



## Epidemiology of injuries within English youth rugby union



## Executive Summary

- The aim of this research was to determine the rate, severity, type and cause of injuries in English academy and schools (16-18 year olds) rugby union.
- A two season injury surveillance study was conducted during seasons 2006/07 and 2007/08.
- Overall, the incidence of match and training injuries was less than half that reported in senior elite club rugby union.
- The pattern of injuries (type and body location) was similar to that previously reported for senior rugby union, with the lower limb being the most common injury location and joint ligament sprains the most common type of injuries.
- Similar to senior rugby union, the tackle was the match event most commonly associated with match injury for both academy and school youth rugby.
- Within Academies, attack, defence and ruck/maul drills were the training activities posing the greatest injury risk. Contrary to this, in Schools it was individual skills, weight training and scrummaging practice which posed the greatest injury risk.

## Background

- Previous injury surveillance studies have highlighted high injury incidence rates in senior elite rugby union.
- Despite high participation rates, limited injury data has been available for youth rugby union, with no systematic studies previously conducted for any level of youth rugby union in England.
- The extent to which injury rates and patterns in youth rugby mirror those reported in senior rugby union is not clear. Therefore, it is not known whether specific measures should be taken to manage injury risk in youth rugby that might be different to those in senior rugby.

## Study Aims

- The aim of this research was to determine the rate, severity, type and cause of injuries in English male youth rugby union.

## The Study

- A two season (2006/07; 2007/08) injury surveillance study was conducted by researchers at the University of Bath on behalf of the RFU to investigate injuries in male youth (16 – 18 yrs) rugby union players.
- England nominated and elite player development group academy players were recruited from 12 English Premiership academies to form the “Academy” group (274 players; 131 forwards, 143 backs). 1st XV players (plus reserves) were recruited from 7 rugby playing schools to form the “School” group (222 players; 122 forwards, 100 backs).
- Match and training injuries and exposure (amount of time spent in match and training activities) were reported using forms completed by medical support staff and rugby coaching/fitness staff working in the clubs and schools. Injury diagnosis was recorded using the Orchard sports injury coding system (Orchard, 1993), and data were analysed for injury incidence, nature and overall injury burden.
- Overall, 92% of the expected match/training exposure forms and the individual injury forms were returned.

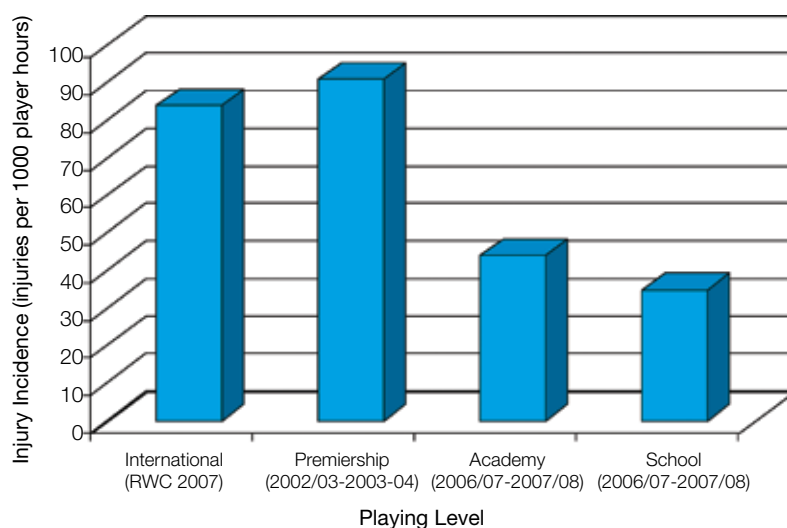


## Definitions

- **Injury** - 'any injury that prevented a player from taking a full part in all training and match play activities typically planned for that day for a period of greater than 24 hours from midnight at the end of the day the injury was sustained'. This injury definition was in line with the 2007 IRB consensus statement (Fuller et al, 2007) and allowed the results of this study to be compared with previous research.
- **Exposure** – the number of hours spent in a particular activity
- **Injury incidence** - the number of injuries sustained per 1000 player hours
- **Injury severity** - the mean number of days lost per injury
- **Injury burden** – a measure of the 'cost' of injuries, multiplying incidence by severity to give total numbers of days lost per 1000 player hours
- **95% CI** – are 95% confidence intervals, which give the range in which the true 'population' value will lie.

