

Original Research

Patients' Mental Barriers in Rehabilitation after ACL Reconstruction: A Qualitative Interview Study

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Background

Recovery after anterior cruciate ligament reconstruction (ACLR) involves both physical and psychological challenges. Although psychological readiness for return to sport (RTS) is increasingly recognized as important, less is known about how patients experience psychological barriers during rehabilitation and how interactions with physiotherapists (PTs) may shape this process.

Purpose

To explore how patients recovering from ACLR navigate potential psychological barriers, what helps them overcome these barriers, and how they experience the role of PTs in enhancing their psychological readiness.

Study Design

Qualitative interview

Methods

Nine patients (5 women, 4 men), aged 19-45 years, from Norway and the Netherlands, 5-9 months post-ACLR, were recruited for individual semi-structured interviews. Data were analyzed using systematic text condensation.

Results

Three themes emerged: (1) The Mental Landscape of Rehabilitation - confidence builds through physical progress amidst emotional setbacks; (2) Pillars of Support - professional and social support, especially from PTs, helps manage fear and build trust; (3) Lessons Learned Along the Way - patients develop insight, resilience, and personalized strategies for mental recovery. Psychological readiness was experienced as a dynamic process shaped by physical progress, emotional responses, support systems, and interactions with PTs.

Conclusion

Psychological readiness should be viewed as an evolving component of ACLR recovery, shaped by patients' experiences, support systems, and interactions with PTs. These findings highlight the importance of a holistic and individualized rehabilitation approach

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that acknowledges mental barriers, supports confidence-building, and considers referral to mental health professionals when needed.

Level of evidence

5 (Qualitative Study)

INTRODUCTION

Recovering from an anterior cruciate ligament (ACL) injury requires more than just physical rehabilitation. It also involves managing psychological responses that can greatly impact the outcome of ACL reconstruction (ACLR). Although rehabilitation traditionally emphasizes restoring strength, mobility, and sport-specific skills, many patients experience emotional responses, including fear of re-injury, anxiety, frustration, and disruption of their athlete identity.¹⁻⁵ Such responses can hinder progress in rehabilitation, delay the return to sports (RTS), and even increase the risk of re-injury.⁶⁻¹¹

Psychological readiness for RTS has been described as a multidimensional concept involving cognitive appraisal, emotional responses, behavioral confidence, and contextual factors that shape whether an athlete feels prepared to resume sport after injury.¹² In ACLR rehabilitation, readiness is commonly considered alongside physical performance and patient-reported measures during criteria-based RTS decision-making.¹²⁻¹⁶ The ACL-Return to Sport after Injury scale (ACL-RSI) is one commonly used measure that captures emotions, confidence in performance, and risk appraisal related to RTS after ACL injury.^{17,18}

Physiotherapists (PTs) have a central role in ACLR rehabilitation and are often the healthcare professionals who follow patients most closely over time. Existing literature suggests that PTs recognize psychological challenges after ACL injury, but may not always have structured strategies, training, or referral pathways for addressing them in routine rehabilitation.¹⁹⁻²² While previous qualitative studies have described psychological responses, fear, uncertainty, and the patient-physiotherapist relationship after ACL injury, less is known about how patients themselves describe the interaction between mental barriers, rehabilitation experiences, and PT support during the clinically demanding transition toward RTS.^{17,18,23}

This study aims to explore how patients recovering from ACLR navigate potential psychological barriers, what helps them overcome these barriers, and how they experience the role of PTs in enhancing their psychological readiness. Through a qualitative study conducted in the Netherlands and Norway, the authors sought to portray a diverse range of patient perspectives and experiences within different national and healthcare contexts. Centering on patient perspectives can aid in informing rehabilitation approaches that address both the physical and mental aspects of recovery.

MATERIAL AND METHODS

This current study is a collaboration between Anna Top-Support (ATS, the Netherlands), Haraldsplass Deaconess

Hospital (HDS, Norway) and the Sports Traumatology and Arthroscopy Research group (STAR, Norway).

