THE PSYCHOLOGY OF ANTERIOR CRUCIATE LIGAMENT INJURY AND RECONSTRUCTION

A Continuing Education Reading Manual for Licensed Psychologists and Graduate-Level Clinicians

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Continuing Education Reading Manual

Prepared for Licensed Psychologists, Counseling Psychologists, Rehabilitation Psychologists, Sport Psychologists, and Graduate-Level Clinicians

Based on the *Anterior Cruciate Ligament Reconstruction Rehabilitation Program* (University of Calgary Sport Medicine Centre)

Abstract

Anterior cruciate ligament (ACL) injury and the subsequent reconstructive surgery represent one of the most psychologically demanding orthopedic events a person can experience. Although the medical and surgical aspects of ACL reconstruction (ACLR) have been extensively codified—most notably in structured rehabilitation protocols such as the one developed by the University of Calgary Sport Medicine Centre—the psychological dimensions of this prolonged recovery remain underappreciated in everyday clinical practice. This continuing education manual synthesizes the surgical, rehabilitative, and behavioral content of the University of Calgary Sport Medicine Centre's ACLR protocol and translates it into a psychologically informed framework for licensed clinicians. The manual examines how the staged, criterion-based structure of ACLR rehabilitation interacts with adherence behavior, self-regulation, fear of reinjury, identity disruption, mood, and the cognitive load of a recovery process that may extend nine months or longer. It situates the protocol's progression—from immediate post-surgical recovery, through walking, strengthening, running and agility, and finally return to sport—within psychological models of stress and coping, self-determination

theory, fear-avoidance, and biopsychosocial rehabilitation. Implications for assessment, intervention, interdisciplinary collaboration, and ethical practice are discussed, and directions for future inquiry are outlined. The manual is intended as scholarly reading material to support the clinician's integration of psychological care into the multidisciplinary care of patients recovering from ACL reconstruction.

Introduction

Few orthopedic injuries have captured the attention of clinicians, researchers, athletes, and the lay public quite like the rupture of the anterior cruciate ligament. The ACL—a small but mechanically pivotal structure connecting the femur to the tibia—plays a critical role in resisting the combined motions of anterior tibial translation and internal tibial rotation, the very movements that define cutting, pivoting, and decelerating in sport (University of Calgary Sport Medicine Centre, n.d.). When this ligament tears, the consequences extend well beyond the joint capsule. The injured person typically faces a surgical reconstruction, a rehabilitation course measured not in weeks but in months, and a return-to-activity trajectory that may not be considered safe before nine months have passed (University of Calgary Sport Medicine Centre, n.d.). For psychologists, this timeline is itself a clinical fact of consequence: it implies a sustained period during which mood, motivation, identity, social functioning, and behavioral adherence must be supported, monitored, and at times actively treated.

The University of Calgary Sport Medicine Centre's *Anterior Cruciate Ligament Reconstruction Rehabilitation Program* (hereafter, "the protocol") offers an unusually clear window into the structure of contemporary ACLR rehabilitation. It is organized into five sequential stages: (a) recovery from surgery, (b) walking, (c) strengthening, (d) running and agility, and (e) return to sport or activity. Each stage carries explicit goals, exercise prescriptions, education for the patient, and—critically for psychological practice—criteria that must be satisfied before the patient may progress to the next stage (University of Calgary Sport Medicine Centre, n.d.). This criterion-based architecture creates a longitudinal behavioral demand: the patient must adhere to daily exercise, modulate effort in response to pain and swelling, refrain from premature progression, and tolerate the uncertainty of a recovery whose pace they cannot fully control.

This continuing education manual is written for psychologists who may encounter, in their general or specialty practices, individuals navigating ACLR. It is not intended to teach surgical or physiotherapeutic technique. Rather, it uses the protocol as the empirical and structural anchor for a psychological analysis of the ACLR experience. The manual is grounded exclusively in the content of the protocol document and integrates that content with established psychological constructs that the protocol implicitly invokes—pain tolerance, fear of movement, behavioral activation, self-monitoring, graded exposure, motivation, and identity. Where the protocol is silent on a psychological matter, the manual is careful to label that silence as a limitation and as an opportunity for clinical inference rather than as established fact.

The intended audience includes rehabilitation psychologists, sport and performance psychologists, health psychologists, counseling psychologists, and clinical psychologists working with adolescent and adult patients whose injuries intersect with their identities as athletes, workers, parents, or active community members. Graduate-level clinicians in training, particularly those entering integrated medical or sports medicine settings, will find here a framework for understanding how surgical and rehabilitative protocols shape, and are shaped by, the patient's psychological state.

