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Risk Factors, Injury Mechanisms, and Prevention Programs for Anterior Cruciate Ligament (ACL) Injuries in Professional Football Players- A Narrative Review

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Abstract

Background: Anterior cruciate ligament (ACL) injuries in professional football cause prolonged absence (6–12 months) and high financial burdens. Incidence remains high despite surgical advancements.

Objective: To synthesize evidence on intrinsic/extrinsic risk factors, kinematic mechanisms, and prophylactic/return-to-play efficacy.

Methods: A narrative review across PubMed, Scopus, Web of Science, and Google Scholar included peer-reviewed cohort studies, video analyses, and RCTs focusing on elite players.

Results: Key intrinsic factors include sex disparities, fast-twitch hamstring typology, dynamic knee valgus, and neurocognitive errors (55% of pressing injuries involve poor inhibitory control; 76% involve attention lapses). Extrinsic factors include fixture congestion and traction. Most injuries occur via non-contact mechanisms within 30–50 ms. Patterns vary by sex (53% in women during pressing/tackling; 79% in MLS without direct contact). Neuromuscular training (FIFA 11+) significantly lowers incidence. Objective clearance (LSI >90%), On-Field Rehabilitation (OFR), and delaying return to 9–12 months maintain return-to-sport rates above 80–85%.

Conclusion: Preventing ACL trauma requires bridging sports medicine and management via mandatory NMT (FIFA 11+), workload monitoring, and objective return-to-play criteria.

Keywords: Anterior cruciate ligament, ACL prevention, Professional football, ACL Injury mechanisms, ACL Risk factors, Neuromuscular training, ACL rehabilitation.

1. Introduction

In elite and professional football (soccer), anterior cruciate ligament (ACL) ruptures are among the most debilitating traumatic events an athlete can experience. An ACL injury invariably leads to prolonged periods of athletic absence, often exceeding 6 to 12 months, and poses significant challenges to an athlete's post-rehabilitation performance level and career longevity (D'Ambrosi et al., 2026a; Grassi et al., 2025; Mazza et al., 2026).

From an organizational and sports management perspective, ACL injuries represent a major economic burden for clubs due to lost player availability, medical expenses, and potential degradation of squad performance in competitive league environments. In European professional football, knee injuries account for 34.8 days lost per 1000 hours (€204,206/1000 hours), with ACL ruptures specifically driving 14.4 days lost per 1000 hours and an associated cost of €84,499 per 1000 hours (Pulici et al. 2022). Furthermore, modern longitudinal registries across top European leagues indicate that a history of primary ACL reconstruction significantly increases the risk of secondary muscle injuries and secondary ACL re-ruptures upon return-to-play (Della Villa et al., 2026; Huber et al., 2026; Ortiz-Sánchez et al., 2026).

Understanding the precise interplay between intrinsic risk factors, external match environments, multi-planar biomechanical mechanisms, and targeted prophylactic interventions is crucial. This narrative review synthesizes current literature to evaluate risk factors, biomechanical injury patterns, and the preventive efficacy of exercise-based intervention strategies in professional football players.

2. Methodology

This narrative review was conducted in accordance with evidence-based reporting standards for epidemiological and clinical reviews in sports medicine.

2.1. Literature Search & Inclusion Criteria

A search was performed using biomedical and sports science databases (including PubMed, MEDLINE, and Scopus). Inclusion criteria restricted studies to peer-reviewed prospective cohort studies, retrospective matched-cohort analyses, systematic video analyses, and systematic reviews/meta-analyses focusing on:

1. Male and female professional, elite, or top-tier collegiate football (soccer) players.

2. Intrinsic and extrinsic ACL injury risk factors.
3. Video-analyzed or registered ACL injury mechanisms on the pitch.
4. Neuromuscular, strength, or standardized prevention programs (e.g., FIFA 11+).

2.2. Excluded Literature

Studies focusing exclusively on non-athletic cohorts, non-football sports, or pediatric populations under high school levels without elite performance stratification were excluded from primary risk synthesis, though developmental context was referenced where applicable.

