduction

The anterior cruciate ligament (ACL) serves as a critical force within the knee joint. Its primary role is to limit the anterior movement of the tibia relative to the femur, contributing to the overall stability of the knee joint.¹ Injuries to the ACL are not uncommon, particularly among athletes, and can have a substantial impact on knee stability and function.^{2,3}

Anterior cruciate ligament reconstruction (ACLR) is a widely performed surgical intervention aimed at restoring knee function and enabling individuals to resume sports activities post-injury.⁴ Several international studies have investigated the outcomes of ACLR, revealing varying success rates in the return to sport ranging from 33% to 92.5%. These studies often cite factors such as age, gender, and surgical technique as influential determinants.^{5,6} Additionally, accompanied preoperatively meniscus and cartilage damage were associated with inferior long-term patient-reported outcome measures.⁷

Existing literature underscores the complex interplay of physical and psychological factors in the return-to-sport journey post-ACLR.⁸ Persistent knee symptoms, encompassing pain, weakness, instability, stiffness, and swelling, have been identified as key determinants affecting an individual's ability to resume sporting activities.^{9,10} Moreover, psychological factors such as fear of reinjury have been consistently reported as a significant barrier.^{11–13} Additionally, life-related reasons, such as occupational commitments and familial responsibilities, have been acknowledged as potential barriers in various studies.^{13,14}

This study was conducted to add to the existing literature and identifying the factors that impact the decision to resume sports activities after ACLR. Through the analysis of the experiences of individuals who have undergone ACL reconstruction surgery in Jordan, the study seeks to offer evidence-based suggestions that can improve rehabilitation strategies for this specific population, mainly in our region. The study hypothesizes that persistent knee symptoms, life-related factors, and psychological barriers, significantly influence patients' decisions to return to sports following ACLR.

Methods

Study Design and Population

This cross-sectional study was conducted using a structured questionnaire at a tertiary teaching hospital with patients referred from all over the country, including patients who underwent ACL reconstruction surgery performed by a sports medicine specialist. Data collection for the study was carried out between May 2023 and February 2024. The inclusion criteria for the study are patients aged at least 18 years who underwent primary ACL reconstruction, with or without meniscal injury and patients were included if at least one year had passed since their ACL reconstruction surgery. The exclusion criteria for this study were patients who experienced a re-injury post-ACLR, patients who were not physically active before the surgery, and patients who underwent posterior cruciate ligament reconstruction.

The main objective of this study is to assess the common factors that prevent patients from returning to sport after ACLR and to evaluate the effects of these factors on returning to sport. Also, this study may help patients who underwent ACL reconstruction surgery to deal and live with this situation and to get back to their normal lifestyle by achieving preinjury levels of activity. Results from this study may guide efforts to enhance the return to sports after ACLR.

Surgical Technique

The surgeries were performed arthroscopically by the same surgeon at a single institution, under either spinal or general anesthesia based on the patient's condition and preference. Patients were positioned supine on the operating table, and a clinical examination under anesthesia was conducted, including Lachman and pivot shift tests to confirm knee instability and varus and valgus stress tests to assess for other ligamentous injuries. A pneumatic tourniquet was applied to the upper thigh, and a table-side post with a foot support maintained the knee in 90° flexion. Prophylactic antibiotics (second-generation cephalosporins) were administered before tourniquet inflation. Skin preparation was performed with povidone-iodine 10% solution, and standard anteromedial and anterolateral portals were created for arthroscopic access. Diagnostic arthroscopy confirmed ACL rupture, evaluated meniscal and chondral conditions, and addressed associated injuries.

After confirming the ACL rupture, the Semitendinosus and Gracilis tendons were harvested from the ipsilateral side through a 3 cm oblique incision on the anteromedial proximal tibia. Subcutaneous dissection exposed the tendons, which were harvested using a tendon harvester. The tendons were cleaned of excess tissue, and a quadrupled graft was prepared on a workstation. High-strength sutures (No. 2 Orthocord[®], DePuy Mitek) were used to whipstitch both ends of the graft. Graft diameter and length were measured, and grafts less than 8 mm in diameter were excluded. The femoral tunnel footprint was identified arthroscopically via the anteromedial portal by hyperflexing the knee and using the resident's ridge as a reference point. A guidewire was drilled using a femoral guide, followed by reaming an appropriately sized tunnel. Similarly, a tibial tunnel was prepared using a tibial tunnel guide to place a guide pin at the ACL footprint, and a cannulated drill was used to create the tunnel according to the graft dimensions.