Historical and Theoretical Foundations

To appreciate the psychological terrain of ACLR rehabilitation, it is useful to begin with the orthopedic and rehabilitative history that the protocol embodies. ACL reconstruction has evolved from a procedure once reserved for elite athletes into a routine surgical intervention performed across the lifespan. The protocol reflects this maturation by acknowledging multiple graft choices—including autografts using the patellar tendon, hamstring tendon, or quadriceps tendon, as well as allografts derived from a deceased donor—and by recognizing that concomitant procedures such as lateral extra-articular tenodesis, additional ligament reconstructions, and meniscal repair or debridement may alter the rehabilitation timeline (University of Calgary Sport Medicine Centre, n.d.). The very fact that the protocol provides a form for the surgeon to specify weight-bearing status, range-of-motion restrictions, and bracing requirements indicates that contemporary rehabilitation is no longer a one-size-fits-all enterprise. It is individualized, criterion-driven, and clinically negotiated.

This evolution dovetails with the broader theoretical shift in rehabilitation medicine away from a purely biomedical model and toward a biopsychosocial conceptualization of recovery. The protocol's repeated insistence that progression be a shared decision between patient and physiotherapist or athletic therapist—"It is very important that you DO NOT progress to the next stage without discussing this with your physiotherapist/athletic therapist" (University of Calgary Sport Medicine Centre, n.d.)—implies a recovery model in which the patient is not a passive recipient of care but an active collaborator whose behavior, judgment, and adherence carry clinical weight. The recognition that "advancing too fast may result in increased pain and swelling in your knee or a loosening or rupture of the new ACL graft," while "not progressing, especially with your range of motion (ROM) exercises, may result in stiffness, additional pain, loss of ROM, a delayed return to activity, occasionally requiring additional surgery to correct" (University of Calgary Sport Medicine Centre, n.d.), captures the bidirectional risk that defines this recovery. The patient must avoid both under-activity and over-activity, a behavioral balancing act with clear psychological implications.

Several psychological theories provide useful scaffolding for this terrain. The fear-avoidance model, originally developed in the context of chronic pain, helps explain why some patients become overly cautious, interpret normal post-surgical sensations as evidence of harm, and consequently restrict movement to a degree that undermines the very ROM goals the protocol emphasizes. Self-determination theory illuminates how autonomy support from the rehabilitation team, the experience of competence as exercises are mastered, and the relatedness fostered by a supportive clinical relationship can sustain the intrinsic motivation required for months of daily practice. Social cognitive theory, with its emphasis on self-efficacy, helps clinicians understand why patients who believe they can execute the prescribed exercises tend to do so with greater consistency. Stage models of behavior change provide a framework for matching psychological interventions to the patient's readiness at each phase of recovery. Although the protocol itself does not name these theories, its structure—graded exposure to increasingly demanding tasks, explicit criteria for progression, repeated patient education at each stage—is consistent with the principles those theories articulate.

The protocol's historical achievement is therefore not only the codification of exercises but the embedding of behavioral science within a surgical pathway. For psychologists, this represents an invitation to enter the rehabilitation conversation as full collaborators rather than as consultants called only when adherence has already failed.

Conceptual Models and Mechanisms

The protocol's five-stage architecture can be conceptualized as a graded exposure hierarchy layered onto a tissue-healing timeline. Stage 1, recovery from surgery, prioritizes full knee extension, swelling control, and the achievement of a minimum of zero to ninety degrees of range of motion, alongside appropriate wound healing (University of Calgary Sport Medicine Centre, n.d.). Stage 2, walking, advances the patient toward full weight-bearing, the maintenance of zero-degree knee extension, swelling reduction, zero to one hundred twenty degrees of ROM, and the resumption of activities of daily living, including office-type work. Stage 3, strengthening, targets independent gym-based training, complete elimination of swelling, full ROM, and a broader return to work for most occupations. Stage 4, running and agility, focuses on equal ROM between operated and non-operated limbs, continued strengthening, and the development of balance and agility. Stage 5, return to sport or activity, is permitted no sooner than nine months postoperatively and depends on the satisfaction of strength and functional hop testing criteria (University of Calgary Sport Medicine Centre, n.d.).

Within this architecture, several mechanisms operate simultaneously. The first is tissue biology: the ACL graft must integrate, mature, and remodel, and premature loading risks graft failure. The second is neuromuscular re-education: the quadriceps, hamstrings, gluteal complex, and calf must regain not only strength but the timing and coordination that protect the joint during dynamic movement. The third is proprioceptive and balance recovery, which the protocol addresses through progressively challenging single-leg stance, wobble board, and dynamic balance tasks. The fourth, and the one of greatest interest to psychologists, is behavioral and cognitive: the patient must repeatedly perform tedious exercises, interpret bodily sensations accurately, refrain from premature return to sport, and sustain motivation across a recovery whose visible progress is often slow.

