



Self-Reported Concussion among NCAA Student-Athletes

Executive Summary

February 2014

Descriptive Overview of Self-Reported Concussion

- As part of the 2010 NCAA GOALS survey, approximately 20,000 student-athletes from over 600 NCAA institutions were asked whether they had been diagnosed with, or believed that they had experienced, a concussion during their collegiate career. These suspected concussions could have been reported or unreported events that occurred either on or off the court/field.
- Men reported experiencing a concussion (or what they believed was a concussion) at higher rates during college than reported among women.

	Concussion		
	None	Once	Multiple
Women	86.9%	9.9%	3.2%
Men	80.6%	13.3%	6.1%

- These rates of self-reported concussion were comparable across Divisions I, II and III.

	Concussion		
	None	Once	Multiple
Division I	83.7%	11.7%	4.5%
Division II	83.6%	12.0%	4.4%
Division III	82.6%	11.9%	5.5%

- There were differences in self-reported concussion rates when disaggregating by sport.

Men's Sport	Concussion		
	None	Once	Multiple
Wrestling	72.2%	19.5%	8.2%
Football	72.6%	17.9%	9.5%
Ice Hockey	74.3%	18.6%	7.1%
Lacrosse	74.4%	17.8%	7.8%
Soccer	76.8%	16.8%	6.4%
Basketball	81.6%	13.0%	5.5%
Baseball	86.8%	10.0%	3.2%
Track & Field	92.0%	4.9%	3.0%
Swimming & Diving	92.3%	5.9%	1.8%
Tennis	92.8%	6.0%	1.2%
Golf	95.0%	3.7%	1.3%

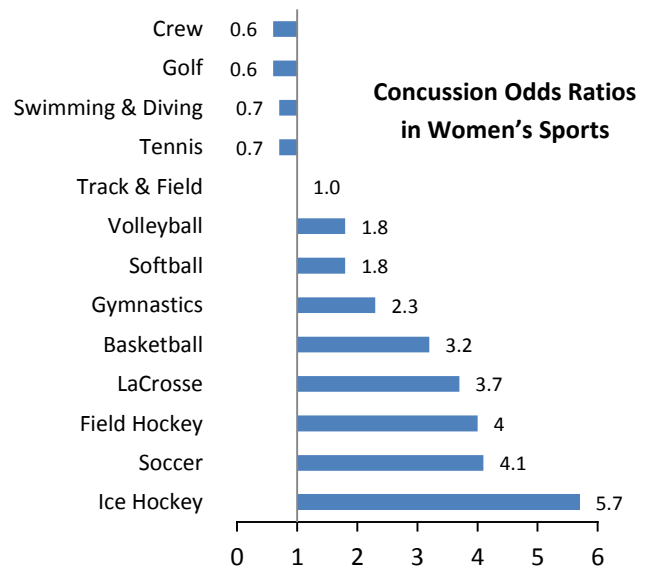
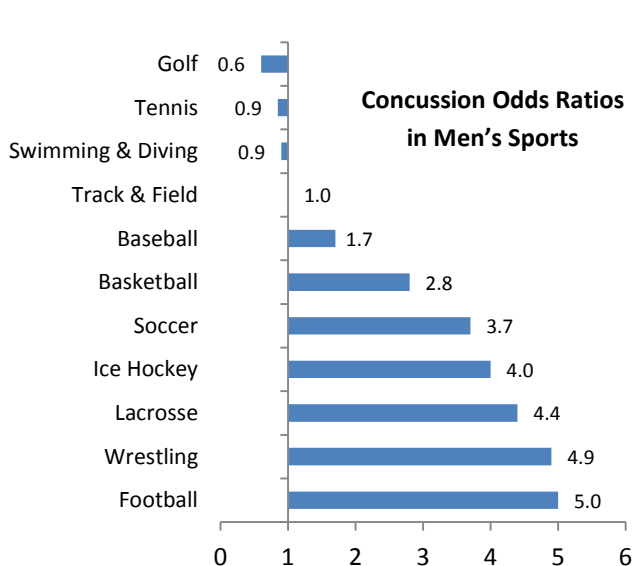
Women's Sport	Concussion		
	None	Once	Multiple
Ice Hockey	70.8%	20.9%	8.3%
Field Hockey	78.8%	15.2%	6.0%
Soccer	79.0%	13.9%	7.1%
Lacrosse	79.5%	14.3%	6.2%
Basketball	82.0%	14.1%	3.9%
Gymnastics	85.6%	12.8%	1.6%
Softball	87.8%	9.9%	2.3%
Volleyball	89.0%	8.8%	2.1%
Track & Field	93.3%	5.4%	1.3%
Tennis	95.1%	4.0%	0.9%
Crew	95.2%	4.6%	0.2%
Swimming & Diving	95.5%	3.7%	0.8%
Golf	95.6%	3.8%	0.6%

- Although these results are informative, such statistics do not account for how these demographics interrelate. For example, would men still have a higher self-reported concussion rate than women if we matched the groups on other demographics like varsity status or sport played? In the following section we present results derived from advanced statistical models employed to disentangle these relationships.

