

**Supplementary Table 1 – Description of included studies**

Author / Year of publication	Data collection details	Definition of injury	Definition of concussion	Who carried out the injury assessment	Age	Gender	Time / Period	Country	Rugby Code
Baker et al (2013)	Retrospective questionnaire survey on club and national academy elite youth rugby players, no time limit for recall	Self-reported concussion	Self-reported concussion symptoms checked against Sports Concussion Assessment Tool version 2 (SCAT-2)	Self-reported	<20 years	Male	2009-10 season	Ireland	Union
Collins et al (2008)	Clubs completed weekly reports including injury details	Requiring medical attention by physician, trainer or emergency department; one or more days missed play	Not defined	Most were assessed by a doctor or other medical personnel such as an athletic trainer (93.0%)	13-19 years Mean age 16.5 years	Male and female	2005 and 2006 seasons	USA	Union
Davidson (1987)	Data collected prospectively at a casualty station during inter-school matches at a large private school	Any injury however minor reported to casualty station	Not defined	Trained nurse and if appropriate by doctor	11-18 years	Male	1969-86	Australia	Union
Durie and Munroe (2000)	Data collected at the injury clinic at a boys high school on the Monday following matches	Unable to continue playing or reported injury at the end of a game: minor (able to play again in 7 days); moderate (unable to play for 1-3 weeks); severe (unable to play for more than three weeks)	Not defined	Doctor assessment at injury clinic	<19 years	Male	1998 season	New Zealand	Union

Fridman et al (2013)	Data collected routinely at Canadian emergency departments	Sport related injury diagnosis	Not defined	Medical diagnosis	5 to 19 years	Male and Female	1 April 2007 to 31 March 2010	Canada	Not Specified
Fuller and Molloy (2011)	Data collected prospectively during four international competitions, two in 2008 and two in 2010	Time-loss match injuries	Not defined	Team physician responsible for recording injury location and type	<20 years, mean age 19 years	Male	2008 and 2010 tournaments	International	Union
Gabbett (2008)	Prospective match data collection over four seasons, junior rugby league	Player misses subsequent match	Not defined	Head trainer accredited in injury assessment	17-19 years	Male	2003 – 06 seasons	Australia	League
Haseler, Carmont and England (2010)	Prospective data collection from one community rugby club	Unable to return to play for at least two days	Concussion described to form completers as “suffering from transient loss of consciousness, confusion, dizziness, nausea or visual disturbance following a head injury”	Injuries form completed by coaches or first aid staff. Formal diagnoses obtained for those players who attended GP or emergency department	<17 years	Male	2008-09 season	England	Union
Junge et al (2004)	Data collected prospectively via weekly player interview with doctor from 10 school rugby teams	Any physical complaint caused by rugby during training or match	Not defined	Doctor visited teams weekly to record injuries. No on-site team physician or physiotherapist responsible for looking after the players	14-18 years	Male	March to August 2001	New Zealand	Union
King et al (2013)	Retrospective analysis of medical pre-competition questionnaires	Self-reported concussion	Concussion history items not defined, compared to post concussion symptom scale to establish baseline data	Self-reported	Under 15 years and under 17 years	Male	2010 to 2012 competition period	New Zealand	League
King (2006)	Data collected prospectively during	Any pain or disability suffered by a player during	Not defined	Recorded by accredited team trainer	Under 16 years and under 18	Not given	March to April 2005	New Zealand	League

