

**Physical Outcomes and Clinical Readiness during Anterior Cruciate Ligament Injury Return to Play in Football: A Study Protocol for a Systematic Review with Meta-analysis**

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**ADMINISTRATIVE INFORMATION**

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**Review Stage at time of this submission** - Formal screening of search results against eligibility criteria.

**Conflicts of interest** - None declared.

**INPLASY registration number:** INPLASY202620078

**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 26 February 2026 and was last updated on 26 February 2026.

**INTRODUCTION**

**Review question / Objective** This systematic review aims to investigate physical performance outcomes and clinical readiness criteria associated with return-to-play (RTP) after anterior cruciate ligament (ACL) injury in soccer (football) players, with particular attention to factors related to subsequent injuries. Additionally, it seeks to explore clinical, functional, and performance-based measures used to determine readiness for RTP following ACL injury. To this end, the proposed systematic review will address the following question: What physical outcomes and clinical readiness criteria are most commonly used to assess RTP after ACL injury in football players, and how are these associated with the decline in performance and risk of reinjury?

**Rationale** An ACL rupture is a severe injury for professional football players, resulting in long layoff times (1), and a reduced career length (2). Furthermore, an ACL injury is associated with significant short and long-term consequences (3,4), increased risk of secondary ACL injury, and early onset osteoarthritis (3, 5). Although advances in surgical techniques and rehabilitation protocols have improved RTP rates, the reduction in performance or recovery from an ACL injury (6) and risk of reinjury after RTP remains considerable in football (7,8). In this context, determining whether an athlete is physically, psychologically, and subjectively ready to safely RTP represents a major challenge for clinicians, researchers, and performance staff (9). While several physical performance measures and clinical readiness criteria, such as strength assessments, functional performance tests, movement quality evaluations, and time-based criteria, are commonly used to guide RTP decision-making after ACL injury,

growing evidence highlights the critical role of psychological readiness in successful RTP and reinjury prevention (9, 10).

Psychological factors such as fear of reinjury, confidence in knee function, motivation, and self-efficacy have been shown to influence RTP outcomes and may contribute to both delayed RTP and increased risk of reinjury (10). Patient-reported outcome measures (PROMs), such as psychological readiness scales, are increasingly incorporated into RTP decision-making; however, their integration alongside physical and clinical criteria remains inconsistent across studies and applied settings (9).

This variability in the selection, implementation, and interpretation of physical, psychological, and subjective self-assessment RTP outcomes results in limited clarity regarding which factors are most relevant for assessing RTP readiness and reducing reinjury risk in professional football players (11, 12). A comprehensive synthesis of the available evidence is therefore needed to identify the most frequently used RTP criteria, including psychological readiness measures, and their relationship with subsequent injury risk. Improving this understanding may help optimise RTP decision-making processes, rehabilitation strategies, and injury prevention programs in professional football.

**Condition being studied** The present systematic review will address RTP readiness following ACL injury or reconstruction in professional football players, focusing on physical performance and clinical outcomes, and psychological readiness criteria and PROMs used to support RTP decision-making.

Physical performance outcomes will include measures of muscle strength, functional performance tests, running and sprint performance demands, and movement quality assessments. Clinical readiness criteria will include time-based criteria, knee function assessments, limb symmetry indices, and functional test batteries. Psychological readiness and subjective self-assessment will be assessed using PROMs that assess constructs such as self-reported knee function, confidence, and fear of reinjury (9).

The review will also examine the association between RTP readiness criteria and subsequent performance recovery and injury risk following RTP in professional football players.

