

Knee Injuries in Women's Rugby

A PRATICAL SUMMARY

KNEE INJURIES IN WOMEN'S RUGBY

Knee injuries are common, severe and high-burden in women's rugby

but neuromuscular training can cut knee injury risk by ~22% and ACL risk by ~50%.

THE PICTURE IN WOMEN'S RUGBY

#1

Most common injured body site

22.8% of all match injuries
(women's WXV 2023–24)

33%

of forwards' injuries were to the knee

at the 2025 Women's Rugby World Cup

3-4 months

average time out per knee injury

around 102 days lost per injury in elite women's rugby

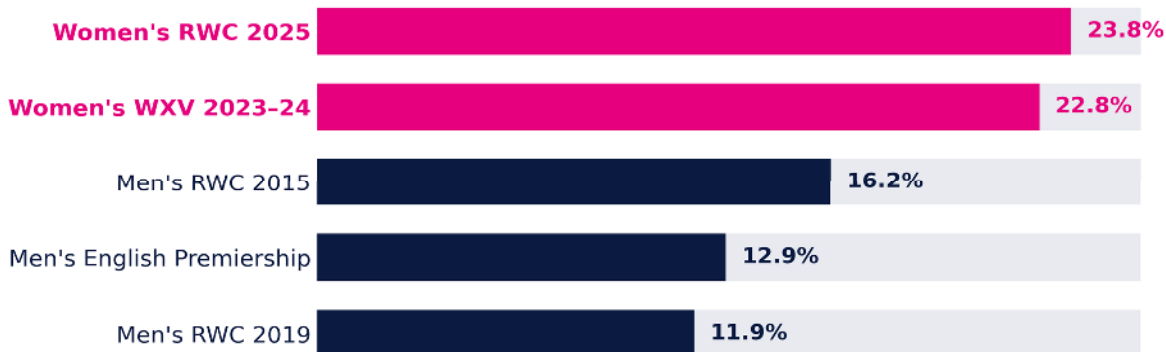
58%

of all time lost came from knee ligament sprains alone

women's WXV 2024

KNEE = A BIGGER SHARE OF INJURIES IN THE WOMEN'S GAME

Knee injuries as % of all match injuries



WHAT YOU CAN DO — NEUROMUSCULAR TRAINING

A short, structured warm-up is the single most evidence-based action you can take to prevent knee injuries

15–20 min

Warm-up duration

ACTIVATE

World Rugby Injury Prevention
Exercise Programme

2–3x / week

Frequency, every week of
season

WHY IT WORKS

- Improves trunk, hip and knee control in cutting, landing and decelerating, when the knee is most vulnerable.
- Stronger hamstrings help resist the forward shin movement that loads the ACL.

WHAT THE EVIDENCE SHOWS

- 22%** fewer overall knee injuries with NMT in female team-sport athletes
- 50%** fewer ACL injuries with NMT in female team-sport athletes
- 40%** fewer lower-limb injuries in adult community men's rugby with Activate

Coaches don't need to wait for more research, they need to act on the evidence we already have

Neuromuscular training should be regarded as a **core part of training**, not an optional extra

Introduction

This report was commissioned by the Women's High Performance Committee in February 2026 in response to growing concern that knee injuries are common and highly burdensome in the women's game. Stakeholders highlighted a need for clear, accessible information on the current state of knee injuries in women's rugby, the practical steps that can be taken to reduce them, and where the priorities lie for future action.

The headline message is straightforward. Across rugby, the lower limb is one of the most commonly injured body regions, and within the lower limb the knee is a major concern, accounting for a large share of injuries in many cohorts (1, 2). In international women's rugby, the knee is now consistently reported as the most commonly injured body site (3). It is also one of the most costly injuries in terms of player availability, often keeping players out of training and matches for several months at a time (3, 4).

Knee injuries also matter beyond the immediate season. Serious knee injuries can lead to ongoing symptoms, reduced function and a greater risk of osteoarthritis later in life. In New Zealand, a five-year review of moderate-to-serious injury claims in women's rugby players showed that knee injuries accounted for the largest share of injury costs, underlining the financial as well as physical burden of these injuries (5).