## Match Injuries

- Over two seasons, the study observed a total of 2527 player match hours (forwards: 1348; backs: 1179) and 111 injuries (forwards: 45; backs: 66) for the Academy cohort. For the School group, there was a total of 3843 player match hours (forwards: 2060; backs: 1783) and 134 injuries (forwards: 69; backs: 64). Injuries resulted in a total of 3504 and 3947 days being lost for the Academy and School group respectively.
- These match injury rates equated to 0.4 (95% CI 0.3 to 0.5) and 0.6 (95% CI 0.5 to 0.7) match injuries per player per season and 12.8 (95% CI 11.3 to 14.3) and 15.8 (95% CI 15.3 to 16.3) days absence per player per season within academies and schools, respectively
- **Match injury incidence was lower in youth rugby than elite senior rugby union (Figure 1).**
- **Match injury incidence for the Academy group was 43.9 injuries (95% CI: 35.7 to 52.0) per 1000 player match hours; match injury incidence for the School group was 34.9 injuries (95% CI: 29.0 to 40.8) per 1000 player match hours.**
- The mean **severity of injury was higher for Academy (32 days) and School players (30 days) than Premiership players (18 days).** The breakdown of severity classifications for the Academy group, School group and comparisons with senior rugby are presented in **Table 1**.

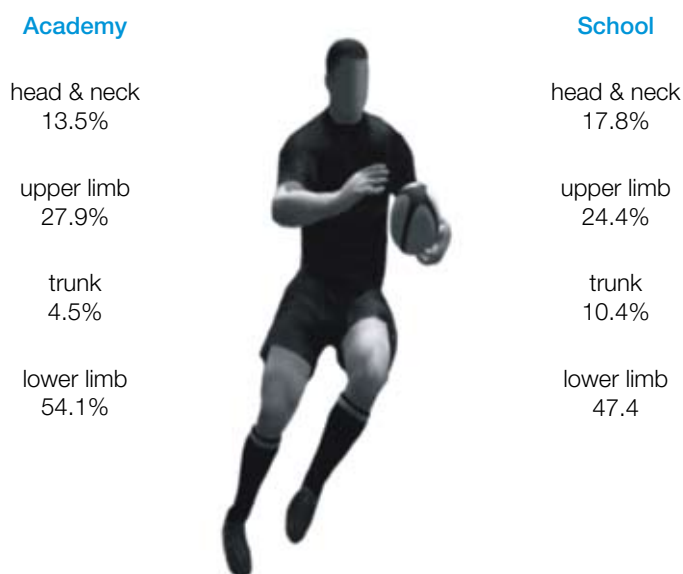


**Figure 1** A comparison of match injury incidence across playing levels

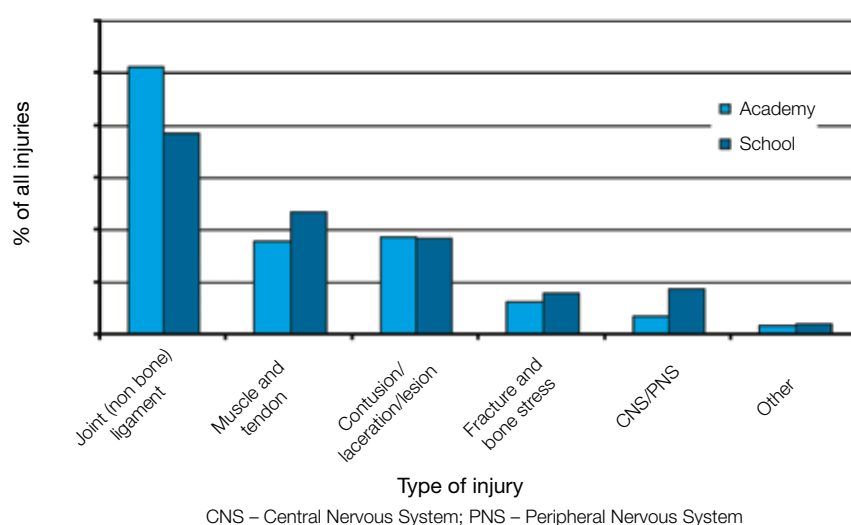
**Percentage of Injuries in iRB Severity Categories**

Injury Severity	International (RWC2007)	Premiership (2002/3-2003/4)	Academy (2006/7-2007/8)	School (2006/7-2007/8)
Slight (0-1 days)			2	6
Minimal (2-3 days)	25 (slight,minimal)		9	6
Mild (4-7 days)	29	54 (slight,minimal,mild)	14	23
Moderate (8-28 days)	28	26 (8-21 days)	48	37
Severe (> 28 days)	18	20 (>21 days)	27	28

