Youth Rugby Injury Surveillance and Prevention Project

Season Report 2021-2022

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The authors would like to thank the coaches and sports injury staff at all participating teams in the Youth Rugby Injury Surveillance and Prevention Project for season 2021-22.

RFU INJURY SURVEILLANCE PROJECTS

Professional Rugby Injury Surveillance Project (PRISP)
Gallagher Premiership and England Senior Men

Women's Rugby Injury Surveillance Project (WRISP)
Allianz Premier 15s and Red Roses

Championship Rugby Injury Surveillance Project
Greene King Championship

BUCS Super Rugby Injury Surveillance Project
Elite men's University Rugby

Community Rugby Injury Surveillance and Prevention (CRISP) Project
Adult men's (levels 3-9) and women's (levels 2-5) community rugby

Youth Rugby Injury Surveillance Project (YRISP)
Schoolboy rugby in under-13, under-15 and under-18 age groups

KEY FINDINGS

PROJECT OVERVIEW

Schools Participating:
18 Schools, 30 teams

Age Groups:
Under 13, 15, 18

Match Exposure:
329 games, 5137 hours

Injury Definition:
24-hour time-loss

Injuries Reported:
157 injuries

OVERALL MATCH INJURIES

Injury Incidence Rate:
30.6 per 1000 player match hours

Mean Severity (days absent):
29 days

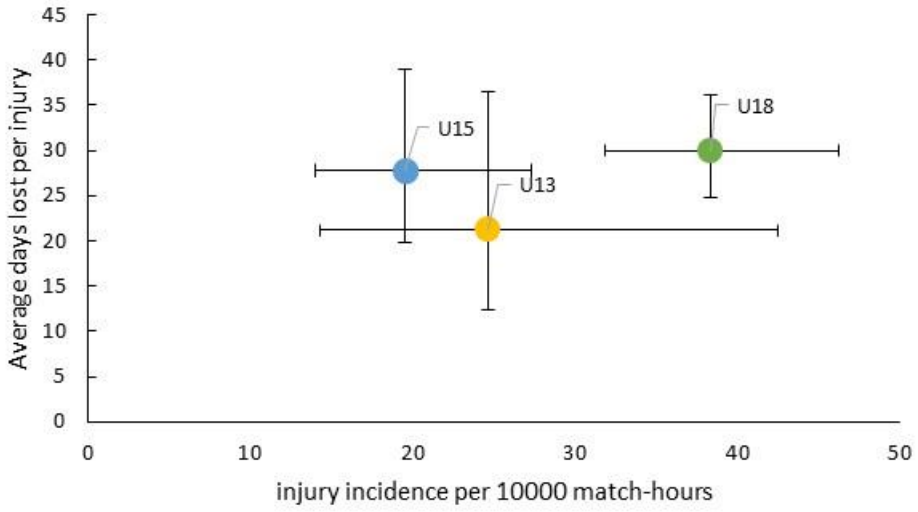
Injury Burden:
880 days absence per 1000 hours

Injury Event:
27% tackling; 22% being tackled

OVERVIEW PER AGE GROUP

1 injury per team every: **U13 – 3.7 matches, U15 – 3.4 matches, U18 – 1.5 matches**
Injury Incidence Rate (per 1000 player match-hours): **U13 – 24.7, U15 – 19.5, U18 – 38.3**
Mean days absent from rugby: **U13 – 21 days, U15 – 28 days, U18 – 30 days**

Each of the data points below represents an age group. How common an injury is (incidence) increases from left to right, with the days absent (severity) due to injury increasing from the bottom to the top. The lines extending from each data point reflect the possible variation based on the data collected.



EXECUTIVE SUMMARY

The Youth Rugby Injury Surveillance Project (YRISP) is responsible for the collection and analysis of injury data within schoolboy rugby union; specifically focussing on the under-13, under-15 and under-18 age groups. This report describes injuries within this population for the 2021-22 playing season.

- 18 schools participated in the project in the 2021-22 season, providing data for 30 individual teams (U13 - 5, U15 - 10, U18 - 15).

- A total of 324 matches (U13 - 49, U15 - 116, U18 - 164) (5137 player hours) were recorded, with 157 match injuries (U13 - 13, U15 - 34, U18 - 110).

- The overall rate of match injuries causing a player to miss more than 24 hours of rugby during the 2021-22 season was 30.6 injuries per 1000 player match hours. In the 2019-20 season this was 27.8 injuries per 1000 player match hours.

- Match injury was highest in the U18 age group: U13 – 24.7 per 1000 player match hours (/1000h), U15 – 19.5/1000h, U18 – 38.3/1000h.

- On average, an U13 team can expect an injury every 3.7 games, an U15 team every 3.4 games and an U18 team every 1.5 games.

- Burden, calculated by multiplying the severity (days lost) of injuries by the incidence, was 880 days per 1000 player match hours.

- The tackle was associated with 49% of all injuries.

- The incidence of reported concussion during 2021-22 was 8.8 injuries per 1000 player match hours; 29% of all injuries were concussions.

- 56% of all concussions occurred in the tackle. Concussion incidence when tackling was 3.3 per 1000 player match hours and 1.6 per 1000 player match hours when carrying the ball into a tackle.

- The 2021-22 season was the first schools rugby played since the 2019-20 season due to rugby being cancelled across the school game in 2020-21 due to Covid-19.

CONTENTS

INTRODUCTION

The Youth Rugby Injury Surveillance Project (YRISP) includes match exposure and match injuries from schools across England at the under-13, under-15 and under-18 age groups. The aim of the project is to better understand the risk, types and mechanisms of injuries in schoolboy rugby across different age groups. This informs strategies to reduce injuries and enhance the safety of the game.

This is the fourth consecutive YRISP season report, and it sits alongside the reports for the professional men's (PRISP), elite women's (WRISP), community men's and women's (CRISP) and university (BUCS Super Rugby) game. Injury research in youth and school rugby in England has been carried out intermittently since 2006. A 2-season study from 2006-2008 investigated injuries in U17-18 schools and academy rugby, finding a higher injury rate in academy matches (35 and 47 injuries per 1000 player match hours, respectively). In a 2015-16 study of U15-18 school age groups, injury incidence was found to be 26-30 per 1000 player match hours. For reference, the incidence rate in the 2021-22 season for professional men's rugby (PRISP) was 75 injuries per 1000 match-hours and for men's BUCS (University) Super Rugby was 70 per 1000 match-hours. All of the previously mentioned studies used the same 24-hour time loss definition adopted in this report but the adult community CRISP report employs a 7-day time loss injury definition, reporting an incidence rate of 29.2 injuries per 1000 match-hours for the 2021-22 season.

Previous season reports for the Youth Rugby Injury Surveillance Project and associated injury surveillance project can be found at RugbySafe Research Toolkit.

The information generated by YRISP can be used to inform injury prevention strategies and also provide a comparison of injury risk compared with other levels of the game. The data will also inform the risk assessment used to determine the level of first aid/immediate care provision required as set out in RFU Regulation 9 (Player Safety) and accompanying guidelines. With data over multiple seasons, it will be possible to detect changes in injury patterns over time, either in response to law changes, education programmes or the evolving progression of the game. Information also informs educational resources within the RFU's RugbySafe player welfare and wellbeing programme. For example, previous research has demonstrated that a rugby specific warm-up programme, Activate, can reduce injuries; this is accessible at: RugbySafe Activate Toolkit.

DEFINITIONS

All methods and definitions used in this study comply with those outlined in the consensus statement for injury definitions and data collection procedures for studies of injuries in rugby union (Fuller et al 2007).

Time-loss injury

A time-loss injury was defined as 'any injury that prevents a player from taking a full part in all training activities typically planned for that day and/or match play for more than 24 hours from midnight at the end of the day the injury was sustained'. For example, if a player was injured during a match on Saturday and he was able to take a full part in training on Monday, the incident would not be classed as an injury. If the player's training was restricted on Monday due to the injury received on Saturday, the incident would be classed as a time-loss injury and reported.