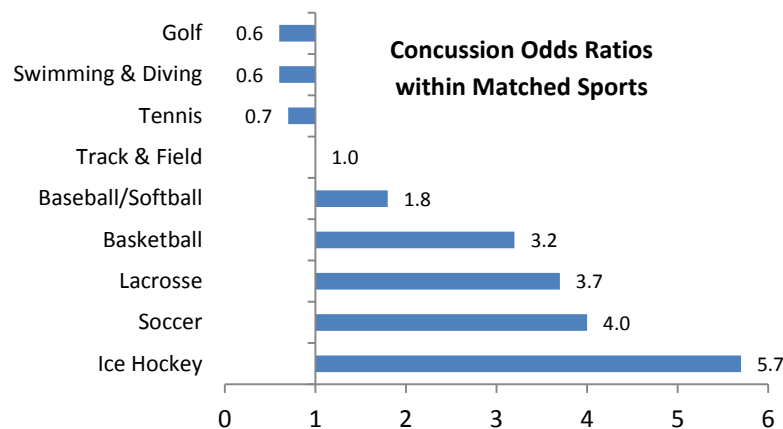
Demographic Predictors of Self-Reported Concussion

Findings

- **Year in school.** Not surprisingly, year in college was the strongest independent predictor of whether a student-athlete reported having a concussion during his/her time in college. The relationship with time was fairly linear with seniors being about twice as likely as frosh to self-report a college concussion.
- **Athletic status.** Student-athletes who reported being starters / first-team participants were significantly more likely to report concussions. However, this relationship was not nearly as strong as year in school, indicating that all student-athletes on a team are at some risk of concussion.
- **Sport.** Sport was a strong independent predictor of self-reported concussion. Among both men and women, the odds of indicating one or more self-reported concussions were significantly elevated for student-athletes competing in certain sports. The figure below displays sport-specific odds ratios derived from statistical models run separately by sex for the sports sampled in the GOALS study. Relative to track and field, which was set as a baseline comparison group, student-athletes in a number of sports showed an elevated concussion risk (all of the odds ratios above 1.0 were statistically significant at the $p < .01$ level, indicating elevated risk relative to track and field).



- **Sex.** Models that did not take sport into account indicated that male student-athletes had a higher risk of these self-reported concussions than female student-athletes. However, it was hypothesized that the men’s sports of football and wrestling might have been driving that observed relationship. Therefore analyses were undertaken that matched similar men’s and women’s sports (for example, men’s vs. women’s ice hockey; baseball vs. softball) in an attempt to delineate sport and sex effects. These analyses continued to show that sport was significantly related to self-reported concussion (see figure below), but that neither sex nor any sport by sex interaction term was significant after controlling for sport. In other words, there was no differential risk observed for males or females overall or within any of these sports. The sport played and not the sex of the participant seems to be the key risk factor.



- **Variables not associated with concussion.** NCAA division showed no relationship with self-reported concussion after controlling for sport and the other demographic variables available. This indicates that concussion risks may be similar within each level of competition. Similarly, race/ethnicity does not appear independently related to concussion.
- **Multiple concussions.** Year in school and first-team status were independently associated with self-reporting multiple concussions while in college on the GOALS survey. Football was the only sport that independently predicted multiple concussions. Given the low base rate of multiple concussions in this sample, it is possible that this effect is observed only in football because of the relatively large football sample size in the study.

Technical notes on analyses

In most of the statistical analyses undertaken, self-reported concussion was treated as a dichotomy (no self-reported concussion vs. any self-reported concussion) and binary logistic regression analyses were applied to examine whether available demographic variables were independently related to self-reported concussion. As appropriate, more nuanced multinomial logistic regression models were examined using the original three-category concussion variable (no self-reported concussion vs. one vs. multiple). All relationships described in this section should be interpreted as independent relationships that control for the other demographic variables available (but not unavailable covariates like position played in a particular sport). Other limitations of these analyses include the researchers not knowing the timing and athletics circumstances (e.g., whether concussion occurred during athletics practice, competition, or off-field) of self-reported concussive episodes. *Study authors are Lydia Bell, Seunghyun Hwang, Tom Paskus and Brian Hainline.*