

SUMMARY REPORT

NATIONAL HIGH SCHOOL SPORTS-RELATED INJURY SURVEILLANCE STUDY

2007-2008 School Year

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High School RIO™

High School Sports-Related Injury Surveillance Study

presented by the Center for Injury Research & Policy



Acknowledgements

We thank the certified athletic trainers (ATCs) for their hard work and dedication in providing us with complete and accurate data. Without their efforts, this study would not have been possible. We would like to thank the National Federation of State High School Associations (NFHS) for their support of this project. We would also like to acknowledge the generous research funding contributions of DonJoy Orthotics, EyeBlack, the Nationwide Children's Hospital Foundation, and the Centers for Disease Control and Prevention.

Note

The analyses presented here provide only a brief summary of collected data, with the feasibility of a more detailed presentation limited by the extensive breadth and detail contained in the dataset. The principal investigator, Dr. R. Dawn Comstock, is happy to provide further information or to discuss research partnership opportunities upon request.

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I. Introduction & Methodology

1.1 Project Overview

To combat the epidemic of obesity among youth in the United States (US), adolescents must be encouraged to get up off the couch and participate in physically active sports, recreation, and leisure activities. Participation in high school sports, one of the most popular physical activities among adolescents, has grown rapidly from an estimated 4.0 million participants in 1971-72 to an estimated 7.0 million in 2007-08. While the health benefits of a physically active lifestyle including participating in sports are undeniable, high school athletes are at risk of sports-related injury because a certain endemic level of injury can be expected among participants of any physical activity. The challenge to injury epidemiologists is to reduce injury rates among high school athletes to the lowest possible level without discouraging adolescents from engaging in this important form of physical activity. This goal can best be accomplished by investigating the etiology of preventable injuries; by developing, implementing, and evaluating protective interventions using such science-based evidence; and by responsibly reporting epidemiologic findings while promoting a physically active lifestyle among adolescents.

1.2 Background and Significance

High school sports play an important role in the adoption and maintenance of a physically active lifestyle among millions of US adolescents. Too often injury prevention in this population is overlooked as sports-related injuries are thought to be unavoidable. In reality, sports-related injuries are largely preventable through the application of preventive interventions based on evidence-based science. The morbidity, mortality, and disability caused by high school sports-related injuries can be reduced through the development of effective prevention strategies and through programmatic decisions based on injury prevention. However, such efforts rely upon

accurate national estimates of injury incidence, injury rate calculations, and risk and protective factor data. Previously, no injury surveillance system capable of providing researchers with the needed quality of injury and exposure data for high school sports-related injuries existed.

Since the 2005-06 school year, Dr. R. Dawn Comstock has conducted the National High School Sports-Related Injury Surveillance System to monitor injuries among US high school athletes participating in boys' football, boys' and girls' soccer, girls' volleyball, boys' and girls' basketball, boys' wrestling, boys' baseball, and girls' softball. This surveillance has been conducted using the time- and cost-efficient RIO™ (Reporting Information Online) surveillance system. The first two study years were funded by the Centers for Disease Control, the Research Institute at Nationwide Children's Hospital, and The Ohio State University. Through the generous contributions of DonJoy Orthotics and EyeBlack, the National High School Sports-Related Injury Surveillance System was able to be continued during the 2007-08 school year.

1.3 Specific Aims

The continuing objectives of this study are to continue the National High School Sports-Related Injury Surveillance System among a nationally representative sample of US high schools. The specific aims of this study are:

- A) To determine the incidence (number) of injuries among US high school boys' football, boys' and girls' soccer, girls' volleyball, boys' and girls' basketball, boys' wrestling, boys' baseball, and girls' softball athletes.
- B) To calculate the rate of injuries per 1,000 athlete-competitions, per 1,000 athlete-practices, and per 1,000 athlete-exposures for US high school athletes in the 9 sports of interest.

- C) To provide detailed information about the injuries sustained by US high school athletes including the type, site, severity, initial and subsequent treatment/care, outcome, etc.
- D) To provide detailed information about the injury events including athlete demographics, position played, phase of play/activity, etc.
- E) To identify potential risk or protective factors.
- F) To compare injury rates and patterns from the 2005-06 through the 2007-08 school years.

1.4 Project Design

The National High School Sports-Related Injury Surveillance System defined an injury as:

- A) An injury that occurred as a result of participation in an organized high school competition or practice and
- B) Required medical attention by a team physician, certified athletic trainer, personal physician, or emergency department/urgent care facility and
- C) Resulted in restriction of the high school athlete's participation for one or more days beyond the day of injury and
- D) Any fracture, concussion, or dental injury regardless of whether or not it resulted in restriction of the student-athlete's participation.

An athlete exposure was defined as one athlete participating in one practice or competition where he or she is exposed to the possibility of athletic injury. Exposure was expressed in two parts:

- A) Number of athlete-practices = the sum of the number of athletes at each practice during the past week. For example, if 20 athletes practiced on Monday through Thursday and 18 practiced on Friday, the number of athlete-practices would equal 98.

B) Number of athlete-competitions = the sum of the number of athletes at each competition during the past week. For example, if 9 athletes played in a Freshman game, 12 in a JV game, and 14 in a Varsity game, the number of athlete-competitions would equal 35.

1.5 Sample Recruitment

All eligible schools (i.e., all US high schools with a National Athletic Trainers' Association (NATA) affiliated certified athletic trainer (ATC) willing to serve as a reporter) were categorized into 8 sampling strata by geographic location (northeast, midwest, south, and west) and high school size (enrollment $\leq 1,000$ or $> 1,000$ students). Participant schools were then randomly selected from each substrata to obtain 100 study schools. To maintain a nationally representative sample, if a school dropped out of the study, another school from the same stratum was randomly selected for replacement. Participating ATCs were offered a \$300 honorarium along with individualized injury reports following the study's conclusion.

1.6 Data Collection

Each ATC that enrolled their school in National High School Sports-Related Injury Surveillance System received an email every Monday throughout the study period reminding them to enter their school's data into the surveillance system. Each participating ATC was asked to complete 45 weekly exposure reports: one for each week from July 30, 2007 through June 8, 2008. Exposure reports collected exposure information (number of athlete-competitions and athlete-practices) and the number of reportable injuries sustained by student athletes of each sport that was currently in session at their school. For each reportable injury, the ATC was asked to complete an injury report. The injury report collected detailed information about the injured player (e.g., age, year in school, etc.), the injury (e.g. site, type, severity, etc.) and the injury event (e.g., position played, phase of play, etc.). This internet-based surveillance tool provided

ATCs with the ability to view all their submitted data throughout the study and update reports as needed (e.g., need for surgery, days till resuming play, etc.).

1.7 Data Management

In an effort to decrease loss-to follow up, a log of reporters' utilization of the internet-based injury surveillance system was maintained throughout the study period. Reporters who repeatedly failed to log on to complete the weekly exposure and injury reports or who had errors with their reporting were contacted by the study staff and either reminded to report, asked to correct errors, or assessed for their willingness to continue participating in the study.

1.8 Data Analysis

Data were analyzed using SAS software, version 9.0 and SPSS, version 15.0. Although fractures, concussions, and dental injuries resulting in <1 day time loss were collected, unless otherwise noted, analyses in this report excluded these injuries. With the exception of injury rates, data were weighted for all analyses to produce national estimates. For each sport in each stratum, weights account for the total number of US schools offering the sport and the average number of participating study schools reporting each week for that sport. For example, following is the algorithm used to calculate football weights for the small (enrollment $\leq 1,000$) west stratum:

$$\textit{Weight} = \frac{\text{national total \# of small, west US high schools}}{\text{average \# of small, west participating schools reporting football each week}}$$

Injury rates were calculated as the ratio of unweighted case counts per 1,000 athlete-exposures, and they were compared using rate ratios (RR) with 95% confidence intervals (CI).

Following is an example of the RR calculation comparing the rate of injury in boys' soccer to the rate of injury in girls' soccer:

$$RR = \frac{\text{\# boys' soccer injuries / total \# boys' soccer athlete-exposures}}{\text{\# girls' soccer injuries / total \# girls' soccer athlete-exposures}}$$

Injury proportions were compared using injury proportion ratios (IPR) and corresponding confidence intervals calculated using the Complex Samples module of SPSS in order to account for the sampling weights and the complex sampling design. Following is an example of the IPR calculation comparing the proportion of male soccer concussions to the proportion of female soccer concussions:

$$IPR = \frac{\text{\# boys' soccer concussions / total \# boys' soccer injuries}}{\text{\# girls' soccer concussions / total \# girls' soccer injuries}}$$

An RR or IPR >1.00 suggests a risk association while an RR or IPR <1.00 suggests a protective association. CI not including 1.00 were considered statistically significant. Injury rates over time were compared by running a linear regression and testing for trend.

II. Overall Injury Epidemiology

Table 2.1 Injury Rates by Sport and Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Overall total	4,799	2,077,780	2.31	1,419,723
Competition	2,501	562,558	4.45	763,034
Practice	2,298	1,515,222	1.52	656,689
Boys' football total	2,392	572,588	4.18	616,665
Competition	1,211	94,842	12.77	311,780
Practice	1,181	477,746	2.47	304,885
Boys' soccer total	355	202,650	1.75	159,351
Competition	219	60,258	3.63	99,785
Practice	136	142,392	0.96	59,566
Girls' soccer total	408	173,731	2.35	215,850
Competition	267	51,811	5.15	146,102
Practice	141	121,920	1.16	69,748
Girls' volleyball total	208	169,831	1.22	72,261
Competition	80	55,860	1.43	26,539
Practice	128	113,971	1.12	45,722
Boys' basketball total	348	249,849	1.39	82,612
Competition	166	74,446	2.23	36,766
Practice	182	175,403	1.04	45,846
Girls' basketball total	320	198,486	1.61	73,283
Competition	195	59,177	3.30	45,236
Practice	125	139,309	0.90	28,047
Boys' wrestling total	408	179,427	2.27	91,625
Competition	175	47,327	3.70	40,698
Practice	233	132,100	1.76	50,927
Boys' baseball total	173	186,264	0.93	44,760
Competition	92	67,167	1.37	22,803
Practice	81	119,097	0.68	21,957
Girls' softball total	187	144,954	1.29	63,316
Competition	96	51,670	1.86	33,325
Practice	91	93,284	0.98	29,991

*Only includes injuries resulting in ≥ 1 days time loss.

Table 2.2 Proportion of Injuries Resulting in Time Loss, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

	≥1 days time loss	<1 day time loss	Total
Overall	97.9%	2.1%	100%
Boys' football	97.1%	2.9%	100%
Boys' soccer	98.5%	1.5%	100%
Girls' soccer	99.1%	0.9%	100%
Girls' volleyball	99.3%	0.7%	100%
Boys' basketball	98.0%	2.0%	100%
Girls' basketball	97.9%	2.1%	100%
Boys' wrestling	98.0%	2.0%	100%
Boys' baseball	96.4%	3.6%	100%
Girls' softball	99.5%	0.5%	100%

*By study definition, non-time loss injuries were fractures, concussions, and dental injuries. Because they accounted for less than 2% of all injuries, they are not included in any other analyses.