	competition	a match that required advice and / or treatment			years				
Lee and Garraway (1996)	Prospective data collection over a season from nine state or private rugby playing schools	Sustained during training or match resulting in inability to play or train. Coded using International Classification of Diseases, ICD-9 classifications	Not defined	Injury recorded by teacher, school nurse or matrons. Additional information gained from parents and General Practitioner or hospital if appropriate	11-19 years	Male	1993-94 season	Scotland	Union
Lewis and George (1996)	Data collected prospectively from games from three youth rugby clubs	Requiring attention on the pitch or after game or training session	Following a blow to the head, one or more of: loss of consciousness, loss of memory, confusion and disorientation; double/blurred/abnormal vision; giddiness or unsteadiness; vomiting; or headache OR within 24 hours of blow to head one or more of: persistent headache; drowsiness leading to unconsciousness; irritability; confusion and loss of concentration; vomiting; or convulsions	Questionnaire completed by club doctor or physiotherapist	< 19 years Mean age 17 years	Not given	September 1992 to April 1994 (two seasons)	England	Union
Marshall and Spencer (2001)	Data collected prospectively onto a custom made database from one high school rugby programme	Injuries resulting in time lost from games or practice, all fractures and concussions recorded	Graded using Cantu Scale, loss of consciousness, disorientation, convulsions, dizziness, amnesia, disorientation or headache	Doesn't say who records them during game or training  Concussions are monitored and reviewed by team physician	Not given (high school)	Not given	1998-2000 three seasons	USA	Union
McIntosh (2001)	Prospective data collection during	A traumatic event resulting in a	"Medically verified concussion"	Team nominated "recording officer".	< 15 years	Male	Single competitive	Australia	Union

	inter school competitions	missed game or missed training		Team medical officers were contacted to verify injury diagnosis			season (doesn't give dates)		
McIntosh et al (2010)	Data collected prospectively from matches, participants were from schools or clubs	Game injury – requiring on-field treatment or removal from game Missed game injury - player misses a game the following week, usually at least 7 days absence from competition	Defined by at least one of a list of “concussion descriptors” on injury form including loss of consciousness, headaches, dizziness and post-traumatic amnesia	Injury data collected at games by university students trained in injuries, typically studying medicine, physiotherapy or sports science supplemented with information from players treating doctor or team physiotherapist	<20 years	Male	2002 and 2003 seasons	Australia	Union
Nathan, Goedeke and Noakes (1983)	Injury data collected weekly from matches in one school via missed game reports	Severe enough to prevent player from play for at least 7 days	Not defined	Self-reported player questionnaire, interviewed by study personnel	<19 years	Male	1982 season	South Africa	Union
Nicol et al (2011)	Data collected prospectively by school “data champion” at five secondary schools (state and private)	Player unable to take a full part in future training or match play (taken from IRB definition)	Not defined	Injury recorded/assessed by school-based data collector (majority were non-medical)	11-18 years	Male and female	Second half of 2008-09 season	Scotland	Union
Roux et al (1987)	Data collected weekly following matches from 26 schools (20 closely monitored)	Severe enough to prevent the player from returning to rugby for at least seven days	All concussion injuries had to be reported regardless of ability to continue playing, concussion not defined	Teacher/coaches completed one weekly form for all injuries, injured players completed individual injury report forms	<19 years	Male	1983, one 18-week season	South Africa	Union
Shuttleworth-Edwards et al (2008)	Data collected prospectively for all concussed players referred to school medical centre from five	Concussion study	Any alteration in neurological status occurring as a result of head-jarring trauma with or without loss of consciousness	Doctor (four schools) and nurse (one school)	South African school grades 8 to 12	Male	2002-06	South Africa	Union

	schools from matches								
Sparks (1981)	Data collected routinely by school doctor from one private school	At least one week's absence from the game	Not defined	Doesn't say, the paper is written by the school doctor	13-18 years	Male	1950-79	England	Union
Sparks (1985)	As above (follow-up study to Sparks 1981)	No definition given for injury, it was defined in prior study (see above Sparks 1981)	Loss of consciousness, however transient, caused by a blow to the head or neck	Doesn't say, the paper is written by the school doctor	13-18 years	Male	1980-83, four seasons	England	Union
Sugerman (1983)	Data collected from matches at 33 schools and centralised monthly	As reported by a player to the teacher, generally after a match	Not defined	Teacher	Secondary school ages (11 to 18 years)	Male	1981 school season (April to July)	Australia (Australian Capital Territory, New South Wales and Queensland)	Union
Upton, Roux and Noakes (1996)	Data collected retrospectively via questionnaire survey to 25 high schools	No definition of injury or concussion given	No definition of injury or concussion given	Self-completed player questionnaires	Not given (high school)	Male	1991	South Africa	Union
Watson (1997)	Data collected prospectively from schools	Required medical treatment or disrupted training or matches	Not defined	Physical education teachers	14 to 19 years	Male	12 month period	Ireland	Not Specified