PARTICIPANTS AND RECRUITMENT

In the current qualitative study, individual interviews were conducted with patients who had undergone isolated ACLR, between five and nine months postoperatively. All participating patients were aiming to return to a pivoting sport following rehabilitation. Patients were interviewed at this time because this period commonly represents a transition from early impairment-focused rehabilitation toward the RTS phase.^{14,24,25} Patients were strategically recruited to include variation in sex, age, country, time from surgery, sports and sports levels, in addition to return-to-sport-related confidence, emotions, and risk appraisal, as described by the short ACL-RSI. A total of nine patients (five women, four men), aged 19 to 45 years, were included. Patients were approached by either the first author (IFM) or second author (NvM), who provided information about the study. All patients who participated in the study provided written informed consent. One patient failed to attend his scheduled interview and was thus excluded from the study. One of the patients underwent ACLR by one of the study's authors, beyond that, there were no other direct relationships between patients and members of the study group.

DATA COLLECTION

To address the study aim, a semi-structured interview guide was developed to explore patients' experiences during ACLR rehabilitation, with particular attention to how mental barriers and interactions with PTs may shape psychological readiness for RTS. The interview guide was developed by selected members of the research team (IFM, AGHF, LHM and NvM), representing backgrounds in physiotherapy, ACL rehabilitation, and qualitative research. A sports psychologist reviewed the guide, including the content and questions, with particular focus on the use of psychological terminology. The guide was piloted with one patient, and no substantive changes were made beyond minor terminology adjustments. The guide was originally written in English and translated into Norwegian and Dutch by PTs fluent in the relevant languages. Formal back-translation was not performed. All interviews were conducted in the participants' native language. IFM conducted all Norwegian interviews except one, which was conducted together with AGHF. NvM conducted all Dutch interviews. None of the interviewers were involved in the participants' clinical care. One participant had undergone ACLR by one of the study authors; however, this author did not conduct or attend the interview.

The interview guide (Appendix 1) focused on three pre-defined areas: (1) patients' psychological responses during

Table 1. Demographics of participants (N=9)

	<i>the Netherlands (n=4)</i>	<i>Norway (n=5)</i>
Age in years, median (range)	23 (19-45)	25 (22-43)
Sex, n (%) female	2 (50)	3 (60)
Short ACL-RSI score, median (range)	60 (33-93)	47 (18-77)
Months after surgery, median (range)	7 (5-9)	8 (5.5-9)

ACLR rehabilitation and preparation for RTS, including confidence, fear, uncertainty, and mental barriers; (2) strategies patients experienced as helpful or challenging when working toward rehabilitation and RTS-related goals; and (3) patients' perceptions of the PT's role in supporting them through mental barriers and psychological aspects of rehabilitation. These areas guided the interviews but did not function as predefined analytic themes.

Participants completed the short version of the ACL-RSI before the interviews. The ACL-RSI assesses emotions, confidence in performance, and risk appraisal related to RTS after ACL injury.^{26,27} In this study, the short ACL-RSI was used descriptively to characterize variation in participants' return-to-sport-related confidence, emotions, and risk appraisal. The scores were not used for sampling, interview probing, or formal integration into the qualitative analysis.

Data collection spanned from July 2024 to April 2025. Sample adequacy was assessed according to the concept of information power rather than through a predefined numerical threshold or a formal criterion of data saturation.²⁸ Four interviews were carried out in the Netherlands and five in Norway. Two interviews were held online, while the remaining seven took place in person at either ATS or HDS. Interviews were recorded, transcribed verbatim by IFM and NvM. Field notes were written after the interviews and used to support contextual understanding, reflexivity, and transparency during the early analytic steps. Demographic data was collected, including age, sex and the short ACL-RSI score (Table 1). All participating patients had undergone primary ACLR and were aiming to return to a pivoting sport following rehabilitation. None experienced surgical complications related to the initial procedure. The research group comprises members with extensive expertise in ACL rehabilitation, surgery, and/or clinical research. In addition, LHM has substantial experience in conducting qualitative studies.

DATA ANALYSIS

The median duration of patient interviews was 47 minutes (range 25-82 min). Systematic text condensation (STC) was used to analyze the data. STC is a cross-case thematic approach that aims to identify main themes and gain an in-depth understanding of the material.²⁸ The analysis was mainly inductive, but guided by predefined areas of interest related to mental barriers, support, coping, and PT interactions. Transcripts were coded in the original languages to preserve contextual meaning. Meaning units were identified as text fragments describing patients' experiences during ACLR rehabilitation. Steps 1-3 of the STC process were

performed independently in each country by IFM and NvM/RB, using the same coding principles. Code groups were then compared across countries to identify shared patterns, differences, and possible country-specific interpretations. The final synthesis was conducted collaboratively by the first and second authors, resulting in themes represented in both datasets. Table 2 illustrates an example of the analytic process from original quote to final theme.