Table 2.3 Demographic Characteristics of Injured Athletes by Sex, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

	Male	Female
Year in School		
Freshman	191,186 (19.4%)	93,256 (22.3%)
Sophomore	237,801 (24.1%)	110,440 (26.4%)
Junior	276,377 (28.0%)	112,030 (26.7%)
Senior	282,218 (28.6%)	103,246 (24.6%)
Total†	987,582 (100%)	418,972 (100%)
Age (years)		
Minimum	13	13
Maximum	19	19
Mean (St. Dev.)	16.0 (1.2)	15.8 (1.2)
BMI		
Minimum	14.3	15.2
Maximum	48.7	46.2
Mean (St. Dev.)	25.2 (4.5)	22.2 (3.3)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

†Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 2.1 Injury Diagnosis by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

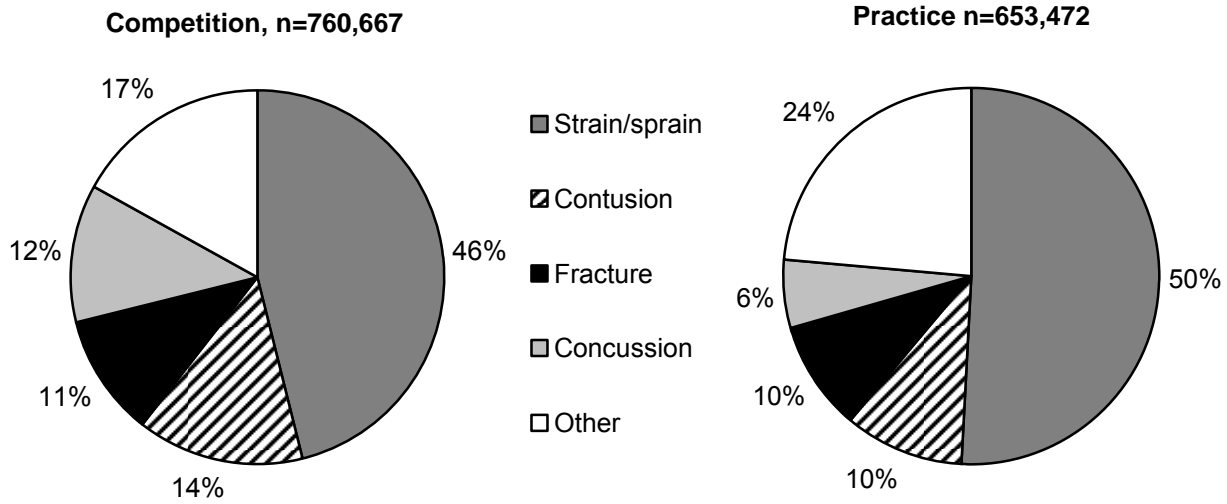


Table 2.4 Body Site of Injury by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	142,807	18.8%	117,836	18.0%	260,643	18.5%
Knee	123,796	16.3%	82,416	12.6%	206,212	14.6%
Head/face	122,912	16.2%	51,619	7.9%	174,532	12.4%
Hip/thigh/upper leg	61,674	8.1%	82,376	12.6%	144,050	10.2%
Hand/wrist	66,188	8.7%	76,160	11.7%	142,348	10.1%
Shoulder	64,828	8.6%	64,150	9.8%	128,978	9.1%
Trunk	41,623	5.5%	49,585	7.6%	91,208	6.5%
Lower leg	44,581	5.9%	35,629	5.5%	80,210	5.7%
Arm/elbow	40,366	5.3%	24,588	3.8%	64,953	4.6%
Foot	27,291	3.6%	31,403	4.8%	58,695	4.2%
Neck	12,305	1.6%	13,180	2.0%	25,485	1.8%
Other	10,203	1.4%	24,104	3.7%	34,307	2.4%
Total	758,575	100%	653,047	100%	1,411,621	100%

Table 2.5 Most Commonly Injured Ankle Structures, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Male		Female		Total	
	n	%	n	%	n	%
Ankle Ligament						
Anterior talofibular ligament	121,959	78.1%	87,581	83.8%	209,540	80.4%
Calcaneofibular ligament	45,626	29.2%	38,371	36.7%	83,996	32.2%
Anterior tibiofibular ligament	47,468	30.4%	27,768	26.6%	75,236	28.9%
Posterior talofibular ligament	17,414	11.2%	18,820	18.0%	36,234	13.9%
Posterior tibiofibular ligament	7,295	4.7%	4,436	4.2%	11,730	4.5%
Total	156,101	100%	104,542	100%	260,643	100%

*Multiple responses allowed per injury report.

Table 2.6 Most Commonly Injured Knee Structures, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Male		Female		Total	
	n	%	n	%	n	%
Knee Ligament						
Medial collateral ligament	45,892	33.8%	18,646	26.4%	64,538	31.3%
Patella/patellar tendon	37,217	27.4%	16,336	23.2%	53,553	26.0%
Anterior cruciate ligament	26,996	19.9%	17,683	25.1%	44,679	21.7%
Torn cartilage (meniscus)	24,922	18.4%	11,012	15.6%	35,935	17.4%
Lateral collateral ligament	7,787	5.7%	5,042	7.1%	12,829	6.2%
Posterior cruciate ligament	2,606	1.9%	1,057	1.5%	3,663	1.8%
Total	135,693	100%	70,520	100%	206,212	100%

*Multiple responses allowed per injury report.

Table 2.7 Ten Most Common Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=758,120		Practice n=652,534		Overall n=1,410,654	
	n	%	n	%	n	%
Ankle strain/sprain	133,168	17.6%	110,846	17.0%	244,013	17.3%
Head/face concussion	90,980	12.0%	38,456	5.9%	129,437	9.2%
Knee strain/sprain	71,506	9.4%	37,757	5.8%	109,263	7.8%
Hip/thigh/upper leg strain/sprain	39,542	5.2%	63,240	9.7%	102,783	7.3%
Knee other	35,049	4.6%	31,573	4.8%	66,622	4.7%
Shoulder other	33,114	4.4%	25,224	3.9%	58,338	4.1%
Hand/wrist fracture	27,422	3.6%	28,658	4.4%	56,079	4.0%
Hand/wrist strain/sprain	23,383	3.1%	30,362	4.7%	53,745	3.8%
Shoulder strain/sprain	21,087	2.8%	27,277	4.2%	48,364	3.4%
Trunk strain/sprain	18,696	2.5%	26,291	4.0%	44,988	3.2%

Figure 2.2 Time Loss by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

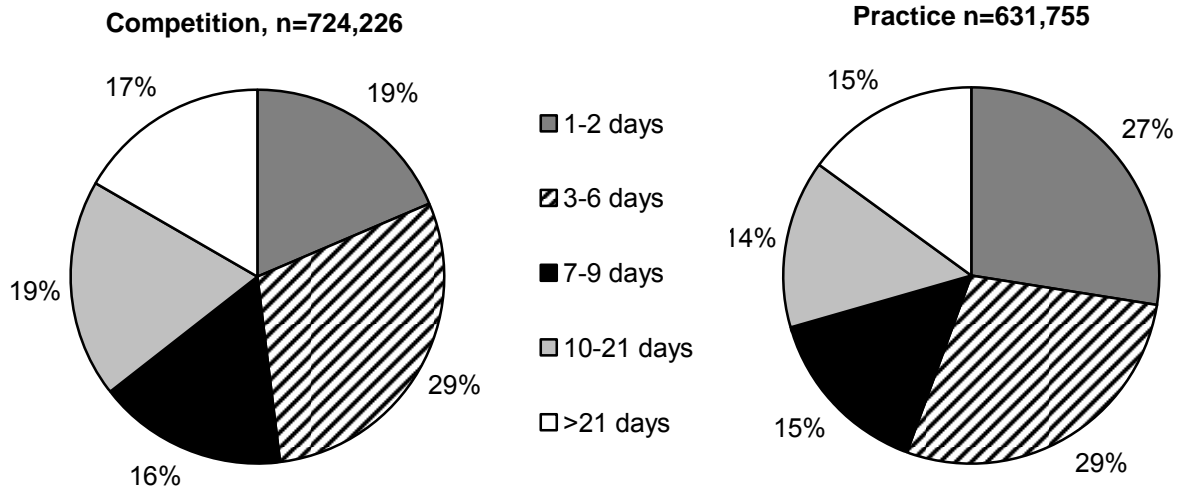


Table 2.8 Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	54,652	7.3%	29,550	4.7%	84,202	6.1%
Did not require surgery	690,718	92.7%	605,951	95.4%	1,296,670	93.9%
Total	745,371	100%	635,502	100%	1,380,872	100%

Figure 2.3 New and Recurring Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

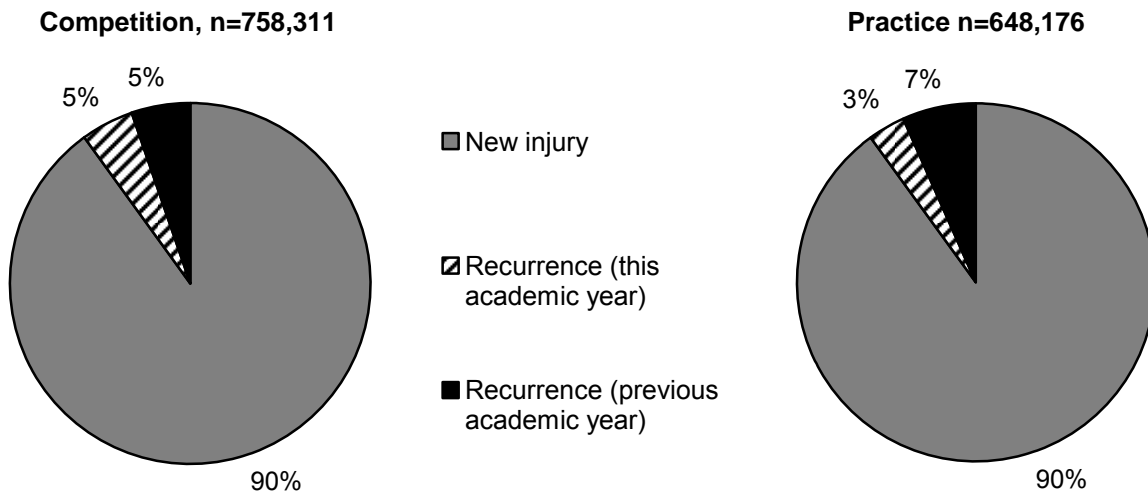


Table 2.9 Time during Season of Injury, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	353,992	24.9%
Regular season	1015875	71.6%
Post season	49,353	3.5%
Total	1,419,220	100%

Table 2.10 Competition-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	17,331	2.3%
Beginning	115,230	15.2%
Middle	413,587	54.7%
End	207,443	27.4%
Overtime	2,262	0.3%
Total	755,852	100
Competition Location		
Home	363,458	47.8%
Away	368,658	48.5%
Neutral site	28,299	3.7%
Total	760,415	100%
Injury Related to Foul Play		
No	667,706	88.1%
Yes, and ruled foul play	28,078	3.7%
Yes, but not ruled foul play	37,867	5.0%
Unknown	23,855	3.1%
Total	757,507	100%

Table 2.11 Practice-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	87,566	13.5%
Second 1/2 hour	173,989	26.9%
Third 1/2 hour	230,116	35.6%
Fourth 1/2 hour	120,219	18.6%
>2 hours into practice	34,565	5.3%
Total	646,455	100%
Practice Type		
Noncontact skills practice	145,908	22.5%
Noncontact partial numbers scrimmage	17,857	2.8%
Noncontact full scrimmage	16,547	2.6%
Partial contact skills practice	96,859	14.9%
Partial contact partial numbers scrimmage	29,381	4.5%
Partial contact full scrimmage	22,230	3.4%
Full contact skills practice	160,941	24.8%
Full contact partial numbers scrimmage	48,081	7.4%
Full contact full scrimmage	81,216	12.5%
Other	29,620	4.6%
Total	648,640	100%

Table 2.12 Methods for Injury Evaluation and Assessment, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
% of Injuries Evaluated by:*		
Certified athletic trainer	1,303,508	91.8%
Physician	790,104	55.7%
Dentist/oral surgeon	1,959	0.1%
Nurse practitioner	13,536	1.0%
Physician's assistant	16,196	1.1%
Other	44,920	3.2%
Total	1,419,723	100%
% of Injuries Assessed by:*		
Evaluation	1,359,583	95.8%
X-ray	587,317	41.4%
MRI	155,204	10.9%
CT-scan	48,581	3.4%
Surgery	19,063	1.3%
Blood work/lab test	17,720	1.2%
Other	27,905	2.0%
Total	1,419,723	100%

*Multiple responses allowed per injury report.

