



**The
Irish Rugby Injury Surveillance
Project**

All-Ireland League Rugby
2019 - 2020 Season Report





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Irish Rugby Football Union Foreword

During these uncertain times, we have all been reminded of how quickly the world can change. Covid-19 have had a tremendous impact on our daily lives. Rugby is part of the many activities we have had to put on hold to ensure the safety of our nation first. The Irish Rugby Football Union (IRFU) have made concerted efforts to support the Health Service Executive in their working, promoting the health and safety of everyone during the Covid-19 pandemic. As we prepare for returning to normal training and competition after the Covid-19 restrictions are lifted, understanding the burden of injury and illnesses across the game will help guide us in making informed decisions.

The IRFU continues to examine global best practice to support the performance and health of all rugby players in Ireland. Together with the University of Limerick, we are proud to have embarked on world leading long term research programmes that are relevant to the health and wellbeing of players, allowing them to enjoy the game and perform to their best.

Injury and illness surveillance is at the heart of the Irish Rugby Injury Surveillance (IRIS) project. It is a fundamental component of focused efforts to protect the health of the players. Carefully designed injury surveillance programmes, accurate data capture and careful analysis are building blocks that help us keep players safe, and ensure everyone can play the game to their fullest potential.

Results from the IRIS project have led to the development of a nationwide programme to improve performance and enjoyment when playing the game. The IRFU Engage programme will be available soon, and aims to increase player readiness and robustness.

Thank you to each and every player that is part of this project. With you, we are eager for the safe return to rugby. We know that rugby will continue to be part of how we support our communities and each other.

Dr Rod McLoughlin



Irish Rugby Injury Surveillance Foreword

Comprehensive injury surveillance systems in amateur Rugby Union are needed to enhance player welfare and this innovative project to date has involved the research, design and implementation of an online injury recording platform. Collection has now been completed of a third season's data and this 2019/20 season report documents our collaborative work with the IRFU, and with 25 male and female All-Ireland League Clubs. This year's match exposure was lower than that of the 2018-2019 season due to the COVID-19 pandemic with approximately 120 matches missed due to a shortened competitive season. This season represents 388 matches, over 1,125 players, and support from dedicated data injury recorders, coaches, doctors, physiotherapists, managers and ancillary staff within clubs: thank you. The IRIS project includes the addition of schools surveillance for both senior cup and junior cup (reported separately).

The IRIS project involves research stemming from ongoing injury prevention and sports performance work by University of Limerick academics across a range of sports, as well as our specific expertise in Rugby Union. It has effectively brought together academics with expert practitioner experience from the fields of biomechanics, medicine, mathematics and statistics, physiotherapy, physiology, sport psychology, and strength & conditioning as well as four doctoral researchers. This holistic approach to injury surveillance and prevention is central to the project.

IRIS Principal Investigators

Dr. Tom Comyns, PhD

Dr. Ian Kenny, PhD



1.0 Executive Summary

1.1 Match Injuries

Starting in September 2019, the Irish Rugby Injury Surveillance (IRIS) project collected injury data across 388 matches from 25 men's and women's amateur Rugby clubs. This year's exposure was lower than that of the 2018-2019 season (644 matches) due to the COVID-19 pandemic with approximately 120 matches missed due to a shortened competitive season.

Men's AIL

- There were 20 men's clubs involved in the IRIS project (9 Division One, 11 Division Two clubs).
- There were a total of 929 male players registered in the IRIS project (454 Division One, 475 Division Two players).
- **The overall match time-loss injury incidence rate for males was 49.1/1,000 player hours.**
 - This is marginally higher than the overall match time-loss injury incidence rate for males during the 2018-2019 season (47.2/1,000 player hours), but slightly lower than the 2017-2018 season (49.7/1,000 player hours).
 - The match time-loss injury incidence rate for Division One males was 47.7/1,000 player hours.
 - The match time-loss injury incidence rate for Division Two males was 50.3/1,000 player hours.
- A single male player would have to play approximately 15 matches to sustain one injury.

Women's AIL

- There were 5 women's clubs involved in the IRIS project.
- There were a total of 196 female players registered in the IRIS project.
- **The overall match time-loss injury incidence rate for females was 34.9/1,000 player hours.**
 - This is higher than the overall match time-loss injury incidence rate for females during the 2018-2019 season (27.7/1,000 player hours), but lower than the 2017-2018 season (46.2/1,000 player hours).
- A single female player would have to play approximately 21 matches to sustain one injury.



1.2 Training Injuries

There were a total of 48 training injuries reported in the men's clubs.

- This is lower than the total number of training injuries reported in the 2018-2019 season (121 training injuries).
- There was a total of 19 training injuries in Division One men's clubs.
- There was a total of 29 training injuries in Division Two men's clubs.

There were a total of 7 training injuries reported in the women's clubs.

- This is lower than the total number of training injuries reported in the 2018-2019 season (11 training injuries).

1.3 Injury Occurrence

The most commonly reported match injuries for the men's clubs were concussion (14%), followed by ankle ligament sprains (9%). Concussion injuries resulted in an average of 38 days' absence from Rugby match or training activities, while ankle ligament sprains resulted in an average of 41 days' absence.

The most commonly reported match injuries for the women's clubs were concussion (16%) and ankle ligament sprains (14%). Concussion injuries resulted in an average of 53 days' absence from Rugby match or training activities, while ankle ligament sprains resulted in an average of 45 days' absence.

1.4 Injury Event

The tackle event accounted for the majority of match and training injuries, with 56% of all injuries happening during the tackle. The tackler sustained more injuries with 53% of tackle-related injuries as opposed to the ball carrier (being tackled) (47%). This was in line with the 2018-2019 season, which reported the tackler sustaining 52% of injuries for all events, compared to 48% when being tackled. However, during the 2017-2018 season, the ball carrier incurring 54% of the tackle-related injuries.

1.5 Playing Position

Of all match injuries recorded in the men's clubs, 56% were to the 'forwards' (position no. 1-8), while 44% were to the 'backs' (position no. 9-15). By position, the blindside flankers (no. 6) accounted for the most injuries at 10%, with the openside flankers (no. 7) and loosehead props (no. 1) having the second highest proportion of injuries with 9% each. In comparison, during the 2018-2019 season the hookers (no. 2) had the highest proportion of injuries with 11%, while openside flankers (no. 7) suffered the most (11%) in the 2017-2018 season.

Of all match injuries recorded in the women's clubs, 52% were to the backs (position no. 9-15), while 48% were to the forwards (position no. 1-8). In contrast, during the 2018-2019 season, the forwards experienced more injuries (60%) than the backs (40%). This season, the outhalves (no. 10) and outside centres (no. 13) had the highest proportion of match injuries with 14% each. During the 2018-2019 season the second rows (no. 4) had the highest proportion of match injuries with 16% of all injuries, while inside centres (no. 12) had the highest proportion of match injuries in the 2017-2018 season.

1.6 Injury Burden

The burden of an injury assesses the incidence rate of an injury in relation to the average severity of the injury, measured as $([IR] \times [\text{average number of days' absent}])$.

Concussions carried the highest injury burden (262 days/1,000 player hours) of all match injuries for the men's clubs. Concussions resulted in an average of 38 days' absence from Rugby match or training. For the women's clubs, ACL sprains carried the highest match injury burden (573 days/1,000 player hours) of all match injuries. ACL sprains resulted in an average of 361 days' absence from Rugby match or training activities.

1.7 New & Recurrent Injuries

New injuries had a higher incidence rate (28.6/1,000 player hours) than recurrent injuries (7.2/1,000 player hours) in Women's Rugby. Similarly, in the Men's AIL, new injuries (44.7/1,000 player hours) were greater compared to recurrent injuries (4.6/1,000 player hours).



2.0 Introduction

2.1 The IRIS Project

The Irish Rugby Injury Surveillance (IRIS) project has developed and implemented the first long-term Rugby Union specific injury surveillance system within amateur Rugby Union in Ireland. This system monitors the incidence, type, nature and severity of both match and training injuries occurring across the amateur game in Ireland. By monitoring this information, injury trends may emerge which will aid in the development and implementation of future evidence-based injury prevention strategies in order to minimise injury risk and enhance player welfare.

IRIS Aims:

- To develop and implement an injury surveillance system for amateur Rugby Union in Ireland.
- To monitor the incidence and nature of injuries occurring and identify any possible injury risk factors.
- To enhance the health and welfare of Rugby Union players by using this information to assist the IRFU policy regarding injury prevention strategies.



2.2 Injury Definitions

The IRIS project follows the guidelines from the World Rugby 'Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union'.¹

An injury is defined as "Any physical complaint, which was caused by a transfer of energy that exceeded the body's ability to maintain its structural and/or functional integrity that was sustained by a player during a Rugby match or Rugby training, irrespective of the need for medical attention or time-loss from Rugby activities."

A recurrent injury is one of the same site and same type as the original injury and occurs after the player has made a full return to match play following the original injury.

Injury occurrences which resulted in multiple diagnoses were analysed as one injury event for the purposes of calculating overall incidence and severity. However, when analysing injury location and nature dual injuries were separated as per international best practice. Dual injury diagnoses were analysed independently as one injury event with regards to injury burden calculations.²

Both time-loss and medical attention injuries have been monitored and analysed separately. Medical attention injuries are any injury that resulted in 0-1 days absent from Rugby match or training activities (i.e. slight injuries). Any injury that results in greater than 1 days' absence from match or training activities is classed as a time-loss injury and categorised according to injury severity. Only these injuries were included in injury incidence calculations¹.

Injury severity is calculated as the number of days that elapsed from the date of injury to the date of the player's return to full participation in training and availability for match selection.

Injury severity is classified as;

slight (0-1 days), minimal (2-3 days), mild (4-7 days), moderate (8-28 days) and severe (>28 days).

Match injury data are presented as the number of injuries per 1,000 player hours of match exposure. In order to calculate match injury incidence rates, the following calculation was used:

Team match injury incidence rate (IR):

$$IR = \frac{\text{number of injuries}}{\text{number of matches} \times \text{number of players (15)} \times \text{match duration (1.33)}} \times 1000$$

¹ Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. *Br J Sports Med*, 41, 328-31.

² International Olympic Committee Injury and Illness Epidemiology Consensus Group, Bahr, R., Clarsen, B., Derman, W., Dvorak, J., Emery, C. A., ... & Khan, K. M. (2020). International Olympic Committee Consensus Statement: Methods for Recording and Reporting of Epidemiological Data on Injury and Illness in Sports 2020 (Including the STROBE Extension for Sports Injury and Illness Surveillance (STROBE-SIIS)). *Orthopaedic journal of sports medicine*, 8(2), 2325967120902908.

2.3 Recruitment

At the beginning of the 2019-2020 season, the IRIS team successfully recruited 30 clubs from the men's and women's AIL and women's league. Unfortunately, the 2019-2020 season was cancelled in March 2020 due to the global COVID-19 pandemic and therefore the results of this report are based on the season running from September to March. The men's AIL is split into two divisions; Division One (Men's AIL 1) and Division Two (Men's AIL 2).

The IRIS project had an 83% compliance rate (25/30 teams recruited) for the 2019-2020 season in comparison to 89% in the 2018-2019 season. These clubs are shown in Table 1.