## METHODS

**Search strategy** PubMed: (("patient-reported outcome\*" [Title/Abstract] OR questionnaire\* [Title/Abstract] OR scale\* [Title/Abstract] OR score\* [Title/

Abstract] OR instrument\* [Title/Abstract]) AND ("anterior cruciate ligament" [Title/Abstract] OR ACL [Title/Abstract]) AND (injur\* [Title/Abstract] OR reconstruct\* [Title/Abstract]) AND (soccer [Title/Abstract] OR football [Title/Abstract]) AND ("return to play" [Title/Abstract] OR "return to sport" [Title/Abstract] OR RTP [Title/Abstract])) NOT (review [Publication Type])

Scopus: (TITLE-ABS-KEY("patient-reported outcome\*" OR questionnaire\* OR scale\* OR score\* OR instrument\*)) AND (TITLE-ABS-KEY("anterior cruciate ligament" OR ACL)) AND (TITLE-ABS-KEY(injur\* OR reconstruct\*)) AND (TITLE-ABS-KEY(soccer OR football)) AND (TITLE-ABS-KEY("return to play" OR "return to sport" OR RTP)) AND NOT TITLE-ABS-KEY(review)

Embase: ('patient-reported outcome':ti,ab,kw OR questionnaire\*:ti,ab,kw OR scale\*:ti,ab,kw OR score\*:ti,ab,kw OR instrument\*:ti,ab,kw) AND ('anterior cruciate ligament':ti,ab,kw OR acl:ti,ab,kw) AND (injur\*:ti,ab,kw OR reconstruct\*:ti,ab,kw) AND (soccer:ti,ab,kw OR football:ti,ab,kw) AND ('return to play':ti,ab,kw OR 'return to sport':ti,ab,kw OR rtp:ti,ab,kw) NOT review:ti,ab,kw

SPORT Discus: ((TI("patient-reported outcome\*" OR AB("patient-reported outcome\*")) OR (TI(questionnaire\*) OR AB(questionnaire\*)) OR (TI(scale\*) OR AB(scale\*)) OR (TI(score\*) OR AB(score\*)) OR (TI(instrument\*) OR AB(instrument\*))) AND ((TI("anterior cruciate ligament") OR AB("anterior cruciate ligament")) OR (TI(ACL) OR AB(ACL))) AND ((TI(injur\*) OR AB(injur\*)) OR (TI(reconstruct\*) OR AB(reconstruct\*))) AND ((TI(soccer) OR AB(soccer)) OR (TI(football) OR AB(football))) AND ((TI("return to play") OR AB("return to play")) OR (TI("return to sport") OR AB("return to sport")) OR (TI(RTP) OR AB(RTP))) NOT (TI(review) OR AB(review))

Web of Science: TS=("patient-reported outcome\*" OR questionnaire\* OR scale\* OR score\* OR instrument\*) AND (TS=("anterior cruciate ligament" OR ACL)) AND (TS=(injur\* OR reconstruct\*)) AND (TS=(soccer OR football)) AND (TS=("return to play" OR "return to sport" OR RTP)) NOT TS=(review).

**Participant or population** Based on the PICOS strategy (13), it will be as follows:

Football players with ACL injury or ACL reconstruction. Studies including mixed athletic populations will be eligible only if data for football players or ACL-injured participants are reported separately.

**Intervention** RTP process following ACL injury or ACL reconstruction, including the assessment of psychological readiness using validated PROMs.

**Comparator** Where available, comparisons may include pre-injury status, pre-RTP assessments, between-group comparisons (e.g., reinjured vs non-reinjured players), or longitudinal follow-up assessments after RTP. A comparator will not be mandatory for study inclusion.

**Study designs to be included** Eligible studies will include longitudinal observational studies (prospective or retrospective cohort studies) with follow-up after RTP.

#### Eligibility criteria

Exclusion criteria:

- Studies not involving ACL injury or reconstruction and not involving football players.
- Studies not using validated PROMs or standardised questionnaires.
- Studies with no longitudinal design (retrospective or prospective) during ACL injury RTS. Narrative reviews, systematic reviews, meta-analyses, expert opinion papers, consensus statements, and single case reports were excluded.
- Studies not published in English or Spanish.

**Information sources** The present systematic review will search the following electronic databases: PubMed, Scopus, Embase, SPORTDiscus, and Web of Science. In addition, a manual search of the reference lists of relevant systematic reviews and included studies will be conducted to identify any additional eligible articles that may not have been captured through the database search.