**Table 1** Severity classifications for match injuries



**Figure 2** Body location of match injuries for Academy and School players



**Figure 3** Types of injuries observed in Academy and School players

- The lower severity observed in senior elite rugby may reflect a number of factors including: a) a tendency / pressure for senior players to return to play rather than a genuine increased severity of injury for youth players; and b) more comprehensive treatment skills and resources available to senior players.
- Unlike previous senior rugby union studies (e.g. Brooks et al, 2005), this study observed a **numerically greater match injury incidence in backs compared with forwards** for youth players (Academy backs = 50.1 injuries/1000 hours; Academy forwards = 37.2 injuries/1000 hours; School backs = 36.5 injuries/1000 hours; School forwards = 33.5 injuries/1000 hours).
- The **lower limb was the most common injury location** for both academies (54% of all injuries) and schools (47% of all injuries).
- Joint (non-bone) ligament injuries were the most common type of injury (Academy=51%; School = 39%), followed by muscle/ tendon injuries (Academy=18%; School = 24%) and contusion/ laceration injuries (Academy=19%; School = 19%). **Figure 3** presents the types of injuries observed in academies and schools in rank order.
- Regarding specific injury diagnoses, **knee anterior cruciate ligament (ACL) injuries (Academy) and shoulder dislocation (School) injuries resulted in the greatest number of overall days lost (Table 2).**

Academy			School		
Injury	Number of injuries	Days Lost	Injury	Number of injuries	Days Lost
Knee ACL	3	219	Shoulder dislocation/ instability	8	257
Knee meniscus/ cartilage	4	145	Shoulder unclassified	14	204
Shoulder rotator cuff	6	18	Knee unclassified	9	112

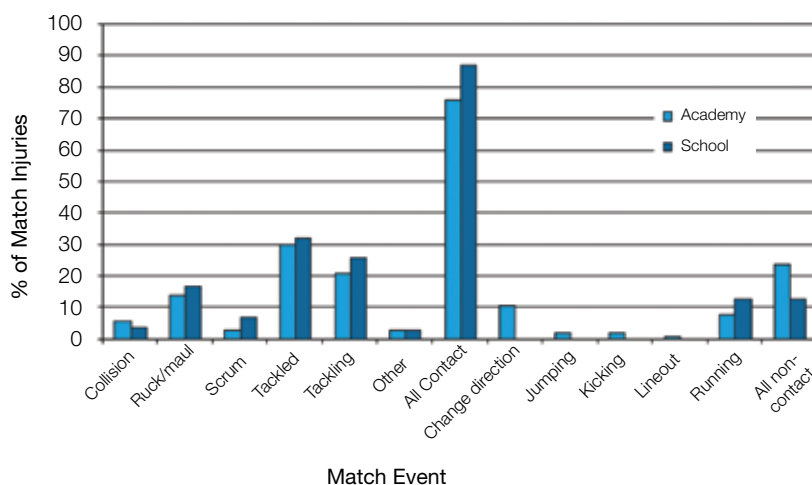
**Table 2** Match injuries causing the greatest overall days lost for academies and schools



- **The tackle was the match event most commonly associated with injury** for both Academy (46% of all match injuries) and School players (52% of all match injuries), with slightly more injuries as a result of being tackled than tackling. The match events causing injury are presented in [Figure 4](#).
- Regarding the level of recurrent (repeat) injuries, the incidence of recurrent injuries for the Academy group was 5.1 (95% CI: 2.3 to 7.9) per 1000 player match hours; recurrent match injury incidence for the School group was 3.9 (95% CI: 1.9 to 5.9) per 1000 player match hours.
- These recurrence rates for Academy players (12%) and School players (11%) were lower than the recurrence rate for Premiership players (18%), indicating generally good rehabilitation completeness for youth players.
- However, **the mean severity of recurrent (repeat) injuries was high in schools** (mean of 46 days) compared with the severity of new injuries in schools (27 days), and higher than the severity of recurrent injuries in academies (17 days), leading to **the burden of recurrent match injury being significantly higher in School than Academy players**.  
This finding reinforces the importance of complete rehabilitation prior to return to play so to avoid the risk of lengthy lay-offs with recurrent injuries.