Days absent from rugby (Injury severity)

Injury severity was measured as time (days) lost from competition and practice and defined as the number of days from the date of the injury to the date that the player was deemed to have regained full fitness not including the day of injury or the day of return. A player was deemed to have regained full fitness when he was 'able to take a part in training activities (typically planned for that day) and was available for match selection.' Severity is subdivided into the following categories: 2-7 days, 8-28 days, 29-84 days and greater than 84 days.

Injury incidence

The likelihood of sustaining an injury during match play or training is reported as the injury incidence. Time-loss injury data is presented as the number of injuries per 1000 player-hours of match exposure. This is a standardised method of presenting injury information so that data can be compared between different groups with a different number of matches. It is calculated by:

$$\text{Injury incidence} = \text{number of Injuries} \Big/ \left[(\text{number of matches} \times \text{number of players (15)} \times \text{match duration (1.33 hours)})/1000\right]$$

Confidence interval (CI)

The confidence interval shows, with 95% certainty, the likely range of the true value for a given statistic.

Burden

The burden of injury is a measure which takes into account both the frequency and severity of injuries. Burden is calculated by multiplying the incidence of injury by the mean days lost (severity) of injury and is reported as the number of days absence per 1,000 player-hours of exposure.

Statistical significance

A result is considered to be statistically significant if the probability that it has arisen by chance is less than 5%, or 1 in 20. In this report, statistical analysis has been performed for the match injury incidence, severity and burden.

Overall injury incidence, severity and burden

For the 2021-22 season, 157 match injuries were reported over 329 matches (5137 hours of match exposure) for all teams combined. This resulted in an overall match time-loss injury incidence of 30.6 injuries per 1000 player match hours.

Table 1. Overview of match injury incidence, mean severity and burden for 2021-22 season.

Overview	Exposure (player-hours)	Injuries (n)	Incidence (/1000h)	Mean Days Absence	Burden (/1000h)	Matches per Injury
U13	527	13	24.7	21	523	3.7
U15	1741	34	19.5	28	543	3.4
U18	2869	110	38.3	30	1150	1.5
Overall	5137	157	30.6	29	880	2.1

Note: Incidence is higher for U13 compared with U15 but the number of matches for one injury is slightly higher because standard U13 games are shorter (normally 50min) than U15 (normally 60min).

Incidence

Figure 1 shows injury incidence over the past four seasons for all age groups combined. Overall, all four seasons are within what would be considered natural variation in the data (between the lower green and upper red dotted lines). Figure 2 demonstrates that while there is some between-season variation within age groups, the incidences across age groups for season 2021-22 are not statistically different to previous seasons. When data for all four seasons are combined, the U18 age group have a significantly higher injury incidence than the two younger age groups, but the U13 and U15 age groups are not different.

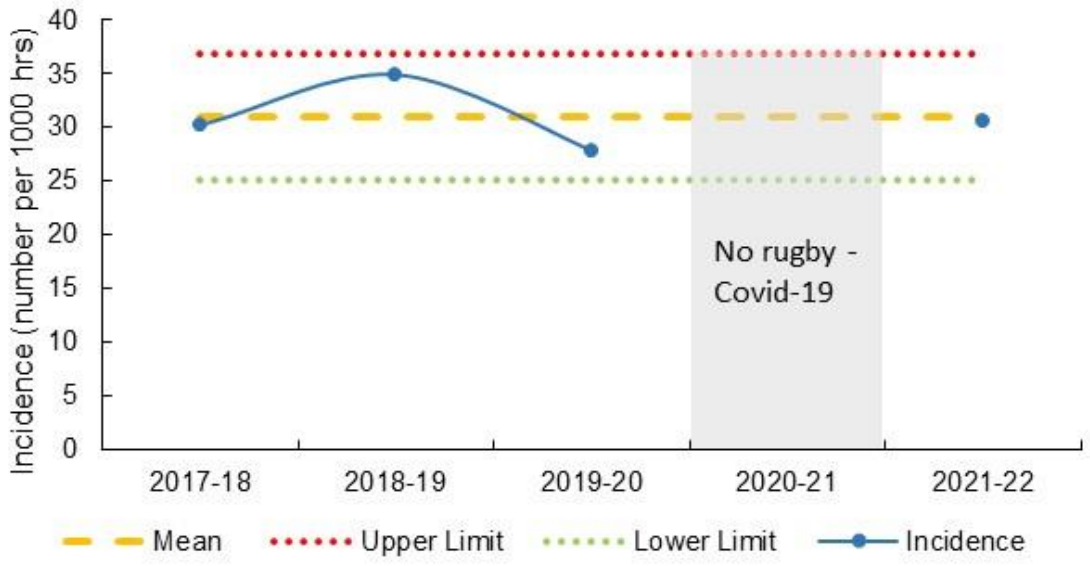


Figure 1. Injury incidence for over four seasons. 2 standard deviations (2SD) above and below the mean incidence denote the range within which a natural variation in the data is expected. There was no competitive rugby in 2020-21 due to Covid-19, denoted by shaded area.

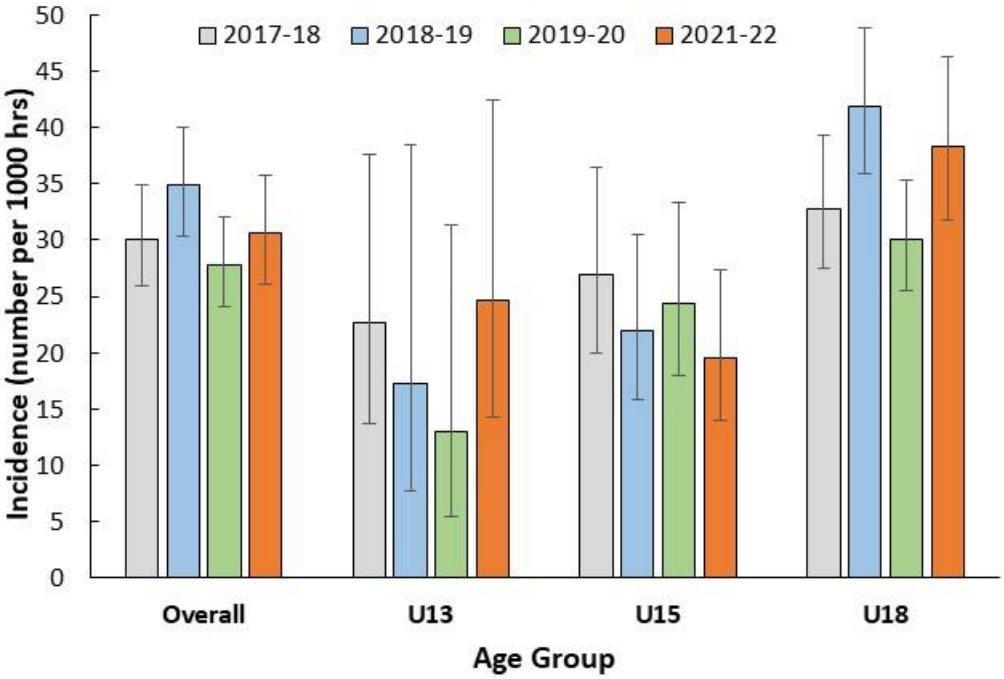


Figure 2. Injury incidence for over four seasons (2017-18 to 2021-22) but age groups. No school rugby was played during 2020-21 due to Covid-19.

Severity

The mean severity (days absent) was 21, 28 and 30 days for the U13, U15 and U18 age groups, respectively (Table 1). Injuries lasting 8-28 days were the most common, responsible for 43% of injuries in 2021-22 and injuries resulting in 29-84 days absent from rugby accounted for 22% of injuries (Table 2).