Table 1: The IRIS clubs 2019-2020

	Men's AIL	Women's Rugby
Number of clubs	20 (Division One = 9; Division Two = 11)	5
Number of players	929 (Division One = 454; Division Two = 475)	196

Each club nominated an 'injury recorder', who was trained on use of the IRIS system during the pre-season training of the 2019-2020 season. In the majority of clubs, the physiotherapist or doctor to the Senior 1XV acted as the injury recorder. Each injury recorder was given a secure and confidential login to their own club's home-page on the IRIS system. Each club registered all players involved with the Senior 1XV on the IRIS system. Beginning with the start of the Rugby season in September 2019, the injury recorder documented all injuries occurring to the Senior 1VX male or female team. The injury recorders also reported when a player returned to play so that injury severity data could be calculated.



3.0 Match Injuries

3.1 Overall Time-loss Match Injuries

For the 2019-2020 season, data from 25 clubs across 388 matches were collected.

A total of 363 match time-loss injuries (any injury resulting in more than 1 days' absence from Rugby match or training activities) were recorded. Any injuries resulting in 0-1 days' absence from Rugby match or training activities (slight injuries) were classified as 'medical attention injuries' and were not included in the analysis of time-loss injuries, as per international best practice.³

The overall team match time-loss injury incidence rates:

- Men's teams – 49.1/1,000 player hours.
- Women's teams – 34.9/1,000 player hours.
- This is approximately one time-loss injury every match for the men's teams and one every fourth match for the women's teams.
- A male player would have to play 15 matches in order to suffer one injury.
- A female player would have to play 21 matches in order to suffer one injury.

Table 2 shows the overall team match time-loss injury incidence rate for the Division One men's clubs (Men's AIL 1), the Division Two men's teams (Men's AIL 2) and the women's clubs (Women's Rugby).

Table 2: Match time-loss injuries (excluding 'slight' injuries)

Division	No. Clubs	No. Players	No. Matches	Exposure hours	No. Injuries	IR*
Men's AIL 1	9	454	149	2980	142	47.7
Men's AIL 2	11	475	176	3520	177	50.3
Overall men's	20	929	325	6500	319	49.1
Women's Rugby	5	196	63	1260	44	34.9
Overall women's	5	196	63	1260	44	34.9

*IR – Incidence rate per 1,000 player hours.

- 11% of match time-loss injuries required medical investigation and/or imaging.
- 3% of match time-loss injuries resulted in surgical intervention.
- 6% of match time-loss injuries resulted in a player being sent to the accident and emergency department for management.
- 2% of match time-loss injuries required pitch-side suturing.

³ Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.

Williams, S., Trewartha, G., Kemp, S. & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. Sports Med, 43, 1043-55.

3.2 Match Injury Classification

The injury diagnosis refers to the specific bodily location and nature of the injury.

The most common injury diagnosis for the men's clubs was concussion, followed by ankle sprains, accounting for 14% and 9% of all time-loss match injuries respectively.

Similarly, the most common time-loss match injury diagnoses for the women's clubs were concussion 16% and ankle sprains 14%.

Tables 3 and 4 show the top three most common specific match time-loss injury diagnosis for all the men's and women's clubs for the current season (2019-2020), season two (2018-2019) and season one (2017-2018).

Table 3:⁴ Overall most common injury diagnoses for Men's AIL (IR/1,000 player hours, % of injuries)

Men's AIL		
2019-2020	2018-2019	2017-2018
Concussion 7.1 (14%)	Concussion 5.3 (11%)	Concussion 6.1 (12%)
⁵ Ankle Sprains 4.5 (9%)	ATFL Sprains 4.1 (9%)	ATFL Sprains 5.7 (11%)
Hamstring Strains 2.9 (6%)	Hamstring Strains 3.9 (8%)	Hamstring Strains 4.1 (8%)

Table 4:⁴ Overall most common injury diagnoses for Women's Rugby (IR/1,000 player hours, % of injuries)

Women's Rugby		
2019-2020	2018-2019	2017-2018
Concussion 5.6 (16%)	Concussion 5.3 (19%)	Concussion 5.1 (11%)
Ankle Sprains 4.8 (14%)	ATFL Sprains 3.4 (12%)	ATFL Sprains 5.1 (11%)
Knee Sprains 4.0 (11%)	Knee MCL 2.9 (11%)	Rotator Cuff Strains 3.2 (7%)

⁴ An 'ATFL sprain' (anterior talo-fibular ligament sprain) refers to a tear of the ligament located on the outside of the ankle joint. It is also called an inversion sprain or lateral ligament sprain.

A 'hamstring strain', refers to a tear of the muscle group located on the back (posterior aspect) of the thigh.

A 'knee MCL sprain' (medial collateral ligament) refers to a tear of the ligament on the inner part (medial aspect) of the knee joint.

A 'rotator cuff strain', refers to a tear of any of the four tendons that surround the shoulder joint.

Ankle sprains are inclusive of injuries to the lateral and medial ligament complexes and also high ankle sprains (syndesmosis injuries).

Knee sprains are inclusive of injuries to any ligaments of the knee joint (anterior cruciate ligament or ACL, posterior cruciate ligament or PCL, medial collateral ligament or MCL, and lateral collateral ligament or LCL).

Table 5 shows the top three most common specific match time-loss injury diagnosis for each of the men's divisions (Division One and Division Two) during the 2019-2020 season.

Table 5:⁵ Most common injury diagnoses for each men's Division One and Division Two (IR/1,000 player hours, % of injuries)

Men's AIL 1	Men's AIL 2
Concussion 7.7 (16%)	Concussion 6.5 (13%)
Ankle Sprains 5.4 (11%)	Ankle Sprains 3.7 (7%)
Hamstring Strains 2.7 (6%)	Hamstring Strains 2.8 (6%)



The head was the most commonly injured bodily location in the men's clubs, accounting for 16% of all injuries, in comparison to the shoulder sustaining the most injuries in 2018-2019 at 14%.

⁵ A 'hamstring strain', refers to a tear of the muscle group located on the back (posterior aspect) of the thigh. Ankle sprains are inclusive of injuries to the lateral and medial ligament complexes and also high ankle sprains (syndesmosis injuries).

For the women's clubs, the head and knee were the most commonly injured bodily locations, accounting for 21% and 18% of all injuries respectively. This is a reversal from last season where the knee suffered the most at 23%, and the head second most at 21% of all injuries.

Tables 6 and 7 show the most common diagnoses for each commonly injured bodily locations.

Table 6:⁶ Men's AIL: Most common injury diagnoses with regards bodily location (IR/1,000 player hours, % of injuries)

Location	Diagnosis
Head 7.7 (16%)	Concussions 7.1 Lacerations 0.3 Fractures 0.2
Knee 5.5 (11%)	MCL sprains 1.7 Meniscal tears 0.9 ACL tears 0.8
Shoulder 5.4 (11%)	ACJ sprains 1.2 Rotator Cuff strains 1.1 GHJ dislocations 1.1

Table 7: Women's Rugby: Most common injury diagnoses with regards bodily location (IR/1,000 player hours, % of injuries)

Location	Diagnosis
Head 7.1 (21%)	Concussions 5.6 Lacerations 0.8 Contusions 0.8
Knee 6.3 (18%)	ACL tears 1.6 Meniscal tears 0.8 MCL sprains 0.8
Ankle 4.8 (14%)	ATFL sprains 4.0 Syndesmosis sprains 0.8

⁶ An 'ACJ sprain' (acromio-clavicular joint sprain) refers to a tear of the ligaments that connect the collar bone (clavicle) to the shoulder (glenohumeral joint).

A 'rotator cuff strain', refers to a tear of any of the four tendons that surround the shoulder joint.

A 'GHJ dislocation' (glenohumeral joint dislocation) refers to the separation of the upper arm bone (humerus) from the shoulder socket (glenoid fossa).

An 'MCL sprain' (medial collateral ligament sprain) refers to a tear of the ligament on the inner part (medial aspect) of the knee joint.

A 'Meniscal tear' refers to a tear of the meniscus (cartilage) inside the knee joint.

A 'contusion/haematoma' refers to a bruise located anywhere on the body.

An 'ACL tear' (anterior cruciate ligament) refers to a tear of the ligament inside the knee joint.

A 'laceration' refers to a cut located anywhere on the body.

An 'ATFL sprain' (anterior talo-fibular ligament sprain) refers to a tear of the ligament located on the outside of the ankle joint. It is also called an inversion sprain or lateral ligament sprain.

A 'syndesmosis sprain' refers to a tear of the ligament located between the distal tibia and fibula. It is also called a high ankle sprain.

3.3 Timing of Match Injury

The majority of injuries occurred in the 2nd half amongst both the men's (66%) and women's teams (61%).

A small proportion of injuries occurred during match play where the exact timing of injury was unknown (0.6/1,000 player hours in the Men's AIL and 1.6/1,000 player hours in the Women's Rugby).

The men's clubs saw a rise from the 1st quarter to the 4th quarter this season and last year (2018-2019). In 2017-2018 however, the men's clubs saw a decline from the 3rd quarter to 4th quarter. Figure 1(a) shows the timing of match injury for the men's clubs comparing this season (2019-2020), season two (2018-2019) and season one (2017-2018).

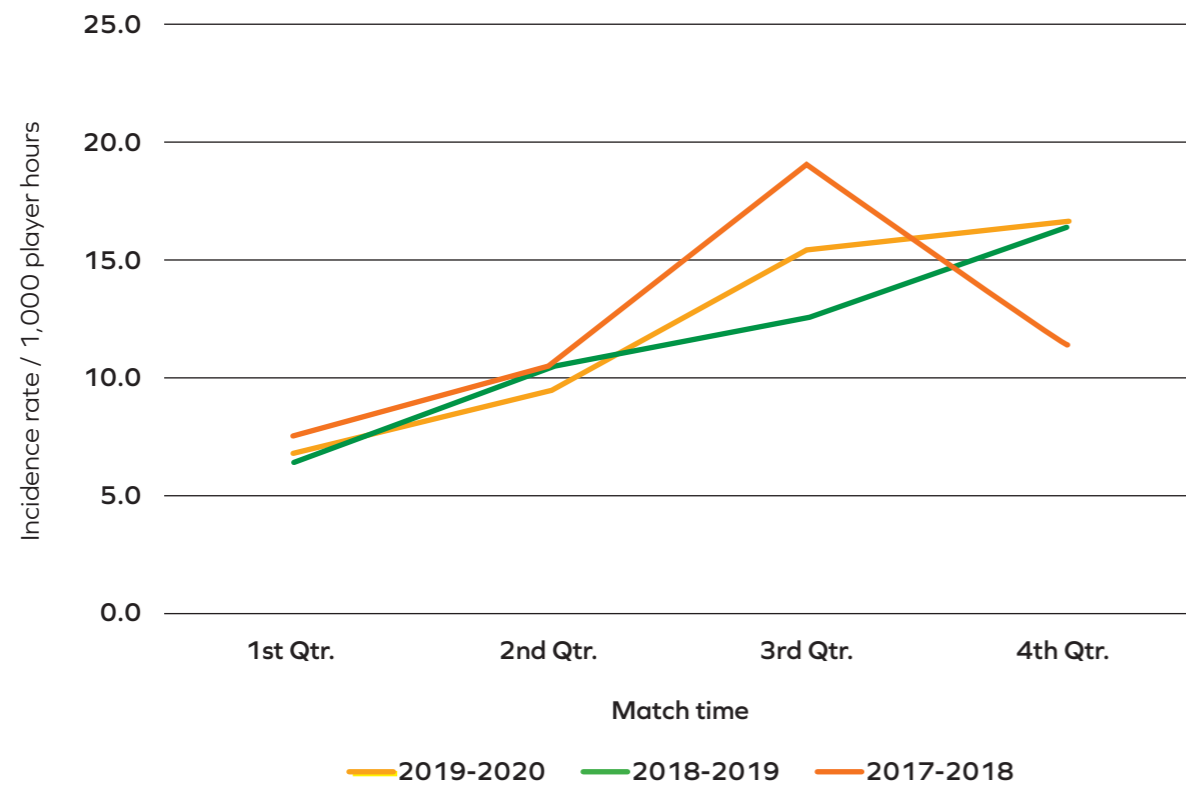


Figure 1(a): Timing of injury during match play for Men's AIL (IR/1,000 player hours)

During the 2019-2020 season, the women's clubs saw a spike in the 3rd quarter, whereas during the first two seasons, the women's injury incidence plateaued after the 2nd quarter, with a slight increase towards the 4th quarter observed in season two (2018-2019). Figure 1(b) shows the timing of match injury for the women's clubs comparing this season (2019-2020), to season two (2018-2019) and season one (2017-2018).