The prepared graft was passed through the tibial and femoral tunnels, and its positioning and alignment were confirmed arthroscopically. The graft was secured in the femoral tunnel using an adjustable loop suspensory fixation

device (RIGIDLOOP™ Adjustable, DePuy Mitek) and tensioned at 20°–30° knee flexion. On the tibial side, the graft was fixed using bioabsorbable interference screws (MILAGRO® Advance Interference Screw, DePuy Mitek). Arthroscopic evaluation verified appropriate tension and the absence of impingement throughout the knee's range of motion. Closure by layers was done for tendon harvest site using Vicryl 0, and skin closure for all wounds was done using non absorbable sutures and sterile dressing was applied. Hemostasis was checked after deflating the tourniquet.

Data Collection

The questionnaire was administered via telephone by healthcare workers who underwent data collection training for cross-sectional studies. Data collection via telephone interview was chosen to maximize accessibility and ensure a larger sample size. To avoid potential response bias, neither the surgeon nor clinical staff conducted telephone interviews. The participants gave verbal consent after being briefed on the study's aim and purpose and the individual's right to withdraw at any time. Healthcare workers were on hand during questionnaire administration to address any participant concerns. The sample size calculation was performed using G*Power (version 3.1.9.7). With parameters set at an effect size of 0.5, an alpha level of 0.05, and a power of 0.80, the analysis determined that at least 128 participants were necessary to achieve adequate statistical rigor for testing mean differences. In total, 274 eligible patients were contacted, and 138 agreed to participate and completed the survey. However, some patients were unreachable or did not answer, so we cannot definitively state that these patients declined participation.

The research was carried out in adherence to the ethical guidelines outlined in the Declaration of Helsinki. This study was approved by the institutional review board of the institute as well as the scientific research committee of the medical faculty at the University of Jordan (Approval No.1020228432) and no form of identification was included at any point throughout the study and the privacy of patients was ensured.

Study Tool

After a thorough literature review, the survey utilized in this study was carefully adjusted from that applied by Flanigan et al,¹⁰ in their study on kinesiophobia and persistent knee symptoms after ACLR, with due consideration given to its relevance to our research objectives. An expert panel of orthopedic surgeons and researchers methodically designed the survey to align with the aims of the investigation and checked it for conceptual equivalence, clarity, comprehensibility, face, and content validity.

The questionnaire encompassed demographic inquiries such as age, gender, weight, height, and smoking status. Additionally, it covered aspects concerning rehabilitation completion, the side of the ACL injury, associations with meniscus tears, and whether patients had successfully returned to their previous level of activity before the ACL injury. For those who had not resumed their pre-injury activity level, reasons were sought, including knee-related symptoms (knee feels unstable, lack of motion, knee hurts with activities, knee or leg muscles feel weak, and knee swelling), life-related factors (about job demands, educational pursuits, familial related, including pregnancy, childcare, and marital status changes), and choice-related considerations (disinterest in resuming activity at the same level, time constraints, fear of reinjury, and recommendations against returning to the previous level).

Statistical Analysis

All data were entered into Microsoft Excel software (Version 16.83), where they were recorded, initial organization, and cleaned. The data were described using variability analysis in the form of means \pm standard deviation. The socio-demographic factors were calculated and provided as frequencies (percentages). Pearson's chi-square test and Fisher's exact test were used to assess the association between categorical variables. Independent-samples *t*-test was used to assess the mean difference between the returners and non-returners regarding several continuous variables. SPSS version 27.0 (Chicago, USA) was used for the analysis. The figures were created using R (version 2.8.2). All variables with a *P* value <0.05 were considered statistically significant.

Results

Demographics

In total, 138 participants were included in the analysis of this study. The mean age of the participants was 33.49 ± 9.19 years and ranged from 19 to 56. Among the patients, 123 (89.1%) were males and 15 (10.9%) were females. The mean BMI among returners was 27.04 ± 4.72 , indicating an overall overweight population. The right-sided injury was slightly more common, with 55.1% and 75.4% having an associated injury. Among the patients, only 39 (28.3%) returned to sport after the ACL injury, and 99 (71.8%) did not return. Table 1 summarizes the demographics of the study.

The frequency of the reasons for patients not returning to sport after ACL injury treatment showed that fear of reinjury alone was reported by 79.8% of the patients, followed by residual knee symptoms (78.8%), other choice-related reasons excluding fear of injury (23.2%), and life-related reasons (18.2%) (Figure 1).

Upon analysis, there was no significant mean difference between the age, height, weight, and BMI of the returners and non-returners. There was no significant association between returning or not and age categories, gender, BMI categories, smoking, ACL side, or associated injury. However, patients who completed the rehabilitations were 6.277 times more likely to return to the previous level of activity compared to those who did not complete the rehabilitation (95% CI 1.801–21.880; $P = 0.001$).