Table 2. Match injury incidence for each injury severity classification over four seasons (2017-18 to 2021-22) for all age groups combined

Injury Severity Classification	2017-18 Incidence (/1000h) (percentage)	2018-19 Incidence (/1000h) (percentage)	2019-20 Incidence (/1000h) (percentage)	2021-22 Incidence (/1000h) (percentage)
2-7 days	7.3 (24%)	5.8 (17%)	3.5 (12%)	4.7 (15%)
8-28 days	9.7 (32%)	12.5 (36%)	10.6 (38%)	13.0 (43%)
29-84 days	7.1 (24%)	8.6 (24%)	7.4 (27%)	6.6 (22%)
>84 days	1.5 (5%)	1.4 (4%)	0.6 (2%)	1.6 (5%)
Unknown	4.4 (15%)	6.5 (19%)	5.8 (21%)	4.7 (15%)

Burden

Injury burden was not significantly different in the 2021-22 season from the 2019-20 season for the U13 and U15 age groups. Injury burden for the U18 age group was higher in the 2021-22 season compared with the 2019-20 season but was not different to 2017-18 and 2018-19. Combining the three seasons, the U18 age group has significantly higher burden than the two younger age groups. There were no significant differences between U13 and U15 age groups.

Over the course of a ten-game season, a total of 57, 81 and 201 days of player absence from matches and training could be expected for U13, U15 and U18 teams, respectively.

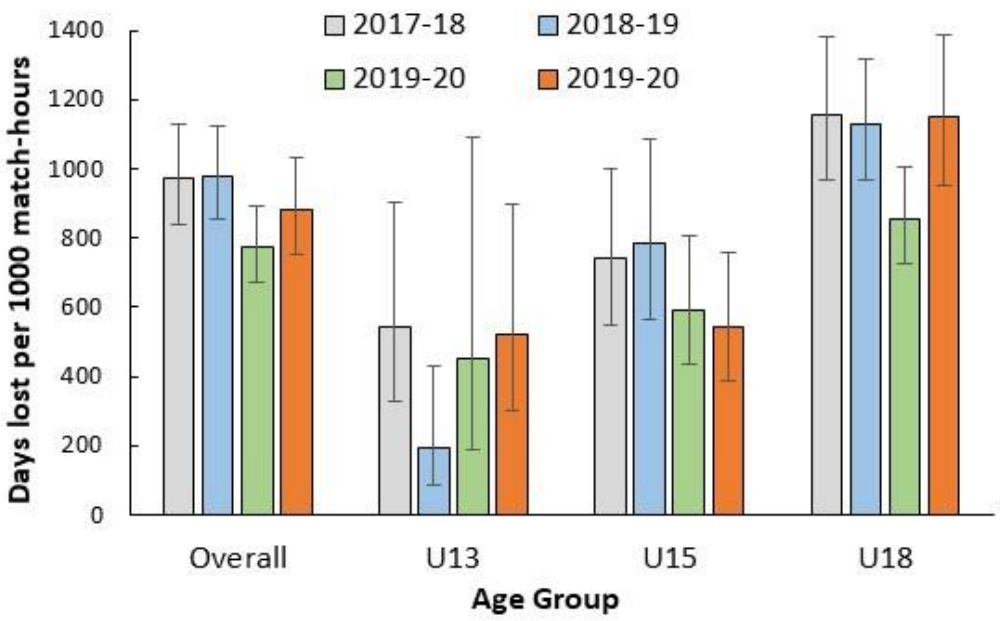


Figure 3. Injury burden over four seasons (2017-18, 2018-19, 2019-20 and 2021-22) by age group and for all age groups combined.

Incidence of injury at different levels of the game

Comparisons of injury incidence in 2021-22 at different levels of the game are shown in Figures 4 (24 hours injuries) and 5 (greater than seven day injuries). Injury incidence is greatest for the professional playing levels, particularly in the men's game. The injury incidence for all levels of schoolboy rugby is lower than all other levels of the men's game but in terms of injuries greater than seven days time-loss the U18 level is similar to men's community level rugby.

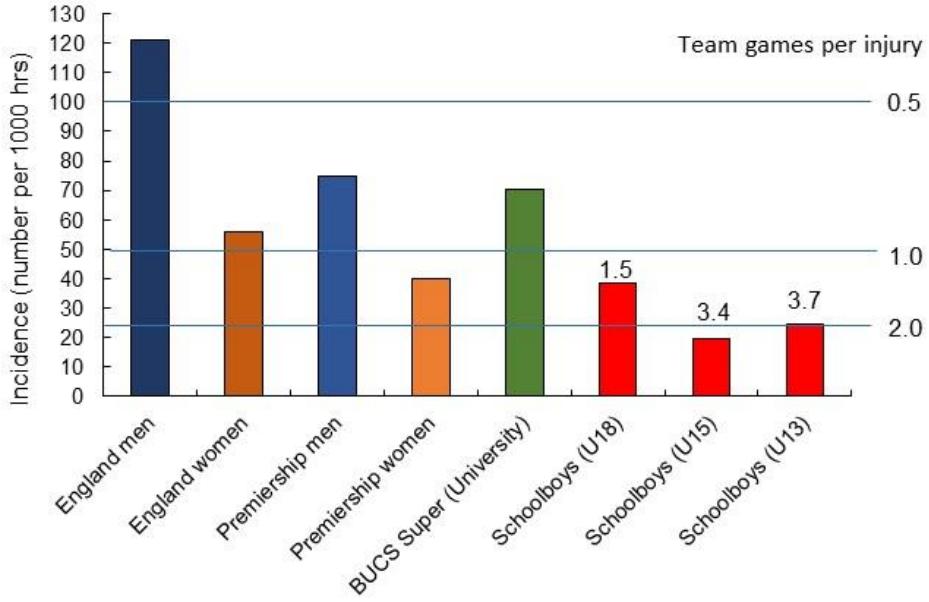


Figure 4. A comparison of greater than 24-hour time-loss injury rates for different levels of school rugby with elite level and university rugby.

Note: 24hr time-loss injuries are not recorded in the adult community game. 'Team games per injury' are based on adult matches of 80min. Games for Schoolboy U18, U15 and U13 are normally 70, 60 and 50 min, respectively and therefore the games per injury will differ, as denoted by values above respective bars.

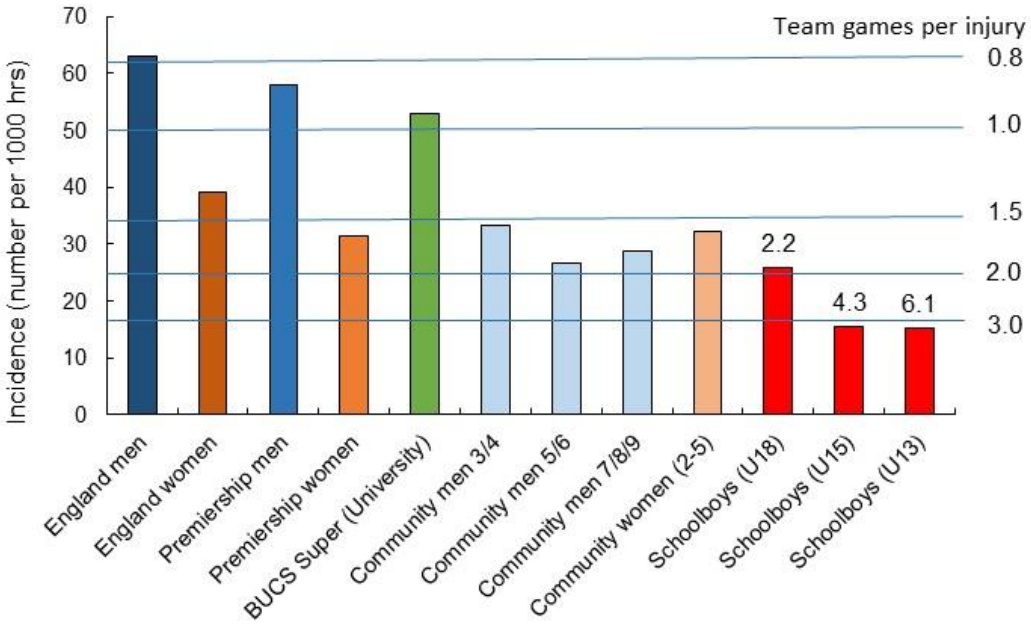


Figure 5. A comparison of greater than 7-day time-loss injury rates for different levels of community rugby with professional, university level and schools rugby.