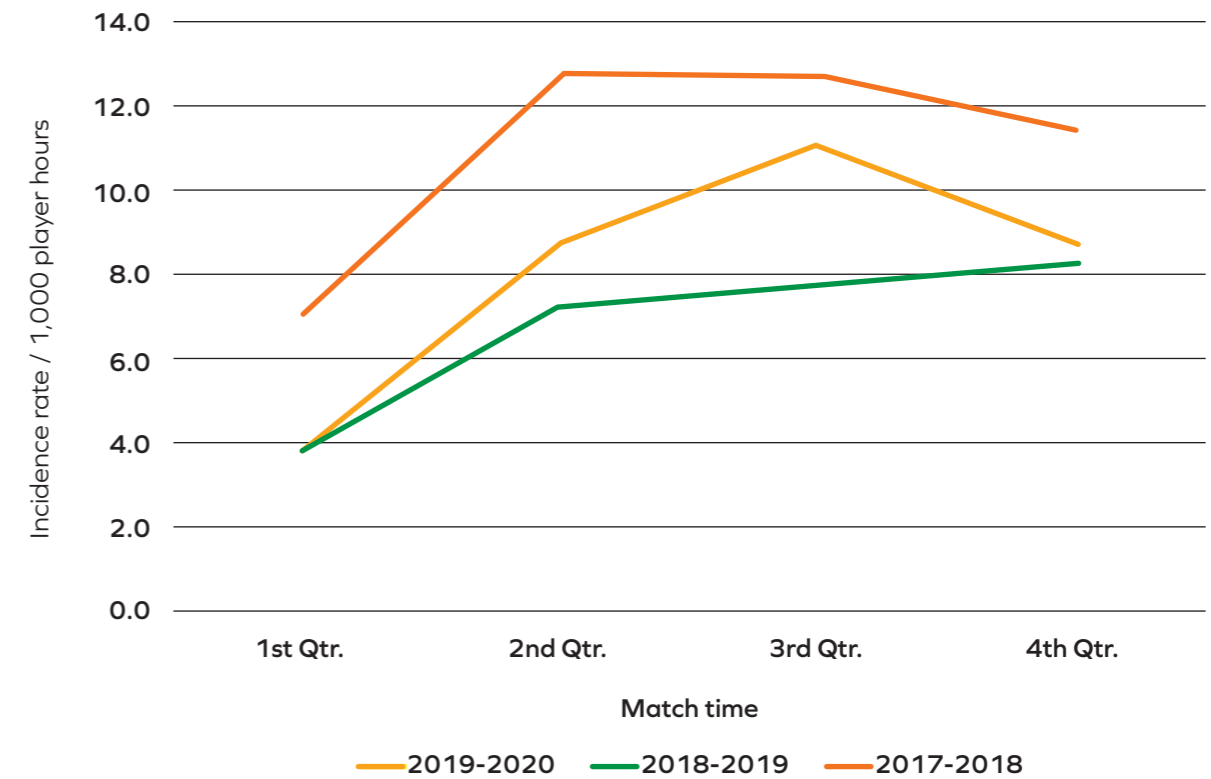


Figure 1(b): Timing of injury during match play for Women's Rugby (IR/1,000 player hours)

3.4 Match Injury Event

Figure 2 shows the event surrounding the occurrence of an injury.

The tackle event has accounted for the majority of injuries across both the men's and women's clubs for three years in a row. For the women's clubs, the 2017-2018 season, 2018-2019 season, and current season reported a higher rate of injuries when being tackled than when tackling. In line with the 2018-2019 Season Two Report, the men's clubs this season reported a higher rate of injuries to the tackler compared to the ball carrier. However, in 2017-2018, the men's clubs reported a higher rate of injuries when being tackled.

The men's clubs again this season had a higher incidence of non-contact injuries (i.e. running in open play) than women's clubs, similar to the 2017-2018 Season One and 2018-2019 Season Two Reports'.

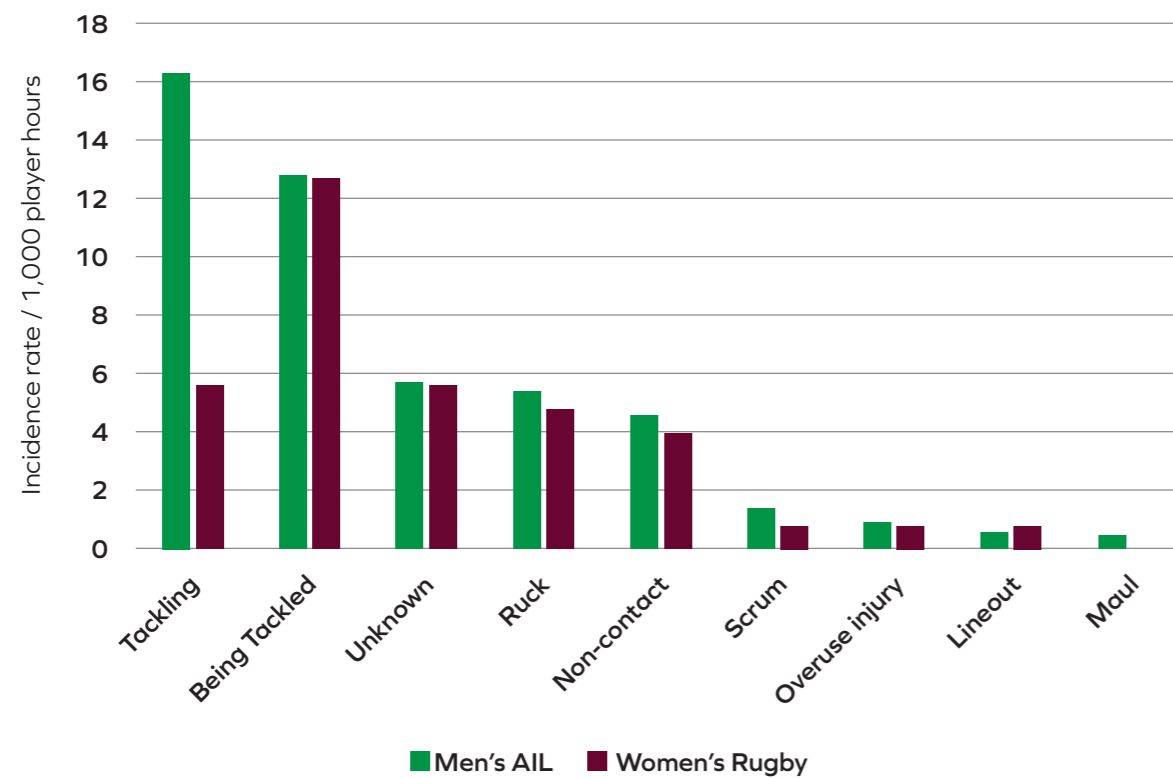


Figure 2: Injury event (IR/1,000 player hours)

3.5 Nature of Match Injury

The nature of injury refers to the type of injury occurring.

Strains (referring to muscle or tendon tears) were the most common injury type for the men's clubs, followed by sprains (referring to ligament tears). This prevalence is similar to the 2018-2019 Season Two Report, where sprains were reported as the most common injury type for the women's clubs, while strains represented the most frequent type of injury in the men's clubs (Figure 3).

The column labelled 'Other' refers to bursal injuries (men's 0.2/1,000 player hours), labral injuries (men's 0.2/1,000 player hours), spinal joint/disc injuries (men's 0.5/1,000 player hours) bone stress injuries (men's 0.2/1,000 player hours) player hours) and perforated ear drum (men's 0.2/1,000 player hours). There were no match time-loss injuries labelled 'Other' for any women's clubs.

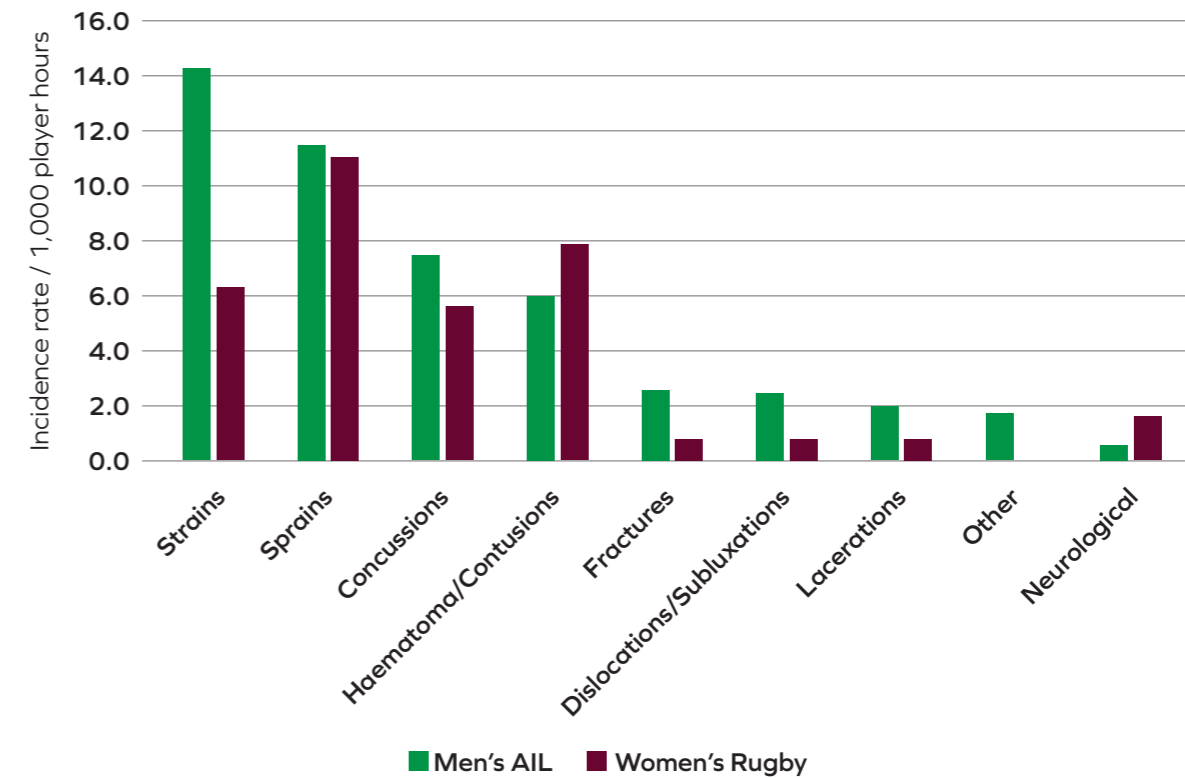


Figure 3: Nature of Injury (IR/1,000 player hours)

3.6 Body Location of Match Injury

In contrast to the 2017-2018 and 2018-2019 seasons' where the shoulder was the most commonly injured area in the men's clubs, this year the head was reported as the most frequently injured location. The knee and shoulder were the second and third most frequently injured bodily locations. Ankle injuries were the fourth most common location for an injury in 2018-2019 and again this year, while in the first season they were the second highest injury location.

