

Appendix 1. High school lacrosse injuries

Author, year, and location	Source, design	(N) subjects/ AE	Dates	Outcomes
Hall et al ¹¹ (2013) New York	Elite Club lacrosse tournament participants in Delaware and New York Prospective	(293) girls	NR	During club play, the ankle, knee and head were the 3 main sites of injury (31%, 17% and 12% of all injuries reported). The top 3 most common injury types in elite womens' club players were ligament sprain (32.1%), muscle strain (14.9%), and fracture (12.5%). Ground contact and player contact comprised 67.7% of injuries, and 42% of injured players lost more than 10 consecutive days of play.
Hinton et al ¹² (2005) Maryland, Virginia	23 public schools in Fairfax County and summer LAX camps in Baltimore Prospective	(6129 boys, 3799 girls) lacrosse players	1999-2001	During seasonal play in school, the injury incidence rates were 2.89 (boys) and 2.54 (girls) per 1000 AE. Boys were more likely to be injured during games (42% vs 15.9%, respectively), but girls were more likely injured during practice (65.2% vs 35.3%, respectively). During summer camp, however, injury rates were similar between boys and girls during games (65.2% and 61.3%) and practices (28.1% and 31.1%). Main sites of injury for both boys and girls included the knee (15.5%-29.3% of total injuries) and ankle (10.4%-25.1%). Boys were 2-2.4 times more likely to sustain arm, shoulder, and upper leg injuries than girls. Moreover, neck injuries occurred at almost 4X greater frequency in boys than girls. Knee and wrist/hand injuries (fractures) cost the greatest loss of playing time than other injuries per player (16-31 days).
Lincoln et al ¹⁹ (2007) Virginia	23 public high schools ITTS, NCAA Injury Surveillance System Prospective	(843,373 total AE) Boys, girls, collegiate men and women lacrosse players	2002-2003	Collegiate men had over twice the frequency of concussions than women of all head injuries reported; fractures to head and face were higher in both girls and women compared with boys and men (3.5% boys 14.0% girls and 3.0% men versus 20.9% women).
Lincoln et al ¹⁸ (2011) Maryland	25 public high schools District-managed database Maryland area	(158,430) football, lacrosse, wrestling, soccer, basketball,	1997-2008	Overall concussion incidence rate was 0.24 per 1000 events. Boys LAX concussion incidence rates were second only to football (0.6 vs 0.3). Concussion rates

	Prospective	cheerleading, baseball, softball, field hockey		increased from 0.1 (per 1000 AE) to 0.6 (boys) and to 0.4 (girls) during 1998 to 2008.
Marar et al ²¹ (2012) Ohio	NHS Injury Surveillance System, High School RIO; 100 high schools, 20 sports including LAX Prospective	(NR) 7,780,064 AE in analysis	2008-2010	After football and ice hockey, LAX had the third highest rate of concussions (10.4 per 10,000 vs 22.9 and 14.6) in boys sport. For girls, LAX had the second highest rate of concussions after soccer (8.6 vs 9.2 per 10,000 AE). Concussions were 9 and 6 times more likely to occur during games than practice for boys and girls, respectively. Main causes for concussions were collisions with other players (76% boys) and contact with equipment (55% girls). Concussions represented ~17%-21% of all reported injuries.
Swenson et al ³³ (2012) Ohio	NHS Injury Surveillance System, High School RIO; 100 high schools, 20 sports including LAX Prospective	(3766 boys and girls)	2008-2011	Boys sustained 79.1% of all fractures. Boys LAX fracture rate was third highest after football and ice hockey (2.59 vs 4.37 and 3.08 per 10,000 AE and ice hockey). Girls LAX fracture rate was 0.78 per 10,000 AE. The mechanisms for fractures were contact with another player for boys (44.3% of fractures) and contact with ball or stick for girls (42.1% of fractures). Boys are more likely to sustain fractures in games than practice (RR, 1.52).
Swenson et al ³⁴ (2013) Ohio	NHS Injury Surveillance System, High School RIO; 100 high schools, 20 sports including LAX; focus on knee injuries Prospective	(5116 knee injuries)	2005-2011	Injury rates for boys and girls were comparable for practice and competition, but the relative risk for a knee injury was higher for girls than boys (3.60 RR girls, 2.30 RR boys). Noncontact and overuse mechanisms for knee injury were most common in girls (51.9% and 22.2% of knee injuries), whereas contact with another person or noncontact mechanisms were common in boys (34.4% and 33.3%, respectively).
Yard and Comstock ³⁶ (2006) Ohio	US Consumer Product Safety Commission National Electronic Injury Surveillance System Prospective	(321,237) ice hockey, lacrosse and field hockey players (aged 2-18 y)	1990-2003	Of all 26.5% emergent injuries were sustained in LAX; incidence of injury ↓ in boys from 24 to 13 per 100,000 persons from 1990-2003, but ↑ in girls from 1 to 6. Main sites were hand (19.7%), face (16.2%), lower leg and ankle (13.4%), and head (10.2%). Main injuries