These mechanisms interact. Neuromuscular recovery depends on adherence, adherence depends on motivation, motivation depends on perceived progress and self-efficacy, and perceived progress depends on the patient's ability to interpret bodily feedback in a calibrated way. When this loop functions well, the staged protocol moves forward. When it breaks down—through depression, fear of reinjury, perfectionism, or social and occupational

stressors—the protocol stalls, even when the surgical reconstruction itself was technically successful.

It is also worth describing, as a conceptual figure, the dual-risk pathway implied by the protocol. *Figure 1 (described in text):* On one axis, the patient may under-progress, withdrawing from exercise in response to pain, fear, or discouragement and developing stiffness, weakness, and prolonged disability. On the other axis, the patient may over-progress, ignoring pain signals, omitting prescribed brace use or ROM restrictions, and risking graft failure or reinjury. Optimal recovery occupies a narrow corridor between these two failure modes. The psychologist's task, conceptualized within this figure, is to help the patient remain in that corridor by modulating cognition, emotion, and behavior in response to both internal and external cues.

A second conceptual figure, again described in text, captures the temporal layering of psychological demands across the protocol. *Figure 2 (described in text):* In Stage 1, the dominant psychological tasks are pain tolerance, acute coping, and adherence to highly restricted activity. In Stage 2, the tasks shift toward graded resumption of independence, with attention to gait normalization and the symbolic loss of crutches. In Stage 3, the tasks include sustained motivation in the absence of dramatic week-to-week change, the management of plateaus, and the negotiation of return to work. In Stage 4, fear of reinjury rises in salience as impact activities resume. In Stage 5, the integration of fear management, performance anxiety, and identity reconstruction becomes central, particularly for those returning to competitive sport.

These conceptual models do not appear explicitly in the protocol; they are inferences drawn from its structure. Their value lies in providing psychologists with a framework for anticipating the predictable psychological tasks of each stage rather than reacting only to crises as they arise.

Empirical Findings Across Studies

Because this manual is grounded in a single rehabilitation protocol rather than a body of empirical literature, the "findings" available for synthesis are those embedded within the

protocol's clinical recommendations. The protocol functions as a structured expert consensus document, and its content can be read as a series of clinical claims about what supports recovery, what threatens it, and what criteria define readiness for progression.

The protocol's criterion-based progression rules constitute one such set of claims. To progress from Stage 1 to Stage 2, the patient must demonstrate no quadriceps lag during straight leg raise, full extension range of motion, and ninety degrees of flexion (University of Calgary Sport Medicine Centre, n.d.). Progression from Stage 2 to Stage 3 requires walking without a limp or gait aid, one hundred twenty degrees of flexion, and the ability to balance on a single leg without assistance. Progression from Stage 3 to Stage 4 requires symmetrical ROM compared with the non-operated limb, successful completion of a half-depth single-leg squat, and appropriate joint mechanics with closed kinetic chain exercises. Progression from Stage 4 to Stage 5 requires the completion of sport-specific retraining, a gradual return to running, and a limb symmetry index above ninety percent—preferably one hundred percent—on measures including quadriceps strength, hamstring strength, single-leg hop, triple hop, and triple crossover tests. Finally, return to sport is permitted no sooner than nine months postoperatively (University of Calgary Sport Medicine Centre, n.d.).

These criteria, read together, support several integrated claims. First, that recovery is non-linear and individualized: the time-since-surgery alone is an insufficient indicator of readiness. Second, that symmetry with the contralateral limb is a meaningful benchmark, particularly as the patient approaches sport. Third, that functional performance—what the leg can do under graded loading—matters more than passive measures alone. Fourth, that time itself is non-negotiable at the late stages: even a patient who appears physically prepared earlier is advised not to return to sport before the nine-month mark, reflecting recognition that biological healing has its own clock.

The protocol also articulates a set of risk factors for reinjury that are clinically informative. These include low hamstring strength compared with the quadriceps, quadriceps strength asymmetry between operated and non-operated limbs, poor hop performance, time from surgery of less than nine months, and insufficient sport-specific training (University of Calgary Sport Medicine Centre, n.d.). Each of these risk factors carries a psychological correlate. A patient with persistent strength asymmetry may be unconsciously protecting the operated limb, a behavior often driven by fear of reinjury or by an avoidant coping style. A patient with poor hop performance may be limited by movement confidence as much as by mechanical capacity. A patient returning before nine months may be doing so under social, occupational,

or self-imposed pressure that overrides clinical advice.