Trustworthiness was supported through reflexive and field notes, preliminary analyses, and repeated team discussions. Preliminary analyses after the first three interviews indicated that no modifications to the interview guide were needed.

RESULTS

The three themes were developed from the data through systematic text condensation and reflected recurring patterns across the Norwegian and Dutch interviews. The first theme (*The Mental Landscape of Rehabilitation*) highlights how patients rebuild confidence and cope with setbacks during ACL rehabilitation, shaped by physical progress, emotional challenges, and trust in care. The second theme (*Pillars of Support – Help is Needed to Move Forward*) emphasizes the crucial role of social and professional support - especially from PTs - in helping patients manage the psychological demands of ACL rehabilitation. The third and final theme (*Lessons Learned Along the Way*) captures how patients gradually develop personal insight and resilience during ACL rehabilitation, learn to focus on individual progress and grow mentally alongside physical recovery.

1) THE MENTAL LANDSCAPE OF REHABILITATION

Participants described developing confidence by successfully completing progressively more demanding exercises during rehabilitation. Improvements in strength and stability fostered a sense of capability and motivated them to try more challenging activities, such as jumping or sport-specific drills. Starting small, setting realistic goals, and adjusting expectations based on individual progress rather than fixed timelines were described as important. Across interviews, repeatedly showing up for training and experiencing that the knee tolerated gradually increasing demands gave patients a sense of control and ownership. Repeated success in structured sessions and everyday training helped rebuild trust in the knee and contributed to psychological readiness for RTS.

Table 2. Example of the analytic process from quotation to final theme

Original quotation	Meaning unit	Code group	Condensate	Final theme
"When I say I'm unsure about something, he's really good at taking it step by step and talking me through it. He'll say, 'You don't have to jump that high right away - let's start here,' and that gradual approach makes me feel safer. He's very good at reassuring me, making things feel as safe as possible so I can slowly build confidence in what I'm doing."	Uncertainty was reduced when the PT adjusted the task, provided reassurance, and guided the patient gradually through feared movements.	PT support through gradual exposure and reassurance	When I felt unsure, it helped when the PT slowed things down, adjusted the task, and explained what we were doing. Starting with something manageable made the situation feel safer and allowed confidence to build gradually.	Pillars of Support - Help is Needed to Move Forward

A Norwegian male patient stated *"If I experience that it actually works out - trying new things - I'll sort of realize that it's not that dangerous after all. So, it's probably just about...experiencing that things go well... mastering situations and feeling that my knee is stable in situations where it didn't feel that way before... I think that really helps me feel more confident!"*

At the same time, participants described rehabilitation as slow and emotionally demanding. They could struggle to assess their progress and feel uncertain about the knee, particularly during running or sudden movements. A lack of visible improvement affected motivation, and setbacks could feel like regression. Testing days and repeated failures could trigger frustration, self-doubt, and helplessness, especially when patients struggled with tasks they perceived as simple.

A male Dutch patient said: *"If you feel something or something just doesn't work out, it immediately feels like you're taking 100 steps back, and that's frustrating. Even if it's something small, it feels like something huge."*

Physical symptoms, including pain and a persistent sense of knee dysfunction, undermined some participants' mental security. These sensations created doubt about whether recovery was on track and whether returning to activity was safe. Participants also described how inconsistent or uncertain professional guidance could erode trust and add to the psychological burden of rehabilitation.

A female Norwegian patient said: *"With [the PT], I think it was mostly a lack of experience. [The PT] seemed unsure of themselves, and that kind of rubbed off on us [the team]. We didn't feel confident, because they didn't seem confident about the questions we asked or the answers we needed. And when they weren't sure, they couldn't make us feel sure about whether what we were doing was right."*

Participants described fear of re-injury, anxiety, and frustration as most prominent early in rehabilitation or during setbacks. Certain movements or activities could trigger memories of the injury and increase anxiety, leading patients to avoid situations they feared might cause harm. Clear guidance and reassurance from professionals were described as important for rebuilding trust in the body and moving forward with confidence.