A core message of this report is that, while more rugby-specific research is welcome and ongoing, much is already known. Neuromuscular training has been studied extensively in women's sport and reduces knee injury risk when implemented consistently. This report presents the current landscape of knee injuries in women's rugby and offers practical guidance on strategies to reduce these injuries.

Incidence of knee injuries in women's rugby

The most recent international data come from the WXV competitions in 2023 and 2024, which reported an overall match injury incidence of 49.5 injuries per 1,000 player match hours. In that cohort, the knee was the single most commonly injured body site, accounting for 22.8% of match injuries (3). Similar patterns have been reported in elite domestic women's rugby and in the community game, where the knee continues to make up a substantial share of the overall injury picture (4, 6, 7).

Compared with the men's game, women appear to sustain a greater proportion of injuries to the knee. At the 2019 Men's Rugby World Cup, knee injuries made up 11.9% of match injuries, and 16.2% at the 2015 Men's Rugby World Cup (3). In the English Premiership, a 2012–2020 meta-analysis of senior men's professional rugby reported that knee injuries accounted for 12.9% of all match injuries (2). The men's community game in England reports knee injuries at a similar share to the men's professional game (6). Taken together, the WXV figure of 22.8% sits noticeably above these men's comparators and points to the knee deserving particular attention in the women's game.

Severity

Knee injuries are among the most severe injuries in rugby when severity is measured by days of time-loss from training and match play. In elite women's rugby, a six-season study reported a mean of 102 days lost per knee injury (4). At the WXV competitions, knee ligament injuries were responsible for the greatest share of total injury time-loss, accounting for around 60% of all time-loss in forwards and more than one-third in backs (3).

This pattern is broadly similar in the men's game, where knee injuries are also high-severity, but published cohorts suggest average time-loss may be lower in men. A twenty-year analysis of the English Premiership reported a mean knee injury severity of 50 days (8).

Burden

Burden combines how often an injury happens with how much time it causes players to be out of regular training and match play. It is a particularly useful measure for coaches because it shows which injuries have the biggest effect on team availability across a season.

Knee injuries have consistently been reported as one of the highest-burden injuries in rugby. In the women's game, published estimates range from 376 to 600 days lost per 1,000 player match hours (6, 7). In the men's professional game, knee injury burden has been reported at around 490 days lost per 1,000 player match hours (8). Reducing even a small number of knee injuries can therefore have a large effect on player welfare and squad availability.

Mechanisms of injury

The collision nature of rugby means that many knee injuries are linked to contact events. Research in men's rugby has identified the tackle, ruck and maul as common situations in which knee injuries occur (8, 9). In women's rugby, there is less published evidence on exact knee injury mechanisms, but the available evidence suggests a mixed picture, with both contact and non-contact actions contributing. This is an important finding as it indicates that while some knee injuries happen from direct contact around the tackle, many occur during cutting, landing, decelerating or trying to stay balanced under pressure. Prevention therefore needs to prepare players for both movement control and contact demands, rather than focusing on only one type of risk (10, 11, 12).

Types of knee injuries

Data from international tournament surveillance highlights knee ligament injuries as the predominant concern in this broader context. Across the 2023 and 2024 WXV competitions, knee ligament sprains were among the most frequently recorded match injuries and carried by far the greatest burden, accounting for roughly 47% of all days lost in 2023 and around 58% in 2024 (3). The knee was consistently one of the most common injury locations, and was the single most common site for forwards (3). At the 2025 Women's Rugby World Cup the knee again accounted for the largest share of match injuries by body site (23.8% overall, rising to 33.3% in forwards), confirming that knee injuries, and ligament sprains in particular, remain the leading driver of time loss in the elite women's game (45).

ACL injuries

The anterior cruciate ligament (ACL) is one of the key stabilising structures of the knee. ACL injuries are serious because they usually involve long rehabilitation, often require surgery, and can affect confidence, performance and long-term knee health.

In many sports, ACL injuries are most often linked to non-contact movements such as cutting, pivoting and landing. In rugby, the picture is mixed. Video-analysis research in professional men's rugby found that 56% of ACL injuries involved direct contact, especially when players were running with the ball or being tackled, suggesting that ball carriers may be at particular risk in rugby settings (12).