Table 1 Demographics of the Study Population

Variables		Total	Returners (n = 39)	Non-Returners (n = 99)	P value
Age, years		33.49 ± 9.19	32.23 ± 9.96	33.98 ± 8.87	0.316
Age, years	≤30	58 (42.0)	20 (51.3)	38 (38.4)	0.277
	31–40	48 (34.8)	13 (33.3)	35 (35.4)	
	≥41	32 (23.2)	6 (15.4)	26 (26.3)	
Gender	Male	123 (89.1)	34 (87.2)	89 (89.9)	0.762
	Female	15 (10.9)	5 (12.8)	10 (10.1)	
Height, Cm		174.08 ± 8.82	174.49 ± 9.10	173.92 ± 8.75	0.735
Weight, Kg		81.90 ± 15.42	79.28 ± 12.57	82.93 ± 16.35	0.212
BMI		27.04 ± 4.72	26.04 ± 3.73	27.44 ± 5.01	0.077
Categorical BMI	Underweight	2 (1.5)	0 (0)	2 (2.0)	0.126
	Normal	42 (30.4)	14 (35.9)	28 (28.3)	
	Overweight	63 (45.7)	21 (53.9)	42 (42.4)	
	Obesity	31 (22.5)	4 (10.3)	27 (27.3)	
Smoking	Yes	60 (43.5)	13 (33.3)	47 (47.4)	0.182
	No	78 (56.5)	26 (66.7)	52 (52.5)	
ACL side	Right	76 (55.1)	18 (46.2)	58 (58.6)	0.254
	Left	62 (44.9)	21 (53.9)	41 (41.4)	
Meniscal tear	Yes	104 (75.4)	25 (64.1)	79 (79.8)	0.078
	No	34 (24.6)	14 (35.9)	20 (20.2)	
Completed rehabilitation	Yes	101 (73.2)	36 (92.3)	65 (65.7)	0.001*
	No	37 (26.8)	3 (7.7)	34 (34.3)	

Note: The data is represented as mean \pm standard deviation for continuous variables including age, height, weight, and BMI. The other variables are described as n (%). P value was calculated using independent sample t-test for continuous variables and chi-square test or Fisher's exact test for categorical variables. * indicates a P value < 0.05.

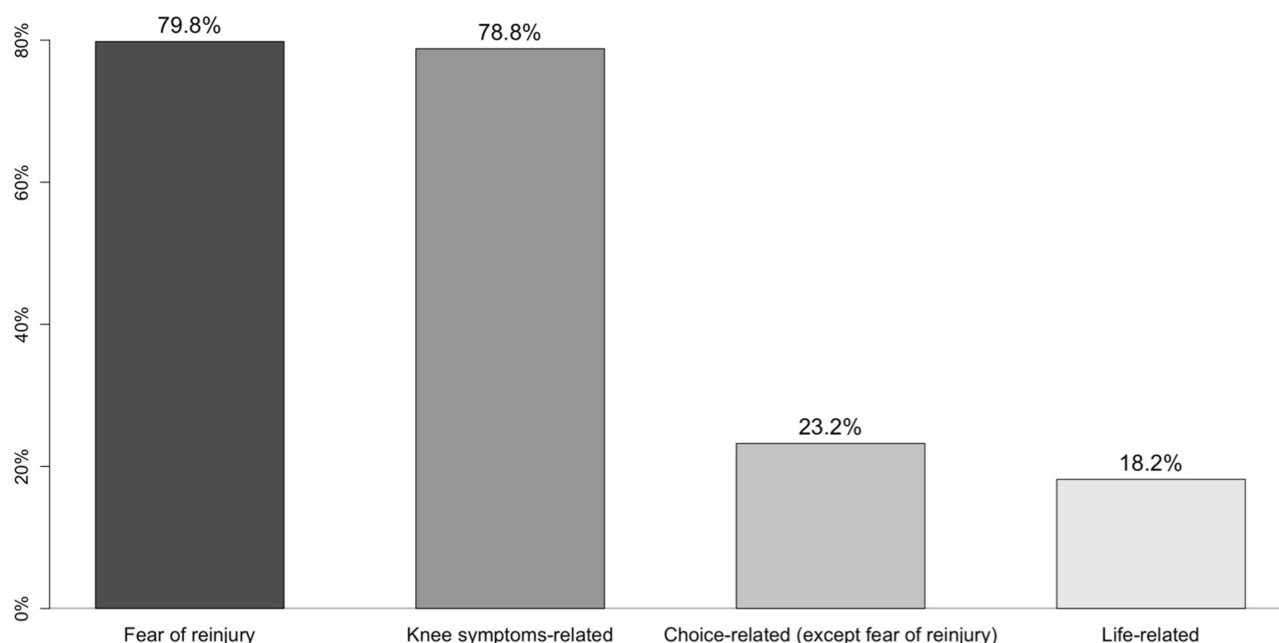


Figure 1 The reasons for patients not returning to sport after ACL injury treatment.