Figure 4(a) shows the incidences of injury according to bodily location for the Men's AIL.

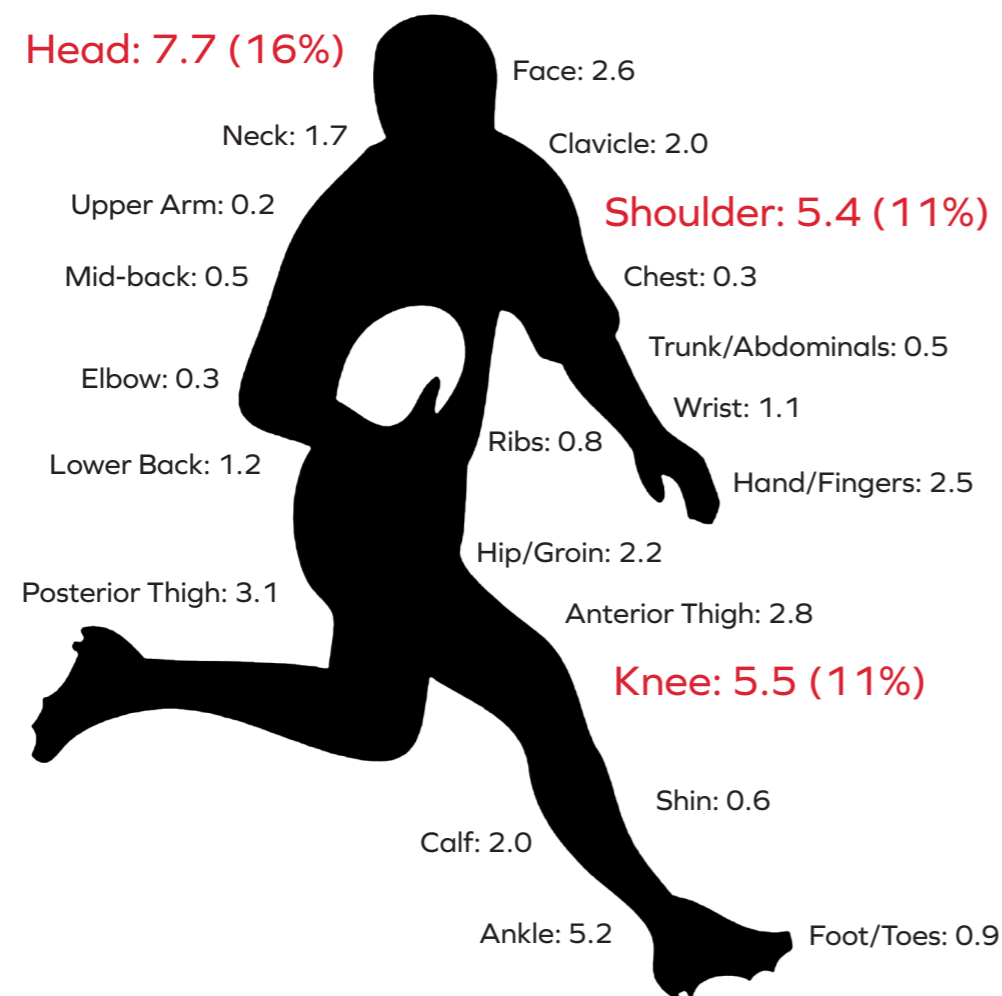


Figure 4(a): Location of injury for the Men's AIL (IR/1,000 player hours)

The head was the most common location of injury for the women's clubs in the current season (2019-2020), followed by the knee. In comparison with Season Two (2018-2019), the knee was more commonly injured, followed by the head. In the 2017-2018 season, the knee was the fifth most common location of injury. The ankle joint was the third most common body location of injury this season (2019-2020), similar to last season (2018-2019).

Figure 4(b) shows the incidences of injury according to bodily location for the Women's Rugby.

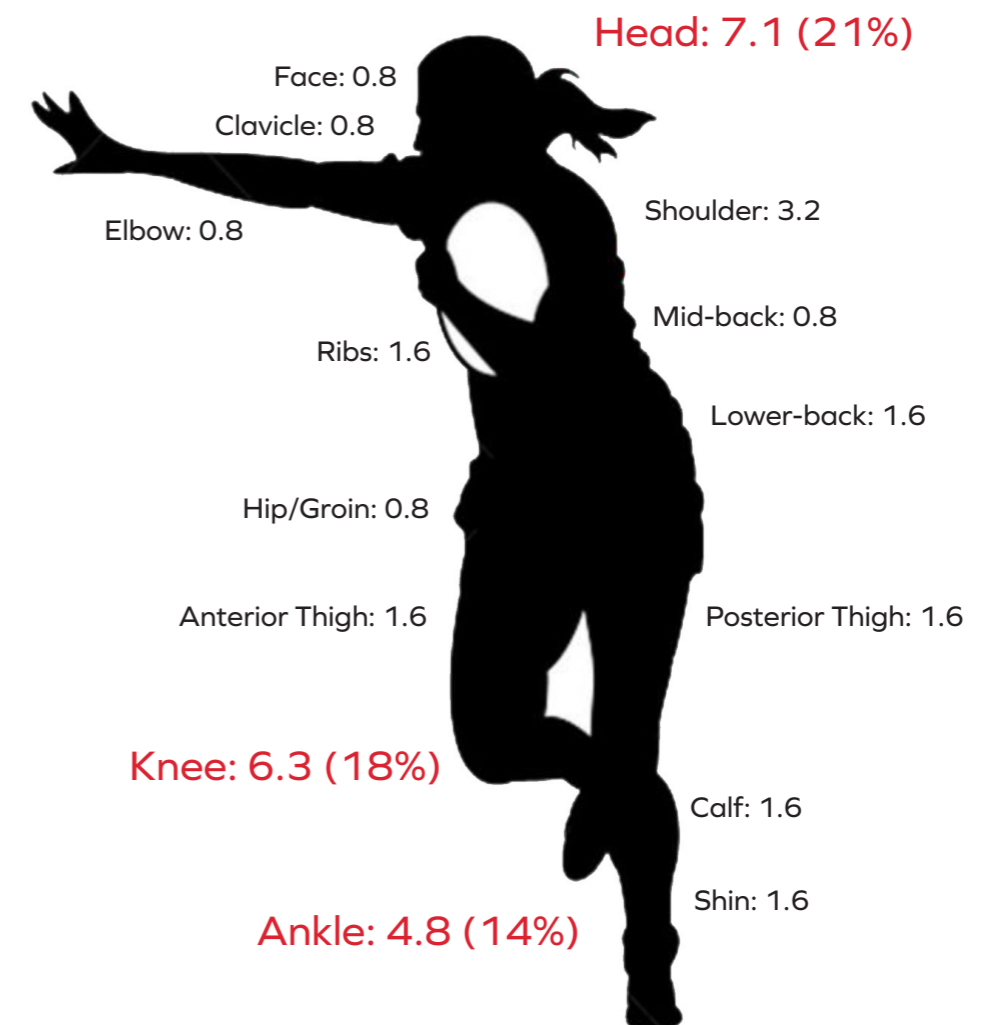


Figure 4(b): Location of injury for Women's Rugby (IR/1,000 player hours)

3.7 Playing Position of Match Injury

Rugby player positions are split into 'forwards' (position no. 1-8) and 'backs' (position no. 9-15).

The blindside flanker (no. 6) position received the most reported injuries, accounting for 10% of all match time-loss injuries for the men's clubs. The openside flankers (no. 7) and loosehead props (no. 1) accounted for the second most injuries (9% each) as seen in Figure 5(a). In 2018-2019, hookers (no. 2) suffered the most injuries (11%) whereas in the 2017-2018 season the openside flankers were the most commonly injured position (11%).

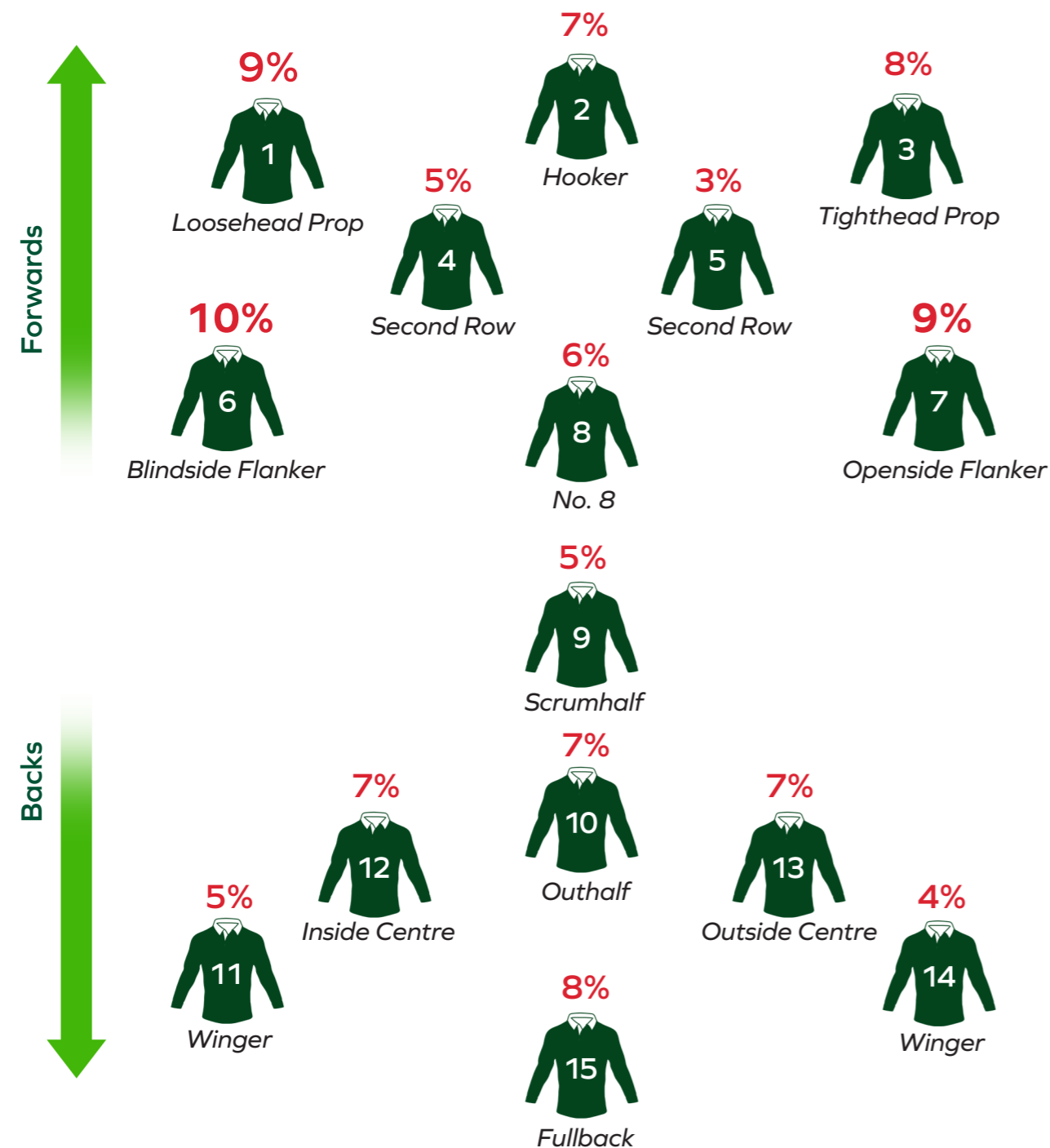


Figure 5(a): Percentage of injuries occurring per playing position in the Men's ALL

In the women's clubs, both the outhalf (no. 10) and outside centre (no. 13) sustained the most injuries, each with 14% of all injuries. In the 2018-2019 Season Two Report, the second row (no. 4) suffered the most injuries in the women's clubs with 16% of all injuries, followed by the inside centre (no. 12) and tighthead prop (no. 3), both with 11% of all injuries. The inside centre (no. 12) suffered the most injuries (18%) in the first season (2017-2018).