ACL injury burden is high. In elite rugby, ACL injury burden has been reported at 115 days lost per 1,000 player hours in women and 112 days lost per 1,000 player hours in men (4, 8). In the community game, where access to surgery and rehabilitation may be slower, this burden can be even higher (13).

MCL injuries

The medial collateral ligament (MCL) helps resist inward collapse of the knee, often described as valgus stress. MCL injuries are usually linked to contact, especially when a force pushes the knee inwards.

MCL injuries are generally more common than ACL injuries but less severe. In elite women's rugby, MCL injuries have been reported as the most common type of knee injury, accounting for 35% of knee injuries (4). When elite and community women's rugby are compared, MCL incidence appears broadly similar, while elite women's rates appear lower than those reported in some men's professional cohorts (4, 8, 13).

Meniscal injuries

The meniscus helps absorb force, spread load across the joint and support knee stability. Meniscal injuries often happen during twisting movements and may occur on their own or alongside ligament injuries.

Although isolated meniscal injuries are often less severe than major ligament injuries, they still matter. They can affect function and contribute to longer-term joint changes including osteoarthritis (8). For that reason, they should not be overlooked when planning prevention and return-to-play support.

Sex-specific risk factors

Women's rugby players may face some risk factors that differ from those seen in men's players. These include differences in lower-limb alignment, trunk and hip control, muscle strength balance, and the way forces are absorbed during landing and change of direction. In practical terms, this can increase knee valgus and reduce the body's ability to control the knee during fast movements (14, 15).

Women are also often reported to have a lower hamstring-to-quadriceps strength ratio than men. Because the hamstrings help resist forward movement of the lower leg, reduced hamstring contribution may place additional strain on the ACL during deceleration, cutting and landing (14, 16).

Across sport more broadly, female athletes are often reported to have a 2- to 8-fold higher risk of ACL injury than men, although this varies considerably by sport and study design (16, 17). Hormonal influences have also been explored, with some studies suggesting that changes in oestrogen and relaxin may affect knee laxity across the menstrual cycle. The evidence remains inconsistent, however, and no single phase of the menstrual cycle can reliably predict injury risk.

These findings should therefore be interpreted with caution, and should not distract from the more clearly modifiable factors of movement quality, strength and fatigue management.(16, 17)

Contextual factors also matter. Fatigue, fixture congestion, playing surface and footwear can all influence injury risk. Fatigue is especially relevant because it can reduce the player's ability to maintain good hip and knee alignment during landing and cutting, delay muscle activation and increase knee loading.

For coaches, this reinforces the value of warm-up quality, load management and good movement habits throughout the season.(3, 14, 15)

On playing surfaces specifically, World Rugby's Regulation 22 sets the performance standard for artificial rugby turf, and a short coach-facing module on the **World Rugby Passport platform** outlines what a Regulation-22-compliant surface means in practice and what to look for at club level (18).

Global prevention strategies

Neuromuscular training

Neuromuscular training (NMT) refers to structured exercise programmes that improve how well players control their body during sport. These programmes typically combine strength, balance, jumping and landing drills, change-of-direction work, and coaching feedback on movement technique. For knee injury prevention, the aim is to improve control of the trunk, hip and knee during the actions that most often place the knee at risk (14, 15).

This matters because many of the movement-related risk factors for knee injury are modifiable. Better trunk and hip control can reduce knee valgus, better landing mechanics can lower force through the knee, and stronger hamstrings can help resist the forward tibial movement that loads the ACL (14, 15). NMT helps players move with more control in the moments when the knee is most vulnerable.

The evidence for NMT in female athletes is strong. An early prospective study in high-school female athletes found that a NMT programme reduced knee injury rates by approximately 72% compared with untrained athletes, with reported incidence dropping from 0.43 to 0.12 per 1,000 athlete-exposures (19). A later intervention study in elite women's handball reported fewer ACL injuries across three seasons, with the largest benefit seen when coaching support helped players complete the programme well (20).