Data sources: Data from all playing levels are derived from respective season reports for the 2021-22 season. 'Team games per injury' are based on adult matches of 80min. Games for Schoolboy

U18, U15 and U13 are normally 70, 60 and 50 min, respectively and therefore the games per injury will differ, as denoted by values above respective bars.

Injury event

The tackle was the most common event associated with injury, collectively accounting for 49% of match injuries (27% to the tackling player and 22% to the tackled player). This finding is common across previous seasons (Figure 6) other injury surveillance studies, which have shown the tackle to be responsible for between 40% and 64% of all youth rugby injuries.

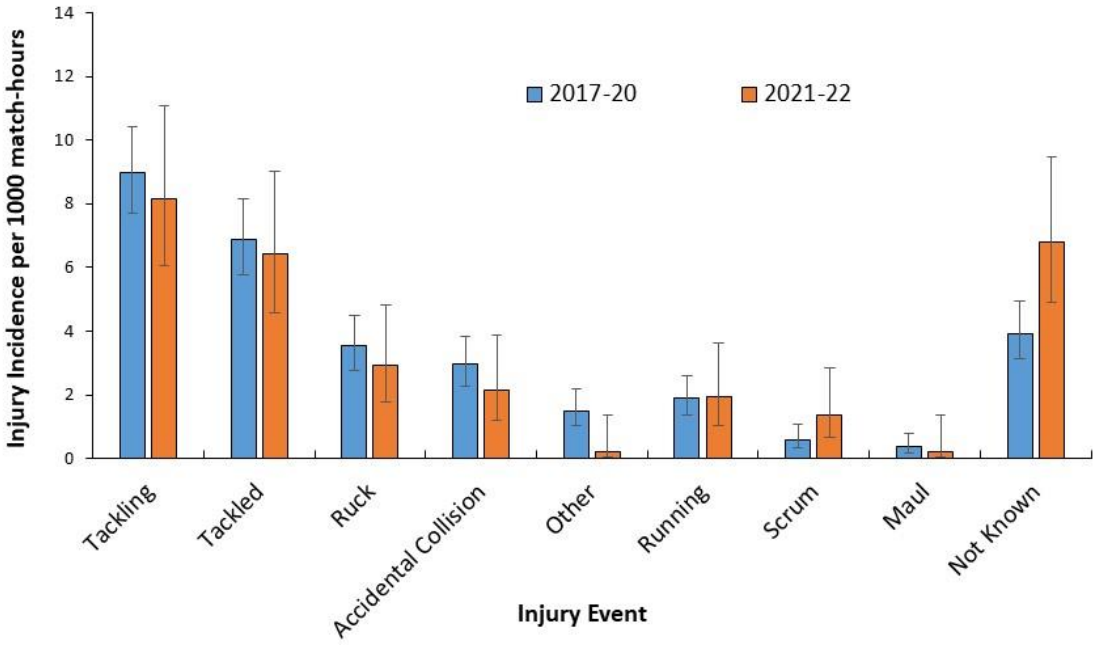


Figure 6. The incidence of injuries for specific match events for all playing levels combined across seasons 2017-20, compared with 2021-22.

Figure 7 combines incidence and average severity (days absence per injury) for each injury event. Tackling was the event associated with the highest number of injuries, with the highest severity coming from the running (36 days lost).

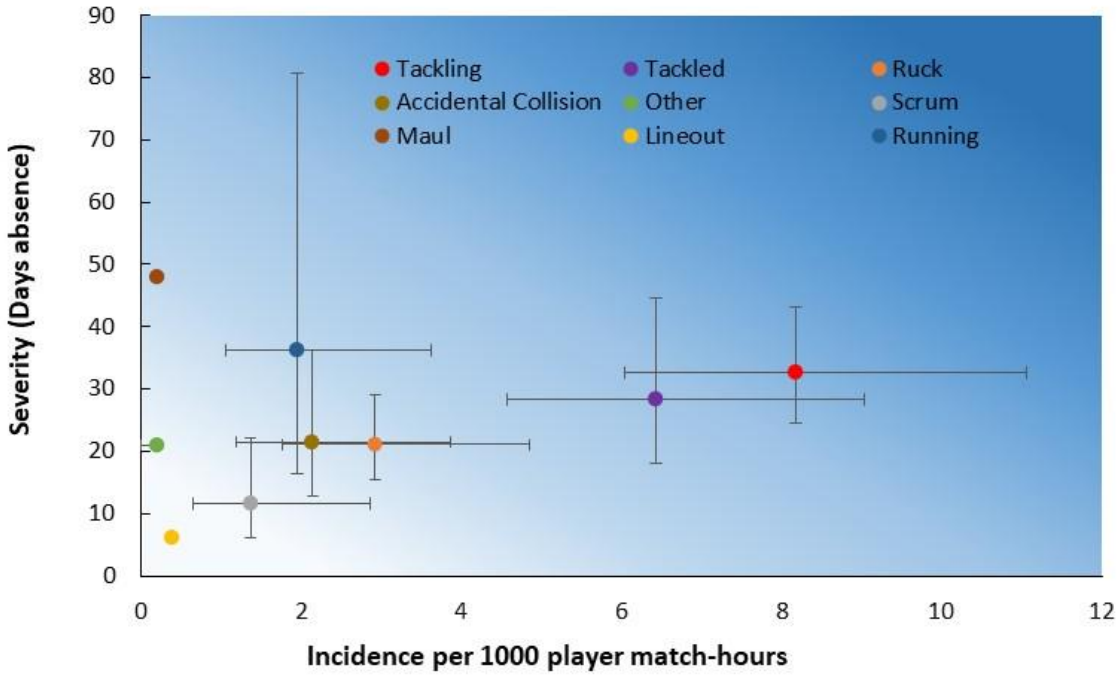


Figure 7. Injury event by incidence and days absence for 2021-22 season. *Note: Confidence intervals have been removed from events where n<5. Lighter blue areas show a low injury burden and darker blue denotes a higher burden.*

Injury location

This section provides information on the most common injury sites. Figure 8 shows the head and neck was the most commonly injured region at all age groups (joint most common at U13 with upper limb).

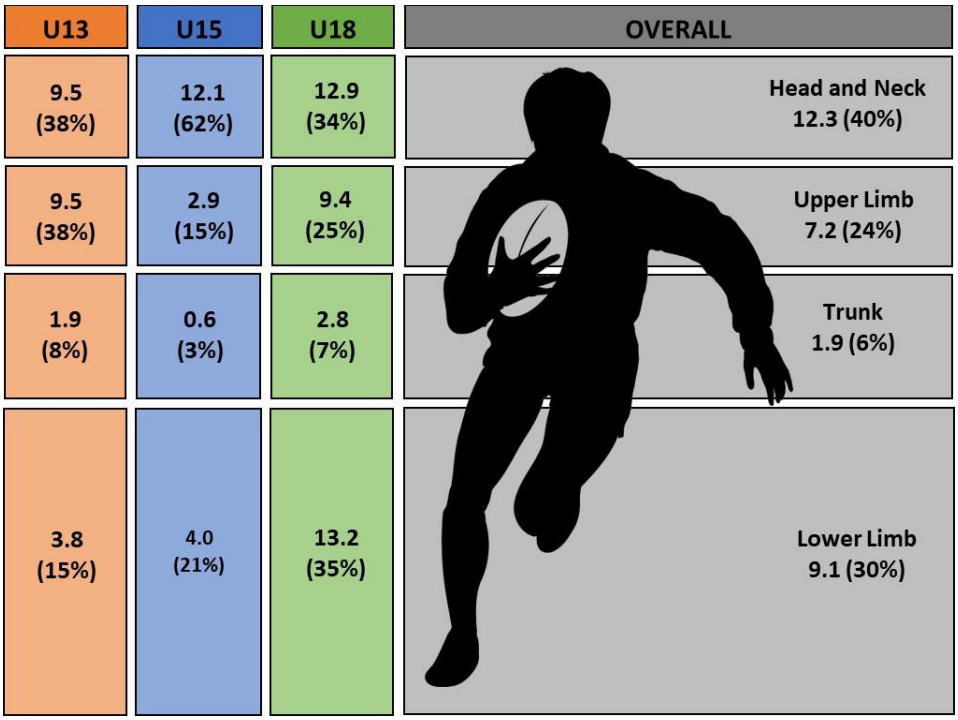


Figure 8. The distribution of match injuries by body region for 2021-22 season by age groups and all ages combined.