**Main outcome(s)** The main outcomes of this systematic review will be psychological readiness and self-reported knee function assessed through validated PROMs in football players following ACL injury or ACL reconstruction. Particular attention will be given to PROMs used to support RTP decision-making and their association with RTP status. These outcomes will be extracted according to the measurement instruments and assessment time points reported in the included studies. When multiple PROMs are reported for the same construct, the most commonly used measure across studies will be prioritised.

**Additional outcome(s)** Additional outcomes will include physical performance and clinical readiness criteria reported alongside PROMs, such as muscle strength assessments, functional performance tests, limb symmetry indices, time to RTP, and RTP status. Player characteristics will also be registered to explore their potential influence on the main outcomes of the review. These characteristics may include sex, age,

playing position, competition level, previous injury history, and follow-up duration. If additional relevant variables are identified during the review process, they will be documented and reported in the final manuscript.

**Data management** A specific codebook will be developed for this systematic review to register: a) study characteristics (e.g., country, year, study design), b) sample characteristics (e.g., sex, age, competition level), c) injury- and RTP-related variables (e.g., ACL injury or reconstruction, follow-up duration, RTP definition), d) PROMs and RTP-related outcomes (e.g., psychological readiness scores, self-reported knee function, reinjury occurrence), e) descriptive statistics of reported outcomes (e.g., means and standard deviations), and f) methodological quality and risk of bias of the included studies.

Two reviewers will independently perform study screening, data extraction, and methodological quality assessment. Disagreements will be resolved through discussion or consultation with a third reviewer.

**Quality assessment / Risk of bias analysis** The methodological quality and risk of bias of the included studies will be assessed using the Newcastle–Ottawa Scale (NOS) for cohort studies. This tool evaluates three domains: selection of study groups, comparability of groups, and outcome assessment (14).

Two reviewers will independently assess the risk of bias of the included studies. Any disagreements will be resolved through discussion or consultation with a third reviewer when necessary.

If studies with different observational designs are identified, an appropriate risk-of-bias assessment tool will be selected accordingly.

The overall certainty of the evidence for the main outcomes will be evaluated using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach, considering domains such as risk of bias, inconsistency, indirectness, imprecision, and publication bias (15).

**Strategy of data synthesis** A narrative synthesis of the included studies will be conducted, summarising the characteristics of the studies, participant populations, PROMs, RTP criteria, and follow-up outcomes. Descriptive statistics and frequency distributions of the reported PROMs, RTP outcomes, and reinjury events will be presented.

Where sufficient methodological homogeneity exists across studies in terms of PROMs, follow-up time points, and reported outcomes, quantitative synthesis may be considered. If meta-analysis is

not feasible due to heterogeneity in study design, outcome measures, or reporting methods, findings will be synthesised descriptively.

Subgroup analyses will be performed when data are available, considering factors such as player characteristics (e.g., age, sex, competition level), ACL injury or reconstruction status, RTP status, and reinjury occurrence.

**Subgroup analysis** Subgroup analyses will be conducted when sufficient data are available. Meta-regression analyses will be performed if at least ten studies are available for a given outcome, as recommended by Borenstein et al. (16). Potential subgroup variables may include player characteristics (e.g., age, sex, competition level), type of ACL management (injury vs reconstruction), follow-up duration, and RTP status.

If the number of studies is insufficient to perform meta-regression, subgroup findings will be synthesised descriptively. Where appropriate, studies may be grouped according to similar PROMs, follow-up periods, or RTP-related outcomes to facilitate comparison across studies.

**Sensitivity analysis** Not applicable.

**Country(ies) involved** All the authors involved in the review are from Spain and the United Kingdom.

**Keywords** ACL injury, return to sport; patient-reported outcome measures; psychological readiness; soccer.

**Dissemination plans** The present systematic review is intended to be published in a journal included in the Journal Citation Reports.

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- Contributorship: all authors will contribute equally to this work.