



Concussion Rates in U.S. Middle School Athletes

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Key Findings

1

Football had the highest overall concussion rate among all middle school sports (Table 1).

2

Girls suffered concussions at a higher rate than boys when participating in sex-comparable sports.

3

Middle school sports had an overall higher rate of concussion than reported in high school or collegiate sports (Figure 1).

Purpose: To investigate the epidemiology of concussions among middle school age athletes from the 2015-16 to 2019-20 school years.

Background:

- Research describing concussion incidence and mechanisms is necessary to inform primary prevention efforts and improve clinical care.
- There is limited information regarding the incidence of concussions in middle school athletic settings.

Methods:

- Athletic trainers recorded injury and athlete exposure (AE) data from public middle schools in Virginia.
- Concussion rates per 1000 AEs with 95% confidence intervals (CIs) were calculated for 12 school-sponsored sports (baseball, football, wrestling, boys' and girls' basketball, cheerleading, boys and girls' soccer, softball, boys' and girls' track, and volleyball).
- Injury rate ratios (IRR) were calculated to compare concussion rates between practice and competition. with 95% CI excluding 1.00 were deemed statistically significant, consistent with prior protocols.
- Sex-comparisons were conducted for sports played by boys and girls (e.g., soccer, basketball, track and field, and softball/baseball).
- Due to COVID-19 data was not collected for boys' track, baseball, softball, and girls' soccer for 2019-2020.