3. Risk Factors for ACL Injury in Professional Football

3.1. Intrinsic Risk Factors

- **Sex-Based Disparities:** Female professional football players experience a significantly higher relative incidence rate of ACL ruptures compared to their male counterparts (Achenbach et al., 2024; D'Ambrosi et al., 2026b; John et al., 2025; Mazza et al., 2025). Anatomical alignment differences (higher Q-angle), altered neuromuscular landing control, and hormonal cycles contribute to this elevated vulnerability (John et al., 2025).
- **Neuromuscular Deficits and Muscle Fiber Typology:** Dynamic knee valgus collapse, lateral trunk displacement, and quad-dominant deceleration patterns are key neuromuscular predictors of ACL loading (Asadi et al., 2026; Bisciotti et al., 2019). Additionally, recent physiological evidence indicates that an overrepresentation of fast-twitch hamstring muscle fiber typology is associated with heightened ACL injury susceptibility due to faster fatigue kinetics during intense eccentric braking (Tampere et al., 2026).
- **Neurocognitive Errors:** In high-intensity match situations, rapid decision-making under cognitive load can lead to micro-level neurocognitive errors, resulting in miscalculated foot placement or delayed muscle activation during unexpected plant-and-cut tasks (Gokeler et al., 2024).

3.2. Extrinsic Risk Factors

- **Match Density and Schedule Congestion:** Elite league play across top European competitions involves demanding match calendars. Accumulated peripheral and central fatigue significantly impairs joint stabilization mechanisms, elevating injury frequency during congested fixture periods (Huber et al., 2026; Ortiz-Sánchez et al., 2026; Rekik et al., 2018).
- **Pitch Surface and Footwear Interactions:** High rotational traction between boot studs and artificial turf or dry natural grass increases torsional forces transmitted directly to the knee joint during sudden directional changes (Bisciotti et al., 2019; Rekik et al., 2018).

4. Biomechanical Injury Mechanisms and On-Field Patterns

The recent video literature has made football-specific ACL mechanisms much clearer. In women's professional football, four recurrent patterns were identified: pressing, parallel sprinting and tackling, knee-to-knee contact, and landing (Achenbach et al., 2024). Across 25 women's leagues, 53% of injuries occurred during pressing or tackling, and most arose in defensive play within the first 45 minutes (Hampstead et al., 2026). In MLS, injuries most often occurred during defensive pressing and offensive driving, with 79% occurring without direct contact to the injured knee (Clarke et al., 2026).

Biomechanically, ACL injury in football repeatedly clusters around knee valgus, moderate flexion, trunk-control deficits, and unstable cutting or landing mechanics (Bisciotti et al., 2019; Hampstead et al., 2026; Clarke et al., 2026; D'Ambrosi et al., 2026b). Women's video studies specifically implicate limited lower-limb flexion, hip abduction, and valgus alignment in pressing or tackling situations, while the BJSM analysis emphasized lateral and rotational trunk stability during one-legged stance and upper-body perturbation (Hampstead et al., 2026; Achenbach et al., 2024). Neurocognitive errors have also been identified in non-contact ACL injuries among male professional soccer players. In a video analysis of 47 non-contact ACL injuries, 26 (55%) were classified as pressing-type injuries, of which 19 (73%) involved a deceptive action by the opponent, suggesting poor inhibitory control by the defender. Among the remaining 21 injuries, 16 (76%) were attributed to attentional errors (Gokeler et al., 2024).

Non-Contact and Indirect-Contact Deceleration: The overwhelming majority of ACL injuries occur without direct physical contact to the knee joint. They typically happen during

high-speed deceleration, single-leg landing from a jump, or sudden side-step cutting maneuvers (Clarke et al., 2026; Hampstead et al., 2026).

1. **Pressing and Tackling Tasks:** In professional women's and men's football, high-risk situational patterns frequently involve defensive pressing or closing down an opponent, where the extended leg plants forcefully with the foot fixed to the turf while the trunk rotates away (Achenbach et al., 2024; Hampstead et al., 2026).
2. **Multi-Planar Loading:** Video kinematics consistently show a combination of multi-planar forces: knee flexion near full extension (0° – 30°) excessive dynamic knee valgus, and internal rotational torque acting on the tibia relative to the femur (Bisciotti et al., 2019; Clarke et al., 2026).