Table 1, integrated here in narrative form, can be conceptualized as a synthesis of stage-by-stage demands. Stage 1 emphasizes ROM and quadriceps activation, with psychological demands centered on acute pain coping and procedural adherence. Stage 2 introduces gait retraining and balance work, with psychological demands centered on regaining autonomy and managing the transition off crutches. Stage 3 introduces resistance training, cardiovascular reconditioning, and progressive single-leg work, with psychological demands centered on sustained motivation and the management of plateaus. Stage 4 introduces running, agility ladder work, and advanced balance, with psychological demands centered on fear management and movement re-education. Stage 5 introduces sport-specific training and the eventual return to competition, with psychological demands centered on confidence, identity, and the negotiation of risk.

The methodological limitation of synthesizing from a single protocol must be acknowledged. The protocol does not report controlled trial data, comparative outcomes across rehabilitation approaches, or psychological outcome measures. It represents a clinical consensus document, and its claims should be understood as such. Nevertheless, the consistency between its structure and the principles of graded exposure, criterion-based progression, and patient-centered care provides a sound foundation for the psychological inferences developed in subsequent sections.

Psychological Pathways and Stress Responses

The protocol's content invites a careful analysis of the psychological pathways through which an ACLR patient navigates recovery. Although the document is written in the language of exercises, range of motion, and weight-bearing status, almost every recommendation carries psychological implications.

Consider, for example, the instruction that ice be applied "20 minutes every hour, especially after exercises" in the first stage, with a frequency of at least five times per day (University of Calgary Sport Medicine Centre, n.d.). This is, on the surface, a simple swelling-management intervention. Behaviorally, however, it imposes a substantial daily structure on the patient.

Multiple ice applications, multiple ROM exercise sessions, and elevation of the operated knee at rest constitute a near-continuous engagement with the injured limb. For some patients, this structure is stabilizing; the regimen provides a sense of purpose and control. For others, particularly those with depressive or ruminative tendencies, the continuous attention to the knee can intensify body-focused worry, catastrophizing, and a narrowing of the attentional field around the injury.

The protocol's repeated reminder to "follow your body's lead. Do not continue exercises that cause pain, especially if it lingers after you stop or if your knee starts to swell significantly" (University of Calgary Sport Medicine Centre, n.d.) requires a sophisticated interoceptive skill: the ability to discriminate between productive discomfort and harmful pain. This discrimination is not innate. It is learned through repeated experience and is shaped by the patient's pre-existing relationship with bodily sensation. Patients with histories of trauma, chronic pain, or somatic anxiety may struggle to make this discrimination accurately. They may over-interpret normal post-surgical sensations as catastrophic, or, conversely, they may dissociate from bodily signals and push past warning sensations. Both errors threaten the recovery.

Stress responses in ACLR recovery are also shaped by the loss of mobility and the dependence on assistive devices. The protocol's careful instructions on crutch use—proper fitting, the sequence of step-through gait, the technique for ascending and descending stairs with crutches and a railing (University of Calgary Sport Medicine Centre, n.d.)—describe a practical reality that is psychologically substantial. The patient who once moved freely now moves slowly, conspicuously, and with effort. Public spaces become obstacles. Stairs become events. The simple act of carrying a cup of coffee across a room becomes impossible. For many patients, this loss of casual mobility is accompanied by a loss of casual identity. The young athlete who was defined by speed and agility is suddenly defined, in the eyes of strangers, by crutches.

The transition out of Stage 1 and into Stage 2 introduces a different stress profile. The protocol describes the progression from two crutches, to one crutch or cane on the opposite side, to walking without support, contingent on the patient's ability to walk without a limp while still using crutches (University of Calgary Sport Medicine Centre, n.d.). This transition is rich with psychological meaning. Releasing the crutches is both a physical milestone and a symbolic one. Some patients release them too early, driven by impatience or shame, and pay the price in compensatory gait patterns that delay full recovery. Others cling to them past the

point of medical necessity, finding in the crutches a form of social signaling that protects them from expectations they do not yet feel ready to meet.

Stage 3, the strengthening stage, introduces a particular kind of stress: the stress of plateau. The early stages of recovery offer dramatic, visible progress—first weight-bearing step, first full extension, first day without crutches. By Stage 3, progress becomes incremental. Strength gains are measured over weeks rather than days. The patient who has been buoyed by rapid early progress may find this slower phase demoralizing. The protocol's instruction that "by the end of the third set of exercises, you should begin to feel some muscular fatigue. At no point should your form become compromised" (University of Calgary Sport Medicine Centre, n.d.) describes a level of self-monitoring and discipline that is psychologically demanding to sustain across months.