Table 3 shows more information on the incidence and burden for specific body locations. Overall, the most common injury location was the head (38% of all injuries), which also had the highest burden, 278 days lost per 1000 player match hours. The most severe injuries occurred to the hip and groin, with a time loss of 67 days (2 injuries), followed by the forearm (62 days, 1 injury).

Table 3. Incidence, severity and burden by body location (ranked within each region for burden) for 2021-22 season. Incidence, severity and burden values are colour coded for all sites (red: highest value – green: lowest value).

		Count	Percentage	Incidence	Severity	Burden
Head/Neck	Head	59	38%	11.5	24	278
	Neck	4	3%	0.8	42	32
Upper limb	Shoulder	19	12%	3.7	38	139
	Wrist & Hand	16	10%	3.1	22	70
	Forearm	1	1%	0.2	62	12
	Upper Arm	1	1%	0.2	2	0
	Elbow	0	0%	0.0	0	0
Trunk	Trunk & Abdomen	3	2%	0.6	20	12
	Lumbar Spine	3	2%	0.6	13	8
	Chest	2	1%	0.4	12	4
	Thoracic	2	1%	0.4	6	2
Lower Limb	Knee	16	10%	3.1	40	126
	Ankle	13	8%	2.5	33	84
	Thigh	8	5%	1.6	28	43
	Lower Leg	4	3%	0.8	43	34
	Hip & Groin	2	1%	0.4	67	26
	Foot	4	3%	0.8	31	24

Injury type

Table 4 shows the incidence, severity and burden of injury by site and type. For the 2021-22 season, the highest incidence and burden was for head central/peripheral nervous system injuries (all concussions). Shoulder bone-related injuries were the most severe (mean days lost = 78).

Table 4. Incidence, severity and burden per type of injury for the top 12 most common injuries in 2021-22.

Site	Type	Injuries	Percentage	Incidence	Severity	Burden
Head	CNS/PNS (concussion)	45	29%	**8.8**	28	245
Knee	Joint/Ligament	12	8%	2.3	55	129
Ankle	Joint/Ligament	11	7%	2.1	34	73
Shoulder	Joint/Ligament	8	5%	1.6	41	64
Thigh	Muscle/Tendon	8	5%	1.6	28	43
Head	Muscle/Tendon	7	4%	1.4	9	13
Wrist & Hand	Bone	6	4%	1.2	31	36
Wrist & Hand	Joint/Ligament	6	4%	1.2	20	23
Shoulder	Muscle/Tendon	5	3%	1.0	20	19
Knee	Muscle/Tendon	4	3%	0.8	7	5
Shoulder	Bone	4	3%	0.8	78	61
Wrist & Hand	Muscle/Tendon	4	3%	0.8	14	11

Note: CNS/PNS = Central nervous system/peripheral nervous system and includes the specific diagnosis of concussion.

Figure 9 shows the top four most common types of diagnoses by age group (three for U13 due to the low number of injuries). The most common type of injury was central/peripheral nervous system injuries for all age groups and overall which are nearly all concussions.

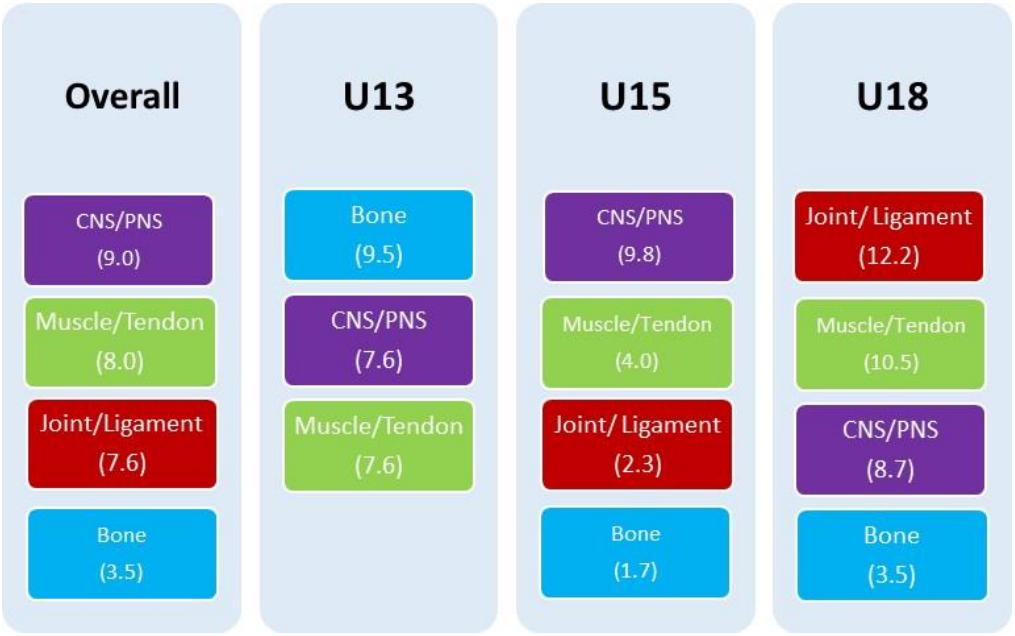


Figure 9. Top four injury types in rank order for **injury incidence** for all age groups in the 2021-22 season. Numbers within brackets denote incidence (injuries per 1000 player match hours).

Concussion

Concussion incidence and severity

The 2021-22 concussion incidence for all age groups combined was 8.8 concussions per 1000 player match hours. This equates to 1 concussion in every 7 team games and accounted for 29% of all time-loss injuries (Table 5). Figure 10 shows that over the last four seasons, the overall incidence of concussion has remained within the lower and upper limits expected through natural variation.

Table 5. Overview of match concussion incidence, mean severity and burden for 2021-22 season.

Overview	Exposure (player-hours)	Injuries (n)	Incidence (/1000h)	Mean Days Absence	Burden (/1000h)	Matches per Injury
U13	527	4	7.6	21.5	163	12.2
U15	1741	16	9.2	28.7	263	7.3
U18	2869	25	8.7	28.6	249	6.6
Overall	5137	45	8.8	27.9	245	7.3

Note: Incidence is slightly higher for U15 compared with U18 but the number of matches for one concussion to occur is slightly higher because standard U15 games are shorter (normally 60min) than U18 (normally 70min).