5. Prevention Programs and Implementation Strategies

Mitigating primary anterior cruciate ligament (ACL) injuries and preventing secondary re-ruptures in professional football require a comprehensive strategy that bridges acute clinical care, structured exercise physiology, and long-term sports management.

5.1. Neuromuscular Training (NMT) and the FIFA 11+ Program

Exercise-based prevention programs emphasizing multi-planar neuromuscular control, progressive plyometrics, eccentric hamstring strengthening, and core-lumbopelvic stability have proven highly effective in mitigating non-contact ACL risks across elite and sub-elite cohorts (Alkishnawi et al., 2026; Bharadwaj et al., 2026; Olivares-Jabalera et al., 2021; Watson et al., 2026).

Implementation and Efficacy of the FIFA 11+

The FIFA 11+ program and its youth/gender-adapted variations serves as a standardized, warm-up intervention designed to improve dynamic joint stability during football-specific tasks:

- **Multi-Season Incidence Reduction:** Prospective multi-season cohort studies demonstrate that consistent execution of the FIFA 11+ routine (performed at least twice weekly with high team compliance) yields statistically significant reductions in

non-contact ACL injury incidence rates among both female and male football players (Alkishnawi et al., 2026; Magoshi et al., 2026; Silvers-Granelli et al., 2017).

- **Population-Wide Meta-Analyses:** Systematic reviews and meta-analyses encompassing dozens of randomized controlled trials confirm that structured NMT regimens significantly lower overall lower-extremity injury burdens, providing strong justification for universal club-level adoption (Alkishnawi et al., 2026; Martinez-Calderon et al., 2025; Watson et al., 2026).

Biomechanical Adaptations and Fatigue Resilience

NMT interventions directly target key biomechanical risk factors identified in video analysis literature:

- **Attenuating Dynamic Valgus Collapse:** Controlled 8-week NMT protocols significantly improve Landing Error Scoring System (LESS) performance and reduce dynamic knee valgus angles during single-leg landing and cutting tasks (Asadi et al., 2026). Crucially, these movement adaptations persist even under induced functional fatigue states, protecting players during the late stages of competitive matches (Asadi et al., 2026).
- **Neuromuscular vs. Strength-Only Training:** Head-to-head comparative evidence highlights that structured multi-component NMT which combines agility drills, balance tasks, and real-time proprioceptive feedback yields superior ACL injury reduction and re-injury mitigation compared to isolated resistance or strength-only strength routines (Bharadwaj et al., 2026).

5.2. Post-Injury Rehabilitation and Secondary Prevention

For professional football players undergoing ACL reconstruction (ACLR), returning to elite competition presents severe secondary risks, including graft re-rupture, contralateral ACL tears, and secondary muscle strains (D'Ambrosi et al., 2026a; Della Villa et al., 2026; Grassi et al., 2025; Mazza et al., 2026).

On-Field Rehabilitation (OFR) and Functional Progression

Traditional time-based rehabilitation frameworks are increasingly replaced by criterion-based, functional progression models:

- **Context-Specific Re-Conditioning:** Integrating late-stage On-Field Rehabilitation (OFR) allows players to re-adapt to high-velocity multi-directional deceleration, unexpected physical contact, and open-loop cognitive decision-making tasks before returning to full squad training (Della Villa et al., 2026).
- **Clinical Outcomes of OFR:** Higher exposure to on-field rehabilitation was associated with a greater likelihood of return to pre-injury competitive level; however, overall OFR compliance was not significantly associated with the risk of a second ACL injury. (Della Villa et al., 2026).

Objective Return-to-Play (RTP) Criteria and Secondary Risk Windows

Premature discharge from rehabilitation remains a primary driver of secondary joint and muscle trauma:

- **Secondary Muscle Vulnerability:** Longitudinal matched-cohort tracking indicates that players returning to competition after ACLR suffer a heightened incidence of secondary hamstring and quadriceps muscle injuries, as well as measurable performance declines during their initial comeback season (Mazza et al., 2026).
- **Time and Function Thresholds:** Longitudinal Transfermarkt-based and single-center cohort studies confirm that returning to competitive match play earlier than 9 to 12 months post-surgery markedly increases the risk of secondary graft failure or contralateral ACL injury (D'Ambrosi et al., 2026a; Grassi et al., 2025). Objective battery testing combining limb symmetry indices (LSI >90%), force plate biomechanical symmetry, neurocognitive testing, and clear psychological readiness markers must govern final clearance (Christoffel et al. 2026).