included contusion/abrasion (28.5%), strain-sprain (21.1%), fractures (17.8%), and lacerations (16.2%). Boys had ~5X more shoulder injuries than girls, but girls had ~2X more lower leg injuries than boys.

AE, athletic exposures in practice, game; ITTS, injury tracking treatment system; LAX, lacrosse; NR, not reported; NHS, National High School; RIO, reporting information online; RR, relative risk.

Appendix 2. Intercollegiate lacrosse injuries

Author, year, and location	Source	(N) subjects	Dates	Outcomes
Bowers et al ² (2010) Pennsylvania	NCAA Injury Surveillance System Prospective	18%-23.3% of men's and women's LAX and hockey teams, Divisions I, II, and III 3,038,255 AE	1986-2002	276 thumb injuries were reported for men, and this was 3.45 greater than that reported for women. Rates were 59.4% for men and 42% for women. Main injuries were fractures (41.3%-48.9% both sexes) and contusions (21.7%-36.0%), with the primary mechanism being contact with a stick (52.5%-65.3%).
Dick et al ⁸ (2007) Indiana	NCAA Injury Surveillance System Prospective	Men's LAX teams; 18% of all Division I, II, and III schools sponsoring men's LAX. 35,800 AE	1988-2004	For all Divisions, preseason injury rates were $\geq 2X$ higher than in season and postseason (4.89 vs 1.99 and 1.55 per 1000 AE, respectively). Game injury rates were higher every year than practice injury rates (9-17 injuries per game vs 3-4 injuries per practice per 1000 AE). Main injury sites during games and practice were ankle (sprains, 11.3%- 16.4%), knee (internal derangement, 7.1%-9.1%), concussion (3.6%-8.6%), shoulder (AC joint, sprain, contusion, strain, 7.3%-12.4%). Thumb fractures were most common fracture (1.2%-1.5%). Player contact was a major source of musculoskeletal injuries and concussions.
Dick et al ⁷ (2007) Indiana	NCAA Injury Surveillance System Prospective	Women's LAX teams; 23.1% of all Division I, II, III schools sponsoring women's LAX 42,000 AE	1988-2004	For all Divisions, the game injury rate was 2X higher than the practice injury rate (7.15 vs 3.30 injuries per 1000 AE). Division I game/practice injury rates were higher than Division III rates. Preseason injury rates were higher than in season practice rates (4.29 vs 2.47 per 1000 AE). Main sites of injury during practice and games were the ankle (sprain, 15.5%-22.6% of total), knee (internal derangement (6.1%-14.0%), upper leg (muscle tendon strain, 11.7%-7.2%) and head (concussion 6.1%-9.8%). The rate of concussion was 5X higher during games than practice and was largely due to stick contact.
Matz and Nibbelink ²⁵	8 to 10 colleges on	Women's LAX teams,	2002-2003	Of 27,616 AE, the total number of injuries was 104.

(2004) Maryland	the eastern seaboard; Prospective	4 Division I and 15 Division III schools; 27,616 AE		The game injury rate was 8.4 per 1000 AE, compared with men's game injury rate at 10.8 per 1000 AE. Main sites were head and face (37.5% and 39%) in both years of the study, respectively. Other non-head sites included ankle and knee (15% and 13% of total), hand (8.6%), upper leg (6.7%), lower leg (4.8%) and other (12.5%)
Mihata et al ²⁷ (2006) Maryland	NCAA Injury Surveillance System Prospective	Men's and women's LAX, soccer and basketball teams; Division I, II, and III schools were represented 1,783,903	1989-2004	ACL injury rates in NCAA lacrosse were 3.3% in man and 4.2% in women. This corresponded to an injury rate of 0.17 (men) and 0.18 (women) per 1000 AE. For women, these rates were lowest in lacrosse compared with soccer and basketball. For men, the lacrosse ACL injury rate was highest compared to the other two sports.

AE = athletic exposures in practice, game; LAX, lacrosse.