III. Boys' Football Injury Epidemiology

Table 3.1 Football Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	2,392	572,588	4.18	616,665
Competition	1,211	94,842	12.77	311,780
Practice	1,181	477,746	2.47	304,885

Table 3.2 Demographic Characteristics of Injured Football Athletes, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	126,565 (20.6%)
Sophomore	150,675 (24.6%)
Junior	171,178 (27.9%)
Senior	164,835 (26.9%)
Total[†]	613,252 (100%)
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.9 (1.2)
BMI	
Minimum	15.1
Maximum	48.7
Mean (St. Dev.)	26.2 (4.6)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

[†]Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 3.1 Diagnosis of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

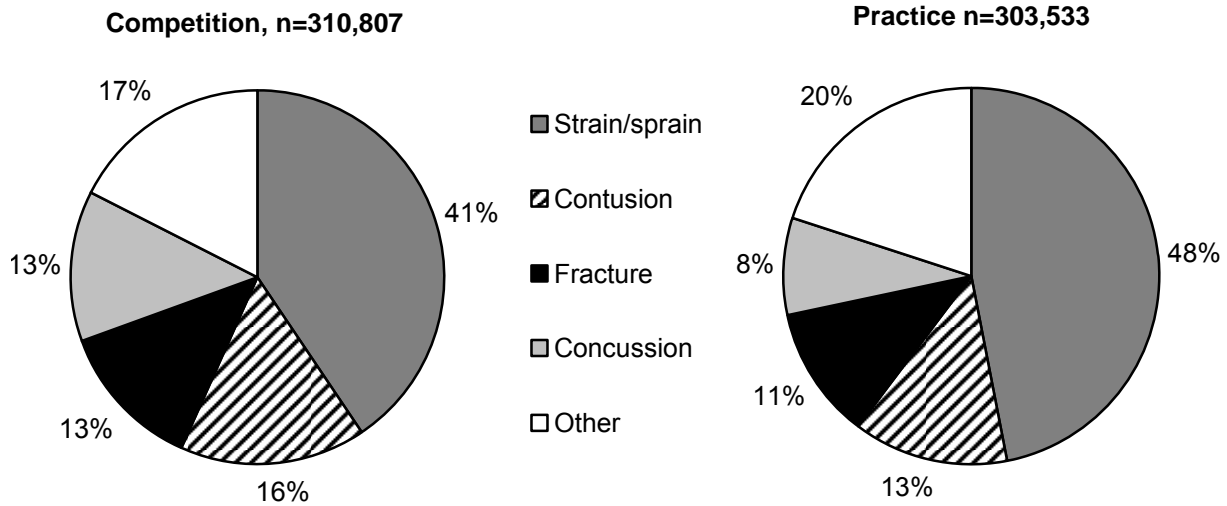


Table 3.3 Body Site of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	42,178	13.6%	42,059	13.9%	84,236	13.8%
Knee	47,320	15.3%	33,933	11.2%	81,253	13.3%
Head/face	44,407	14.4%	27,133	9.0%	71,540	11.7%
Hip/thigh/upper leg	20,264	6.6%	33,391	11.0%	53,655	8.8%
Hand/wrist	32,626	10.6%	44,509	14.7%	77,136	12.6%
Shoulder	39,566	12.8%	36,377	12.0%	75,944	12.4%
Trunk	21,380	6.9%	28,876	9.5%	50,256	8.2%
Lower leg	18,251	5.9%	12,843	4.2%	31,094	5.1%
Arm/elbow	20,111	6.5%	11,180	3.7%	31,291	5.1%
Foot	9,338	3.0%	10,180	3.4%	19,518	3.2%
Neck	8,007	2.6%	8,309	2.7%	16,316	2.7%
Other	5,922	1.9%	14,404	4.8%	20,327	3.3%
Total	309,370	100%	303,194	100%	612,564	100%

Table 3.4 Ten Most Common Football Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=309,293		Practice n=302,681		Total n=611,974	
	n	%	n	%	n	%
Ankle strain/sprain	39,362	12.7%	38,403	12.7%	77,765	12.7%
Head/face concussion	40,645	13.1%	24,760	8.2%	65,405	10.7%
Knee strain/sprain	31,023	10.0%	16,342	5.4%	47,364	7.7%
Hand/wrist fracture	16,717	5.4%	18,171	6.0%	34,888	5.7%
Hip/thigh/upper leg strain/sprain	10,784	3.5%	23,611	7.8%	34,394	5.6%
Shoulder other	21,828	7.1%	12,039	4.0%	33,867	5.5%
Shoulder strain/sprain	9,995	3.2%	16,212	5.4%	26,207	4.3%
Trunk strain/sprain	8,690	2.8%	15,630	5.2%	24,319	4.0%
Hand/wrist strain/sprain	7,093	2.3%	16,448	5.4%	23,541	3.9%
Knee other	10,211	3.3%	10,857	3.6%	21,068	3.4%

Figure 3.2 Time Loss of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

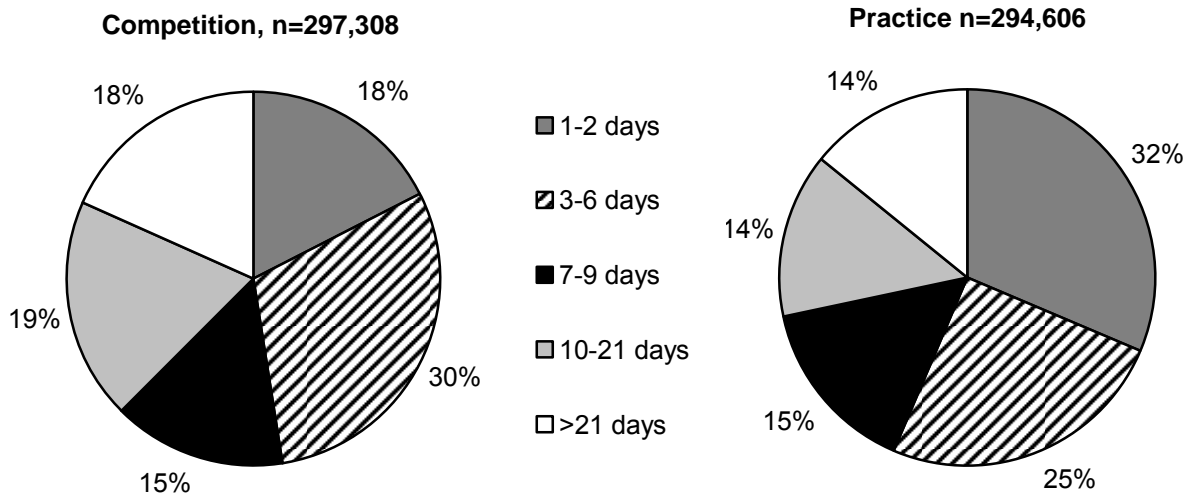


Table 3.5 Football Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	20,452	6.8%	14,085	4.8%	34,537	5.8%
Did not require surgery	281,673	93.2%	281,107	95.2%	562,780	94.2%
Total	302,125	100%	295,192	100%	597,317	100%

Figure 3.3 History of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

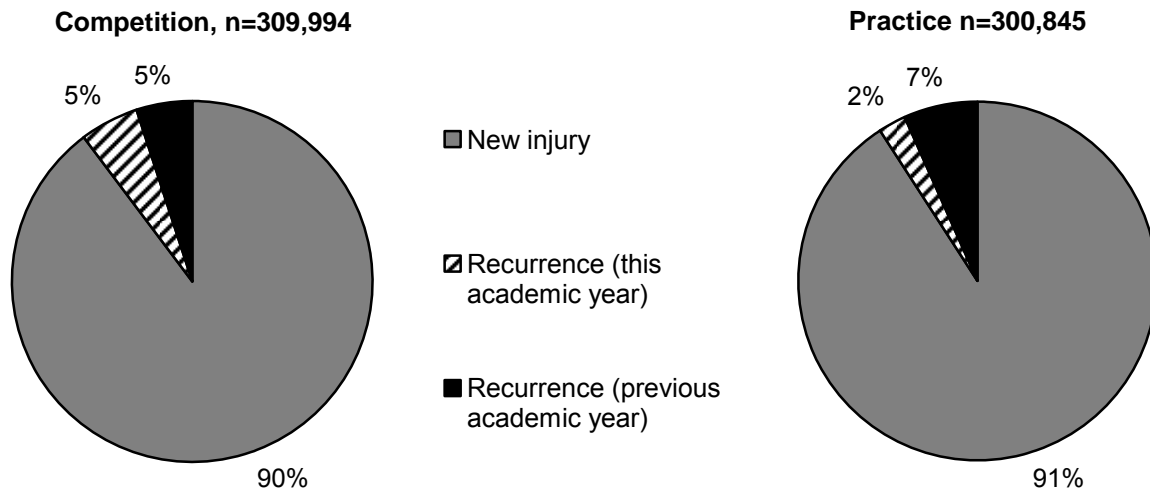


Table 3.6 Time during Season of Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	176,789	28.7%
Regular season	423,894	68.7%
Post season	15,904	2.6%
Total	616,587	100%

Table 3.7 Competition-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	6,355	2.1%
Beginning	50,158	16.2%
Middle	170,435	55.2%
End	81,737	26.5%
Overtime	77	0.0%
Total	308,762	100%
Competition Location		
Home	144,184	46.4%
Away	162,147	52.2%
Neutral site	4,554	1.5%
Total	310,885	100%
Injury Related to Foul Play		
No	290,569	93.8%
Yes, and ruled foul play	2,814	0.9%
Yes, but not ruled foul play	9,498	3.1%
Unknown	6,790	2.2%
Total	309,670	100%
Field Location		
Between the 20 yrd lines	243,180	80.2%
Red zone	50,874	16.8%
End zone	5,079	1.7%
Off the field	4,011	1.3%
Total	303,144	100%

Table 3.8 Practice-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	31,525	10.4%
Second 1/2 hour	80,045	26.5%
Third 1/2 hour	110,655	36.6%
Fourth 1/2 hour	61,084	20.2%
>2 hours into practice	19,060	6.3%
Total	302,369	100%
Practice Type		
Noncontact skills practice	40,382	13.3%
Noncontact partial numbers scrimmage	4,367	1.4%
Noncontact full scrimmage	1,737	0.6%
Partial contact skills practice	47,821	15.8%
Partial contact partial numbers scrimmage	9,506	3.1%
Partial contact full scrimmage	10,231	3.4%
Full contact skills practice	96,383	31.8%
Full contact partial numbers scrimmage	32,272	10.7%
Full contact full scrimmage	48,860	16.1%
Other	11,088	3.7%
Total	302,648	100%

Figure 3.4 Player Position of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