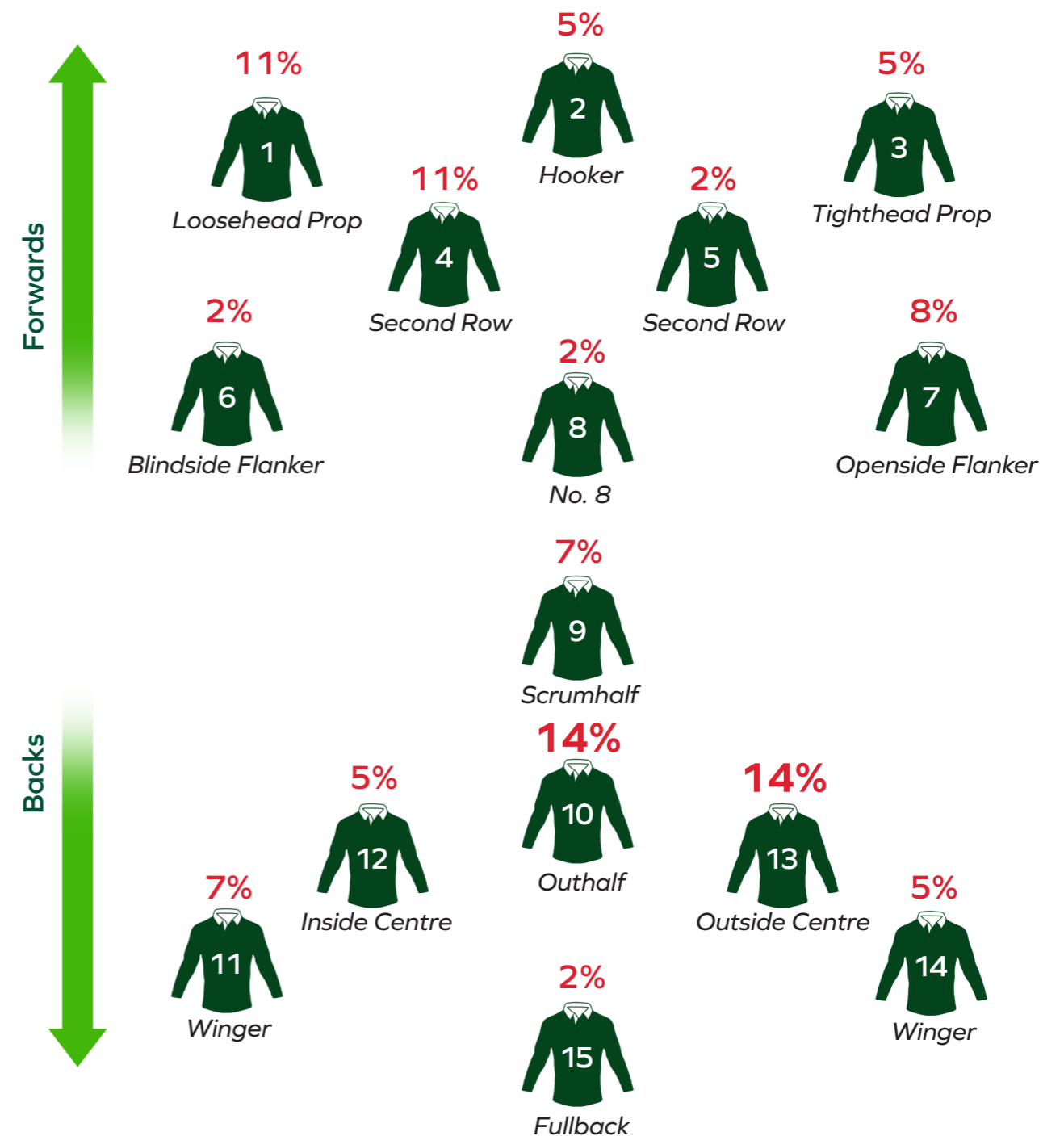


Figure 5(b): Percentage of injuries occurring per playing position in Women's Rugby

3.8 Match Injury Severity

Injury severity was calculated as total number of days absent from Rugby match or training and classified according to the World Rugby Consensus guidelines. Most injuries had 'moderate' time-loss, as shown in Figure 6.

Slight injuries (0-1 days absence) were considered as 'medical attention' injuries and were not included in analysis of time-loss injuries.⁷ Slight injuries are discussed in more detail in sub-section 3.10.

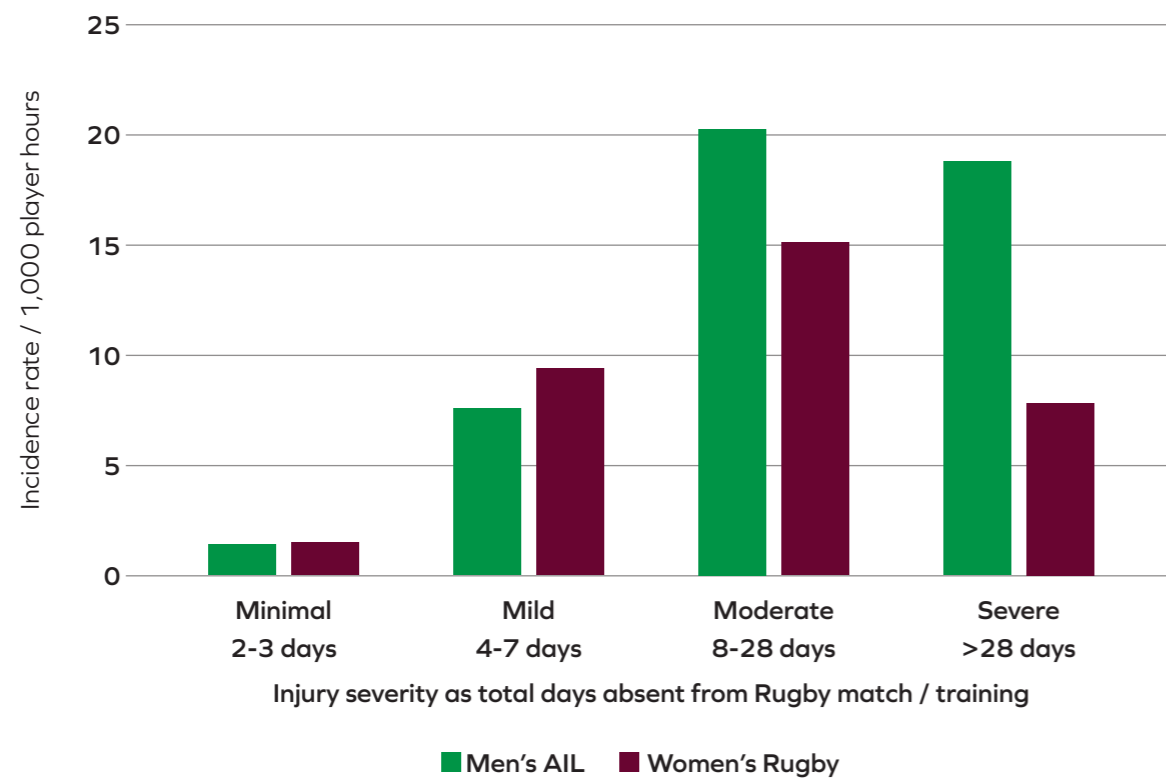


Figure 6: Injury severity of time-loss injuries (IR/1,000 player hours)

⁷ Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
Williams, S., Trewartha, G., Kemp, S. & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. Sports Med, 43, 1043-55.

3.9 Match Injury Burden⁸

The burden of an injury assesses the incidence rate of an injury in relation to the average severity of the injury ([IR] x [average number of days' absence]).

Concussions carried the highest injury burden (262 days/1,000 player hours) of all match injuries for the men's clubs. Concussions resulted in an average of 38 days' absence from Rugby match or training. In 2018-2019 however, ankle sprains carried the highest burden (193 days/1,000 player hours) with an average of 47 days' absence.

For the women's clubs, ACL sprains carried the highest match injury burden (573 days/1,000 player hours) of all match injuries. ACL sprains resulted in an average of 361 days' absence from Rugby match or training activities. In 2018-2019, ACL tears carried the highest injury burden (368 days/1,000 player hours) with an average of 245 days' absence.

Table 8 shows the highest injury burden and average total days off for all men's and women's clubs.

Table 8:⁹ Diagnosis, Injury Burden (days absence/1,000 player hours), Average Total Days Off

	Diagnosis	Injury Burden	Average Total Days Off
Men's AIL	Concussion	262	38
	GHJ dislocations	206	187
	Ankle sprains	176	41
Women's Rugby	ACL sprains	573	361
	Concussions	298	53
	Ankle sprains	215	45

⁸ Fuller, C. W. (2007). Managing the risk of injury in sport. Clinical Journal of Sport Medicine, 17(3), 182-187.

⁹ Ankle sprains are inclusive of injuries to the lateral and medial ligament complexes and also high ankle sprains (syndesmosis injuries). An 'ACL rupture' (anterior cruciate ligament) refers to the complete tear of the main stabilising ligaments of the knee joint. A 'GHJ dislocation' (glenohumeral joint dislocation) refers to the separation of the upper arm bone (humerus) from the shoulder socket (glenoid fossa).

3.10 Medical Attention Match Injuries (slight injuries)

Any injuries resulting in 0-1 days' absence from Rugby match or training are considered as slight or 'medical attention' injuries, therefore were excluded from the analysis of time-loss injuries as per international best practice.¹⁰

During the 2019-2020 season, 10 medical attention injuries were recorded in the men's clubs, with an additional 10 recorded for the women's clubs.

The overall team match medical attention injury incidence rates:

- Men's AIL clubs – 1.5/1,000 player hours
- Women's Rugby clubs – 7.9/1,000 player hours

Table 9: Match medical attention injuries (slight injuries) per division

Division	No. Clubs	No. Players	No. Matches	Exposure hours	No. Injuries	IR*
Men's AIL 1	9	454	149	2980	3	1.0
Men's AIL 2	11	475	176	3520	7	2.0
Overall men's	20	929	325	6500	10	1.5
Women's Rugby	5	196	63	1260	10	7.9
Overall women's	5	196	63	1260	10	7.9

*Incidence rate per 1,000 player hours

- Contusions held the highest incidence rate (0.5/1,000 player hours) for all types of medical attention injuries for the men's clubs.
- Sprains held the highest incidence rate (3.2/1,000 player hours) for the women's clubs medical attention injuries, of which 75% were to the ankle joint.
- The face was the most common location of injury for all men's and women's clubs, with an incidence rate of 0.8/1,000 player hours. 50% of these facial injuries were lacerations, with the other half contusions.
- The tackle event accounted for the majority of medical attention injuries (1.5/1,000 player hours) for all men's and women's clubs, with being tackled (1.0/1,000 player hours) resulting in more injuries than tackling (0.5/1,000 player hours).

