

Supplementary Table 2: Results of the Newcastle-Ottawa Score stars assigned to each paper, by domain

	Representativeness *	Sample size *	Non-respondents *	Exposure assessment **	Comparability **	Outcome assessment **	Statistical test *	Total (Out of 10)
McMillan et al, 2017 (32)	Sampling frame identified (*)	Not justified	No description of non-respondents	Description of concussion (*)	No adjustment for confounding with rugby cohort	Self-reported (*)	Examined number of concussions within rugby players (*)	4
Hume et al, 2017 (31)	Self-selected cohort	Not justified	No description of non-responders	Definition of concussion (*)	No adjustment for confounding within rugby cohort	Self reported (*)	No test of concussion in elite cohort	2
Decq et al, 2016 (27)	Sampling frame identified (*)	Not justified	No description of non-responders	No description of concussion data	No attempt to examine effect of concussion	Self-reported using scale (*)	Examined number of concussions within rugby players (*)	3
Esopenko et al, 2018* (28)	No clear sampling frame identified	Not justified	No description of non-respondents	Description of concussion (*)	Adjusted for age in analysis of alumni group (*)	Self-reported (*)	Examined concussion within ice-hockey players (*)	4
Baker et al, 2018 (24)	No clear sampling frame identified	Not justified	No description of non-respondents	No mention of concussion data	No attempt to examine effect of concussion	Self-reported (*)	No test of concussion in ice hockey players	1
Misquitta et al, 2018 (33)	No clear sampling frame identified	Not justified	No description of non-respondents	Zurich guidelines on concussions used (*)	Regression model adjusted for age (*)	Imaging data – not clear if done in absence of knowledge of exposure (*)	Appropriate regression analysis (*)	4

	Representativeness *	Sample size *	Non-respondents *	Exposure assessment **	Comparability **	Outcome assessment **	Statistical test *	Total (Out of 10)
				(Career used as a proxy for repeated concussions)				
Alosco et al 2017 (22)	No description of sampling strategy	Not justified	No description of non-responders	Cumulative head impact index (**)	Mixed effect models adjusted for age and BMI (**)	Neuropsychological test battery and self-reports (*)	Appropriate statistical modelling (*)	6
Multani et al, 2016 (34)	No description of sampling strategy	Not justified	No description of non-responders	Description of concussion (*)	No reported analyses within football players	Neuro-psychological testing (*)	Test not appropriately applied to examine concussion	2
Hart et al, 2013 (30)	Probably not representative	Not justified	No description of non-responders	Concussion using 1997 AAN guidelines (**)	Main analysis within NFL players (*)	Neuro-psychological testing (*)	No test of concussion within players	4
Randolph et al, 2013 (35)	Selected as having MCI	Not justified	No description of non-responders	No mention of concussion data	Analysis of NFL players by cumulative years of professional play (*)	Modified telephone interview of cognitive status (*)	Cumulative years of play (surrogate for cumulative concussions)	3
Amen et al, 2011 (23)	Probably not representative	Not justified	No description of non-responders	Self-reported concussion (*)	Not obvious that controlled analysis performed	Neuro-psychological tests (*)	Analysis of concussion within cohort (*)	3

	Representativeness *	Sample size *	Non-respondents *	Exposure assessment **	Comparability **	Outcome assessment **	Statistical test *	Total (Out of 10)
Guskiewicz et al, 2005 (29)	Questionnaire sent to all retired players (69% response rate) (*)	Not justified	No description of non-responders	Self-reported concussion (*)	Analysis stratified by age (*)	MCI questionnaire (*)	Chi-squared test for trend (*)	5
Bang et al, 2016 (25)	Small case series	Not justified	No description of non-responders	No concussion data collected	Not sufficient sample size	Purdue pegboard test (*)	To small a sample to be meaningful	1
Bernick et al, 2015 (26)	Not clear how representative	Comparison of sample with population (*)	No specific mention of results of the comparison	Knockouts and technical knockouts (forms of concussion) (*)	Multivariable modelling (*)	Computerised battery of test (*)	Appropriate analysis including Cis (*)	6

* One "control" excluded due to a history of concussion with extended post-concussion symptoms. Another was diagnosed with Parkinson's shortly after testing and so was excluded.