Concomitant Meniscal/Cartilage Surgeries and Long-Term Registry Data

In top European leagues (such as the German Bundesliga and Italian Serie A), health registry analyses reveal that primary ACL tears frequently co-occur with meniscal or articular cartilage damage (D'Ambrosi et al., 2026c; Huber et al., 2026). Comprehensive meta-analyses demonstrate that while overall return-to-sport rates among professional players undergoing combined ACLR, meniscal repair, or chondral procedures remain high (>80–85%), career longevity and multi-year performance metrics are heavily dictated by the severity of initial

articular damage and strict adherence to long-term load-management protocols (D'Ambrosi et al., 2026c; Grassi et al., 2020; Grassi et al., 2025).

6. Discussion

The primary objective of this narrative review was to synthesize current evidence regarding the multifactorial nature of anterior cruciate ligament (ACL) injuries in professional football, evaluating the interplay between intrinsic vulnerabilities, mechanical injury vectors, and prevention frameworks.

6.1. Synthesis of Findings and Biomechanical Realities

The findings confirm that ACL injuries rarely result from a single isolated factor. Instead, structural failure represents the cumulative effect of dynamic valgus moments, low knee flexion angles (0° – 30°), internal tibial rotation, and uncoordinated ground impact forces occurring within a narrow 30 to 50 ms window (Bisciotti et al., 2019; Baldazzi et al., 2026).

Recent video analysis literature highlights distinct situational triggers across professional cohorts. While non-contact plant-and-cut tasks remain a primary mechanism in men's football (79% non-contact cases in Major League Soccer) (Clarke et al., 2026), female professional players demonstrate a particularly high vulnerability during defensive pressing and tackling actions (53% of match injuries across 25 international leagues) (Achenbach et al., 2024; Hampstead et al., 2026). Furthermore, the integration of neurocognitive screening underlines that decision-making errors such as impaired inhibitory control or attentional lapses under competitive pressure frequently precede mechanical breakdowns (Gokeler et al., 2024).

6.2. Clinical vs. Managerial Implications

From a sports management and organizational perspective, an ACL injury represents not only a clinical trauma but also a substantial financial and competitive burden for elite clubs (Pulici et al., 2022; Mazza et al., 2026). The high incidence of secondary injuries including graft re-ruptures, secondary hamstring/quadriceps muscle tears, and accelerated joint degeneration underscores the inadequacy of traditional time-based return-to-play criteria (Della Villa et al., 2026; Mazza et al., 2026).

Adopting objective functional batteries (Limb Symmetry Index $>90\%$, force-plate dynamic stability, neurocognitive readiness) alongside football-specific On-Field Rehabilitation (OFR)

is critical for protecting player assets (Della Villa et al., 2026; Pecci et al., 2026). Moreover, team-wide implementation of structured Neuromuscular Training (NMT) programs, such as the FIFA 11+, provides a cost-effective strategy to significantly reduce primary injury incidence when enforced consistently by technical staff (Alkishnawi et al., 2026; Magoshi et al., 2026; Silvers-Granelli et al., 2017).

7. Conclusion

Anterior cruciate ligament ruptures in professional football represent a complex challenge requiring a unified approach across sports medicine, biomechanics, and sports management. The main conclusions of this review are:

1. **Multifactorial Mechanics:** Non-contact and indirect-contact ACL tears occur predominantly within 30–50 ms of initial foot contact, driven by a combination of dynamic knee valgus, low flexion angles, internal tibial torque, and neurocognitive decision-making errors.
2. **Prophylactic Efficacy of NMT:** Multi-component neuromuscular training particularly team-wide compliance with protocols like the FIFA 11+ performed at least twice weekly significantly reduces non-contact ACL incidence and restores dynamic joint stability even under functional fatigue.
3. **Objective Criterion-Based Clearance:** Preventing secondary graft failure and secondary muscle trauma requires abandoning rigid time-based recovery timelines in favor of objective functional criteria (LSI >90%, neurocognitive testing, force-plate symmetry) and late-stage On-Field Rehabilitation (OFR).
4. **Organizational Responsibility:** Medical staffs, strength coaches, and club management must mandate season-long NMT integration and workload monitoring during congested match periods to protect player health, sustain squad competitive quality, and preserve club financial assets.