¹⁰ Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
Williams, S., Trewartha, G., Kemp, S. & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. Sports Med, 43, 1043-55.

3.11 Other Match-day Related Injuries

A very small proportion of injuries occurred during the match warm-up and these were not included in the analysis of the time-loss match injury incidence, as only injuries occurring during the match play counted as match injuries.

- In the Men's AIL, 1 warm-up injury (hamstring strain) was reported.
- In the Women's clubs, 1 warm-up injury (patellar subluxation) also occurred.
- In the 2018-2019 Season Two report, there were 13 warm-up injuries reported, all from men's clubs. The posterior thigh (38%) was the most common location of warmup injuries, followed by the ankle (31%) in season two.

New injuries had a higher incidence rate (28.6/1,000 player hours) than recurrent injuries (7.2/1,000 player hours) in Women's Rugby. Similarly, in the Men's AIL, new injuries (44.7/1,000 player hours) were greater compared to recurrent injuries (4.6/1,000 player hours).



4.0 Training Injuries

4.1 Overall Time-loss Training Injuries

For the 2019-2020 season, training injury data from 25 clubs (20 men's and 5 women's) were also collected. For operational reasons, as the frequency and duration of training sessions were not recorded for this season, training injury incidence rates are not available. Therefore, the total number of training injuries that occurred are reported.

Any injuries resulting in 0-1 days absent from Rugby match or training activities were considered to be medical attention injuries and are not included in the analysis of time-loss injuries, as per international best practice.¹¹

The overall number of training injuries for the Men's AIL clubs was 48, while the overall number of training injuries for the Women's clubs was 7.

Table 10 shows the overall number of training injuries for the Division One men's teams (Men's AIL 1), the Division Two men's teams (Men's AIL 2) and the women's teams (Women's Rugby).

Table 10: Training time-loss injuries (excluding slight injuries)

Division	No. Clubs	No. Players	No. Injuries
Men's AIL 1	9	454	19
Men's AIL 2	11	475	29
Overall men's	20	929	48
Women's Rugby	5	196	7
Overall women's	5	196	7

¹¹ Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. Br J Sports Med, 41, 328-31.
Williams, S., Trewartha, G., Kemp, S. & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. Sports Med, 43, 1043-55.

4.2 Training Injury Classification

The injury diagnosis refers to the specific bodily location and nature of the injury.

The most common injury diagnosis for the men's clubs was hamstring strains, accounting for 23% of all training time-loss injuries. This was followed by ankle sprains, accounting for 13% and concussions 4% of training injuries.

There were two finger fractures which accounted for the most diagnosed training time-loss injuries for the women's clubs. There were no concussions reported from training in the women's clubs.

In the 2018-2019 Season Two Report there were six shoulder dislocations (glenohumeral joint dislocations) reported from training in the men's clubs compared to two this year.

Table's 11 and 12 show the top three most common specific training time-loss injury diagnosis for both the men's and women's clubs over the past three seasons.

Table 11:¹² Overall most common injury diagnoses for Men's AIL (% of injuries)

Men's AIL		
2019-2020	2018-2019	2017-2018
Hamstring strains (23%)	Hamstring strains (13%)	Hamstring strains (12%)
Ankle sprains (13%)	ATFL sprains (12%)	ATFL sprains (11%)
Calf strains (6%)	Calf / Achilles strains (10%)	Groin strains (11%)
Knee tendon strains (6%)	-	-
Quadriceps contusions (6%)	-	-

¹² A 'hamstring strain', refers to a tear of the muscle group located on the back (posterior aspect) of the thigh.
An 'ATFL sprain' (anterior talo-fibular ligament sprain) refers to a tear of the ligament located on the outside of the ankle joint. It is also called an inversion sprain or lateral ligament sprain.
A 'calf/achilles strain', refers to a tear of one or more of the muscle groups located on the back of the lower leg.
A 'groin strain' refers to a tear of one or more of the adductor muscle groups located on the inner thigh.
Ankle sprains are inclusive of injuries to the lateral and medial ligament complexes and also high ankle sprains (syndesmosis injuries).

Table 12: Overall most common injury diagnoses for Women's Rugby (% of injuries)

Women's Rugby		
2019-2020	2018-2019	2017-2018
Finger fractures (29%)	Hamstring strains (18%)	ATFL sprains (19%)
Sternoclavicular joint sprains (14%)	Concussions (18%)	Hamstring strains (13%)
Neck Strains (14%)	-	Lumbar spine strains (13%)
Wrist Sprains (14%)	-	-
Lumbar (disc) (14%)	-	-
Finger (neural) (14%)	-	-

Table 13 shows the top three most common specific training time-loss injury diagnoses for each of the men's divisions (Division 1 and Division 2).

Table 13:¹³ Most common injury diagnoses for each men's Division One and Division Two (% of injuries)

Men's AIL 1	Men's AIL 2
Hamstring strains (21%)	Hamstring Strains (24%)
Ankle sprains (21%)	Ankle sprains (7%)
Calf strains (11%)	Shoulder dislocations (7%)
-	Knee tendon strains (7%)
-	Quadriceps contusions (7%)
-	Groin strains (7%)

¹³ A 'hamstring strain', refers to a tear of the muscle group located on the back (posterior aspect) of the thigh.
 An 'ATFL sprain' (anterior talo-fibular ligament sprain) refers to a tear of the ligament located on the outside of the ankle joint. It is also called an inversion sprain or lateral ligament sprain.
 A 'calf/achilles strain', refers to a tear of one or more of the muscle groups located on the back of the lower leg.
 A 'quadriceps contusion' is deep bruise in the muscle group at the front of your thigh, usually caused by a direct blow.
 A 'knee tendon strain' is a tear or overstretch to one of the two tendons in the knee joint (patellofemoral or quadriceps tendon).
 A 'sternoclavicular joint sprain' is a tear of the ligament that connects the breastbone (sternum) to the collar bone (clavicle).
 A 'neck strain' is a tear or overstretch to one of the muscles or tendons in the neck region.
 A 'wrist sprain' refers to a tear of one or more of the ligaments in the wrist joint usually caused by a fall onto an outstretched arm.
 A 'groin strain' is a tear to one or more of the muscles or tendons in the muscle group located at the inner thigh (adductors).
 A 'lumbar disc injury' refers to damage to the soft jelly like structures (discs) that are located between each of bones in the lower (lumbar region) part of your spine. The most common type of injury to the lumbar discs are tearing or bulging.
 A 'finger sprain' refers to a tear or overstretch of the ligaments that connect the bones of the finger joints.



4.3 Body Location of Training Injuries

Overall, the posterior thigh (23%) and ankle (15%) were the most common injury sites in the men's clubs, followed by the knee (13%) and shoulder (13%). During the 2018-2019 season, the shoulder and ankle were the most common injury sites each with 15% respectively, while the posterior thigh (14%) was the most commonly injured body location for training injuries in the 2017-2018 season.

Figure 7(a) shows the incidences of injury according to bodily location for the Men's AIL.

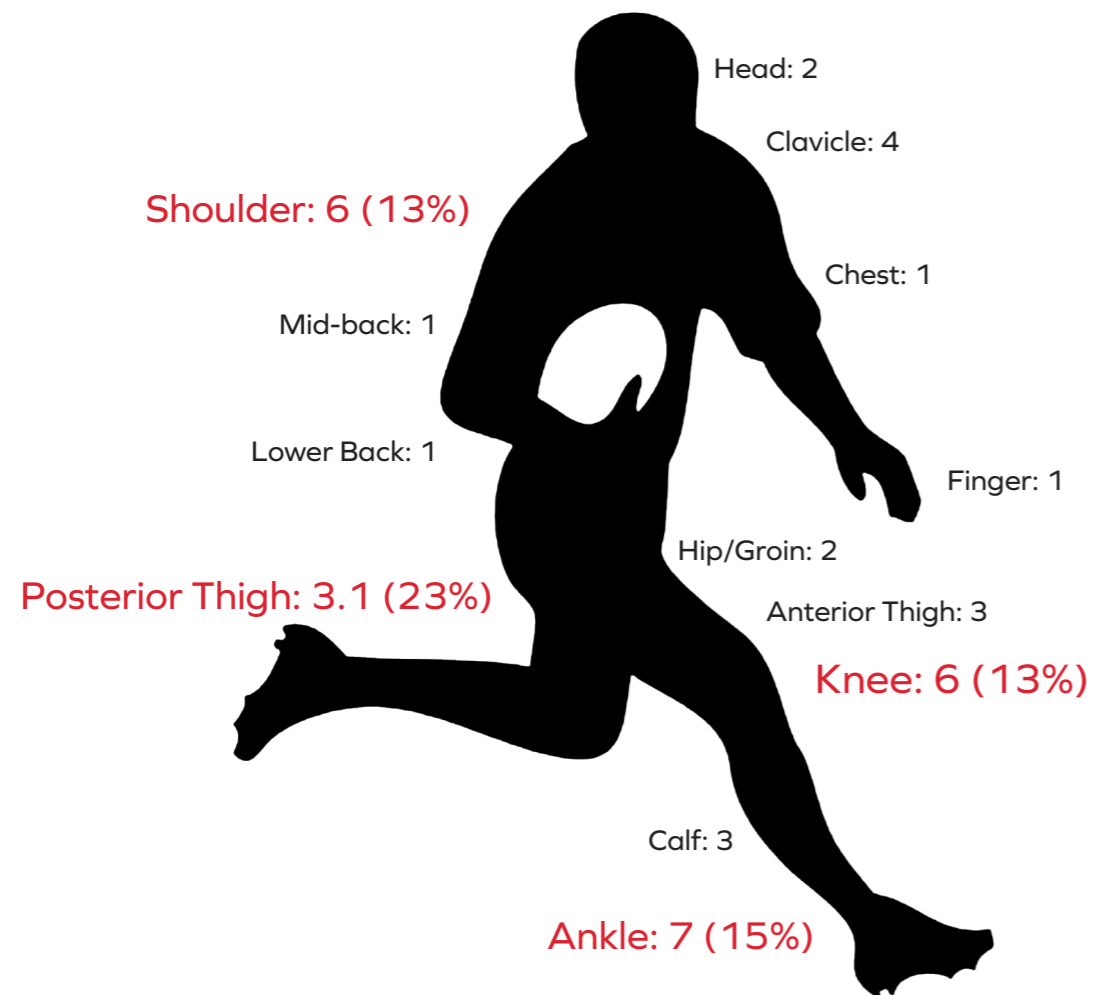


Figure 7(a): Location and number of injuries for the Men's AIL (%)

The fingers were the most common location of injury in the women's clubs (43%). In contrast, the head, posterior thigh, knee and ankle were the most common locations of training injuries in the 2018-2019 season accounting for 18% each. Similar to Season Two, in Season One (2017-2018) the ankle (25%), knee (19%) and posterior thigh (13%) were the most common injury sites in the women's clubs.

Figure 7(b) shows the incidences of injury according to bodily location for the women's clubs.