More recent reviews support the same message. A meta-analysis showed that better compliance with NMT was linked to lower ACL injury risk in female athletes, with a clear dose-response relationship between how often programmes were completed and how effective they were (21). A follow-up meta-analysis showed that programmes including strengthening, proximal control work and multiple exercise components were associated with the greatest reductions in ACL injury risk (22).

The strongest recent summary comes from a 2025 systematic review and meta-analysis in women's team-sport athletes by Gu, Zhang and colleagues, which reported a 22% reduction in overall knee injury risk and a 50% reduction in ACL injury risk with neuromuscular training (23). The same review showed that the best results were seen when programmes lasted at least 15 minutes, were completed 2–3 times per week, and were followed with high compliance ($\geq 75\%$). The key point for coaches is straightforward: these programmes work best when they are short, regular and done properly.

FIFA 11+

FIFA 11+ is the best-studied neuromuscular warm-up programme in team sport. It was developed for football, not rugby, but it remains a useful proof of concept. It shows that a short, structured, field-based warm-up can reduce injuries when used consistently (24, 25, 26).

The programme lasts 15–20 minutes and combines running drills, strength exercises, balance work, plyometrics and controlled changes of direction (27). In a large cluster-randomised trial in young women's football players, regular use of FIFA 11+ was associated with reductions in severe and overall injuries across a season, with the strongest benefits in teams with the best compliance. Approximately a one-third reduction in overall injuries and around a 45% reduction in severe injuries among compliant teams (24). A later trial in Canadian youth women's football players showed that high adherence to the programme was linked to substantially lower injury risk than low adherence (28).

Systematic review evidence supports these findings. A meta-analysis of cluster-randomised trials concluded that the FIFA 11 and FIFA 11+ programmes reduced overall injury rates by around 39% (25). Reviews of the wider evidence have shown that the programme works best when coaches deliver it with good technique feedback and use it at least twice per week across the season (26).

For rugby, FIFA 11+ should not be copied directly. It was not designed for contact sport and does not include rugby-specific preparation for collisions, wrestling or contest situations. It does, however, provide strong evidence that neuromuscular warm-up programmes can reduce lower-limb injury risk, which makes it a useful benchmark when explaining why rugby-specific programmes such as **World Rugby's Activate programme** are worth using.

World Rugby Activate

World Rugby's Activate is a rugby-specific injury prevention warm-up built around the same broad principles as other neuromuscular training programmes. It combines movement preparation, balance, whole-body strength, plyometrics, neck strength and controlled rehearsal of rugby-specific actions, and is designed to be used as a 15–20 minute pre-activity warm-up (29, 30, 31).

Activate is one of the very few rugby-specific programmes to have been tested in randomised trials. In schoolboy rugby, teams completing Activate three or more times per week had a 72% lower overall match injury rate, a 72% reduction in contact-related match injuries, and a 59% lower concussion rate per protocol (29). In adult community men's rugby, the programme was associated with a 40% reduction in lower-limb injuries and a 60% reduction in concussion incidence and burden, again with the strongest benefits seen in teams with the best compliance (30).

Real-world follow-up work has shown the same pattern. Teams using Activate had lower match and training injury rates than teams not using it. Approximately 23% lower match injury rates, 59% lower training injury rates, and 26% lower match injury burden, with a 32% lower match injury rate among teams with the highest adherence (32). This is important for coaches: Activate is not only effective in trials, it works in normal rugby settings.

Activate is freely available on **World Rugby Passport** in age-banded versions (**Under-15**, **Under-16**, **Under-18** and **Adult**), each progressing through 6–8 week levels with a separate match-day version, supported by a **Coaches Corner module** that answers common implementation questions and a research summary that links the programme to its evidence base (31).

Activate in the women's game: ongoing research

Until recently, Activate had not been formally evaluated in adult women's players. World Rugby has now invested approximately £69,000 in a multi-centre study, Efficacy of the World Rugby Activate injury prevention programme in the female setting: a multi-centre home nations approach, led by Dr Debbie Palmer at the University of Edinburgh and delivered across England, Scotland and Wales (40). The study has two primary aims: to determine the incidence and nature of match and training injuries in national-level adult women's rugby across the three home nations, and to evaluate the efficacy of Activate in this population, including recommendations for any women-specific adaptations.