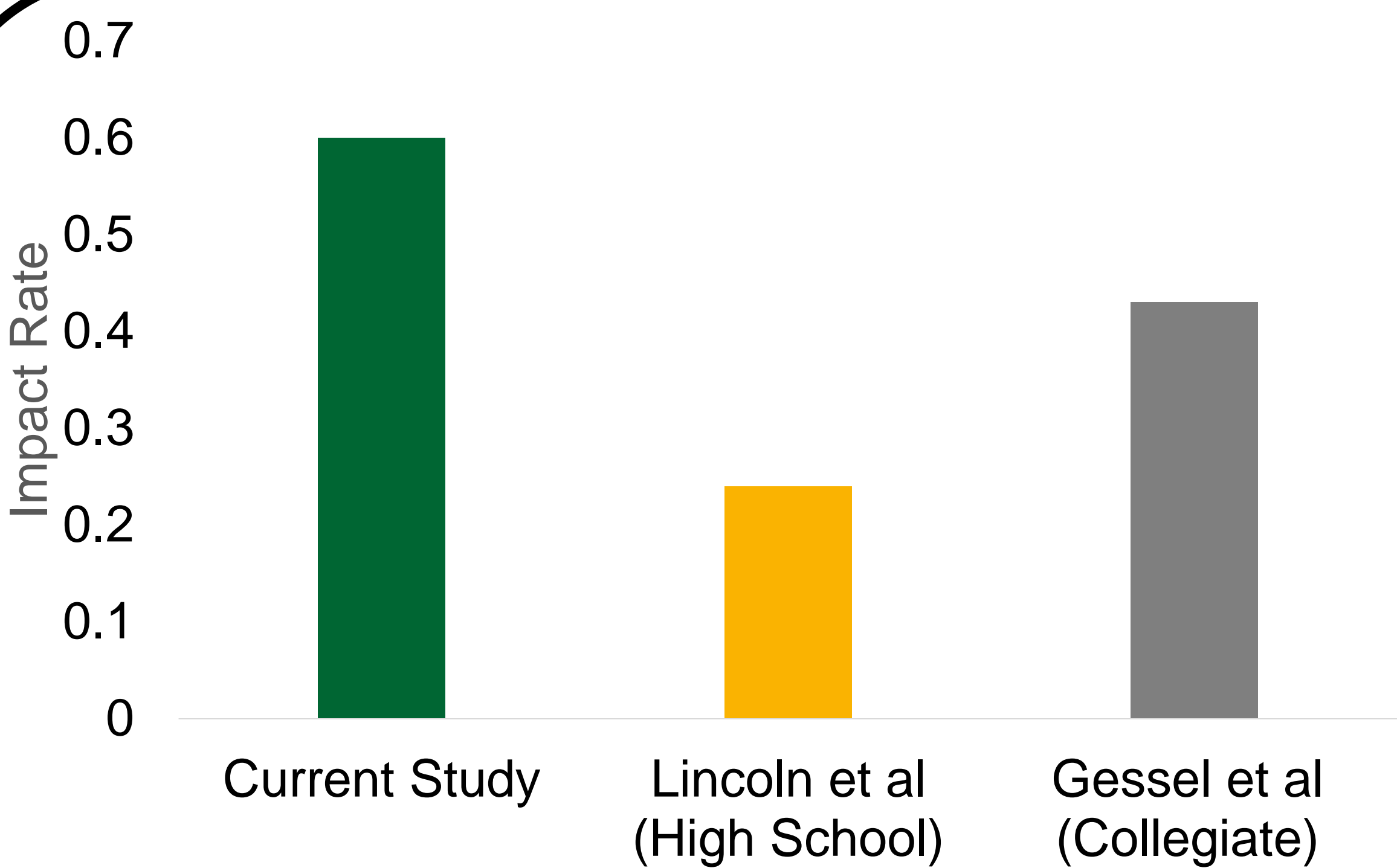


Figure 1. Concussion rates per 1000/AE by Study

Results:

- A total of 233 concussions were reported across 390,562 AEs attributed to school-sponsored sport participation (IR: 0.60/1,000 AE;95% CI=0.56-0.64).
- The overall concussion rate was higher in competition than practice (IRR_{competition/practice}=2.45, 95% CI= 1.16-3.75).
- Among sex-comparable sports, concussion rates for girls were more than twice that for boys (overall: 0.49 vs. 0.23/1000 AE; IRR = 2.13, 95% CI = 0.40-3.86; competition: IRR_{girls/boys}=2.08, 95% CI= 0.29-3.86; practice: IRR_{girls/boys} =2.09, 95% CI= 0.00-4.17).

Sport		Competition		Practice		Overall	
		Concussions, n	IR per 1000 Aes (95% CI)	Concussions, n	IR per 1000 Aes (95% CI)	Concussions, n	IR per 1000 Aes (95% CI)
Girls							
	Cheer	2	0.23 (0.00-0.56)	14	0.35 (0.17-0.53)	16	0.33 (0.17-0.49)
	Girls Basketball	13	1.17 (0.54-1.81)	6	0.27 (0.05-0.49)	19	0.57 (0.32-0.83)
	Girls Soccer	16	2.57 (1.31-3.83)	9	0.66 (0.23-1.09)	25	1.26 (0.77-1.75)
	Girls Track	-	-	2	0.23 (0.00-0.55)	2	0.05 (0.00-0.11)
	Softball	4	1.09 (0.02-2.16)	2	0.23 (0.00-0.54)	6	0.48 (0.10-0.87)
	Volleyball	8	0.87 (0.27-1.48)	15	0.61 (0.30-0.92)	23	0.68 (0.40-0.96)
	Sex-Comparable Total	33	1.11 (0.73-1.49)	19	0.24 (0.13-0.35)	52	0.48 (0.35-0.62)
Boys							
	Baseball	1	0.24 (0.00-0.72)	3	0.29 (0.00-0.62)	4	0.28 (0.01-0.55)
	Boys Basketball	3	0.28 (0.00-0.60)	5	0.21 (0.03-0.39)	8	0.23 (0.07-0.39)
	Boys Soccer	12	1.26 (0.55-1.97)	1	0.04 (0.00-0.13)	13	0.41 (0.19-0.63)
	Football	32	3.62 (2.37-4.88)	42	0.92 (0.64-1.20)	74	1.36 (1.05-1.67)
	Wrestling	11	1.27 (0.52-2.03)	32	1.08 (0.71-1.45)	43	1.12 (0.79-1.46)
	Sex-Comparable Total	16	0.54 (0.27-0.80)	8	0.10 (0.03-0.17)	24	0.22 (0.13-0.31)

Table 1. Concussions Rates per 1000 AEs and 95% CIs by Sport and Event Type in Middle School Sports