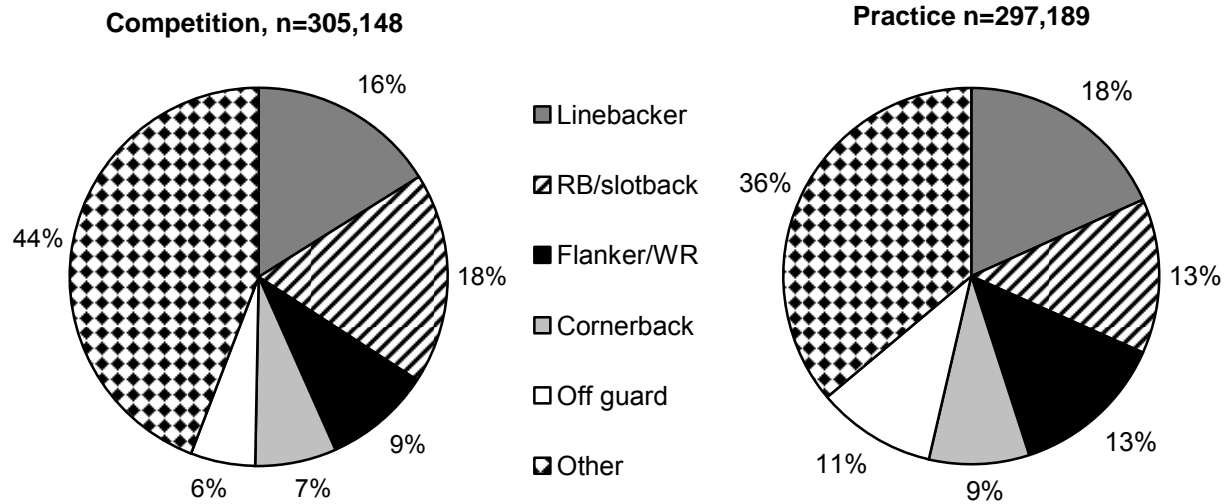
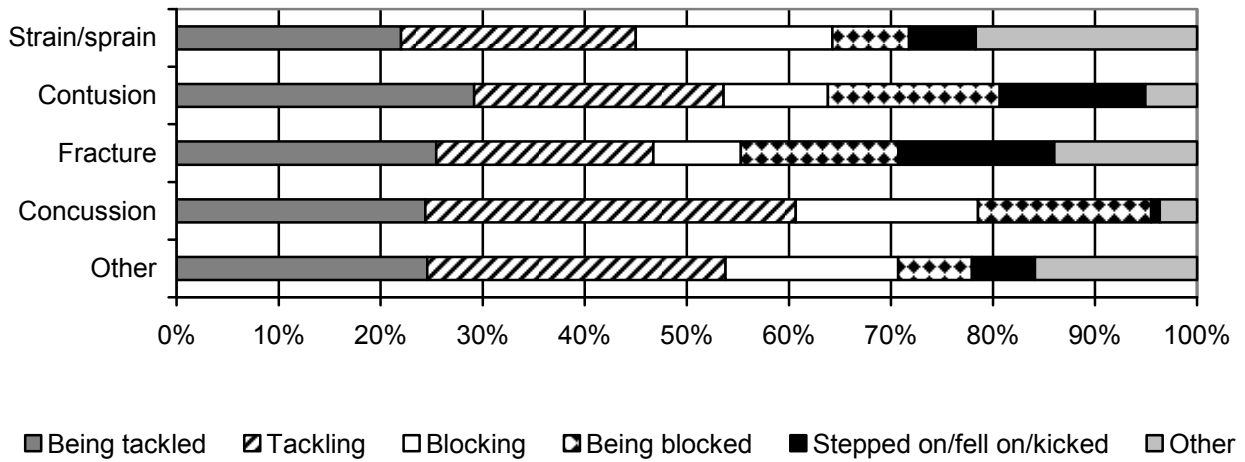


Table 3.9 Activities Leading to Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Tackling	79,233	25.9%	62,647	20.9%	141,880	23.4%
Being tackled	84,592	27.7%	50,270	16.7%	134,862	22.3%
Blocking	40,863	13.4%	47,706	15.9%	88,569	14.6%
Being blocked	40,476	13.3%	21,105	7.0%	61,580	10.2%
N/A, chronic/overuse	7,960	2.6%	41,681	13.9%	49,641	8.2%
Stepped on/fell on/kicked	26,968	8.8%	18,559	6.2%	45,527	7.5%
Rotation around a planted foot	13,136	4.3%	20,263	6.7%	33,399	5.5%
Other	12,142	4.0%	38,133	12.7%	50,276	8.3%
Total	309,370	100%	303,194	100%	612,564	100%

Figure 3.5 Activity Resulting in Football Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



IV. Boys' Soccer Injury Epidemiology

Table 4.1 Boys' Soccer Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	355	202,650	1.75	159,351
Competition	219	60,258	3.63	99,785
Practice	136	142,392	0.96	59,566

Table 4.2 Demographic Characteristics of Injured Boys' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	23,026 (14.6%)
Sophomore	33,707 (21.4%)
Junior	45,741 (29.0%)
Senior	55,076 (35.0%)
Total†	157,550 (100%)
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	16.2 (1.2)
BMI	
Minimum	17.5
Maximum	34.3
Mean (St. Dev.)	22.7 (2.8)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

†Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 4.1 Diagnosis of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

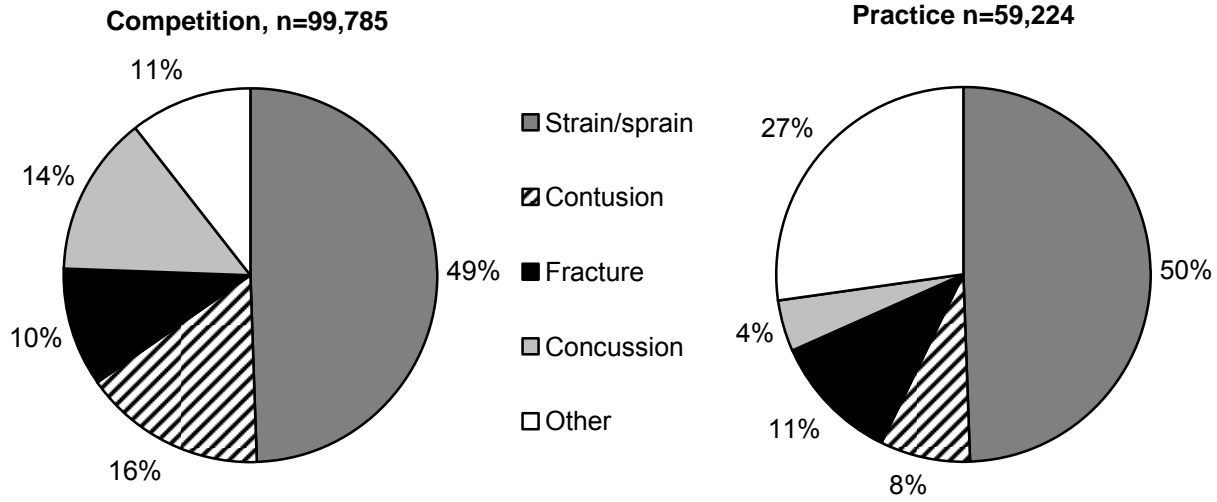


Table 4.3 Body Site of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	20,997	21.3%	12,353	20.9%	33,350	21.1%
Knee	12,156	12.3%	9,188	15.5%	21,344	13.5%
Head/face	22,399	22.7%	3,464	5.8%	25,863	16.4%
Hip/thigh/upper leg	13,379	13.5%	9,909	16.7%	23,288	14.7%
Hand/wrist	3,795	3.8%	1,260	2.1%	5,054	3.2%
Shoulder	3,408	3.5%	3,425	5.8%	6,833	4.3%
Trunk	6,492	6.6%	3,886	6.6%	10,378	6.6%
Lower leg	8,058	8.2%	4,929	8.3%	12,987	8.2%
Arm/elbow	1,784	1.8%	1,071	1.8%	2,855	1.8%
Foot	4,746	4.8%	6,591	11.1%	11,336	7.2%
Neck	84	0.1%	1,078	1.8%	1,162	0.7%
Other	1,455	1.5%	2,073	3.5%	3,528	2.2%
Total	98,753	100%	59,224	100%	157,978	100%

Table 4.4 Ten Most Common Boys' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=98,754		Practice n=59,224		Total n=157,978	
	n	%	n	%	n	%
Ankle strain/sprain	19,570	19.8%	12,353	20.9%	31,923	20.2%
Hip/thigh/upper leg strain/sprain	9,977	10.1%	6,758	11.4%	16,735	10.6%
Head/face concussion	13,847	14.0%	2,529	4.3%	16,376	10.4%
Knee strain/sprain	9,422	9.5%	2,862	4.8%	12,285	7.8%
Knee other	1,455	1.5%	5,256	8.9%	6,712	4.2%
Head/face other	5,603	5.7%	229	0.4%	5,832	3.7%
Trunk strain/sprain	2,795	2.8%	2,369	4.0%	5,165	3.3%
Shoulder other	2,733	2.8%	2,431	4.1%	5,163	3.3%
Lower leg strain/sprain	3,098	3.1%	2,027	3.4%	5,125	3.2%
Trunk contusion	3,697	3.7%	707	1.2%	4,403	2.8%

Figure 4.2 Time Loss of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

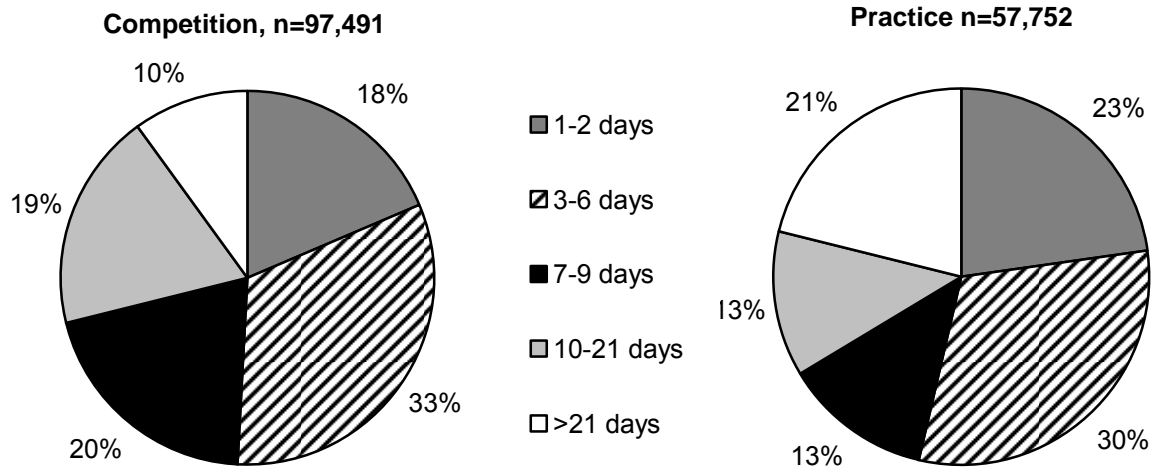


Table 4.5 Boys' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	10,152	10.4%	821	1.4%	10,973	7.0%
Did not require surgery	87,141	89.6%	58,039	98.6%	145,181	93.0%
Total	97,294	100%	58,860	100%	156,153	100%

Figure 4.3 History of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

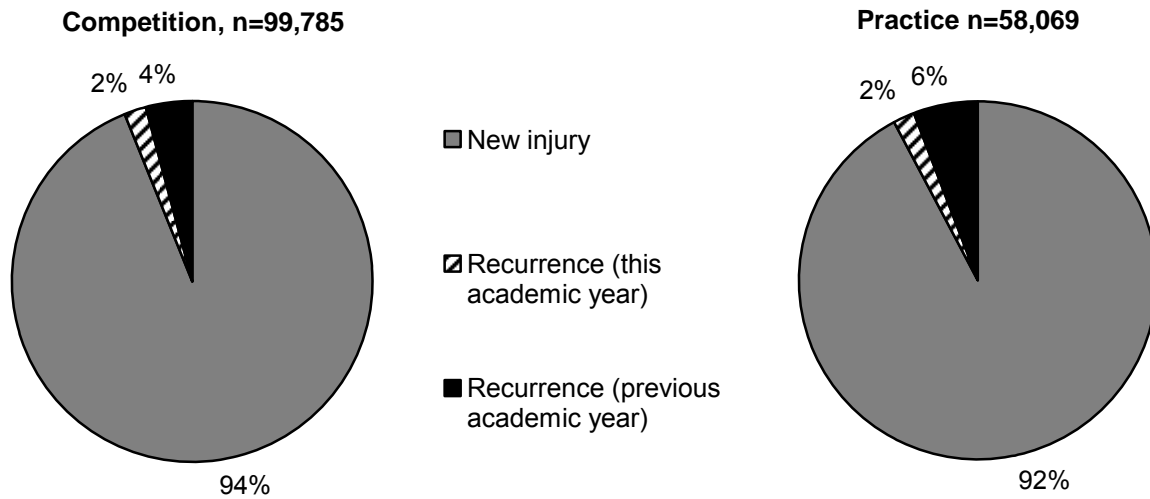


Table 4.6 Time during Season of Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	38,128	24.0%
Regular season	111,399	70.1%
Post season	9,399	5.9%
Total	158,926	100%