A female Norwegian patient said: *"I need to clear my head a bit, because I overthink my knee all the time. I just have to kind of... shut off my brain a little and trust my body more."*

2) PILLARS OF SUPPORT – HELP IS NEEDED TO MOVE FORWARD

Participants described PTs as a central source of support, particularly when managing fear and uncertainty. PTs provided structure and reassurance by guiding progression, setting realistic expectations, and encouraging patients to trust their bodies. Patients often described the therapist's support as part of rehabilitation rather than as a separate psychological intervention. Gradual exposure to physical challenges, consistent follow-up, and personalized adaptation were experienced as important for sustaining motivation and fostering mastery.

A male Norwegian patient said: *"When I say I'm unsure about something, he's really good at taking it step by step and talking me through it. He'll say, 'You don't have to jump that high right away - let's start here,' and that gradual approach makes me feel safer. He's very good at reassuring me, making things feel as safe as possible so I can slowly build confidence in what I'm doing."*

A strong therapeutic alliance was central to this support. Participants valued being seen and heard as individuals, not only as injured athletes. PTs who respected limits while knowing when to progress exercises helped build trust and openness. Frequent dialogue and emotional support created a safe space where patients could share fears and frustrations.

A Norwegian female patient said: *"There was a few weeks where I didn't go [to my PT], and it was like... damn, I have to go back! Not just for my knee, but to get that confirmation that someone is here for you – that they're going to help you. Honestly, I'd say he's been the most important person in my rehab, really."*

Participants varied in how easily they opened up about psychological challenges. Some valued conversations with PTs, sport psychologists, trusted friends, or family members, whereas others kept difficult thoughts to themselves or preferred to confide outside the clinical setting. Across these accounts, having access to someone who listened and normalized the rehabilitation process was described as helpful in preventing emotional burden from building up.

Support from outside physiotherapy was also important. Support from teammates, coaches, peers, and family helped sustain motivation and athletic identity. When this support was absent or faded over time, participants described feel-

ing isolated, which made the PT's role as a consistent source of reassurance more important.

A female Dutch patient said: "It's kind of like...you get the feeling that you're a bit on your own, you know? In the beginning, people are like, 'oh, that sucks,' and they come by to check in. But after a while, you start to feel like, yeah, you know, this is something I really have to go through on my own now."

3) LESSONS LEARNED ALONG THE WAY

As rehabilitation progressed, participants described gaining new perspectives. They learned to focus on their own progress rather than comparing themselves with others or with their pre-injury state. Recognizing individual differences in recovery helped them manage frustration and stay motivated. This shift in mindset, sometimes supported by PTs or sport psychologists, helped patients relate to the knee less as an enemy and more as a body part that could gradually be trusted again.

A male Dutch patient said: "I expected it to be really tough because I'd heard from others that it was painful and difficult. So I went into it thinking it would be the same for me. But now, going through it myself, I've realized that my body is not their body. You can get tips and advice from others, but in the end, you really have to listen to your own body."

Participants also described learning strategies to cope with the mental demands of rehabilitation, such as taking breaks from thinking about the knee, focusing on small wins, journaling, seeking conversations, or adjusting expectations. For some, the rehabilitation process became a source of personal development. Facing physical and emotional adversity helped them feel more resilient, even when RTS still felt distant.

A female Dutch patient said: "I tell that to a lot of people as well. It's really not nice to tear your ACL, but some things are definitely positive."

DISCUSSION

The current study explored patients' experiences during ACLR rehabilitation, with particular attention to how mental barriers and interactions with PTs may shape psychological readiness for RTS. Three themes were developed: (1) *The mental landscape of rehabilitation*, (2) *Pillars of support - help is needed to move forward*, and (3) *Lessons learned along the way*. Together, the themes suggest that psychological readiness for RTS was not experienced as a single fixed milestone, but as a dynamic process shaped by mastery experiences, physical symptoms, uncertainty, therapeutic relationships, and social support.

WHAT DOES THIS STUDY ADD?