Knee Symptoms-Related Reasons

The majority of non-returned reported pain (58.6%) and weakness (56.6%) as significant deterrents. A notable portion reported stiffness (20.2%) and swelling (17.2%) as factors contributing to non-return. The least common knee-symptom-related reason was instability (16.2%).

Life-Related Reasons

Life-related factors such as job (14.1%) played a major role in the non-return decisions, followed by education (4.0%) and marital status change (2.0%). About 30% of females reported that education was one of the issues that led to not returning to sport after ACL injury, compared to only 1.1% of males (OR = 37.714 95% CI 3.454–411.791; $P = 0.003$).

Choice-Related Reasons

Fear of reinjury was the most common (79.8%) reason for not returning to sport after an ACL injury. A subset of non-returned expressed disinterest (12.1%) or time constraints (9.1%) as reasons for not resuming sports. Moreover, males were more likely to report fear of reinjury than females (OR = 4.933 95% CI 1.269–19.186; $P = 0.027$). Table 2 summarizes reasons for non-returning to sports after ACL reconstruction surgery.

Table 2 Summary of the Reasons for the Patients Not Returning to Sport After ACL Injury

	Knee Symptoms-Related Reason					Life-Related Reason			Choice-Related Reason			
	Pain	Weakness	Swelling	Stiffness	Instability	Job	Education	Marital status change	Fear of reinjury	Not interested	No time	Advised not to return
Male	50 (56.2)	51 (57.3)	14 (15.7)	17 (19.1)	15 (16.9)	13 (14.6)	1 (1.1)	2 (2.2)	74 (83.1)	9 (10.1)	9 (10.1)	8 (9)
Female	8 (80)	5 (50)	3 (30)	3 (30)	1 (10)	1 (10)	3 (30)	0 (0)	5 (50)	3 (30)	0 (0)	0 (0)
Total	58 (58.6)	56 (56.6)	17 (17.2)	20 (20.2)	16 (16.2)	14 (14.1)	4 (4.0)	2 (2.0)	79 (79.8)	12 (12.1)	9 (9.1)	8 (8.1)

Notes: participants were able to select more than one choice, so the percentage is not 100%. P value was calculated using Fisher's Exact test and significant value with P value <0.5 was for the education and fear of reinjury.

Discussion

Our study provides critical insights into the barriers faced by patients attempting to return to sport after ACL reconstruction. The cohort of patients allowed for a detailed exploration of demographic, psychological, and physical factors, providing insights into the complex landscape of return-to-sport decisions. The most common reasons for patients not returning to sport after ACL injury treatment were fear of reinjury followed by residual knee symptoms, other choice-related reasons (excluding fear of reinjury), and life-related reasons. In addition, patients who completed the rehabilitation were more likely to return to the previous level of activity compared to those who did not complete the rehabilitation.

Despite the widely recognized effectiveness of anterior cruciate ligament reconstruction (ACLR) in improving knee function, our investigation found that a large proportion of patients (71.7%) did not go back to their pre-injury activity levels after ACL reconstruction surgery. The prevalence of an older patients in our study relative to other study populations, however, may account for this low return to sport rate. A meta-analysis of forty-eight studies demonstrated that only 44% of patients returned to competitive sports post-ACLR.¹⁵ Moreover, Muller et al's study reported that only 48.6% of participants returned to their preinjury sports level.¹⁶ In contrast, Ardern et al's study showed that, on average, 65% of individuals returned to their pre-injury sport levels after ACL reconstruction.¹⁷ Additionally, Sepúlveda et al's study indicated that 81% of athletes returned to some form of sport, while only 65% returned to their pre-injury level and 55% returned to competitive sports.¹⁸

Central to the reluctance to return to sport was the pervasive fear of reinjury, identified as the predominant barrier. This resonates massively with existing literature.^{10,19–24} These studies collectively underscore the profound psychological impact of kinesiophobia, which has been defined as “an excessive, irrational fear of physical movement and activity. This fear stems from a perceived vulnerability to experiencing pain or reinjury”.²⁵ This condition has been frequently cited as preventing an athlete's return to sport after ACLR,²⁶ and in a recent scoping review they found that this condition is the most prevalent psychological barrier to postoperative rehabilitation.¹¹ Several studies concluded that kinesiophobia raises the risk of re-injury, lower Knee injury and Osteoarthritis Outcome Score (KOOS) scores, decreased muscle strength, and worse performance, concluding that they should be evaluated before returning to sports.^{27–29} Moreover, patients with higher fear had lower activity levels, reduced hop performance and quadriceps strength, and a higher risk of a second ACL injury within 2 years of returning to sport.²⁸ Even though another study that included 38 individuals within two years post-ACLR found that those with a higher fear of re-injury adopted a protective strategy, showing increased muscle activation, likely to stabilize the knee.³⁰ To address these challenges, tailored interventions such as cognitive-behavioral therapy, gradual exposure therapy, psychosocial support groups, mindfulness techniques, and educational programs are essential.