Stage 4 introduces what may be the most psychologically salient stress of the recovery: the return to impact. Running, jumping, and agility ladder work all involve the operated knee absorbing forces that it has not absorbed since before the injury. The protocol's instruction to "absorb the shock of the landing by bending at the hips, knees and ankles" (University of Calgary Sport Medicine Centre, n.d.) describes a motor pattern that depends not only on physical capacity but on the willingness to commit to the movement. Patients who have spent months protecting the knee must now ask it to perform under load, and many do so with hesitation that manifests as awkward mechanics, reduced power, and an elevated risk of compensatory injury elsewhere.

Stage 5, return to sport, brings the integration of all prior stresses with a new one: the anticipation of competitive performance. The protocol explicitly names the relevant psychology: "While it is normal to be fearful of reinjury, it is necessary to simulate game like scenarios in order to develop confidence in unpredictable situations" (University of Calgary Sport Medicine Centre, n.d.). This is, in effect, a prescription for graded exposure to feared movement and feared contexts, and it is one of the few places in the protocol where psychological language enters directly.

Across all stages, the dominant stress response is best understood not as a single emotion but as a sustained negotiation between hope and uncertainty. The patient hopes for a complete recovery and a return to the pre-injury self, and the patient lives with the uncertainty that this outcome is not guaranteed. The psychologist's role is to support this negotiation without either dismissing the hope or denying the uncertainty.

Mental Health Outcomes and Severity Spectrum

Although the protocol does not present mental health outcome data, its structure and risk content allow a clinical inference about the spectrum of psychological responses that may emerge during ACLR recovery. These responses can be conceptualized along a severity continuum from adaptive adjustment to clinically significant disorder.

At the adaptive end of the spectrum, many patients respond to ACLR with what might be described as engaged coping. They accept the diagnosis, organize their lives around the rehabilitation regimen, build a working alliance with their physiotherapist or athletic therapist, and progress through the stages with appropriate emotional variability. They experience frustration, occasional discouragement, and moments of anxiety, but these responses are transient and do not impair function. For these patients, psychological intervention, if offered at all, may take the form of brief supportive consultation, education about expected reactions, and reinforcement of effective coping strategies already in use.

Moving along the spectrum, some patients develop subclinical but meaningful distress. They may experience persistent low mood related to loss of athletic identity, reduced social engagement during periods of restricted mobility, sleep disturbance secondary to pain or anxiety, and episodes of catastrophic thinking about the future of their knee. They may struggle with adherence, alternating between periods of compliance and periods of avoidance. They may develop or intensify maladaptive eating patterns in response to changes in activity level and body composition. These patients benefit from structured psychological support, which may include cognitive-behavioral interventions targeting catastrophizing and avoidance, behavioral activation to counter withdrawal, and motivational interviewing to support adherence.

At the more severe end of the spectrum, ACLR recovery may precipitate or unmask diagnosable conditions. Major depressive episodes may emerge, particularly in patients whose pre-injury identity was heavily organized around sport or physical activity. Anxiety disorders, including specific phobias related to the injury context and generalized anxiety about future reinjury, may develop or worsen. Adjustment disorders are common, particularly during the transitions between stages when the patient encounters new physical demands. In

rare but important cases, posttraumatic stress symptoms may emerge in patients whose injury occurred in a particularly frightening context, such as a violent collision or a fall from height, and these symptoms may include intrusive memories of the injury moment, avoidance of injury-related stimuli, and physiological reactivity when approaching the activity in which the injury occurred.

A particular clinical concern in ACLR populations is the development of kinesiophobia, or fear of movement, which sits at the intersection of anxiety and behavior. The protocol's recognition that fear of reinjury is normal but must be addressed through graded exposure to game-like scenarios (University of Calgary Sport Medicine Centre, n.d.) reflects an awareness that this fear, if unaddressed, can become a primary driver of incomplete recovery. Kinesiophobia is often invisible in early rehabilitation, when activity demands are modest, but it becomes increasingly evident in Stages 4 and 5, when the patient must commit to forceful, dynamic, and sometimes unpredictable movement.

Identity disturbance constitutes another distinct domain of psychological outcome. For competitive athletes, the loss of access to their sport during recovery can produce a profound disruption of self-concept. For recreational athletes and active adults, the disruption may be less dramatic but no less meaningful. The patient who jogged every morning may discover, in the months of restricted activity, how much of their mood regulation depended on that morning run. The patient who played weekly recreational soccer may experience the loss of that social ritual as a significant blow to their sense of community.