The study programme combines a baseline injury surveillance phase with coach workshops, controlled implementation of Activate against a comparison warm-up, focus groups exploring barriers and facilitators to programme uptake, and active engagement of clubs, national governing bodies and World Rugby in dissemination and implementation. The final report is expected imminently, and any indicated updates to Activate will be released alongside it. Coaches and unions can therefore expect a women's-rugby evidence base for Activate, and any women-specific adaptations, to become available in the latter half of 2026.

New Zealand's rugby warm-up for women's players

New Zealand Rugby has produced a women-specific warm-up called **Kia Rite Wāhine Mā: A Rugby Warm-Up for Injury Prevention and Performance** (41). The programme is aimed at female players aged 14 years and older and was developed in response to evidence showing that the knee is the most commonly injured body site in women's rugby players in New Zealand, accounting for 40.3% of moderate-to-serious claims and 46.9% of associated costs between 2013 and 2017 (5).

The warm-up takes 15–20 minutes and includes progressive movement preparation, mobility, squatting and lunging patterns, hopping and landing drills, plant-and-hold and cutting exercises, neck preparation and partner contact work (41). It is designed to prepare players for the actions that commonly challenge knee control in rugby, while feeling specific to the game.

Kia Rite Wāhine Mā does not yet have its own peer-reviewed effectiveness trial. However, it is built on the same neuromuscular training principles that underpin FIFA 11+ and Activate, and it sits within the wider RugbySmart system that has supported large-scale injury prevention education in New Zealand rugby for many years (29, 42, 43). It gives coaches a practical, women-specific option grounded in the wider prevention evidence, even though direct outcome data in women's rugby players are still needed.

Taken together, FIFA 11+, Activate and Kia Rite Wāhine Mā support the same practical message. A short, structured warm-up built around movement quality, balance, strength, landing control and progressive game preparation is likely to reduce lower-limb and knee injury risk when used consistently. For women's rugby players, this approach is especially important because knee injuries make up such a large share of the overall injury burden.

Other Passport resources that support knee injury prevention

Alongside Activate, several other modules on World Rugby Passport are directly relevant to knee injury prevention in women's rugby and are worth signposting to coaches:

- ▶ **Contact Confident**, within the Tackle Ready strand, is the closest thing on Passport to a dedicated module on falling and landing. It covers mobility, rolling, falling and landing, deep neck stabilisation, neck strengthening and head reaction, and explicitly notes that these activities are particularly important in the women's game given documented differences in concussion mechanism and a reported 47% lower neck strength in women's compared with men's rugby players (33).
- ▶ The full **Tackle Ready** programme provides the five-stage tackle framework with key performance indicators for both tackler and ball carrier, and the **Lower Tackle Height Law Trial** module explains the rationale and implementation of the law trial that has been associated with reductions in head contact events in women's community rugby in Scotland (34, 35, 36).
- ▶ **Conditioning for Female Rugby Players**, delivered with Setanta College, is the most directly relevant women-specific resource on Passport. Its four modules cover training the youth female athlete; female athlete health and supportive training environments (including menstrual-cycle and energy-availability considerations); movement skills, warm-ups and screening tools; and introductory resistance training. The **movement-skills** sub-module is particularly relevant to knee injury prevention because it covers landing mechanics, movement screening and warm-up design specifically for women's rugby players, and it complements Activate well (37).
- ▶ **Coaching Women and Girls** addresses physiological specificities and practical coaching approaches in the women's game, with contributions from senior women's coaches (38).

- **Rugby Ready** provides foundational risk-management content including dedicated sub-sections on warm-up, the tackle and equipment, environment and emergency planning that reinforce the same prevention messages at community and school level (39).

For coaches, a practical pathway is therefore: **Activate** as the structured warm-up, **Contact Confident** and **Tackle Ready** for safe contact and landing skills, the **Conditioning for Female Rugby Players movement-skills module** for women-specific screening and movement preparation, and **Coaching Women and Girls** and **Rugby Ready** for the broader coaching and risk-management context.