Another significant factor contributing to hesitancy in returning to sports was the substantial prevalence of knee-related symptoms, with pain and weakness identified as primary determinants affecting individuals' ability to resume sporting activities. While these findings align with broader studies on ACLR outcomes,¹⁰ our study provides specific insights into the prevalence of these symptoms within the Jordanian population. A comparative analysis with the study conducted by Flanigan et al reveals that, despite substantial improvements in knee symptom scores often noted in ACL outcomes studies, non-returners frequently mentioned lingering knee symptoms, particularly pain.¹⁰ This observation aligns with the research by Lentz et al, where persistent symptoms were identified as a robust independent predictor of the lack of return to sport after ACLR.³¹ Furthermore, our study, showed a considerable percentage of participants who identified stiffness and swelling as contributing factors hindering their return to sports. Notably, among males, instability emerged as a prominent reason, aligning with their reported knee symptoms. This observation holds psychological significance, suggesting potential psychological implications for individuals experiencing instability.

The harmony between our results and those of Flanigan et al underscores the universal challenges posed by persistent knee symptoms post-ACLR, emphasizing the imperative need for interventions designed to address these specific issues.¹⁰ Implementing structured interventions such as specific exercises, monitoring pain thresholds, or incorporating psychological support could be instrumental in addressing these specific issues. Moreover, life-related reasons, comprising 6.78% of responses in our study, were identified as a notable barrier, with job-related factors predominating. This

aligns with Burland et al's work, emphasizing the broader psychosocial challenges individuals face post-ACLR.¹³ We also found that some individuals who do not return to sports attribute it to a lack of interest or time constraints. Further investigation into these factors may reveal underlying motivational and scheduling difficulties that could be alleviated through personalized counseling and time-management interventions.

According to our study, patients who successfully completed their rehabilitation were 6.277 times more inclined to go back to their previous level of activity in comparison to those who did not finish the rehabilitation. Previous research has demonstrated that individuals might need an extended period of postoperative rehabilitation beyond the typical recommendation to achieve a successful return to competitive sports post ACL reconstruction surgery.³² Rehabilitation that focuses on managing pain and swelling, protecting the graft, restoring range of motion, and strengthening muscles plays a vital role in the return to sports.³³ These findings underscore the importance of a comprehensive and individualized rehabilitation program in facilitating a safe and successful return to sport following ACL reconstruction.

In Brophy et al's study, the findings indicate that younger age and male gender are associated with a higher likelihood of returning to play after ACL reconstruction among soccer players.³⁴ However, our results show that gender and age were not significant factors affecting the return to sport following ACL reconstruction surgery. While Brophy et al's study underscore the influence of age as a determinant factor in return-to-play outcomes, it specifically focuses on soccer players, while our research examines a broader population undergoing ACL reconstruction surgery.³⁴ Other important variables like weight and height were obtained, and the corresponding body mass index (BMI) was computed. In our study, a significant proportion of participants were classified as overweight (45.65%), In contrast, the Korkoman et al study indicates that approximately half of the respondents had an average BMI, with a lower prevalence of overweight individuals (26.36%).³⁵ Overall, these comparative results underscore the importance of considering BMI distribution in the context of research on ACL reconstruction outcomes and return to sport.

Kim et al's study revealed significant findings regarding the adverse effects of smoking on the outcomes of ACL reconstruction and the increased knee instability observed in heavy smokers. This suggests that smoking may have a significant role to play in the recovery process following surgery.³⁶ It is important to highlight that Kim et al's study also indicated that patients who quit smoking at least one month prior to ACL reconstruction achieved outcomes comparable to non-smokers, indicating the potential for improvement through smoking cessation. Conversely, our own research did not establish a significant association between smoking status and the ability to return to sports. It is crucial to emphasize the higher prevalence of smoking in our group compared to the majority of ACLR cohorts. The findings from Novikov et al's study enhance the growing evidence suggesting a strong association between cigarette smoking and outcomes following ACL reconstruction.³⁷ These findings could provide valuable insights for orthopedic surgeons, emphasizing the importance of considering smoking status when counseling patients about the potential impact on the outcomes of ACL reconstruction.