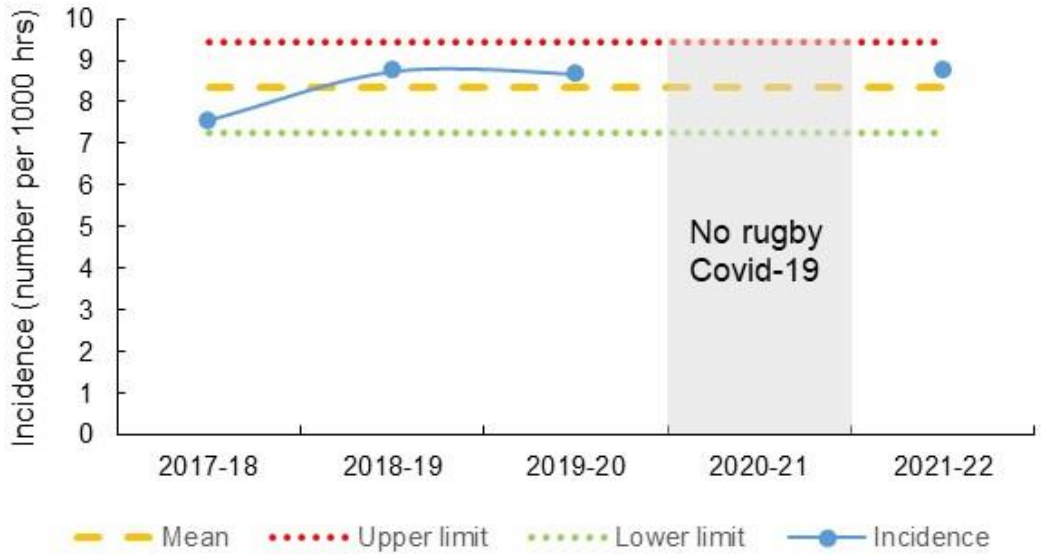


Figure 10. Injury incidence for over four seasons. 2 standard deviations (2SD) above and below the mean incidence denote the range within which a natural variation in the data is expected. There was no competitive rugby in 2020-21 due to Covid-19, denoted by shaded area.

Match events associated with concussion

In 2021-22, the tackle was the reported injury event for 56% of all concussions with 38% of all concussions to the tackling player and 18% to the ball carrier.

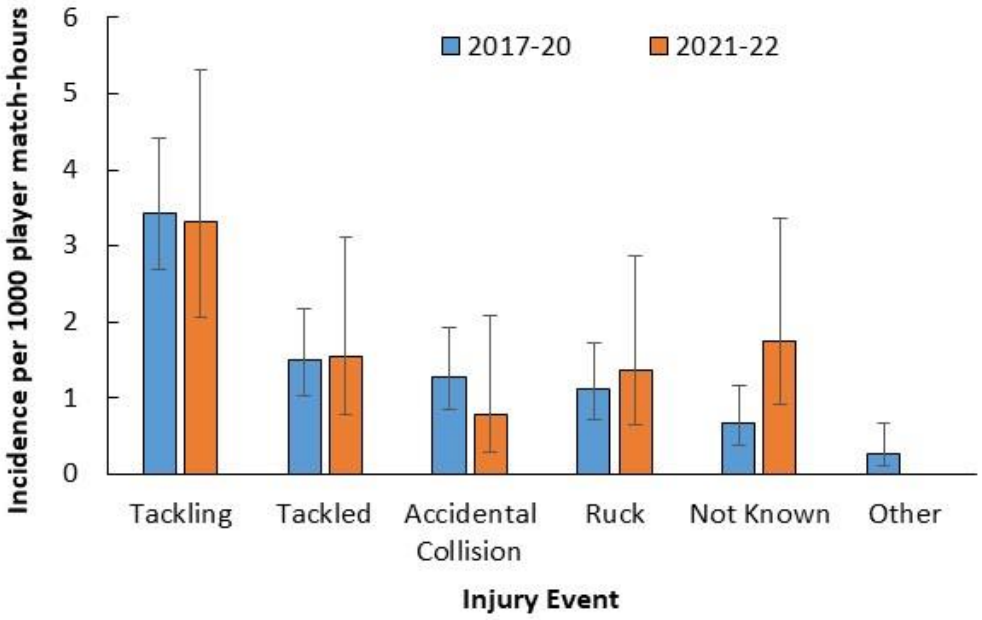


Figure 11. Incidence of reported concussions by match event for all age groups combined for seasons 2017-20 compared with 2021-22 season.

Recognising concussion

In community rugby, all teams should adhere to the principle of recognising the signs and symptoms of concussion and subsequently removing the player from play immediately. The player should not return to the field during that match. More detailed information can be found on the Pocket recognition tool.

Return to play guidelines

The return to play pathway for players aged 19 and below in the 2021-22 season can be seen in Figure 12. This includes a minimum of two weeks physical rest, prior to commencing a graduated return to play (GRTP) protocol once the player is symptom free. All players must be reviewed by a healthcare professional prior to commencing contact. The minimum timeframe in which the protocol can be completed is 23 days. However, not all athletes will recover fully within this timeframe and may need longer.

Current guidelines, on the pathways for concussed age 19 and under players returning to play are available in the RFU's Headcase resource.

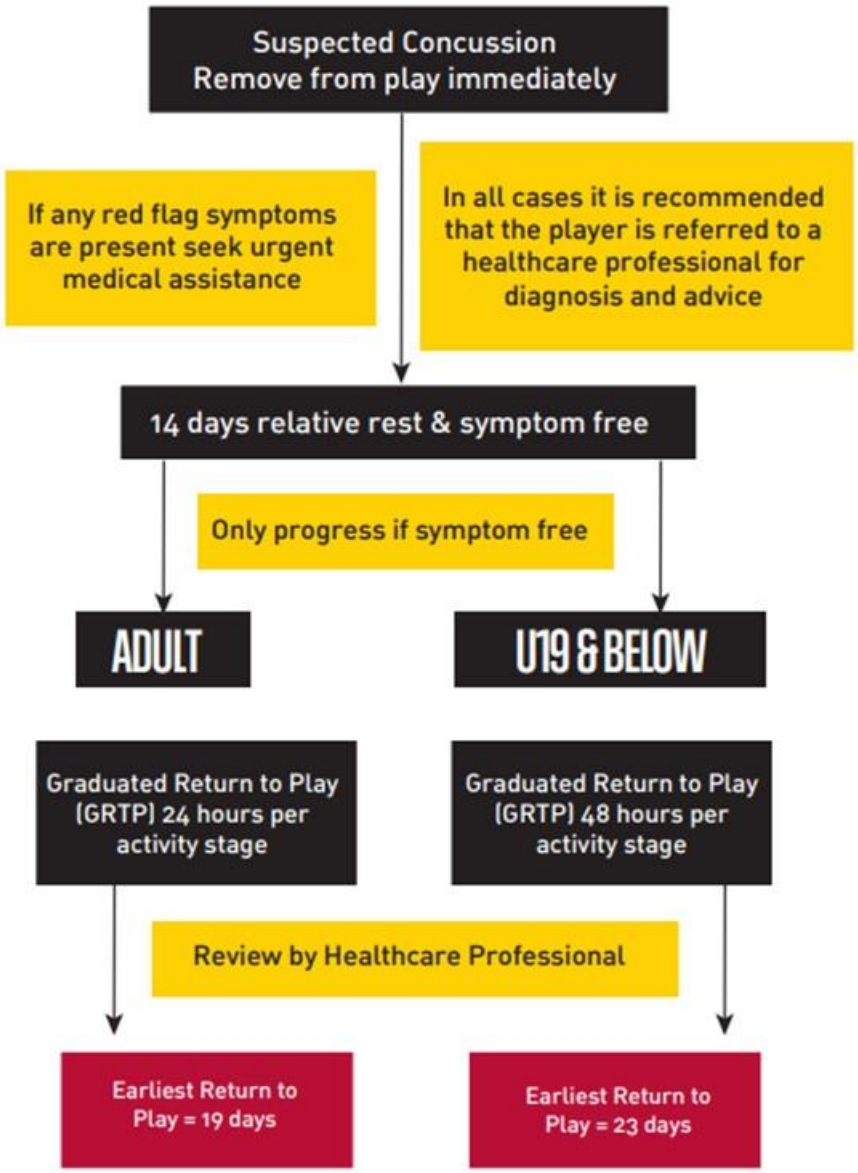


Figure 12. Standard return to play pathway for concussed players not in an enhanced care setting.