## Training Injuries

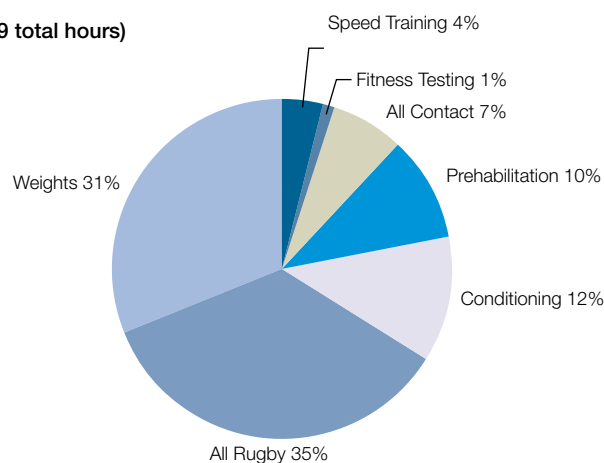
- Academy players conducted over twice the amount of training compared with school players on average (Academy: - 3.7 hours per week per player; School: - 1.4 hours per week per player), with a greater proportion of time spent doing weight training and prehabilitation (injury prevention) training ([Figure 5](#)).



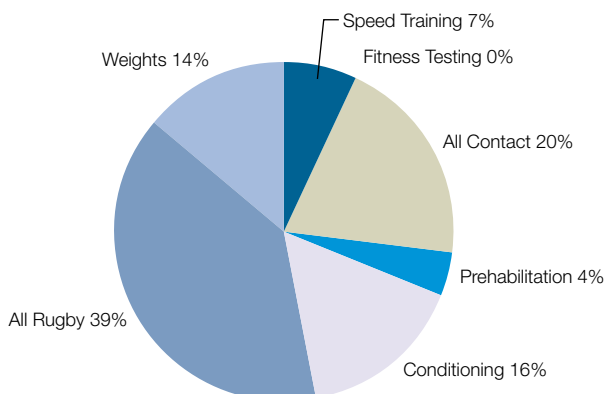
**Figure 4** Proportion of injuries arising from particular match events

NB. Match events leading to non-contact injuries in schools were not coded to the same level of detail.

### Academy (52,109 total hours)



### School (15,877 total hours)



**Figure 5** Distribution of training activities for academies and schools

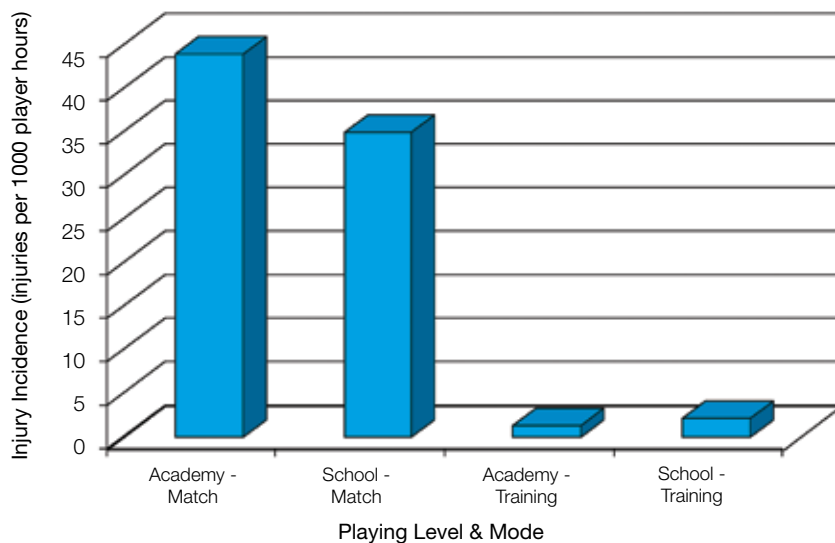


Figure 6 A comparison of injury incidence across matches and training

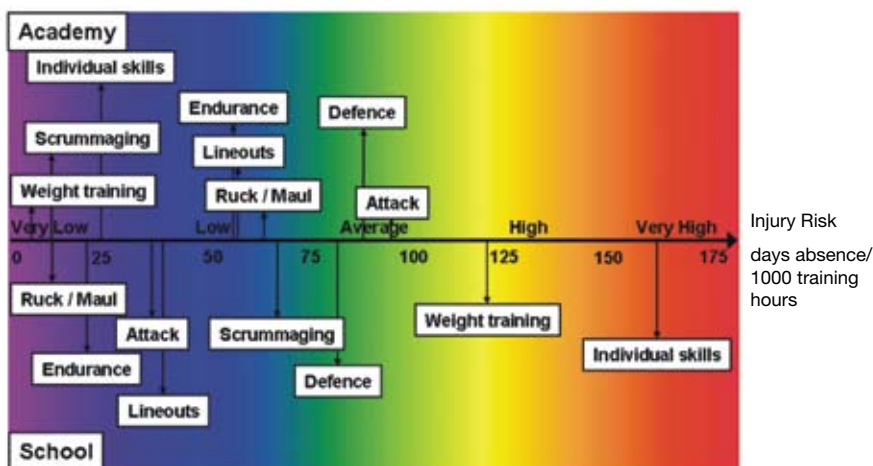


Figure 7 Training injury risk (days absence/1000 player training hours), as a function of training activity