Based on the findings, our study emphasizes the importance of an individualized approach to postoperative care. It is recommended to incorporate pre-surgery psychological evaluations for patients undergoing ACL reconstruction (ACLR). Utilizing validated surveys to assess anxiety, fear of reinjury, and kinesiophobia can provide valuable insights into each patient's psychological profile. This proactive approach enables clinicians to identify patients with heightened psychological concerns before surgery, allowing for the implementation of targeted strategies to address these barriers. Tailored interventions, such as cognitive-behavioral therapy and enhanced rehabilitation protocols focusing on pain management, strength restoration, and joint flexibility, are crucial. By addressing both psychological and physical aspects of rehabilitation, this comprehensive approach can significantly improve the overall success of ACLR procedures. Additionally, managing patient expectations regarding knee symptoms during rehabilitation can further optimize outcomes, enhancing the overall rehabilitation experience.

Despite the valuable insights offered by this study on the return to sport after ACLR, our study is not without limitations. A limitation of this study pertains to the demographic composition of the cohort, which features an older population, a higher proportion of males, and a greater prevalence of smoking compared to typical ACLR cohorts. This demographic imbalance can potentially impact the generalizability of the study findings, as factors such as age, gender,

and smoking habits can influence both the occurrence and outcomes of ACLR. Furthermore, the study focuses on demographics in Jordan, limiting the findings' generalizability. Moreover, the reliance on telephone interviews introduces the potential for response bias. The study could have benefited from a more comprehensive psychological assessment tool to understand better the intricate interplay between mental health and the decision-making process post-ACLR. Additionally, while focusing on the decision to return to sports post-ACLR, a more nuanced exploration of actual sports-related performance and satisfaction post-surgery could provide a more comprehensive understanding of the outcomes. Finally, an objective evaluation was not conducted, limiting the identification of common factors contributing to persistent knee symptoms and kinesiophobia, such as muscle wasting and weakness. These are critical factors that affect the return to sports post-injury.

Future research endeavors should incorporate diverse methodologies, including qualitative approaches, to capture a more detailed understanding of the psychological and sociocultural factors influencing return to sport in the Jordanian context. Additional longitudinal studies tracking participants over time could provide valuable insights into the long-term effects of ACLR on return-to-sport outcomes such as injury recurrence, psychological well-being, and overall athletic performance. Moreover, future research could expand on our findings by incorporating validated psychological scales to further delineate the impact of fear on return-to-sport outcomes.

Conclusion

Our study sheds light on the intricate obstacles encountered by individuals after undergoing anterior cruciate ligament reconstruction (ACLR), which greatly influence their return to sports. The majority of participants did not manage to resume their pre-injury level of activity, primarily due to the fear of reinjury and persistent knee symptoms. To optimize postoperative outcomes, tailored interventions that address both the psychological and physical challenges encountered by these patients should be taken into consideration. In order to enhance future rehabilitation protocols, it is crucial to adopt a balanced approach that integrates patient-specific counseling that consider the disparities and barriers related to individuals' lives. By incorporating comprehensive psychological assessments, validated surveys, and continuous monitoring of patients' post-surgery progress, interventions can be refined to contribute to a more holistic approach to postoperative care. These findings provide valuable insights into the global discourse on ACLR outcomes, highlighting the importance of individualized strategies in optimizing postoperative rehabilitation.

Data Sharing Statement

The raw data from this research that were used and analyzed are available online as [Supplementary Material](#).

Consent for Publication

The study did not disclose any individual details, images or videos.

Ethics Approval

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by Institutional Review Board of the University of Jordan (approval number 1020228432). Informed written consent was obtained from the patients.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

No funding was received for conducting this study.

Disclosure

The authors declare that they have no known competing financial or personal interests that could have influenced the work reported in this paper.