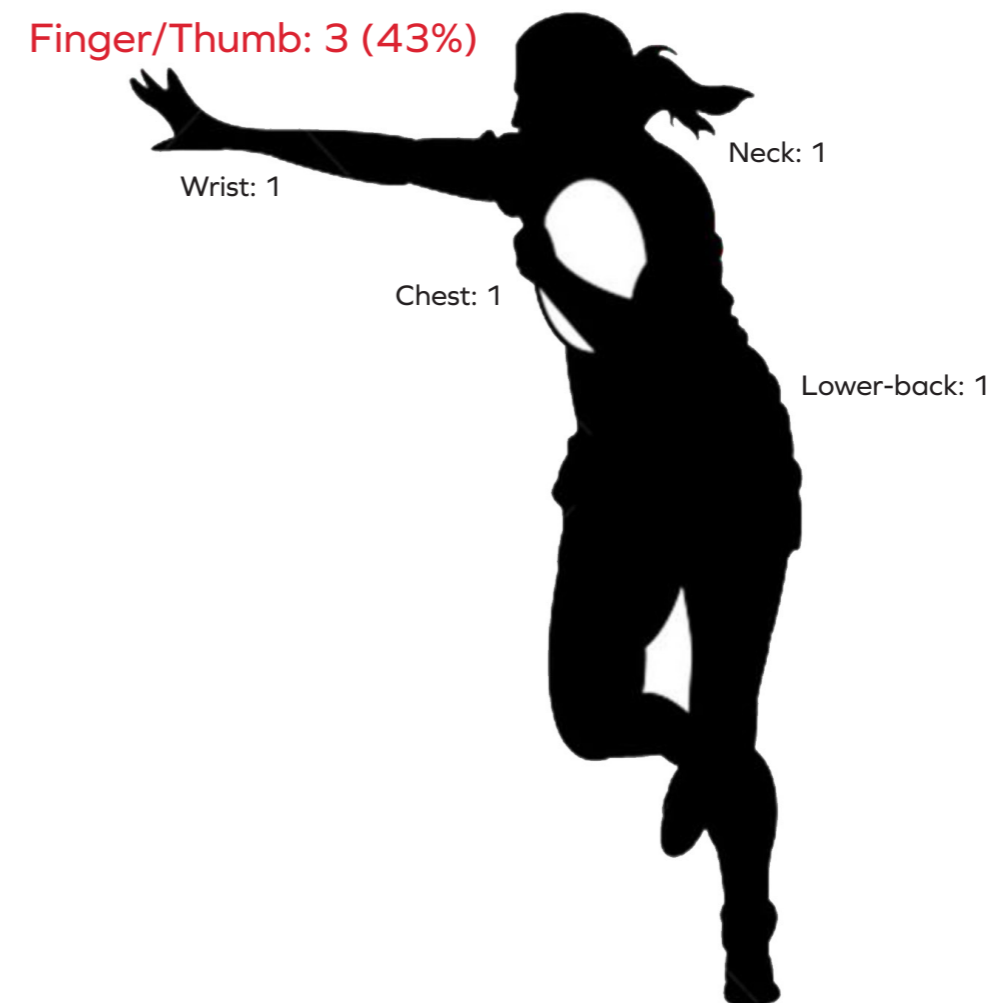


Figure 7(b): Location and number of injuries for Women's Rugby (%)

4.4 Nature of Training Injuries

The nature of injuries refers to the type of injury occurring.

In season one and season two, sprains (referring to ligament injuries) and strains (referring to muscle or tendon injuries) were the most common injury type across both the men's and women's clubs. This was consistent with the men's clubs again this year, but differed slightly for the women's clubs and was distributed more evenly across natures as shown in Figure 8. The column 'other' refers to an impingement injury (n=1, men's clubs).

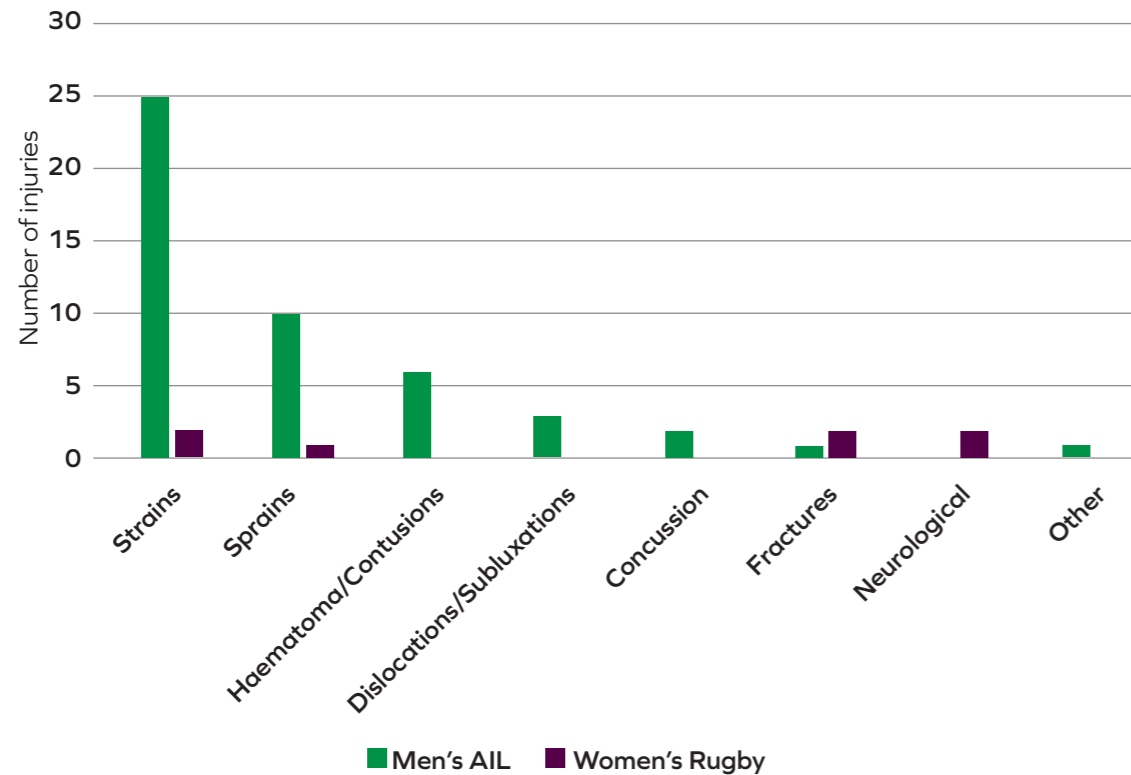


Figure 8: Nature of injury (number of injuries)

4.5 Training Injury Event

Figure 9 shows the events surrounding the occurrence of an injury.

The tackle-event accounted for the majority of injuries sustained during training, similar to match injury events. Moreover, in line with the 2019-2020 match time-loss injuries, the men's clubs saw more injuries sustained by the tackler than the ball carrier, while the ball carrier sustained more injuries compared to the tackler in the women's clubs.

In the women's clubs, 1 injury was reported from a conditioning drill event where 1 injury was reported during a gym session in the men's clubs.

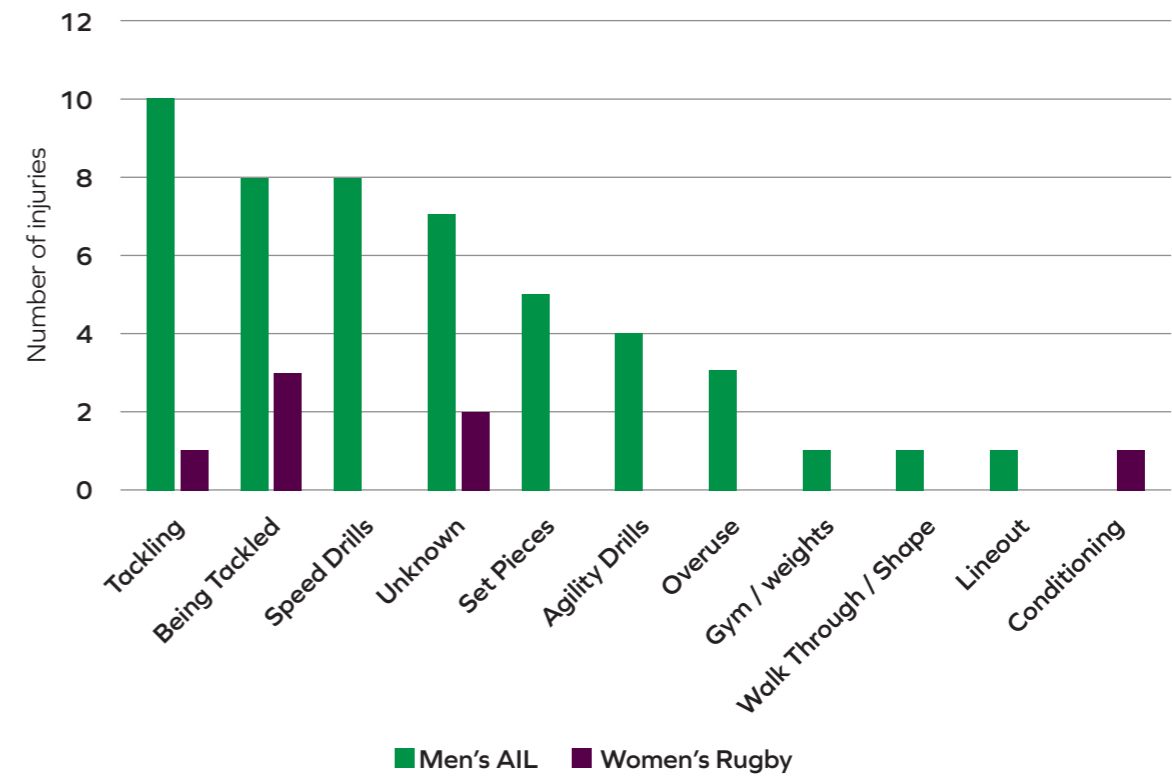


Figure 9: Nature of injury (number of injuries)

4.6 Training Injury Severity

Injury severity was calculated as total number of days absent from Rugby match or training and classified according to the World Rugby Consensus guidelines. The majority of injuries were moderate or severe, as shown in Figure 10.

Slight injuries (0-1 days' absence) were considered as 'medical attention' injuries and were not included in analysis of time-loss injuries, as per international best practice.¹⁴ Slight injuries are discussed in more detail in sub-section 4.8.

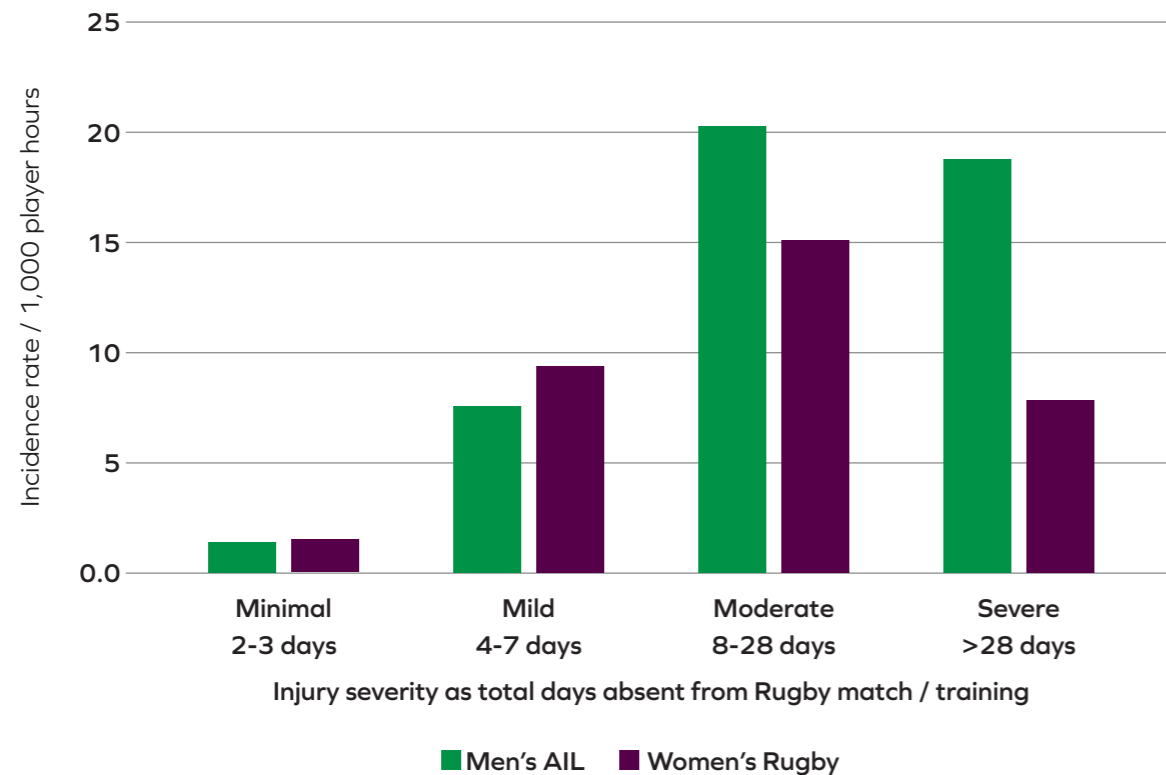


Figure 10: Injury severity (number of injuries)

¹⁴ Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. *Br J Sports Med*, 41, 328-31.
Williams, S., Trewartha, G., Kemp, S. & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. *Sports Med*, 43, 1043-55.