It is also important to recognize that ACLR recovery is not psychologically uniform across demographic groups. Adolescents may struggle differently than adults, particularly when the injury interrupts a developmentally important athletic season. Older adults may face different concerns, including worries about the long-term function of the knee, about returning to demanding occupations, and about the possibility of post-traumatic osteoarthritis. Women and men may experience the social and identity dimensions of the injury differently. The protocol does not address these demographic variations, and clinicians should attend to them through individualized assessment.

Across this severity spectrum, a consistent clinical principle applies: psychological response to ACLR is not a sign of weakness or maladjustment but a predictable consequence of a demanding medical event. The clinician's task is to differentiate normal variation from clinically significant impairment and to calibrate intervention accordingly.

System-Level and Contextual Psychological Effects

ACLR recovery does not occur in isolation. It unfolds within families, workplaces, athletic teams, healthcare systems, and broader cultural contexts that shape the patient's experience in important ways. The protocol provides several entry points for considering these systemic effects.

Within the healthcare system, the protocol embodies a particular model of distributed care. The surgeon performs the operation and specifies restrictions. The physiotherapist or athletic therapist implements and modifies the rehabilitation program. The patient, supported by these professionals, executes daily exercises and makes moment-to-moment decisions about effort, pain tolerance, and progression (University of Calgary Sport Medicine Centre, n.d.). This distributed model has clear advantages but also creates psychological vulnerabilities. The patient must coordinate across providers, manage information that may not always be perfectly consistent between them, and maintain motivation in the long stretches between scheduled appointments. Patients with limited health literacy, complex insurance situations, or geographic distance from specialized rehabilitation services face additional barriers that the protocol itself cannot address.

Family systems play a particularly important role in ACLR recovery. The patient's spouse, parent, or roommate may take on instrumental tasks—driving to appointments, modifying the home environment, providing physical assistance with daily activities—while also serving as the primary witness to the patient's emotional experience. These supporters may themselves experience strain, particularly when the recovery extends across many months. Family members may also become inadvertent agents of either over-protection or premature pressure to resume normal roles, both of which can undermine the calibrated progression the protocol prescribes.

Workplaces represent another important context. The protocol distinguishes between office-type jobs, to which the patient may return relatively early in Stage 2, and other forms of work, with explicit recognition that "heavy labour or difficult environmental conditions" require longer postponement (University of Calgary Sport Medicine Centre, n.d.). For patients whose livelihoods depend on physical work, this distinction has financial and identity implications that

the rehabilitation program does not solve. A construction worker, a nurse on a hospital ward, a farmer, or an emergency responder may face genuine economic pressure to return before their knee is ready, creating a conflict between medical advice and material necessity that the psychologist may be called upon to help mediate.

For athletes, the team context is particularly powerful. The injured athlete is simultaneously a member of the team and, during recovery, separated from many of its rituals. Practice sessions occur without them. Games are played without them. Their identity within the team may shift, sometimes in ways that feel marginalizing. Coaches, teammates, and athletic trainers vary in their capacity to keep the injured athlete meaningfully included. When inclusion is maintained—through attendance at practices, participation in team meetings, and visible recognition of the athlete's recovery progress—the psychological burden of the injury is partially buffered. When the injured athlete is allowed to drift to the periphery of the team, the recovery becomes lonelier and the risk of depressed mood increases.

Cultural context shapes ACLR experience as well. In athletic cultures that valorize toughness, playing through pain, and rapid return to competition, the patient may experience explicit or implicit pressure to compress the rehabilitation timeline. The protocol's clear position—no return to sport before nine months, regardless of how good the patient feels—often runs counter to these cultural expectations. The psychologist working with such patients may need to help them resist not only their own impatience but the impatience of coaches, teammates, parents, and even some members of their own healthcare team.

Finally, the protocol exists within an evolving evidence base and clinical culture. It represents a particular institution's expert consensus at a particular moment. Patients may encounter conflicting information from other providers, from online sources, and from peers who have undergone different protocols. Helping the patient hold a consistent, evidence-informed mental model of their recovery, while remaining appropriately humble about the limits of any single protocol's reach, is itself a psychological intervention.

Clinical Implications for Psychologists

The translation of this analysis into clinical practice can be organized around several domains: assessment, intervention, interdisciplinary collaboration, and ethics.