What else World Rugby is doing for knee injuries

Injury surveillance

World Rugby and its affiliated unions now run several complementary surveillance systems that provide the evidence base for injury prevention work. These include the Women's Rugby World Cup and WXV surveillance programmes (3), national-level systems run by individual unions including the English Women's Professional Rugby Injury Surveillance Project and the Community Rugby Injury Surveillance and Prevention project (6, 7), regional surveillance through World Rugby's research centres, and **projects funded through World Rugby's annual research call**. Together these systems provide a continually updating picture of where injuries are occurring in women's rugby and where prevention efforts should be focused.

Women-specific initiatives

Beyond the ongoing Activate-in-women's-rugby trial described above, World Rugby is supporting a programme of women-specific work that includes a dedicated webinar on knee injuries in women's rugby planned for August 2026. There is continued investment in women-specific research through the annual funding call and World Rugby's wider women's health resources are publicly available through the **Women's Health hub** (44).

Education

World Rugby Passport is the main global platform used to share injury prevention content with coaches, players and practitioners. It hosts the Activate programme in age-banded versions, the Tackle Ready and Contact Confident modules covering safe contact and falling/landing skills, the Conditioning for Female Rugby Players programme delivered with Setanta College, the Coaching Women and Girls module, the Rugby Ready risk-management programme, lower tackle-height education resources, an introduction to artificial turf and Regulation 22, and wider player welfare materials, all freely available online (18, 31, 33, 35–39). Even the best programme is only useful if coaches can access it, understand it and apply it consistently. Free, easy-to-use education platforms make injury prevention more realistic at community and school level, where medical support may be limited.

For coaches reading this report, a single starting page brings most of these resources together: **the Injury Prevention and Risk Management strand** on Passport.

Conclusion

Knee injuries are one of the biggest player welfare challenges in women's rugby. They are common, they lead to long absences from training and matches, and they carry a high burden across international, domestic and community levels of the game (4, 3, 6–8).

Among the available prevention options, neuromuscular training currently has the strongest evidence base. Across women's sport, these programmes reduce overall knee injury risk by approximately 22% and ACL injury risk by approximately 50% when used consistently and with good compliance (16, 17, 19, 21–23). FIFA 11+ provides strong proof that a short, structured warm-up can reduce lower-limb injuries (24, 25), while Activate and Kia Rite Wāhine Mā show how the same principles translate into rugby-specific settings (29–31, 41).

The crucial point is that we already know a great deal. Coaches do not need to wait for more research to take action. The practical recommendation is consistent across the evidence: deliver a structured neuromuscular warm-up of 15–20 minutes, at least 2–3 times per week, every week of the season, with attention to movement quality and player buy-in. In the women's game, where knee injuries make up a particularly large share of the injury problem, this should be regarded as a core part of training rather than an optional extra.

Gaps in the current evidence

- ▶ Knee injury mechanism data specific to women's rugby remain sparse compared with the men's game; targeted video-analysis and biomechanical studies in elite and community women's rugby would help direct prevention.
- ▶ Compliance remains a major challenge. The benefits of prevention programmes are clearly greater when teams complete them regularly and with good quality; further work on coach education and adherence strategies is needed.
- ▶ Wider questions around menstrual-cycle effects, playing surface, fixture congestion, fatigue and equipment still require more rugby-specific research in women's players.
- ▶ Outcome data for Kia Rite Wāhine Mā and other women-specific warm-up adaptations would strengthen the recommendations available to coaches.
- ▶ A dedicated, women-specific module on landing mechanics and knee-injury prevention does not currently exist on World Rugby Passport. The closest analogues are Contact Confident (within Tackle Ready) and the Movement Skills, Warm-ups and Screening Tools sub-module of Conditioning for Female Rugby Players; a more focused women's knee-injury resource may be a useful future addition.
- ▶ Deceleration and braking mechanics are a specific, under-explored research and training priority. The majority of knee-injury burden comes from ligament sprains sustained when players slow, stop, change direction or absorb load, thus dedicated work on controlled deceleration, height drop and hip-hinge mechanics may offer a women-specific complement to existing neuromuscular warm-ups, and structured evaluation of such an approach is warranted.

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