Table 6-1

Reported Concussion Rates by Sport, Sex, and Competition Level (Rates per 10,000 AEs)

Sport	High School	College	
	Gessel et al[1] (2005-2006)	*Gessel et al[1] (2005-2006)*	*Hootman et al[2] (1988-2004)*
Football	4.7	6.1	3.7
Ice hockey (W)	—	—	9.1 [8.2]
Ice hockey (M)	—	—	4.1 [7.2]
Lacrosse (W)	—	—	2.5
Lacrosse (M)	—	—	2.6
Soccer (W)	3.6	6.3	4.1
Soccer (M)	2.2	4.9	2.8
Wrestling	1.8	4.2	2.5
Field hockey	—	—	1.8
Basketball (W)	2.1	4.3	2.2
Basketball (M)	0.7	2.7	1.6
Softball	0.7	1.9	1.4
Baseball	0.5	0.9	0.7
Volleyball	0.5	1.8	0.9

Abbreviations: AEs, athlete exposures; M, men's; W, women's.

3.2%), and softball/baseball (4.3% vs 2.5%). The data suggest that female athletes have a higher risk of incurring a concussion than male athletes.

There are several possible reasons why female athletes may be at a greater risk for sustaining a concussion than male athletes. First, female athletes tend to have weaker neck muscles and smaller neck girth, which may predispose them to an increased risk of concussion. Second, research has shown that sex differences exist in head-neck segment dynamic stabilization during head angular acceleration, resulting in acceleration/deceleration forces possibly increasing the risk for concussion. Third, female soccer athletes have a larger ball-to-head size ratio than male athletes, possibly predisposing them to concussions. Finally, research is inconclusive on whether the sex hormone estrogen leads to a greater risk of concussions.