Disclosure

Author Contributions

Conceptualization: Julianna Cholewa, Maria Suchcicka, Bartosz Wójtowicz, Patrycja Okoń, Jagoda Niczyporuk

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Declaration of the use of generative AI and AI-assisted technologies in the writing process

In preparing this work, the author(s) used ChatGPT for language improvement and grammatical correction. After using this tool/service, the author(s) have reviewed and edited the content as needed and accept full responsibility for the substantive content of the publication.

References

Achenbach, L., Bloch, H., Klein, C., Damm, T., Obinger, M., Rudert, M., Krutsch, W., & Szymiski, D. (2024). Four distinct patterns of anterior cruciate ligament injury in women's professional football (soccer): A systematic video analysis of 37 match injuries. *British Journal of Sports Medicine*, 58(13), 709–716. <https://doi.org/10.1136/bjsports-2023-107113>

Alkishnawi, H. M., Alshater, H. M., Alakkas, E. A., Alshehri, N. D., Alsubaya, N. A., Alenezi, N. B. A. J., Alatawi, A. E., Basheer, A. B., Allehaimeed, I. S., Almaghrabi, A. M., & Algarni, M. (2026). Preventive efficiency of neuromuscular training in reducing lower limb injuries among youth soccer athletes: A systematic review and meta-analysis of randomized controlled trials. *Frontiers in Sports and Active Living*, 8, 1853354. <https://doi.org/10.3389/fspor.2026.1853354>

Asadi, F., Sahebozamani, M., & Bahiraei, S. (2026). The effect of an eight-week FIFA 11+ program on the landing error scoring system following functional fatigue in adolescent female soccer players with dynamic knee valgus. *BMC Sports Science, Medicine and Rehabilitation*. <https://doi.org/10.1186/s13102-026-01906-3>

Baldazzi, A., Rum, L., Borzuola, R., Bosio, C., Pillet, H., Margheritini, F., & Bergamini, E. (2026). Association between knee angles at initial contact and post-landing knee ranges of motion in athletes with and without anterior cruciate ligament reconstruction. *Scientific Reports*, 16(1), 8693. <https://doi.org/10.1038/s41598-026-41776-w>

Bharadwaj, A., P. Fraix, M., & K. Agrawal, D. (2026). Evaluating the Benefits of Neuromuscular vs. Strength-Only Training in Athletes for ACL Re-Injury Prevention. *Journal of Orthopaedics and Sports Medicine*, 8(2). <https://doi.org/10.26502/josm.511500267>

Bisciotti, G. N., Chamari, K., Cena, E., Bisciotti, A., Bisciotti, A., Corsini, A., & Volpi, P. (2019). Anterior cruciate ligament injury risk factors in football. *The Journal of Sports Medicine and Physical Fitness*, 59(10). <https://doi.org/10.23736/S0022-4707.19.09563-X>

Christoffel, L., Beaupre, L., Nathanail, S., Labban, W., Sommerfeldt, M., Westover, L., & Thornton, G. M. (2026). Clearance Criteria for Determining Eligibility for Force Plate Testing After Anterior Cruciate Ligament Reconstruction: A Scoping Review. *Medicina*, 62(3), 503. <https://doi.org/10.3390/medicina62030503>

Clarke, C. A., Moore, S. A., Mahatme, R. J., Gangavaram, A., Muthusamy, N., McMillan, P. P., & Grawe, B. M. (2026). Anterior Cruciate Ligament (ACL) Injury Mechanisms in Men's Major League Soccer: A Systematic Video Analysis. *Cureus*. <https://doi.org/10.7759/cureus.110002>

D'Ambrosi, R., Baumert, P., & Fink, C. (2026b). ACL injury in female soccer players: Risk, resilience, and prevention in the modern game. *Science Progress*, 109(2), 00368504261428994. <https://doi.org/10.1177/00368504261428994>