References

- Śmigieński R, Zdanowicz U, Drwięga M, Ciszek B, Williams A. The anatomy of the anterior cruciate ligament and its relevance to the technique of reconstruction. *Bone Joint J.* 2016;98-B(8):1020–1026. doi:10.1302/0301-620X.98B8.37117
- Bisciotti GN, Chamari K, Cena E, Carimati G, Volpi P. ACL injury in football: a literature overview of the prevention programs. *Muscles Ligaments Tendons J.* 2017;6(4):473–479. doi:10.11138/mltj/2016.6.4.473
- Siegel L, Vandenakker-Albanese C, Siegel D. Anterior cruciate ligament injuries: anatomy, physiology, biomechanics, and management. *Clin J Sport Med.* 2012;22(4):349–355. doi:10.1097/JSM.0b013e3182580cd0
- Bach BR, Levy ME, Bojchuk J, Tradonsky S, Bush-Joseph CA, Khan NH. Single-incision endoscopic anterior cruciate ligament reconstruction using patellar tendon autograft. Minimum two-year follow-up evaluation. *Am J Sports Med.* 1998;26(1):30–40. doi:10.1177/03635465980260012201
- Ardern CL, Taylor NF, Feller JA, Webster KE. Psychological responses matter in returning to preinjury level of sport after anterior cruciate ligament reconstruction surgery. *Am J Sports Med.* 2013;41(7):1549–1558. doi:10.1177/0363546513489284
- de Sa D, Shanmugaraj A, Weidman M, et al. All-inside anterior cruciate ligament reconstruction—a systematic review of techniques, outcomes, and complications. *J Knee Surg.* 2018;31(9):895–904. doi:10.1055/s-0038-1627446
- Pedersen M, Johnson JL, Grindem H, Magnusson K, Snyder-Mackler L, Risberg MA. Meniscus or cartilage injury at the time of ACL tear are associated with worse prognosis for patient-reported outcome 2 to 10 years after ACL injury – a systematic review. *J Orthop Sports Phys Ther.* 2020;50(9):490–502. doi:10.2519/jospt.2020.9451
- Paterno MV, Schmitt LC, Ford KR, et al. Biomechanical measures during landing and postural stability predict second anterior cruciate ligament injury after anterior cruciate ligament reconstruction and return to sport. *Am J Sports Med.* 2010;38(10):1968–1978. doi:10.1177/0363546510376053
- Logerstedt D, Arundale A, Lynch A, Snyder-Mackler L. A conceptual framework for a sports knee injury performance profile (SKIPP) and return to activity criteria (RTAC). *Braz J Phys Ther.* 2015;19(5):340–359. doi:10.1590/bjpt-rbf.2014.0116
- Flanigan DC, Everhart JS, Pedroza A, Smith T, Kaeding CC. Fear of reinjury (kinesiophobia) and persistent knee symptoms are common factors for lack of return to sport after anterior cruciate ligament reconstruction. *Arthroscopy.* 2013;29(8):1322–1329. doi:10.1016/j.arthro.2013.05.015
- Truong LK, Mosewich AD, Holt CJ, Le CY, Miciak M, Whittaker JL. Psychological, social and contextual factors across recovery stages following a sport-related knee injury: a scoping review. *Br J Sports Med.* 2020;54(19):1149–1156. doi:10.1136/bjsports-2019-101206
- Longo UG, De Salvatore S, D’Orrico F, et al. The impact of psychological factors on return to sports after anterior cruciate ligament reconstruction: a systematic review. *Osteology.* 2023;3(3):78–93. doi:10.3390/osteology3030009
- Burland JP, Toonstra JL, Howard JS. Psychosocial barriers after anterior cruciate ligament reconstruction: a clinical review of factors influencing postoperative success. *Sports Health.* 2019;11(6):528–534. doi:10.1177/1941738119869333
- Walker A, Hing W, Lorimer A. The influence, barriers to and facilitators of anterior cruciate ligament rehabilitation adherence and participation: a scoping review. *Sports Med Open.* 2020;6(1):32. doi:10.1186/s40798-020-00258-7
- 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(7):596–606. doi:10.1136/bjsm.2010.076364
- Muller B, Yabroudi MA, Lynch A, et al. Return to preinjury sports after anterior cruciate ligament reconstruction is predicted by five independent factors. *Knee Surg Sports Traumatol Arthrosc.* 2022;30(1):84–92. doi:10.1007/s00167-021-06558-z
- Ardern CL, Taylor NF, Feller JA, Webster KE. Fifty-five per cent return to competitive sport following anterior cruciate ligament reconstruction surgery: an updated systematic review and meta-analysis including aspects of physical functioning and contextual factors. *Br J Sports Med.* 2014;48(21):1543–1552. doi:10.1136/bjsports-2013-093398
- Sepúlveda F, Sánchez L, Amy E, Micheo W. Anterior cruciate ligament injury: return to play, function and long-term considerations. *Curr Sports Med Rep.* 2017;16(3):172–178. doi:10.1249/JSR.0000000000000356
- McCullough KA, Phelps KD, Spindler KP, et al. Return to high school- and college-level football after anterior cruciate ligament reconstruction: a Multicenter Orthopaedic Outcomes Network (MOON) cohort study. *Am J Sports Med.* 2012;40(11):2523–2529. doi:10.1177/0363546512456836
- Everhart JS, Best TM, Flanigan DC. Psychological predictors of anterior cruciate ligament reconstruction outcomes: a systematic review. *Knee Surg Sports Traumatol Arthrosc.* 2015;23(3):752–762. doi:10.1007/s00167-013-2699-1
- 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(5):393–397. doi:10.1007/s00167-004-0591-8
- Papadopoulos S, Tishukov M, Stamou K, Totlis T, Natsis K. Fear of re-injury following ACL reconstruction: an overview. *J Res Prac Musculoskelet Sys.* 2018;02(04):124–130. doi:10.22540/JRPMS-02-124
- Raizah A, Alhefzi A, Alshubruqi AAM, Hoban MAMA, Ahmad I, Ahmad F. Perceived kinesiophobia and its association with return to sports activity following anterior cruciate ligament reconstruction surgery: a cross-sectional study. *Int J Environ Res Public Health.* 2022;19(17):10776. doi:10.3390/ijerph191710776
- Cozzi AL, Dunn KL, Harding JL, Valovich McLeod TC, Welch Bacon CE. Kinesiophobia after anterior cruciate ligament reconstruction in physically active individuals. *J Sport Rehabil.* 2015;24(4):434–439. doi:10.1123/jsr.2014-0196
- Luque-Suarez A, Martinez-Calderon J, Falla D. Role of kinesiophobia on pain, disability and quality of life in people suffering from chronic musculoskeletal pain: a systematic review. *Br J Sports Med.* 2019;53(9):554–559. doi:10.1136/bjsports-2017-098673
- Christino MA, Fantry AJ, Vopat BG. Psychological aspects of recovery following anterior cruciate ligament reconstruction. *J Am Acad Orthop Surg.* 2015;23(8):501–509. doi:10.5435/JAAOS-D-14-00173
- Rips L, Koovit T, Luik M, et al. In the medium term, more than half of males report kinesiophobia after anterior cruciate ligament reconstruction. *J ISAKOS.* 2024;9(5):100309. doi:10.1016/j.jisako.2024.100309