Playing position

In 2021-22, there were 68 injuries to forwards and 72 injuries to backs, equating to an injury incidence for forwards of 24.8 injuries per 1000 player hours and 30.0 injuries per 1000 player hours for backs (Table 6). The mean number of days missed for an injury to forwards was 26 days, compared with 33 days for backs.

Table 6. Overview of match injury incidence, mean severity and burden by positional groupings for 2021-22 season.

Overview	Exposure (player-hours)	Injuries (n)	Incidence (/1000h)	Mean Days Absence	Burden (/1000h)
Forwards	2740	68	24.8	26	641
Backs	2397	72	30.0	33	981

When broken down further (Figure 13), injuries were most common for outside backs (36.0/1000h) in the 2021-22 season.

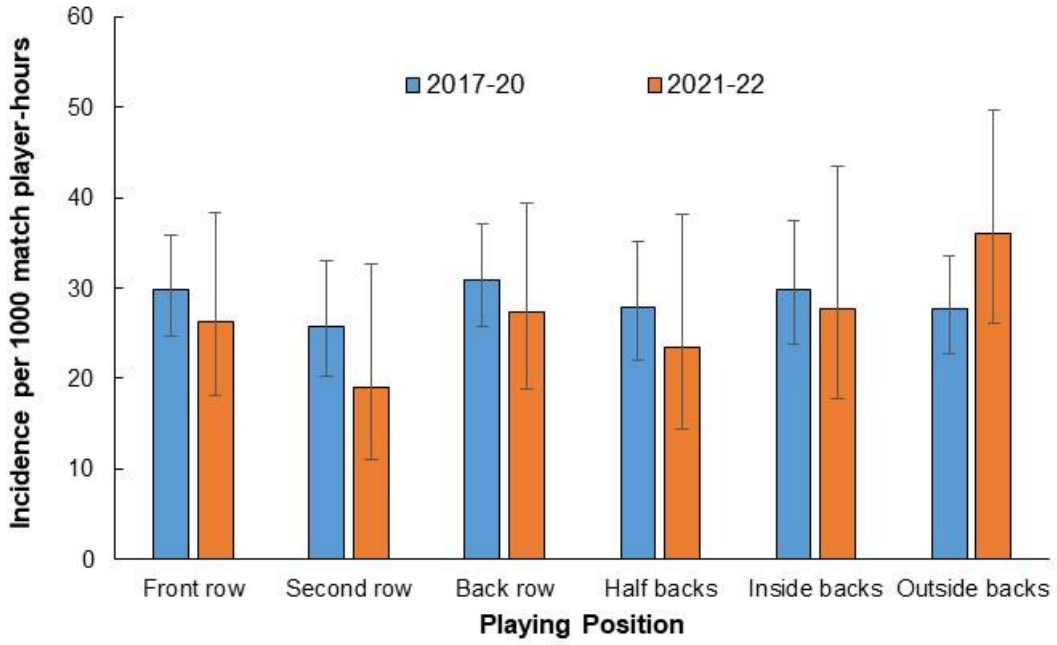


Figure 13. Comparison of injury incidence between positional groups for seasons 2017-20 combined compared with 2021-22. *Note: Forwards: Front row: loose head and tight head props, hooker, Second row: left and right locks; Back row: open side and blind side flankers, No. 8; Backs: Inside backs: outside half, inside centre, outside centre; outside backs: left and right wings, full back.*

MATCH ANALYSIS

During the 2021-22 season, under 15 and under 18 schoolboy match play footage was analysed for match events and tackles. This analysis was not linked to specific injuries but provided a description of these game events. A total of 20 matches were analysed for the number of different match contact events and passes, and a sample of 3283 tackles were analysed to understand more about player behaviours in this specific event.

Match event analysis

Table 7 show the average number of match events for under 15 and under 18 age groups combined. Figure 14 shows that there were more events during a game for U18 than for U15 but it should be considered that a normal U18 game is longer (70min) compared with a U15 game (60min).

Table 7. Number of events per match for U15 and U18 groups combined.

	Tackles	Rucks	Lineouts	Mauls	Scrums	Passes
Number/match	164	117	18	8	18	187

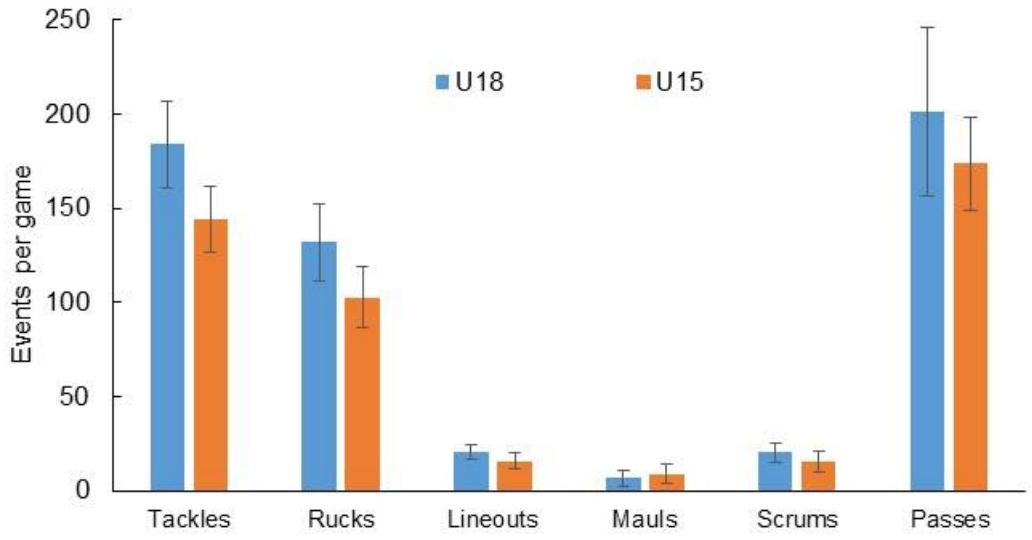


Figure 14. Number of events per match at under 15 and under 18 age groups

Tackle analysis

Figure 15 shows the percentage of tackles made by the tackler by the first point of contact on the ball carrier and that this was similar for the U15 and U18 age groups.

Overall, in 12.4% of all tackles, the first point of contact made by the tackler on the ball carrier was from the armpit to the head. When these armpit to head height tackles were subdivided into player body positions at the time of the tackle, the tackler was most commonly upright (9.8%) and bent at the waist on fewer occasions (2.6%). Additionally, the tackler's and ball carrier's body positions were both upright for 8.6%. The principle of lowering the permitted tackle height on the ball carrier by the tackler more often assuming a bent position should result in fewer tackles whereby the tackler's head contacts the ball carrier's shoulder and head.