4.7 Training Injury Burden

The burden of an injury assesses the incidence rate of an injury in relation to the average severity of the injury ($[IR] \times [\text{average number of days' absence}]$). However, as the frequency and duration of training sessions were not collected, exposure hours and overall incidence rates were unable to be calculated.

For men's clubs, hamstring strains represented the most training injuries (23%) with an average days' absence of 30 days per injury. In the 2018-2019 season, hamstring strains also were the most frequently diagnosed injury (13%) but had an average days' off of 47 days per injury.

For the women's clubs, one finger fracture reported the most days off from Rugby match and training (239 days), whereas in 2018-2019 a knee meniscus tear forced the most days absent (304 days).

Table 14 represents the injury occurrence and highest average number of total days off per diagnoses.

Table 14:¹⁵ Diagnosis, number of injuries, average total days off

	Diagnosis	Number of Injuries	Average Total Days Off
Men's AIL	Shoulder dislocations	2	212
	Knee Sprains	1	355
	Hamstring strains	11	30
Women's Rugby	Finger fracture	1	239
	Lumbar (disc)	1	82
	Finger sprain	1	35

¹⁵ A 'hamstring strain' refers to a tear of the muscles located on the back (posterior aspect) of the thigh.

A 'Knee sprain' refers to a tear of one of the four stabilising ligaments that support the knee joint. This includes the anterior and posterior cruciate ligaments, and the medial and lateral collateral ligaments.

A 'Shoulder dislocation' refers to the separation of the upper arm from the shoulder socket.

A 'lumbar disc injury' refers to damage to the soft jelly like structures (discs) that are located between each of bones in the lower (lumbar region) part of your spine. The most common type of injury to the lumbar discs are tearing or bulging.

A 'finger sprain' refers to a tear or overstretch of the ligaments that connect the bones of the finger joints.

4.8 Medical Attention Training Injuries (slight injuries)

Any injury resulting in 0-1 days absent from Rugby match or training is considered a slight, or 'medical attention' injury and therefore were excluded from the analysis of time-loss injuries, as per best international practice.¹⁶

During the 2019-2020 season, 1 medical attention injury occurred during training activities in both the men's and women's clubs. Comparatively in the 2018-2019 season, 4 injuries were reported for the men's clubs and 0 for the women's.

Table 15: Training medical attention injuries

Division	No. Clubs	No. Players	No. Injuries
Men's AIL	20	929	1
Women's Rugby	5	196	1

- Women's clubs reported 1 quadriceps contusion.
- Men's clubs reported 1 adductor tendinopathy injury.

¹⁶ Fuller, C. W., Molloy, M. G., Bagate, C., Bahr, R., Brooks, J. H., Donson, H., Kemp, S. P., McCrory, P., McIntosh, A. S., Meeuwisse, W. H., Quarrie, K. L., Raftery, M. & Wiley, P. 2007. Consensus statement on injury definitions and data collection procedures for studies of injuries in Rugby Union. *Br J Sports Med*, 41, 328-31.
Williams, S., Trewartha, G., Kemp, S. & Stokes, K. 2013. A meta-analysis of injuries in senior men's professional Rugby Union. *Sports Med*, 43, 1043-55.



5.0 Future Directions

Following two successful seasons of the IRISweb system, the IRIS project continued and completed its third season of data collection during the 2019-2020 campaign. Recruitment continued in the Men's AIL across both Division One and Division Two. Recruitment expanded beyond the Women's AIL to the first league division in each province in order to recruit more women's teams. For the 2020-2021 season, the IRIS Project aims to maintain compliance across all the men's clubs (n=20) and try to recruit additional women's clubs in an effort to have 10 women's clubs participating.

IRIS also began conducting injury surveillance in the school's game at Senior Cup level across Munster and Connacht for the 2018-2019 season. The IRIS Project successfully completed a second season in 2019-2020 and aims to begin collecting injury data from the Junior Cup level in these areas.

Additionally, this season (2019-2020), the IRIS Project began collecting training load and player wellness data from a select number of men's clubs, in addition to the injury data already being collected.



6.0 Publications and Conferences

6.1 Journal Publications

Griffin, A., Kenny, I.C., Comyns, T.M. and Lyons, M. (2020). Training load monitoring in amateur Rugby Union: A survey of current practices. *The Journal of Strength and Conditioning Research*. 2020 May [in press]

Griffin, A., Kenny, I.C., Comyns, T.M. and Lyons, M. (2020) The Relationship Between the Acute:Chronic Workload Ratio and Injury and its Application in Team Sports: A Systematic Review. *Sports Medicine*. 50(3), 561-580.

Leahy T.M., Kenny I.C., Campbell M.J., Warrington G.D., Cahalan R., Harrison A.J., Lyons M., Glynn L.G., Purtill, H. and Comyns T.M. (2020). Injury Surveillance and Prevention Practices across Rugby Schools in Ireland. *Physical Therapy in Sport*. 43. 134-142.

Yeomans C., Comyns T.M., Cahalan R., Hayes K., Costello V., Warrington G.D., Harrison A.J., Lyons M., Campbell M.J., Glynn L.G. and Kenny I.C. (2019). The relationship between physical and wellness measures and injury in amateur Rugby Union players. *Physical Therapy in Sport*. 40, 59-65.

Leahy, T.M., Kenny, I.C., Campbell, M.J., Warrington, G.D., Cahalan, R., Harrison, A.J., Lyons, M., Glynn, L.G., Comyns, T.M. Injury surveillance in school Rugby: A systematic review of injury epidemiology & surveillance practices. *Physical Therapy in Sport*, 2019. 38: 170-178.

Yeomans, C., Kenny, I.C., Cahalan, R., Warrington, G.D., Harrison, A.J., Hayes, K., Lyons, M., Campbell, M.J., Glynn, L.G., Comyns, T.M. The design, development, implementation and evaluation of IRISWeb; A Rugby-specific web-based injury surveillance system. *Physical Therapy In Sport*, 2019. 35: 79-88.

Yeomans, C., Kenny, I.C., Cahalan, R., Warrington, G.D., Harrison, A.J., Hayes, K., Lyons, M., Campbell, M.J., Comyns, T.M. The Incidence of Injury in Amateur Male Rugby union: A Systematic Review and Meta-analysis. *Sports Medicine*, 48(4): 837-848.

Yeomans, C., Comyns, T. M., Cahalan, R., Warrington, G. D., Harrison, A. J., Hayes, K., Lyons, M., Campbell, M.J., Kenny, I. C.. Current injury monitoring and player education practices in Irish amateur Rugby Union. *Physical Therapy in Sport*, 33: 27-32.

6.2 Conference Communications

Griffin, A., Kenny, I.C., Comyns, T.M. and Lyons, M. (2020). Training load monitoring in amateur Rugby Union: A survey of current practices. Accepted for presentation at the European College of Sport Science Conference 2020, 28-30th October 2020, Prague, Czech Republic.

Yeomans, C., Comyns, T.M., Cahalan, R., Warrington, G.D., Harrison, A.J., Purtill, H., Lyons, M., Campbell, M.J., Glynn, L.G. and Kenny, I.C. (2019) A Comparison of Injuries between Male and Female Amateur Rugby Union Players. Accepted for presentation at the International Olympic Committee (IOC) World Conference on Prevention of Injury & Illness in Sport, 11-13 Feb, 2021.

Griffin, A., Kenny, I.C., Comyns, T.M. and Lyons, M. (2019). The relationship between the acute:chronic workload ratio and injury and its application in team sports: a systematic review. Proceedings of the British Association of Sport and Exercise Sciences (BASES) Conference 2019, 19-20 November 2019, Leicester, UK.

Leahy T.M., Kenny I.C., Campbell M.J., Warrington G.D., Cahalan R., Harrison A.J., Lyons M., Glynn L.G., and Comyns T.M. (2019) Injury Surveillance in School Rugby Union in Ireland. Proceedings of the SASMA South African Sports Medicine Association BRICSCESS BRICS Council of Exercise and Sports Science 2019 Congress. 10-13 October 2019, Cape Town, South Africa.

Yeomans, C., Kenny, I.C., Cahalan R., Costello V., Warrington G.D., Cahalan R., Harrison A.J., Lyons M., Glynn L.G., and Comyns T.M. Relationship between physical and wellness baseline screening measures and seasonal amateur Rugby injury. ACSM Annual Conference. Florida. May 2019.

Warrington G.D., Yeomans C., Comyns T.M., Cahalan R., Glynn L.G., Harrison A.J., Hayes K., Lyons M., Campbell M.J., Kenny I.C. Developing a Rugby-specific injury surveillance project. ACSM Annual Conference. Florida. May 2019.

Comyns T.M., Yeomans C., Cahalan R., Warrington G.D., Glynn L.G., Harrison A.J., Hayes K., Lyons M., Campbell M.J., Kenny I.C. Injury Surveillance in Amateur Rugby n Ireland. ACSM Annual Conference. Florida. May 2019.

Kenny I.C., Yeomans C., Cahalan R., Warrington G.D., Glynn L.G., Campbell M.J., Harrison A.J., Hayes K., Lyons M., Comyns T.M. Comparison of Injury in Male and Female Amateur Rugby Union. ACSM Annual Conference. Florida. May 2019.

Griffin, A., Kenny, I.C., Comyns, T.M. and Lyons, M. (2019). A comparison of the rolling average and exponentially weighted moving average models for calculating the acute:chronic workload ratio: a systematic review. AIPG Conference. Athlone IT. May 2019.

Leahy, T.M., Kenny I.C., Campbell M.J., Warrington G.D., Cahalan R., Harrison A.J., Lyons M., Glynn L.G., and Comyns T.M. A Systematic review of injury epidemiology and surveillance practices in school Rugby. AIPG Conference. Athlone IT. May 2019.

Yeomans, C., Comyns, T.M., Cahalan, R., Hayes, K., Costello, V., Warrington, G.D., Harrison, A.J., Lyons, M., Campbell, M.J., Glynn, G. L., Kenny, I.C. Injury Risk Profiling in Irish Amateur Rugby Union. AIPG Conference. Athlone IT. May 2019

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