Table 4.7 Competition-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	1,432	1.5%
Beginning	16,689	17.0%
Middle	55,337	56.5%
End	23,117	23.6%
Overtime	1,358	1.4%
Total	97,933	100%
Competition Location		
Home	47,079	47.5%
Away	45,089	45.5%
Neutral site	6,910	7.0%
Total	99,079	100%
Injury Related to Foul Play		
No	76,020	76.2%
Yes, and ruled foul play	6,655	6.7%
Yes, but not ruled foul play	12,123	12.1%
Unknown	4,988	5.0%
Total	99,785	100%
Field Location		
Top of goal box extended to center line (offense)	33,212	35.3%
Top of goal box extended to center line (defense)	17,624	18.7%
Goal box (defense)	16,509	17.5%
Side of goal box (defense)	9,801	10.4%
Side of goal box (offense)	9,518	10.1%
Goal box (offense)	6,463	6.9%
Off the field	1,069	1.1%
Total	94,196	100%

Table 4.8 Practice-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	9,748	16.8%
Second 1/2 hour	16,208	27.9%
Third 1/2 hour	21,739	37.4%
Fourth 1/2 hour	9,356	16.1%
>2 hours into practice	1,042	1.8%
Total	58,093	100%
Practice Type		
Noncontact skills practice	14,820	25.5%
Noncontact partial numbers scrimmage	1,701	2.9%
Noncontact full scrimmage	4,053	7.0%
Partial contact skills practice	11,060	19.0%
Partial contact partial numbers scrimmage	4,452	7.6%
Partial contact full scrimmage	2,308	4.0%
Full contact skills practice	7,038	12.1%
Full contact partial numbers scrimmage	5,949	10.2%
Full contact full scrimmage	5,695	9.8%
Other	1,155	2.0%
Total	58,230	100%

Figure 4.4 Player Position of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

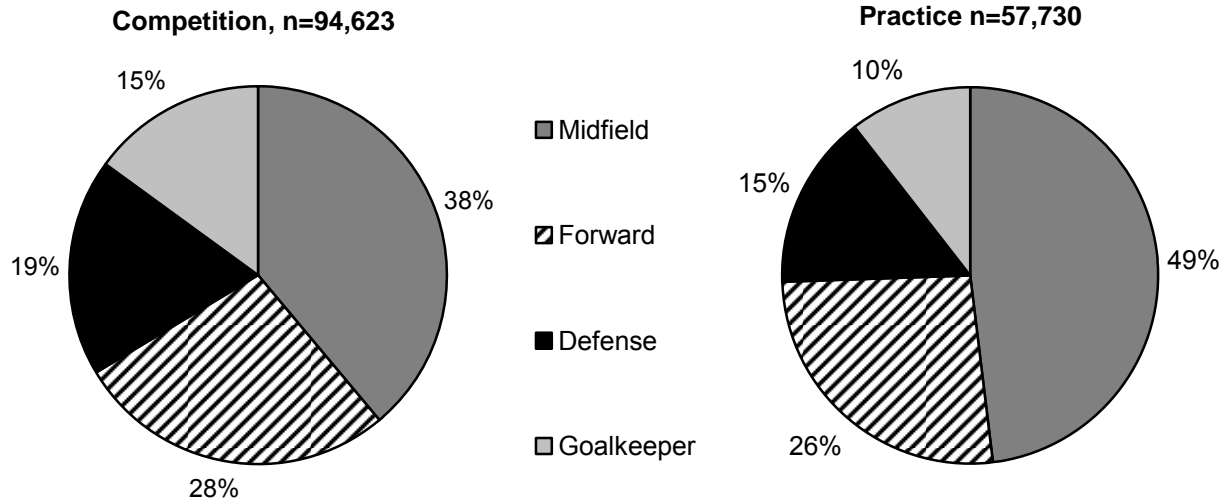
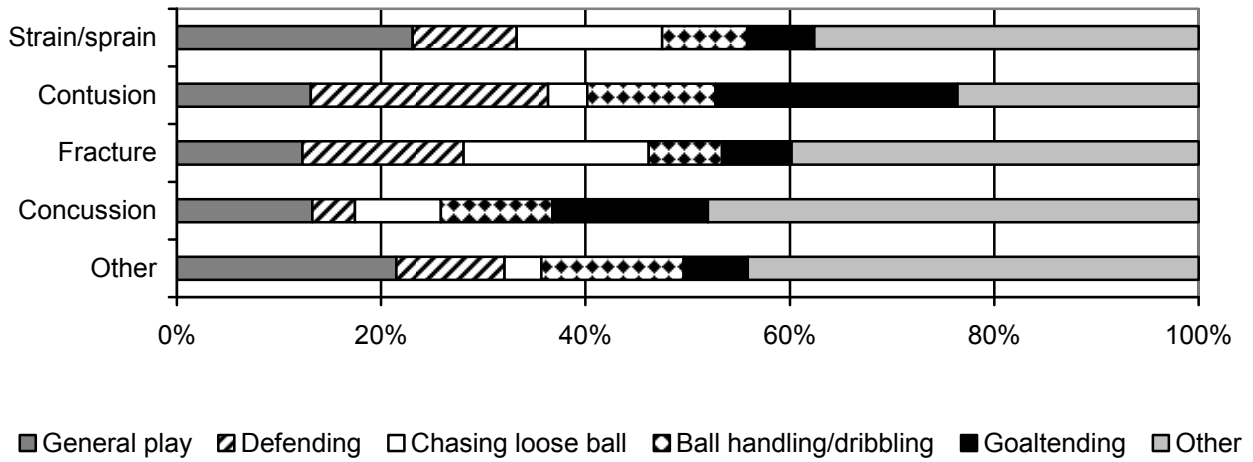


Table 4.9 Activities Leading to Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	16,425	16.8%	13,877	23.9%	30,302	19.4%
Defending	13,591	13.9%	4,777	8.2%	18,368	11.8%
Chasing loose ball	11,292	11.6%	5,762	9.9%	17,054	10.9%
Ball handling/dribbling	9,735	10.0%	5,798	10.0%	15,533	10.0%
Goaltending	12,342	12.6%	2,491	4.3%	14,833	9.5%
Shooting (foot)	5,225	5.3%	7,075	12.2%	12,300	7.9%
Heading ball	11,480	11.7%	790	1.4%	12,270	7.9%
Passing (foot)	6,045	6.2%	4,328	7.5%	10,373	6.7%
Receiving pass	6,065	6.2%	4,199	7.2%	10,264	6.6%
Other	5,558	5.7%	8,975	15.5%	14,532	9.3%
Total	97,757	100%	58,071	100%	155,828	100%

Figure 4.5 Activity Resulting in Boys' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



V. Girls' Soccer Injury Epidemiology

Table 5.1 Girls' Soccer Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	408	173,731	2.35	215,850
Competition	267	51,811	5.15	146,102
Practice	141	121,920	1.16	69,748

Table 5.2 Demographic Characteristics of Injured Girls' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	38,152 (17.9%)
Sophomore	58,120 (27.2%)
Junior	50,840 (23.8%)
Senior	66,417 (31.1%)
Total[†]	213,528 (100%)
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.9 (1.2)
BMI	
Minimum	15.7
Maximum	34.4
Mean (St. Dev.)	21.9 (3.0)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

[†]Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 5.1 Diagnosis of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

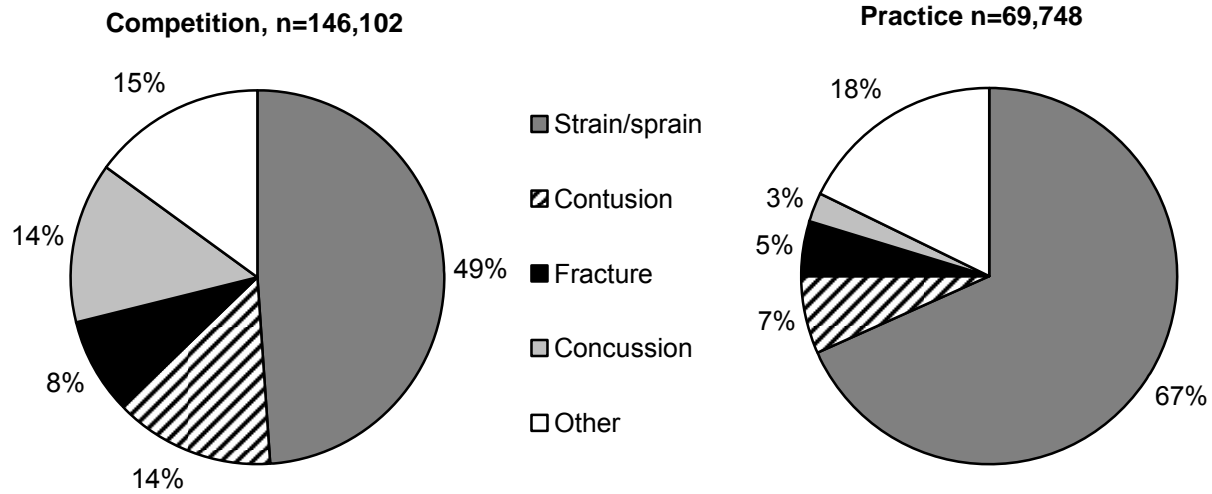


Table 5.3 Body Site of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	32,605	22.3%	17,697	25.4%	50,302	23.3%
Knee	35,768	24.5%	9,570	13.7%	45,338	21.0%
Head/face	25,003	17.1%	2,360	3.4%	27,363	12.7%
Hip/thigh/upper leg	14,925	10.2%	18,544	26.6%	33,470	15.5%
Hand/wrist	9,526	6.5%	4,864	7.0%	14,390	6.7%
Shoulder	1,640	1.1%	1,232	1.8%	2,871	1.3%
Trunk	1,801	1.2%	719	1.0%	2,520	1.2%
Lower leg	10,743	7.4%	5,947	8.5%	16,690	7.7%
Arm/elbow	3,692	2.5%	2,373	3.4%	6,064	2.8%
Foot	8,597	5.9%	3,291	4.7%	11,888	5.5%
Neck	1,803	1.2%	0	0.0%	1,803	0.8%
Other	0	0.0%	3,152	4.5%	3,152	1.5%
Total	146,102	100%	69,748	100%	215,849	100%

Table 5.4 Ten Most Common Girls' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=146,102		Practice n=69,748		Total n=215,849	
	n	%	n	%	n	%
Ankle strain/sprain	31,802	21.8%	16,570	23.8%	48,372	22.4%
Hip/thigh/upper leg strain/sprain	8,815	6.0%	16,938	24.3%	25,752	11.9%
Knee strain/sprain	18,434	12.6%	6,762	9.7%	25,196	11.7%
Head/face concussion	20,319	13.9%	1,847	2.6%	22,166	10.3%
Knee other	12,782	8.7%	1,621	2.3%	14,403	6.7%
Hand/wrist strain/sprain	5,304	3.6%	4,505	6.5%	9,808	4.5%
Lower leg other	3,694	2.5%	4,235	6.1%	7,929	3.7%
Hip/thigh/upper leg contusion	5,752	3.9%	719	1.0%	6,470	3.0%
Knee contusion	3,833	2.6%	1,186	1.7%	5,020	2.3%
Foot contusion	4,618	3.2%	0	0.0%	4,618	2.1%