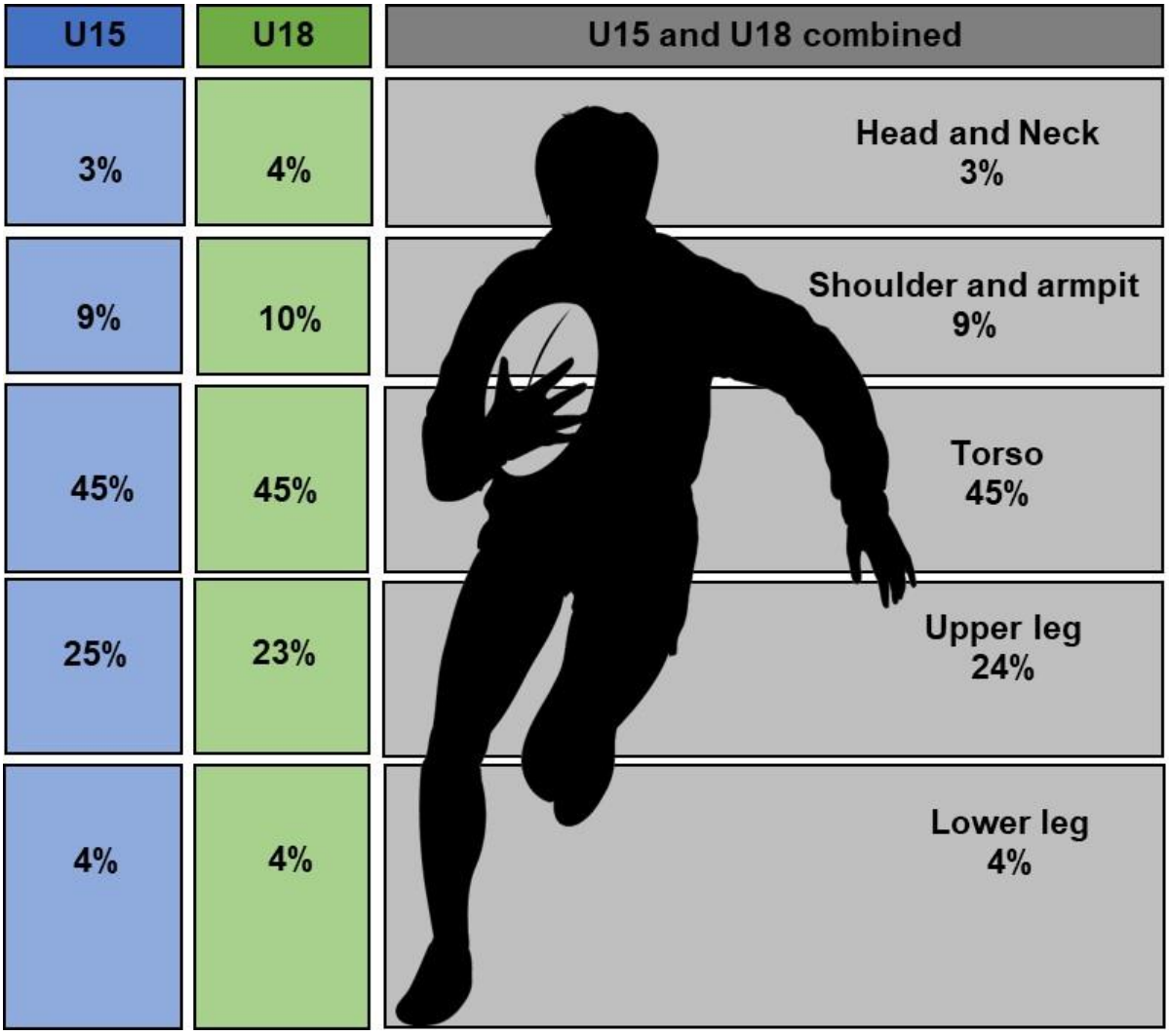


Figure 15. The first point of contact made by the tackler on the ball carrier.

FUTURE DIRECTIONS FOR THE PROJECT

There have been intermittent studies of injury in schoolboy rugby in England since 2006, but this project establishes longitudinal data collection which enables comparisons of trends over consecutive seasons. We are always looking for schools to take part and contribute to this research. Interested schools can contact the research team via: rfu-youth@bath.ac.uk.

To give context to these studies, match analysis is also being conducted. Initially, as described above, research is looking to understand how the game differs at different age groups by comparing the number of events within matches. As most injuries occur within the tackle, a second study is seeking to identify any differences in the characteristics of the tackle at each age group.

The injury surveillance project provides the opportunity to compare injury trends over consecutive seasons, making it possible to examine the potential influence of law changes or the effects of any other methods of intervention on injury patterns. Season 2023-24 will see the introduction of a lowered tackle height in all levels of the game below professional rugby union in England. The purpose is to reduce the potential for head impacts between the tackler and ball carrier and increase player safety. The injury surveillance project provides a means of monitoring injury-related outcomes and therefore will be integral to understanding the impact of this law variation. Analysis of tackle characteristics will allow comparison of how players behave in tackle events both before and after the change in tackle height. Additionally, by analysing match play for certain events (such as numbers of contact events and passes), there will be an opportunity to assess the impact of a lowered tackle height on how the game is played.

PROJECT METHODS

Recruitment

A database of 278 schools was compiled from previous seasons which was subsequently used for recruitment. Schools were contacted via email and invited to participate in YRISP. Schools who wished to do so participated voluntarily and consent was gained from players and their parents at the beginning of the season. The 18 schools who participated were spread across the country, with the majority located in southern England (Figure 13). There was a greater weighting of independent schools (blue marker) participating compared to state schools (maroon marker).

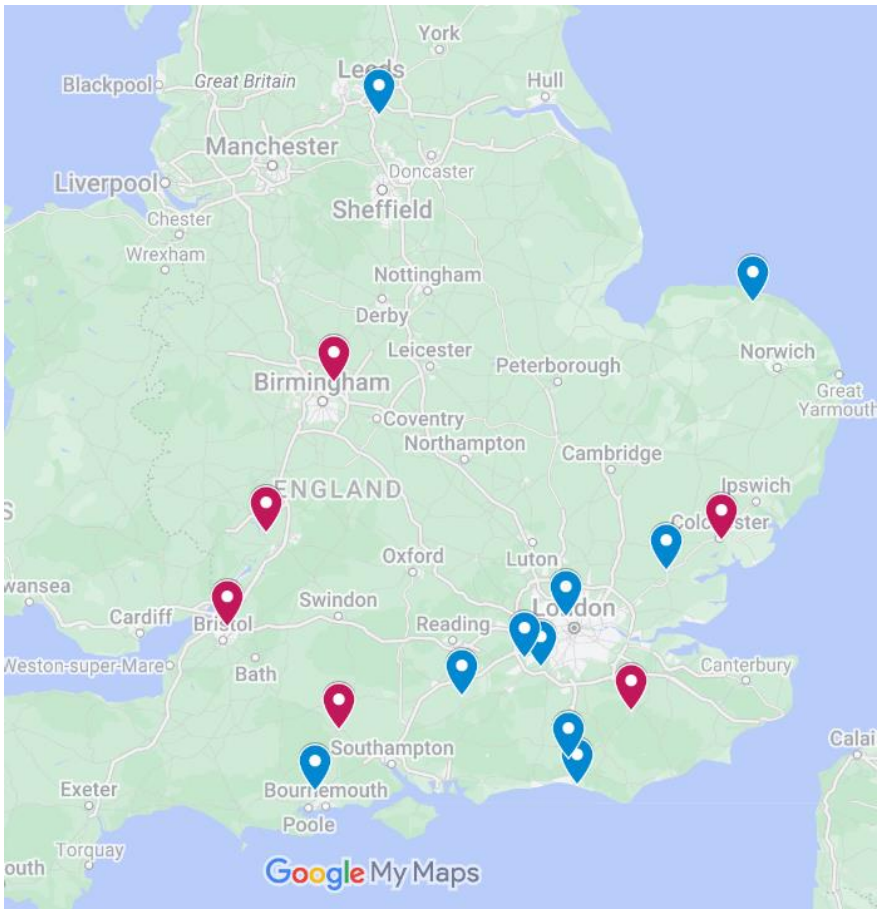


Figure 13. Map showing locality of participating schools, and their status, for the 2021-22 season.

Data collection

Each participating school assigned a primary contact who was provided with a bespoke worksheet to record exposure and injury reporting. The primary contact was asked to record this data weekly and transfer back to the research team at the University of Bath on a monthly basis. Report forms contained the following information:

Match exposure data (location, surface type, length of game, opponent, outcome)

Injury data (date of injury, return to play date, match quarter, position, mechanism, location, type)

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Many thanks to the coaches and sports injury staff at the following participating schools in the Youth Rugby Injury Surveillance Project for 2021-22:

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