D'Ambrosi, R., Dahmen, J., Carrozzo, A., Sconfienza, L. M., Kittl, C., Herbst, E., & Fink, C. (2026c). Return to sport after ACL reconstruction, meniscus and cartilage surgeries in professional soccer players: A systematic review and meta-analysis. *Knee Surgery & Related Research*, 38(1), 6. <https://doi.org/10.1186/s43019-026-00304-w>

D'Ambrosi, R., Williams, A., Sonnery-Cottet, B., Fink, C., & Baumert, P. (2026a). Return-to-play timing and secondary anterior cruciate ligament injury risk in elite soccer players: A transfermarkt-based longitudinal analysis. *Journal of Experimental Orthopaedics*, 13(2), e70763. <https://doi.org/10.1002/jeo2.70763>

Della Villa, F., Picinini, F., Di Paolo, S., Scavone, A., Caminati, D., Gamberini, J., & Buckthorpe, M. (2026). The impact of on-field rehabilitation on return to play and ACL re-injury risk after ACL reconstruction in football (soccer) players: A study on 401 consecutive cases. *Knee Surgery, Sports Traumatology, Arthroscopy*, 34(6), 2255–2267. <https://doi.org/10.1002/ksa.70392>

Gokeler, A., Tosarelli, F., Buckthorpe, M., & Della Villa, F. (2024). Neurocognitive Errors and Noncontact Anterior Cruciate Ligament Injuries in Professional Male Soccer Players. *Journal of Athletic Training*, 59(3), 262–269. <https://doi.org/10.4085/1062-6050-0209.22>

Grassi, A., Bonanzinga, T., Adravanti, F. M., Lucidi, G. A., Altovino, E., Zaffagnini, S., & Marcacci, M. (2025). Return to Sport and Risk of Second Anterior Cruciate Ligament (ACL) Injury in Elite Male Footballers: 10-Year Experience From a Single Center. *Orthopaedic*

Journal of Sports Medicine, 13(12), 23259671251391362.
<https://doi.org/10.1177/23259671251391362>

Grassi, A., Macchiarola, L., Filippini, M., Lucidi, G. A., Della Villa, F., & Zaffagnini, S. (2020). Epidemiology of Anterior Cruciate Ligament Injury in Italian First Division Soccer Players. *Sports Health: A Multidisciplinary Approach*, 12(3), 279–288.
<https://doi.org/10.1177/1941738119885642>

Hampstead, W., Lovell, R., Whalan, M., Chia, L., Bonney, J., Wakefield, B., Crespin, V., & Pappas, E. (2026). Mechanisms and situational patterns of anterior cruciate ligament injuries in professional women's football (soccer): A systematic video analysis across 25 leagues (2022–2024). *Knee Surgery, Sports Traumatology, Arthroscopy*, 34(9), 3441–3458.
<https://doi.org/10.1002/ksa.70528>

Huber, L., Szymiski, D., Krutsch, W., Weber, J., Huppertz, G., Zeman, F., Koller, M., Pietzonka, M., Klein, C., Nagel, A., & Alt, V. (2026). National health registries in professional German football: Development and first results from the men's and women's 1st and 2nd Bundesliga. *BMJ Open Sport & Exercise Medicine*, 12(2), e003003.
<https://doi.org/10.1136/bmjsem-2025-003003>

John, G., AlNadwi, A., Georges Abi Antoun, T., & Ahmetov, I. I. (2025). Injury Prevention Strategies in Female Football Players: Addressing Sex-Specific Risks. *Sports*, 13(2), 39.
<https://doi.org/10.3390/sports13020039>

Magoshi, H., Hoshiba, T., Tohyama, M., Hirose, N., & Fukubayashi, T. (2026). Effect of the FIFA 11+ on anterior cruciate ligament injury incidence rates in collegiate female football players over three consecutive seasons. *The Journal of Sports Medicine and Physical Fitness*, 66(3). <https://doi.org/10.23736/S0022-4707.25.17071-0>

Martinez-Calderon, J., Infante-Cano, M., Matias-Soto, J., Perez-Cabezas, V., Galan-Mercant, A., & Garcia-Muñoz, C. (2025). The Incidence of Sport-Related Anterior Cruciate Ligament Injuries: An Overview of Systematic Reviews Including 51 Meta-Analyses. *Journal of Functional Morphology and Kinesiology*, 10(2), 174. <https://doi.org/10.3390/jfmk10020174>