Figure 5.2 Time Loss of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

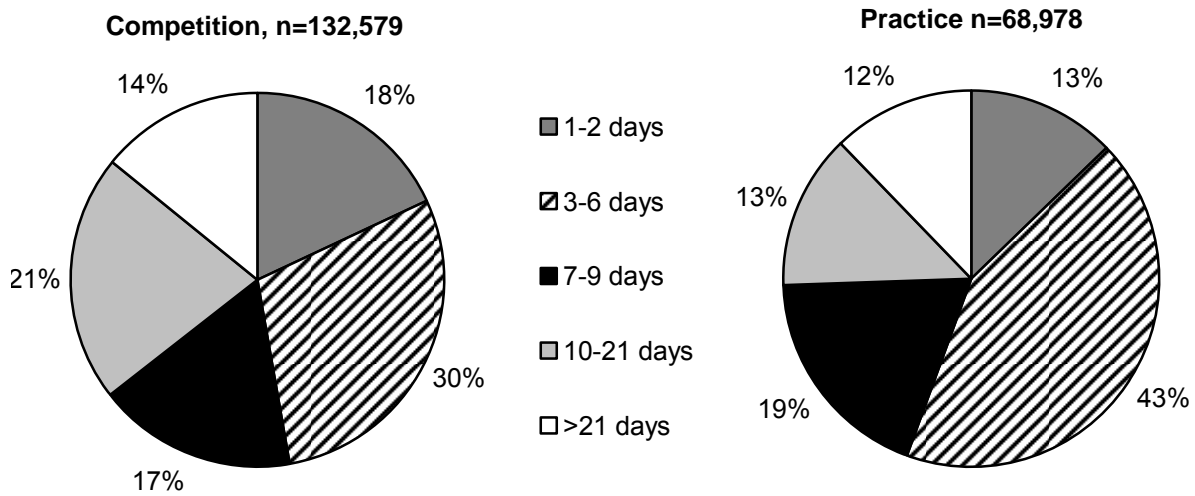


Table 5.5 Girls' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	8,721	6.0%	2,058	3.1%	10,779	5.1%
Did not require surgery	135,769	94.0%	63,875	96.9%	199,645	94.9%
Total	144,491	100%	65,933	100%	210,424	100%

Figure 5.3 History of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

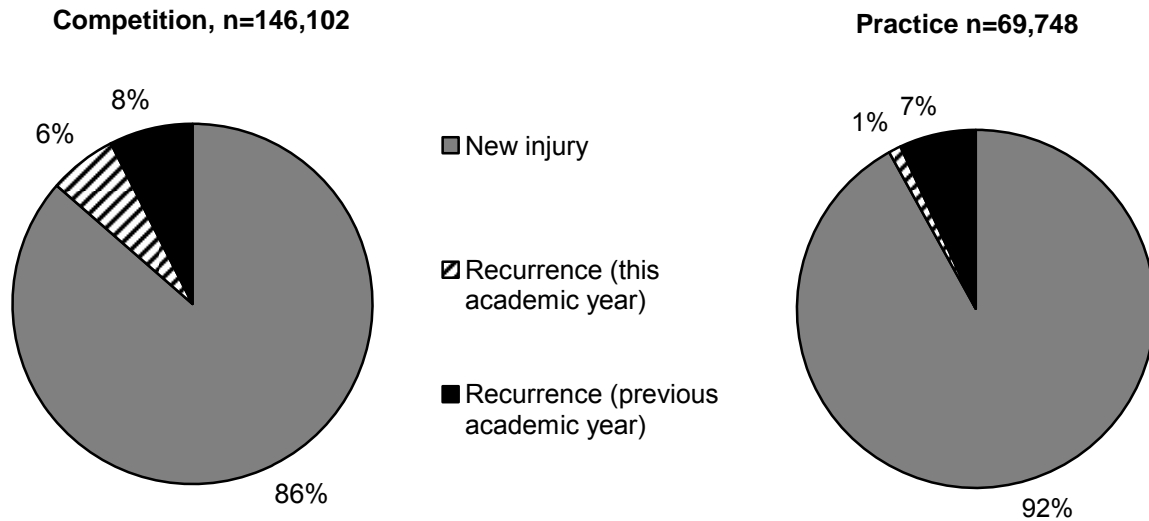


Table 5.6 Time during Season of Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	38,733	17.9%
Regular season	165,826	76.8%
Post season	11,291	5.2%
Total	215,849	100%

Table 5.7 Competition-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	3,332	2.3%
Beginning	20,275	13.9%
Middle	68,944	47.4%
End	52,885	36.4%
Total	145,436	100%
Competition Location		
Home	78,458	53.7%
Away	61,226	41.9%
Neutral site	6,418	4.4%
Total	146,102	100%
Injury Related to Foul Play		
No	117,502	81.2%
Yes, and ruled foul play	9,173	6.3%
Yes, but not ruled foul play	9,573	6.6%
Unknown	8,424	5.8%
Total	144,672	100%
Field Location		
Top of goal box extended to center line (offense)	38,337	27.1%
Goal box (defense)	34,058	24.0%
Top of goal box extended to center line (defense)	31,347	22.1%
Goal box (offense)	14,638	10.3%
Side of goal box (defense)	12,821	9.1%
Side of goal box (offense)	7,789	5.5%
Off the field	2,669	1.9%
Total	141,659	100%

Table 5.8 Practice-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	10,030	15.0%
Second 1/2 hour	18,013	26.9%
Third 1/2 hour	26,126	39.0%
Fourth 1/2 hour	11,520	17.2%
>2 hours into practice	1,384	2.1%
Total	67,073	100%
Practice Type		
Noncontact skills practice	17,091	24.7%
Noncontact partial numbers scrimmage	3,679	5.3%
Partial contact skills practice	16,398	23.7%
Partial contact partial numbers scrimmage	6,267	9.1%
Full contact skills practice	13,825	20.0%
Full contact partial numbers scrimmage	2,168	3.1%
Full contact full scrimmage	4,145	6.0%
Other	5,678	8.2%
Total	69,251	100%

Figure 5.4 Player Position of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

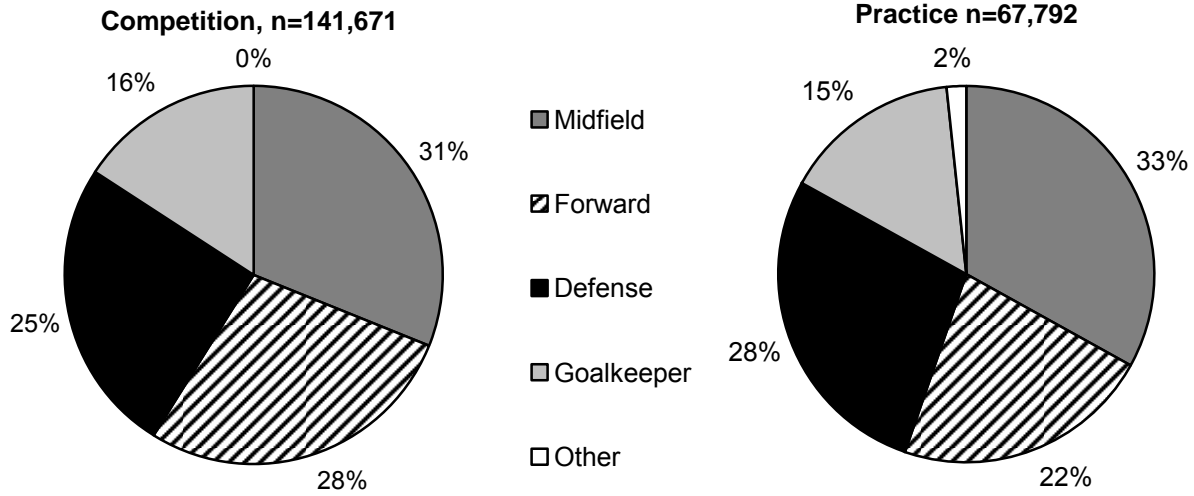
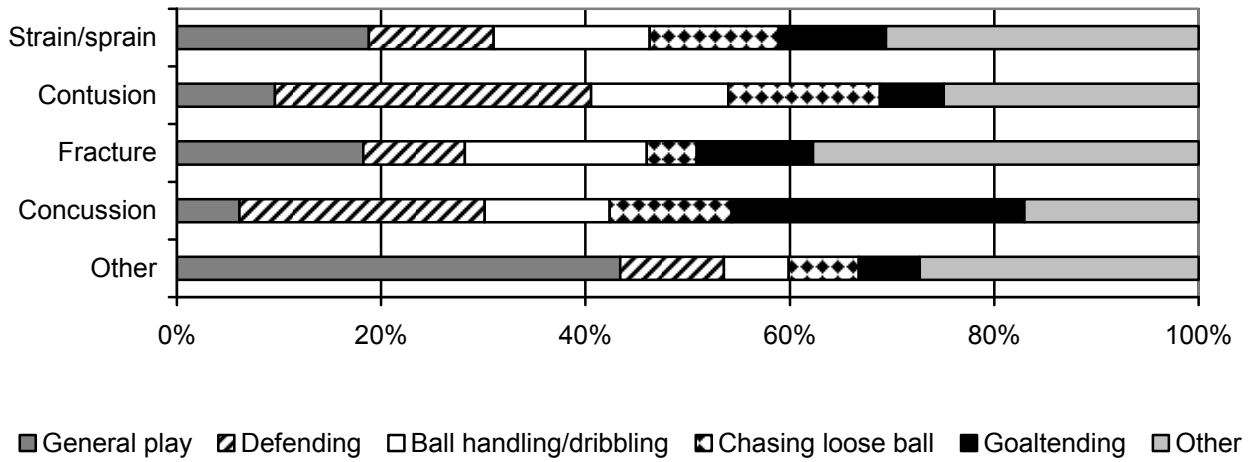


Table 5.9 Activities Leading to Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	22,332	15.7%	20,953	30.1%	43,285	20.5%
Defending	25,561	18.0%	6,295	9.0%	31,856	15.1%
Ball handling/dribbling	19,854	14.0%	8,681	12.5%	28,535	13.5%
Chasing loose ball	22,616	15.9%	1,438	2.1%	24,054	11.4%
Goaltending	17,935	12.6%	5,541	8.0%	23,477	11.1%
Passing (foot)	7,181	5.1%	4,137	5.9%	11,319	5.3%
Blocking shot	5,972	4.2%	2,983	4.3%	8,955	4.2%
Receiving pass	6,350	4.5%	2,533	3.6%	8,883	4.2%
Conditioning	153	0.1%	7,296	10.5%	7,449	3.5%
Shooting (foot)	3,910	2.8%	3,491	5.0%	7,401	3.5%
Other	5601.9	3.9%	512.41	0.7%	6114.3	2.9%
Total	142,030	100%	69,595	100%	211,625	100%

Figure 5.5 Activity Resulting in Girls' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



VI. Volleyball Injury Epidemiology

Table 6.1 Volleyball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	208	169,831	1.22	72,261
Competition	80	55,860	1.43	26,539
Practice	128	113,971	1.12	45,722

Table 6.2 Demographic Characteristics of Injured Volleyball Athletes, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	18,674 (26.2%)
Sophomore	18,897 (26.5%)
Junior	17,790 (25.0%)
Senior	15,956 (22.4%)
Total[†]	71,317 (100%)
Age (years)	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.6 (1.2)
BMI	
Minimum	15.2
Maximum	46.2
Mean (St. Dev.)	21.7 (3.2)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

[†]Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 6.1 Diagnosis of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