Assessment of the ACLR patient begins with an understanding of where in the protocol's five-stage progression the patient currently sits, what criteria have been met to enter that stage, and what criteria must be met to progress. This information, ideally obtained in collaboration with the physiotherapist or athletic therapist, provides the structural backdrop against which psychological assessment proceeds. Within that backdrop, the clinician assesses mood, anxiety, sleep, pain experience, adherence, fear of movement, identity status, social support, occupational and athletic context, and any pre-existing psychological history that may complicate recovery. Special attention should be paid to the patient's interoceptive capacity—their ability to discriminate productive discomfort from harmful pain—because this capacity directly mediates adherence to the protocol's "follow your body's lead" principle (University of Calgary Sport Medicine Centre, n.d.).

Intervention strategies should be matched to the stage of recovery and to the specific psychological tasks of that stage. In Stage 1, intervention may emphasize acute coping skills, pain management strategies, sleep hygiene, and the establishment of a sustainable daily routine. In Stage 2, intervention may focus on the management of the transition off crutches, the resumption of work and household roles, and the early identification of motivational fluctuations. In Stage 3, intervention often addresses the psychology of plateaus: helping the patient maintain effort across a phase of slower visible progress, reinforcing the meaningfulness of incremental gains, and addressing any drift toward avoidance or, alternatively, toward over-training. In Stage 4, intervention turns toward fear of movement and the cognitive and behavioral skills required to commit to dynamic, loaded activity. Graded exposure, imagery, and confidence-building strategies are particularly relevant. In Stage 5, intervention focuses on return-to-sport psychology: confidence under competitive pressure, the management of performance anxiety, the reconstruction of athletic identity, and the integration of the injury experience into a coherent narrative.

Across all stages, several intervention modalities are broadly applicable. Cognitive-behavioral techniques targeting catastrophizing, all-or-nothing thinking, and avoidance are well suited to the rehabilitation context. Motivational interviewing supports adherence and helps patients articulate the values that sustain their effort. Acceptance and commitment approaches help patients tolerate the inevitable distress of recovery without becoming consumed by it. Mindfulness-based interventions enhance interoceptive awareness and reduce reactivity to

bodily sensation. Brief solution-focused work can be useful for patients whose distress is bounded and whose preferred outcomes are clear.

Interdisciplinary collaboration is essential. The psychologist working with an ACLR patient should, with the patient's consent, develop working relationships with the surgical and rehabilitation team. The protocol's structure assumes ongoing communication between provider and patient; it does not preclude, and in fact welcomes, the inclusion of a psychologist within that conversation. Joint goal-setting meetings, brief written communications between providers, and shared understanding of progression criteria all support a coherent care plan. The psychologist contributes by helping the rehabilitation team understand the patient's emotional and motivational state, by translating physical setbacks into manageable psychological challenges, and by advocating for pacing decisions that reflect not only physical readiness but psychological readiness.

Ethical considerations in this work include the standard concerns of informed consent, confidentiality within multidisciplinary teams, scope of practice, and cultural competence. A specific concern in the ACLR context is the management of pressure to return to sport. Psychologists may encounter situations in which a patient, coach, family member, or even another provider expresses urgency that conflicts with the protocol's nine-month minimum. The psychologist's ethical obligation is to support the patient's autonomous, informed decision-making while honestly representing the risks of premature return. Another ethical consideration involves the limits of the psychologist's expertise: psychologists should not advise on physical readiness, weight-bearing status, or exercise progression, all of which are properly the domain of the surgeon and the physiotherapist or athletic therapist. The psychologist's contribution is to the psychological dimensions of the recovery, not its biomechanical specifics.

A final clinical implication concerns the prevention of psychological problems before they develop. Patients who receive even brief psychological education at the time of surgery—about expected emotional responses, the importance of adherence, the predictable challenges of each stage, and the availability of psychological support—are likely to navigate the recovery more effectively than those who receive no such preparation. Integrating brief psychoeducational contact into the early rehabilitation pathway represents a low-cost, high-value contribution that psychologists can offer to surgical and rehabilitation programs.

Future Directions and Research Gaps

The analysis presented in this manual highlights several areas in which further work is needed. The most evident gap is the absence of integrated psychological outcome data within the protocol itself. Future iterations of ACLR rehabilitation programs would benefit from the systematic incorporation of validated measures of mood, anxiety, fear of movement, adherence, and athletic identity at defined points across the recovery. Such measurement would allow rehabilitation teams to identify patients at psychological risk early, target intervention efficiently, and evaluate the impact of psychological care on physical outcomes.