Mazza, D., Carrozzo, A., Annibaldi, A., De Carli, F., Santoriello, V., Zeppilli, P., & De Carli, A. (2025). ACL tears in female and male professional soccer players. *The Knee*, 57, 292–297.
<https://doi.org/10.1016/j.knee.2025.08.021>

Mazza, D., De Carli, A., De Carli, F., Gagliardo, S., Suraci, F., Liberati Petrucci, G., Santoriello, V., & Zeppilli, P. (2026). Secondary Muscle Injuries and Performance Decline After Anterior Cruciate Ligament Reconstruction in Professional Soccer: A Retrospective Matched Cohort Study. *The American Journal of Sports Medicine*, 54(7), 1592–1598. <https://doi.org/10.1177/03635465261441252>

Olivares-Jabalera, J., Filter-Ruger, A., Dos'Santos, T., Afonso, J., Della Villa, F., Morente-Sánchez, J., Soto-Hermoso, V. M., & Requena, B. (2021). Exercise-Based Training Strategies to Reduce the Incidence or Mitigate the Risk Factors of Anterior Cruciate Ligament Injury in Adult Football (Soccer) Players: A Systematic Review. *International Journal of Environmental Research and Public Health*, 18(24), 13351. <https://doi.org/10.3390/ijerph182413351>

Ortiz-Sánchez, D., Bravo-Sánchez, A., Ramírez-delaCruz, M., Abián, P., García-Sánchez, C., & Abián-Vicén, J. (2026). Epidemiology of Anterior Cruciate Ligament Injuries in the Top 5 European Football (Soccer) Leagues. *Orthopaedic Journal of Sports Medicine*, 14(1), 23259671251400766. <https://doi.org/10.1177/23259671251400766>

Pecci, J., Van Dyk, N., Myer, G. D., & Sañudo, B. (2026). Return-to-Play Criteria Following Lower Limb Muscle Injuries in Soccer: A Systematic Review with Evidence Synthesis. *Sports Medicine*, 56(6), 1433–1465. <https://doi.org/10.1007/s40279-026-02404-9>

Pulici, L., Certa, D., Zago, M., Volpi, P., & Esposito, F. (2022). Injury Burden in Professional European Football (Soccer): Systematic Review, Meta-Analysis, and Economic Considerations. *Clinical Journal of Sport Medicine*, 33(4), 450–457. <https://doi.org/10.1097/JSM.0000000000001107>

Rekik, R. N., Tabben, M., Eirale, C., Landreau, P., Bouras, R., Wilson, M. G., Gillogly, S., Bahr, R., & Chamari, K. (2018). ACL injury incidence, severity and patterns in professional male soccer players in a Middle Eastern league. *BMJ Open Sport & Exercise Medicine*, 4(1), e000461. <https://doi.org/10.1136/bmjsem-2018-000461>

Silvers-Granelli, H. J., Bizzini, M., Arundale, A., Mandelbaum, B. R., & Snyder-Mackler, L. (2017). Does the FIFA 11+ Injury Prevention Program Reduce the Incidence of ACL Injury in Male Soccer Players? *Clinical Orthopaedics & Related Research*, 475(10), 2447–2455. <https://doi.org/10.1007/s11999-017-5342-5>

Tampere, T., Denolf, S., Lievens, E., Witvrouw, E., Victor, J., & Schuermans, J. (2026). Anterior Cruciate Ligament Injury Is Associated With Fast Twitch Hamstring Muscle Fiber Typology: A case-control study using MR spectroscopy in male football players. *Scandinavian Journal of Medicine & Science in Sports*, 36(3), e70232. <https://doi.org/10.1111/sms.70232>

Watson, S. L., Gohal, C., Owen, M. M., Bajaj, P. M., Plantz, M. A., & Tjong, V. K. (2026). A Systematic Review and Meta-analysis of Anterior Cruciate Ligament Injury Prevention Programs: Training to Stay in the Game. *The American Journal of Sports Medicine*, 54(3), 733–740. <https://doi.org/10.1177/03635465251376670>