This study reinforces previous findings that the mental impact of ACL injury is substantial.^{18,23,29,30} Patients described a close and continuous interplay between physical and psychological rehabilitation, where physical progress fuels psychological confidence, while setbacks can hinder

mental recovery. This reflects self-efficacy and motivation theory, which emphasize the importance of mastery of experiences in developing belief in one's ability to succeed.³¹ Experiencing that the body can tolerate increased physical load over time gradually helps patients overcome mental barriers and build psychological readiness.

This bidirectional influence of mastering (or not mastering) underscores the importance of tailoring rehabilitation to the individual. Setting realistic, meaningful goals that promote both physical and psychological progress is essential. This approach aligns well with current rehabilitation guidelines, which advocate individualized care rather than strict time-based criteria.^{13-15,32} Goal setting has been widely recommended in the literature as a valuable tool for supporting psychological readiness and is commonly used by clinicians to maintain motivation throughout rehabilitation.^{19,33-35} The fact that patients in this study echoed these principles - emphasizing the importance of small wins, clear goals, and a sense of progression - reinforces the relevance and applicability of these strategies in real-world practice. It also highlights the alignment between patient experiences, clinical expertise, and evidence-based recommendations, suggesting that when these elements work in synergy, they can meaningfully enhance psychological readiness during ACLR rehabilitation.

Uncertainty was a central mental barrier. Participants described concerns about knee stability, pain, persistent symptoms, and slow progress. These experiences align with prior research showing that fear of re-injury, frustration, and anxiety are common after ACL injury.¹⁻⁵ The present findings add nuance by showing that ambiguous physical sensations and inconsistent professional guidance could deepen distress and reduce trust in the rehabilitation process. This underscores the importance of clear communication, validation of patient concerns, and access to clinicians with ACL-specific rehabilitation expertise.

Previous research using the ACL-RSI suggests that psychological readiness may change over time and follow different trajectories during ACLR rehabilitation.^{36,37} In the present study, patients interviewed 5-9 months post-ACLR described readiness as closely connected to physical progress, emotional responses, everyday experiences, and interactions with PTs and others around them. These findings support the view that psychological readiness should not be understood as a fixed milestone, but as a process that may fluctuate throughout rehabilitation. For PTs, this highlights the importance of repeated dialogue and individualized support rather than relying solely on single time-point assessments.

Another key finding is the importance of the therapeutic alliance. Patients described how feeling seen, heard, and supported by their PTs created a sense of safety. This is in line with previous studies that emphasize the positive effects of a strong therapeutic alliance on rehabilitation outcomes.^{17,36-38} In the current study, patients perceived encouragement, attentiveness, and the PT's physical presence during challenging exercises as important factors in helping them navigate fear and uncertainty. In this way, the PTs

become not only a physical guide, but also a psychological anchor throughout the recovery process.

A clinically relevant point is that patients may not always recognize psychologically informed rehabilitation as psychological support. For example, gradual exposure, reassurance, progress tracking, and individualized progression were often described as physical rehabilitation strategies, even when patients also explained that these strategies made them feel safer and more confident. This suggests that PTs may need to communicate more explicitly when an exercise progression is intended not only to improve physical capacity, but also to rebuild confidence and reduce fear. Making this link visible may help patients understand the purpose of challenging tasks and may strengthen shared decision-making during rehabilitation.

While many patients received valuable psychological support from their PTs, others found additional help through family, teammates, coaches, or mental health professionals - for example sports psychologists. This highlights that although PTs often address patients' mental support needs sufficiently, those facing more persistent psychological barriers may benefit from specialist referral. For such referrals to be effective, PTs must be equipped to assess psychological readiness and have access to appropriate mental health resources - something not consistently available across clinical settings.³⁹

These findings also complement recent work among physiotherapists in which clinicians described addressing psychological challenges during ACLR rehabilitation through graded exposure, reassurance, communication, and individualized progression.⁴⁰ Viewed together, the patient and clinician perspectives suggest that a potential gap may exist between what PTs intend to provide and what patients consciously perceive as psychological support. Future research should examine how psychologically informed strategies can be communicated and implemented in ways that are meaningful for both patients and PTs.