- Over two seasons, the study observed a total of 52,109 player training hours and 66 injuries (forwards: 28; backs: 38) for the Academy cohort. For the School group, there were a total of 15,877 player training hours and 34 injuries (forwards: 23; backs: 11).
- **Injury occurrence was considerably lower during training than matches (Figure 6).** Training injury incidence for the Academy group was 1.3 (95% CI: 1.0 to 1.6) per 1000 player training hours and was significantly lower than the training injury incidence for the School group at 2.1 (95% CI: 1.4 to 2.9) per 1000 player training hours. The training injury incidence of elite senior players (Premiership) was 2.0 (95% CI: 1.8 to 2.2) per 1000 player training hours.
- The mean severity of new training injuries were 17 days (Academy) and 19 days (School).
- Overall, **front row forwards were the most commonly injured of all position groups within training**, with a significantly higher training injury incidence in school front row forwards than academy front row forwards, mainly due to injuries resulting from scrummaging practice.
- The **lower limb was the most common injury location** for academies and schools.
- Training activities of **individual skills, weight training and scrummaging training posed greater risk for injury in schools than in academies (Figure 7).** The training activities of **ruck/maul and attack training posed greater risk for injury in academies than in schools.**
- **The severity of recurrent (repeat) training injuries was high in schools (60 days) versus academies (13 days),** mirroring the situation with match injuries.
- Academies had a greater volume of training than schools but the overall risk of training injury was significantly lower. There was little pre-season preparation training recorded within schools compared with academies and a greater proportion of training time during the competitive season was spent in high risk contact training activities – these factors may have contributed to the higher incidence of training injuries observed within the School group.



## External Risk Factors for Injury

- Regarding protective equipment, the burden of shoulder injuries sustained during matches was higher when shoulder padding was not worn for both academies (Relative Risk: 1.60) and schools (Relative Risk: 1.10), although this increased risk was not statistically significant.
- Similarly, **the burden of head injuries increased when head guard padding was not worn** for both academies (with padding: 19 days absence/1000 player match hours; without padding: 53 days absence/1000 player match hours) and schools (with padding: 9 days absence/1000 player match hours; without padding: 54 days absence/1000 player match hours), a significant difference for schools although the relatively small number of injuries observed suggests that more data is required to confirm this finding.

## Assumptions / Limitations/Constraints

- The study captured only the rugby exposure and injuries sustained by players during their participation for the teams involved in the project. Some players may have had rugby and other sport exposure for teams outwith those analysed for the study.
- The School cohort came from very established rugby playing schools and so this group may not be representative of the entire rugby playing Schools population in England.

## Implications for The Future

- In general the injury patterns in youth rugby broadly mirror those observed in senior rugby, in terms of types and causes of injury, particularly for the Academy group. However, there does appear to be certain areas where differences in the injury patterns are beginning to emerge; these may require specific attention or strategies to manage the injury risk in youth rugby union.
- Key areas for potential injury reduction may include:
  - Refining coaching practice to optimise player match technique from a safety perspective without compromising performance  
*This should include appropriate coaching of contact technique for executing and receiving tackles.*
  - Refining coaching practice to optimise player training technique from a safety perspective without compromising performance  
*This should include a review of the proportion of time spent doing contact drills and a review of scrummaging training activities and weight training technique and supervision in school rugby players.*
  - Developing specific pre-habilitation training programmes designed to protect players from high risk injuries.  
*Injuries specifically to the knee (ACL) within academies and shoulder within schools represented the greatest injury burden and this pattern was mirrored within both matches and training.*
  - Improving diagnosis, treatment and rehabilitation (including a review of return to play decisions making) for common, high risk and recurrent injuries  
*This should include the review, development and dissemination of best practice guidelines for selected injuries.*



## Acknowledgements

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## Authors

Debbie Palmer-Green, Dr Grant Trewartha and Dr Keith Stokes

Sport, Health & Exercise Science, School for Health, University of Bath