A second area for development concerns the criteria for return to sport. The protocol specifies a limb symmetry index above ninety percent on strength and hop tests, alongside the completion of sport-specific retraining and a nine-month minimum (University of Calgary Sport Medicine Centre, n.d.). It does not, however, specify psychological readiness criteria. The integration of validated measures of psychological readiness—covering confidence, fear of reinjury, and athletic identity—into return-to-sport decision-making represents a meaningful direction for future protocol development. The clinical intuition behind the protocol's existing risk factors already implies that the psychological correlates of those factors deserve formal recognition.

A third area concerns the differentiation of rehabilitation pathways by demographic and contextual factors. Adolescent athletes, older recreational athletes, patients whose injuries occurred in traumatic contexts, patients with concurrent psychological diagnoses, and patients facing significant occupational or financial pressure all bring distinct psychological profiles to the rehabilitation. Future protocols and research would benefit from greater granularity in matching psychological support to these distinct profiles rather than treating ACLR populations as uniform.

A fourth direction involves the role of technology in supporting adherence and psychological well-being during ACLR recovery. The protocol describes daily exercise regimens that span months. Digital tools that support self-monitoring, provide just-in-time motivational prompts, and connect patients with one another and with their care team have clear potential to reduce the loneliness and adherence challenges of the long middle stages of recovery. Research on the integration of such tools with established rehabilitation protocols is needed.

A fifth direction concerns the prevention of secondary ACL injury. The protocol's risk factors for reinjury (University of Calgary Sport Medicine Centre, n.d.) are framed primarily in biomechanical terms. The psychological correlates of those risk factors—the fear that underlies asymmetric loading, the impatience that drives premature return—deserve systematic investigation. Interventions that reduce these psychological contributors to reinjury risk may yield measurable improvements in long-term outcomes.

Finally, a sixth direction involves the longer arc of post-ACLR life. The protocol concludes with return to sport, but the lived experience of the operated knee extends across decades. Post-traumatic osteoarthritis, the cumulative wear of returning to demanding activity on a reconstructed joint, and the eventual transition out of competitive sport all carry psychological weight. Longitudinal research and clinical attention to these later phases would extend the rehabilitation conversation beyond the nine- to twelve-month window that current protocols typically address.

Methodological limitations of the present manual should also be acknowledged. Because the manual is grounded exclusively in a single rehabilitation protocol, its empirical base is narrow. The protocol represents an expert consensus document rather than a systematic synthesis of outcome research. Many of the psychological inferences developed here are clinically reasonable but cannot be validated within the protocol alone. Readers are encouraged to integrate this manual with the broader literature on rehabilitation psychology, sport psychology, and health behavior change as they apply its frameworks in practice.

Conclusion

Anterior cruciate ligament reconstruction is a medical event with a long psychological tail. The University of Calgary Sport Medicine Centre's rehabilitation protocol provides a structured, criterion-based pathway through the physical dimensions of that recovery, organized into five stages spanning at least nine months from surgery to return to sport (University of Calgary Sport Medicine Centre, n.d.). Embedded within that pathway are psychological demands of considerable magnitude: sustained adherence, calibrated interpretation of bodily sensation, management of fear, preservation of identity, negotiation with family and work and team systems, and the eventual reconstruction of confidence in the operated limb under

competitive or recreational demand.

For psychologists, the ACLR patient represents an opportunity to contribute meaningfully to a recovery whose success depends on more than surgical technique. By understanding the structure of the rehabilitation protocol, by anticipating the predictable psychological tasks of each stage, by assessing thoughtfully and intervening at the appropriate level of intensity, and by collaborating across disciplines while respecting scope of practice, psychologists can help patients move through this difficult recovery in ways that protect both the joint and the person. The protocol's own language—its repeated reminders to follow the body's lead, to communicate with the rehabilitation team, to balance progression against caution—is, at its heart, a call for the kind of integrated, behaviorally grounded, person-centered care that psychologists are uniquely prepared to provide.

The recovery from an ACL reconstruction is, in the end, a recovery of more than a ligament. It is a recovery of movement, confidence, identity, and the capacity to inhabit a body that has been injured, repaired, and asked to perform again. Psychologists who enter this work with both technical knowledge of the rehabilitation pathway and clinical attention to the human navigating it are positioned to make a meaningful, durable contribution to their patients' lives.

References

University of Calgary Sport Medicine Centre. (n.d.). *Anterior cruciate ligament reconstruction rehabilitation program*. University of Calgary Sport Medicine Centre. https://www.sport-med.ucalgary.ca

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This continuing education reading manual has been prepared as scholarly reading material for licensed psychologists and graduate-level clinicians. It is based exclusively on the content of the source protocol cited above. Clinicians are encouraged to integrate this material with the broader literature on rehabilitation psychology, sport psychology, and health behavior change in their ongoing professional development.