28. Paterno MV, Flynn K, Thomas S, Schmitt LC. Self-reported fear predicts functional performance and second ACL injury after acl reconstruction and return to sport: a pilot study. *Sports Health*. 2018;10(3):228–233. doi:10.1177/1941738117745806
29. Norte GE, Solaas H, Saliba SA, Goetschius J, Slater LV, Hart JM. The relationships between kinesiophobia and clinical outcomes after ACL reconstruction differ by self-reported physical activity engagement. *Phys Ther Sport*. 2019;40:1–9. doi:10.1016/j.ptsp.2019.08.002
30. Markström JL, Grinberg A, Häger CK. Fear of reinjury following anterior cruciate ligament reconstruction is manifested in muscle activation patterns of single-leg side-hop landings. *Phys Ther*. 2022;102(2):pzab218. doi:10.1093/ptj/pzab218
31. Lentz TA, Zeppieri G, Tillman SM, et al. Return to preinjury sports participation following anterior cruciate ligament reconstruction: contributions of demographic, knee impairment, and self-report measures. *J Orthop Sports Phys Ther*. 2012;42(11):893–901. doi:10.2519/jospt.2012.4077
32. Ardern CL, Webster KE, Taylor NF, Feller JA. Return to the preinjury level of competitive sport after anterior cruciate ligament reconstruction surgery: two-thirds of patients have not returned by 12 months after surgery. *Am J Sports Med*. 2011;39(3):538–543. doi:10.1177/0363546510384798
33. Yabroudi MA, Irrgang JJ. Rehabilitation and return to play after anatomic anterior cruciate ligament reconstruction. *Clin Sports Med*. 2013;32(1):165–175. doi:10.1016/j.csm.2012.08.016
34. Brophy RH, Schmitz L, Wright RW, et al. Return to play and future ACL injury risk after ACL reconstruction in soccer athletes from the Multicenter Orthopaedic Outcomes Network (MOON) group. *Am J Sports Med*. 2012;40(11):2517–2522. doi:10.1177/0363546512459476
35. Korkoman AJ, Aljadaan B, Alqarni A, et al. Return to sport after anterior cruciate ligament reconstruction among physically active adults. *Cureus*. 2023;15(6):e39850. doi:10.7759/cureus.39850
36. Kim SJ, Lee SK, Kim SH, Kim SH, Ryu SW, Jung M. Effect of cigarette smoking on the clinical outcomes of ACL reconstruction. *J Bone Joint Surg Am*. 2014;96(12):1007–1013. doi:10.2106/JBJS.M.00598
37. Novikov DA, Swensen SJ, Buza JA III, Gidumal RH, Strauss EJ. The effect of smoking on ACL reconstruction: a systematic review. *Physic Sports Med*. 2016;44(4):335–341. doi:10.1080/00913847.2016.1216239

Journal of Multidisciplinary Healthcare

Publish your work in this journal

The Journal of Multidisciplinary Healthcare is an international, peer-reviewed open-access journal that aims to represent and publish research in healthcare areas delivered by practitioners of different disciplines. This includes studies and reviews conducted by multidisciplinary teams as well as research which evaluates the results or conduct of such teams or healthcare processes in general. The journal covers a very wide range of areas and welcomes submissions from practitioners at all levels, from all over the world. The manuscript management system is completely online and includes a very quick and fair peer-review system. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/journal-of-multidisciplinary-healthcare-journal>

Dovepress
Taylor & Francis Group