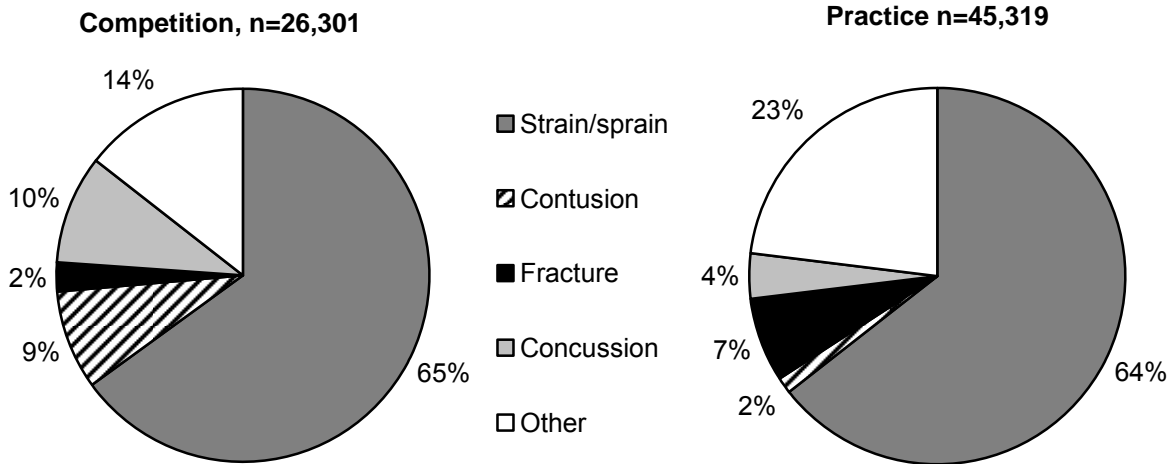


Table 6.3 Body Site of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	8,926	33.8%	14,531	32.1%	23,456	32.7%
Knee	3,119	11.8%	2,763	6.1%	5,882	8.2%
Head/face	2,924	11.1%	2,247	5.0%	5,171	7.2%
Hip/thigh/upper leg	1,544	5.8%	5,345	11.8%	6,890	9.6%
Hand/wrist	3,157	12.0%	3,741	8.3%	6,898	9.6%
Shoulder	2,298	8.7%	4,713	10.4%	7,011	9.8%
Trunk	2,386	9.0%	3,555	7.8%	5,940	8.3%
Lower leg	93	0.4%	3,753	8.3%	3,846	5.4%
Arm/elbow	1,048	4.0%	135	0.3%	1,182	1.6%
Foot	0	0.0%	2,922	6.4%	2,922	4.1%
Neck	0	0.0%	403	0.9%	403	0.6%
Other	910	3.4%	1,213	2.7%	2,123	3.0%
Total	26,405	100%	45,319	100%	71,723	100%

Table 6.4 Ten Most Common Volleyball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=26,301		Practice n=45,319		Total n=71,620	
	n	%	n	%	n	%
Ankle strain/sprain	8,523	32.4%	14,531	32.1%	23,053	32.2%
Hand/wrist strain/sprain	2,413	9.2%	1,887	4.2%	4,300	6.0%
Head/face concussion	2,521	9.6%	1,705	3.8%	4,227	5.9%
Shoulder strain/sprain	1,353	5.1%	2,791	6.2%	4,145	5.8%
Hip/thigh/upper leg strain/sprain	403	1.5%	3,433	7.6%	3,836	5.4%
Trunk strain/sprain	1,141	4.3%	2,046	4.5%	3,187	4.4%
Knee strain/sprain	1,937	7.4%	1,147	2.5%	3,084	4.3%
Shoulder other	944	3.6%	1,922	4.2%	2,866	4.0%
Trunk other	1,141	4.3%	1,509	3.3%	2,650	3.7%
Lower leg other	0	0.0%	2,151	4.7%	2,151	3.0%

Figure 6.2 Time Loss of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

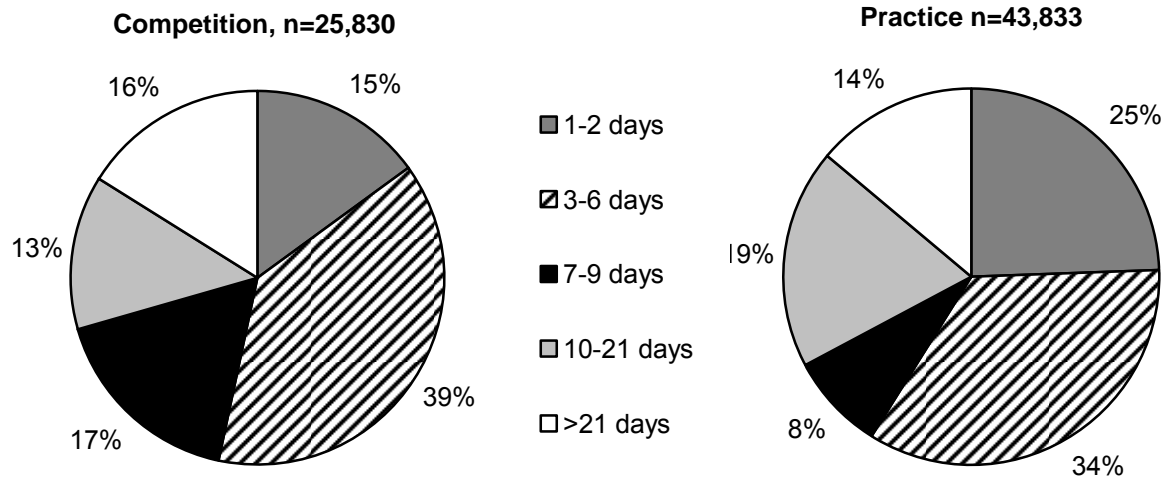


Table 6.5 Volleyball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	590	2.2%	238	0.5%	828	1.2%
Did not require surgery	25,577	97.8%	44,043	99.5%	69,620	98.8%
Total	26,167	100%	44,281	100%	70,448	100%

Figure 6.3 History of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

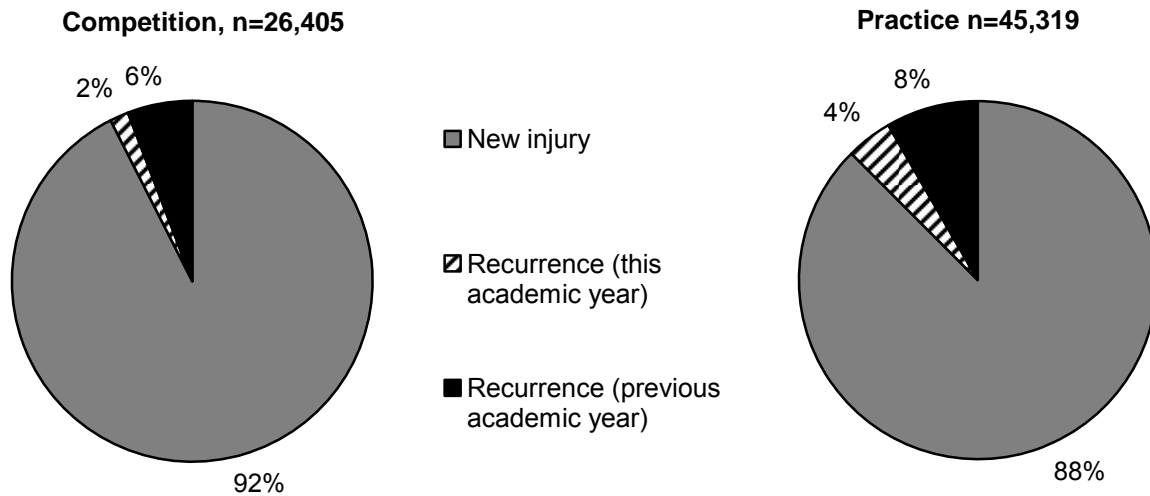


Table 6.6 Time during Season of Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	20,644	28.6%
Regular season	51,513	71.3%
Post season	103	0.1%
Total	72,261	100%

Table 6.7 Competition-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	2,230	8.4%
Beginning	1,514	5.7%
Middle	16,980	64.3%
End	5,680	21.5%
Total	26,405	100%
Competition Location		
Home	11,992	45.4%
Away	13,330	50.5%
Neutral site	1,083	4.1%
Total	26,405	100%
Injury Related to Foul Play		
No	25,598	98.4%
Yes, and ruled foul play	0	0.0%
Yes, but not ruled foul play	403	1.6%
Unknown	0	0.0%
Total	26,002	100%
Court Location		
Middle forward	8,441	34.3%
Right forward	4,919	20.0%
Left back	4,273	17.3%
Left forward	2,786	11.3%
Right back (server)	2,591	10.5%
Off the court	641	2.6%
Outside court (your side)	589	2.4%
Outside court (opponent's side)	403	1.6%
Total	24,644	100%

Table 6.8 Practice-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	6,210	13.7%
Second 1/2 hour	19,147	42.3%
Third 1/2 hour	8,911	19.7%
Fourth 1/2 hour	7,664	16.9%
>2 hours into practice	3,385	7.5%
Total	45,319	100%
Practice Type		
Noncontact skills practice	23,986	52.9%
Noncontact partial numbers scrimmage	4,368	9.6%
Noncontact full scrimmage	5,150	11.4%
Partial contact skills practice	3,126	6.9%
Partial contact partial numbers scrimmage	1,750	3.9%
Partial contact full scrimmage	93	0.2%
Full contact skills practice	2,900	6.4%
Full contact full scrimmage	2,494	5.5%
Other	1,451	3.2%
Total	45,319	100%

Figure 6.4 Player Position of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

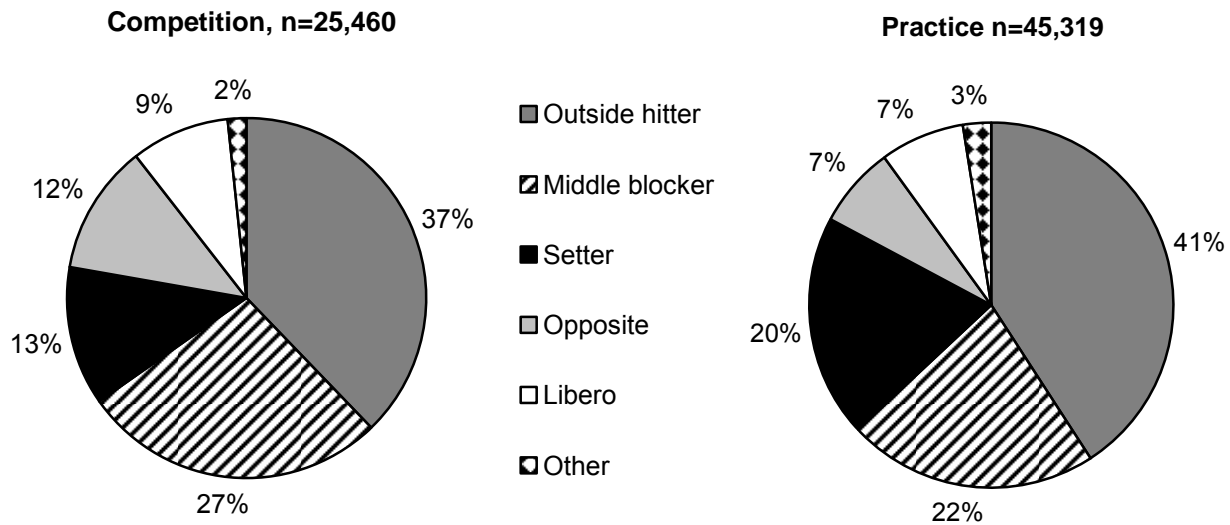
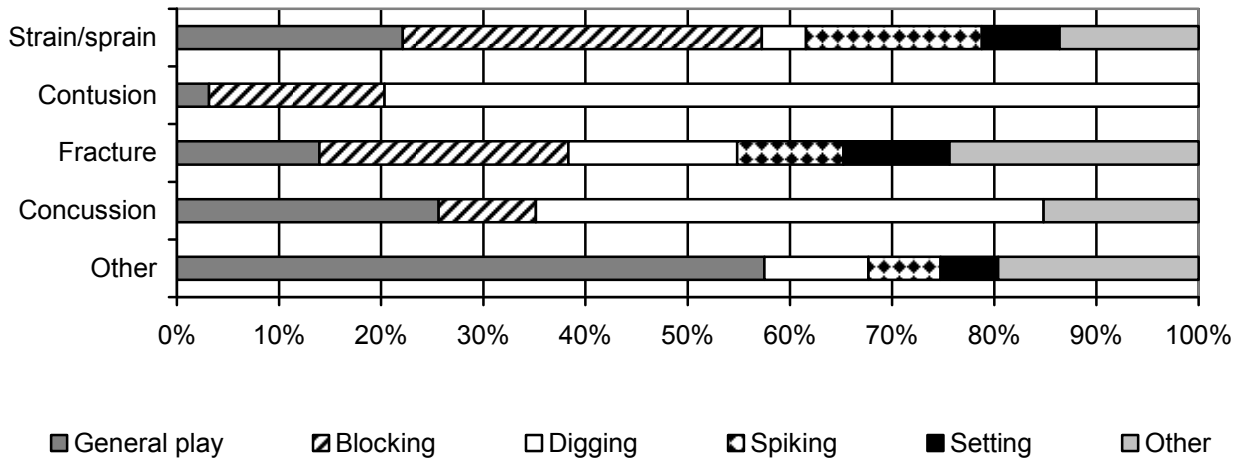