Social support beyond the clinic also shaped rehabilitation experiences. Support from teammates, coaches, peers, and family helped maintain motivation and athletic identity, while lack of such support could increase isolation. The findings suggest that PTs should consider patients' broader social context and, when relevant, involve or encourage communication with athletic networks, coaches, or peer support. However, because this qualitative study did not test interventions or measure RTS outcomes, these implications should be interpreted as hypotheses for clinical practice and future research rather than evidence of effectiveness.

METHODOLOGICAL CONSIDERATIONS

This study employed a transparent and reproducible approach to data analysis, guided by Malterud's principles for STC.²⁸ The authors interviewed a diverse group of patients 5-9 months after ACLR, providing them the opportunity to reflect on the psychological challenges encountered throughout their rehabilitation. The patients provided valuable insights into their individual experiences with

psychological readiness and rehabilitation. Although patients were asked to recall earlier phases of their rehabilitation, such as the preoperative and early postoperative period, these experiences were often described as emotionally significant and vivid. Therefore, the authors consider potential recall bias to be minimal in this context. The study's credibility is strengthened by the richness of the data, the diversity of the sample, and the systematic approach to analysis.

One strength of the study is its inclusion of patients from two different countries, providing insight into experiences across distinct healthcare systems. Although structural and cultural differences may have influenced certain aspects of the data, no clear country-specific patterns emerged during the analysis. The research team considered the variation in responses acceptable.

Based on the focused study aim, the specificity of the sample, and the richness and variation of the interview data, the sample was considered to provide sufficient information power to address the study purpose. The study aim was narrow, and the interview dialogue was strong and clear. Furthermore, the sample was relatively homogeneous, with all patients having undergone primary ACLR and having similar rehabilitation pathways, and all sharing a common goal of returning to pivoting sport at the time of the interview. These factors, combined with the richness of the interview data, support the adequacy of the sample size. Differences in interview duration were considered by focusing on the richness and relevance of the data rather than interview length alone.

The sample consisted of patients aiming to return to pivoting sport after ACLR. Their experiences may differ from those of recreationally active patients, patients not aiming to return to sport, patients with non-pivoting sport goals, or patients at earlier or later rehabilitation stages. This should be considered when judging transferability.

The research group consisted of clinicians and researchers with extensive experience in ACL rehabilitation, ACL surgery, and qualitative research. IFM is a PhD candidate and physiotherapist in the orthopedic field. LHM is a professor of physiotherapy with extensive experience in qualitative research. AGHF is a postdoctoral researcher and physiotherapist. NvM is a postdoctoral researcher and former sports physiotherapist with 15 years of experience in ACLR rehabilitation. EI and RB are orthopedic surgeons with more than 11 years of experience in ACLR surgery. This collective expertise supported clinically meaningful interpretation of the data but may also have shaped preconceptions. Reflexive notes and team discussions were therefore used to challenge assumptions and explore alternative interpretations. One participant had undergone ACLR by one of the study authors; however, this author did not conduct or attend the interview. None of the interviewers were involved in the participants' clinical care.

According to Malterud, each step of STC should preferably be analyzed with agreement reached before progressing, thereby enhancing the analytical rigor.²⁸ In the current study, the first three steps were conducted separately within each country, which may have influenced the analy-

sis. The authors addressed this through shared coding principles, comparison of code groups before final synthesis, and ongoing discussions of preconceptions, interpretations, and cross-country differences. The cross-language design allowed coding in the original languages and thereby supported contextual understanding, but it also introduced limitations. The interview guide was not formally back-translated, and translated quotations were not independently checked by another bilingual researcher, which may have affected nuance in the final English presentation.

CONCLUSION

Patients described psychological readiness during ACLR rehabilitation as an evolving process shaped by physical experiences, emotional responses, therapeutic relationships, and broader social support. Mental barriers such as fear of re-injury, uncertainty, frustration, and lack of trust in the knee were closely connected to physical progress and setbacks. PTs played an important role in helping patients interpret symptoms, progress gradually, and rebuild confidence, while support from teammates, coaches, peers, and family influenced motivation and feelings of isolation. These findings support explicit and individualized consideration of mental barriers in ACLR rehabilitation and highlight the need for future research on how psychologically

informed support can be implemented and evaluated in clinical practice.

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SUPPLEMENTARY MATERIALS

Appendix 1

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