Table 6.9 Activities Leading to Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	8,452	32.0%	11,663	25.9%	20,115	28.1%
Blocking	6,962	26.4%	11,177	24.8%	18,140	25.4%
Spiking	3,181	12.0%	6,159	13.7%	9,339	13.1%
Digging	5,259	19.9%	3,273	7.3%	8,531	11.9%
Conditioning	0	0.0%	5,077	11.3%	5,077	7.1%
Setting	541	2.1%	4,168	9.2%	4,709	6.6%
Serving	1,244	4.7%	1,747	3.9%	2,991	4.2%
Passing	362	1.4%	1,048	2.3%	1,411	2.0%
Other	403	1.5%	779	1.7%	1,182	1.7%
Total	26,405	100%	45,091	100%	71,496	100%

Figure 6.5 Activity Resulting in Volleyball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



VII. Boys' Basketball Injury Epidemiology

Table 7.1 Boys' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	348	249,849	1.39	82,612
Competition	166	74,446	2.23	36,766
Practice	182	175,403	1.04	45,846

Table 7.2 Demographic Characteristics of Injured Boys' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	15,876 (19.3%)
Sophomore	20,692 (25.2%)
Junior	21,378 (26.0%)
Senior	24,154 (29.4%)
Total†	82,099 (100%)
Age (years)	
Minimum	14
Maximum	19
Mean (St. Dev.)	16.2 (1.2)
BMI	
Minimum	16.3
Maximum	33.7
Mean (St. Dev.)	23.0 (2.9)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

†Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 7.1 Diagnosis of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

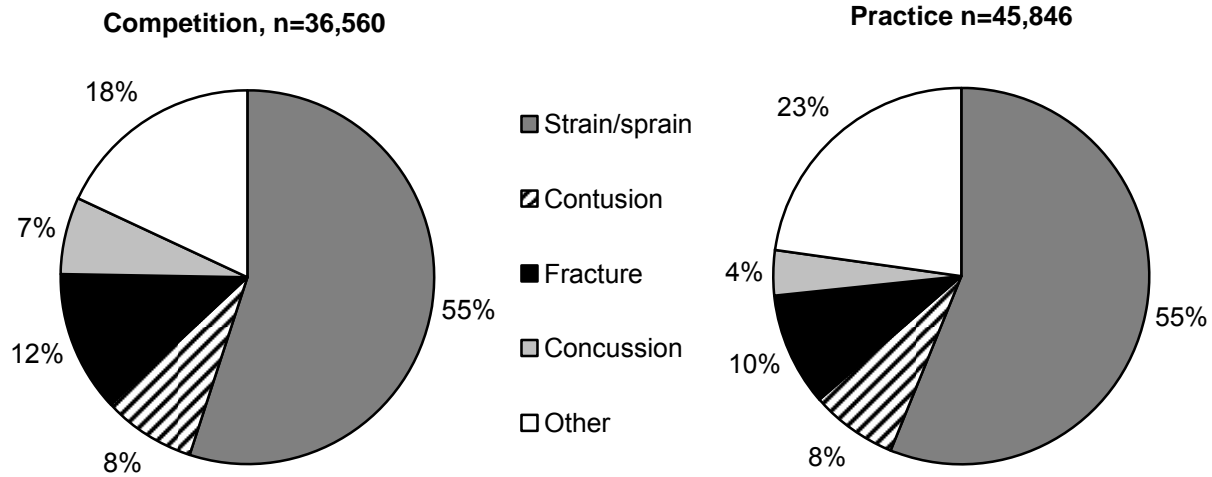


Table 7.3 Body Site of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	12,570	34.3%	14,801	32.3%	27,371	33.2%
Knee	5,672	15.5%	6,548	14.3%	12,220	14.8%
Head/face	4,651	12.7%	3,848	8.4%	8,499	10.3%
Hip/thigh/upper leg	1,430	3.9%	2,090	4.6%	3,520	4.3%
Hand/wrist	3,680	10.0%	6,652	14.5%	10,332	12.5%
Shoulder	1,099	3.0%	2,807	6.1%	3,906	4.7%
Trunk	1,534	4.2%	2,422	5.3%	3,955	4.8%
Lower leg	506	1.4%	505	1.1%	1,011	1.2%
Arm/elbow	2,211	6.0%	946	2.1%	3,157	3.8%
Foot	2,504	6.8%	3,841	8.4%	6,345	7.7%
Neck	85	0.2%	85	0.2%	169	0.2%
Other	703	1.9%	1,302	2.8%	2,005	2.4%
Total	36,645	100%	45,846	100%	82,490	100%

Table 7.4 Ten Most Common Boys' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=36,560		Practice n=45,846		Total n=82,406	
	n	%	n	%	n	%
Ankle strain/sprain	12,279	33.6%	14,197	31.0%	26,477	32.1%
Knee strain/sprain	1,884	5.2%	3,123	6.8%	5,006	6.1%
Knee other	2,433	6.7%	2,451	5.3%	4,884	5.9%
Hand/wrist fracture	1,670	4.6%	2,810	6.1%	4,481	5.4%
Head/face concussion	2,418	6.6%	1,761	3.8%	4,179	5.1%
Hand/wrist strain/sprain	1,562	4.3%	2,252	4.9%	3,814	4.6%
Foot strain/sprain	1,961	5.4%	1,015	2.2%	2,976	3.6%
Head/face other	1,803	4.9%	1,097	2.4%	2,900	3.5%
Foot other	0	0.0%	2,395	5.2%	2,395	2.9%
Shoulder strain/sprain	683	1.9%	1,704	3.7%	2,386	2.9%

Figure 7.2 Time Loss of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

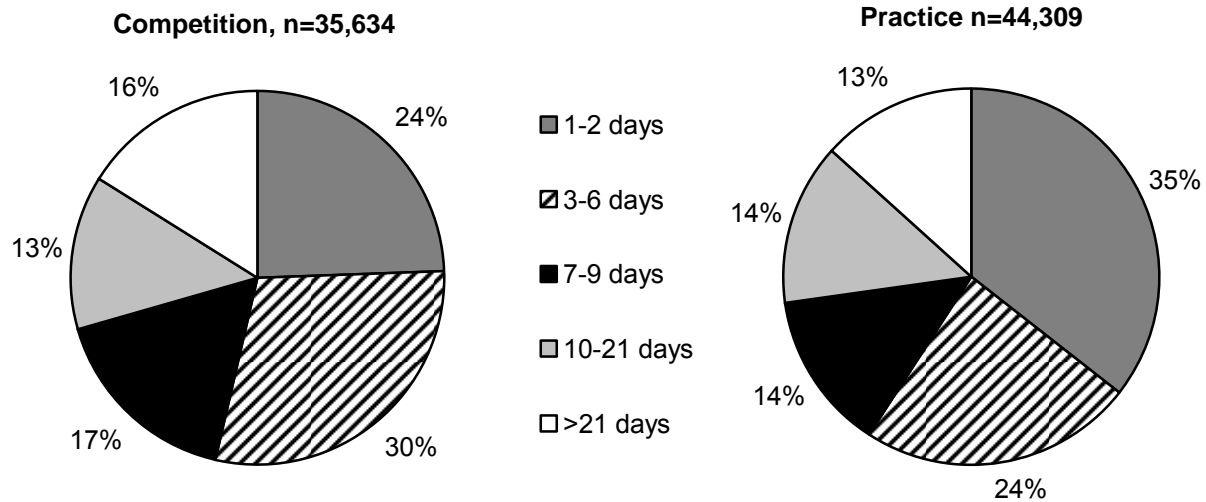


Table 7.5 Boys' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	1,563	4.3%	3,729	8.3%	5,292	6.5%
Did not require surgery	34,745	95.7%	41,156	91.7%	75,900	93.5%
Total	36,308	100%	44,884	100%	81,192	100%

Figure 7.3 History of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

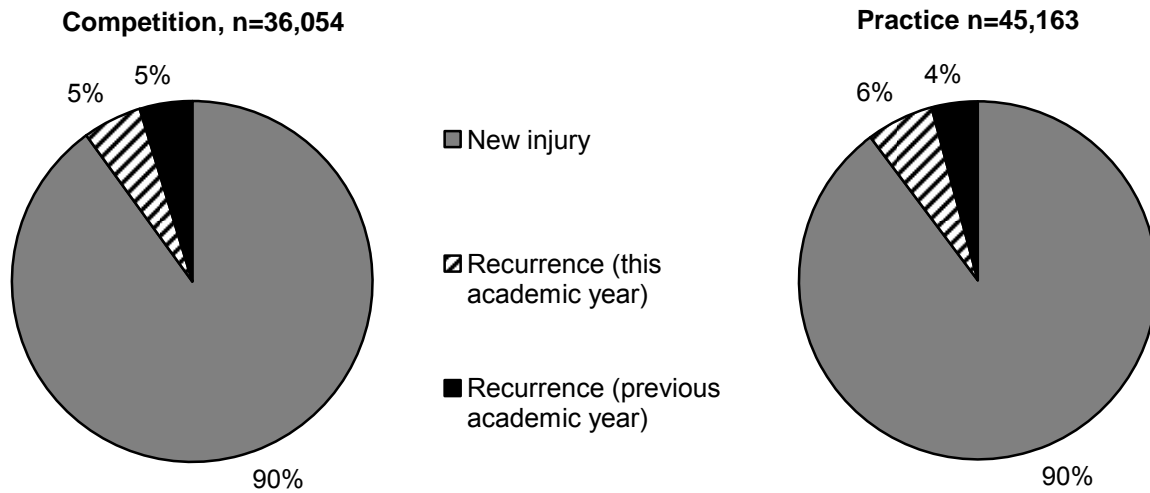


Table 7.6 Time during Season of Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	16,039	19.4%
Regular season	62,042	75.1%
Post season	4,530	5.5%
Total	82,612	100%

Table 7.7 Competition-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	252	0.7%
Beginning	5,098	13.9%
Middle	19,200	52.4%
End	12,095	33.0%
Total	36,645	100%
Competition Location		
Home	18,902	51.6%
Away	16,305	44.5%
Neutral site	1,438	3.9%
Total	36,645	100%
Injury Related to Foul Play		
No	29,701	81.1%
Yes, and ruled foul play	3,958	10.8%
Yes, but not ruled foul play	1,363	3.7%
Unknown	1,623	4.4%
Total	36,645	100%
Court Location		
Inside lane (offense)	8,563	23.7%
Inside lane (defense)	7,103	19.7%
Outside 3 point arc (offense)	5,546	15.3%
Outside 3 point arc (defense)	5,349	14.8%
Between 3 pt arc and lane (defense)	4,324	12.0%
Between 3 pt arc and lane (offense)	4,091	11.3%
Out of bounds	795	2.2%
Off the court	373	1.0%
Total	36,144	100%

Table 7.8 Practice-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	6,118	13.5%
Second 1/2 hour	11,937	26.3%
Third 1/2 hour	16,723	36.9%
Fourth 1/2 hour	7,305	16.1%
>2 hours into practice	3,273	7.2%
Total	45,356	100%
Practice Type		
Noncontact skills practice	7,823	17.2%
Noncontact partial numbers scrimmage	206	0.5%
Noncontact full scrimmage	2,046	4.5%
Partial contact skills practice	5,105	11.2%
Partial contact partial numbers scrimmage	4,247	9.3%
Partial contact full scrimmage	4,959	10.9%
Full contact skills practice	6,308	13.9%
Full contact partial numbers scrimmage	5,235	11.5%
Full contact full scrimmage	8,059	17.7%
Other	1,526	3.4%
Total	45,515	100%

Figure 7.4 Player Position of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

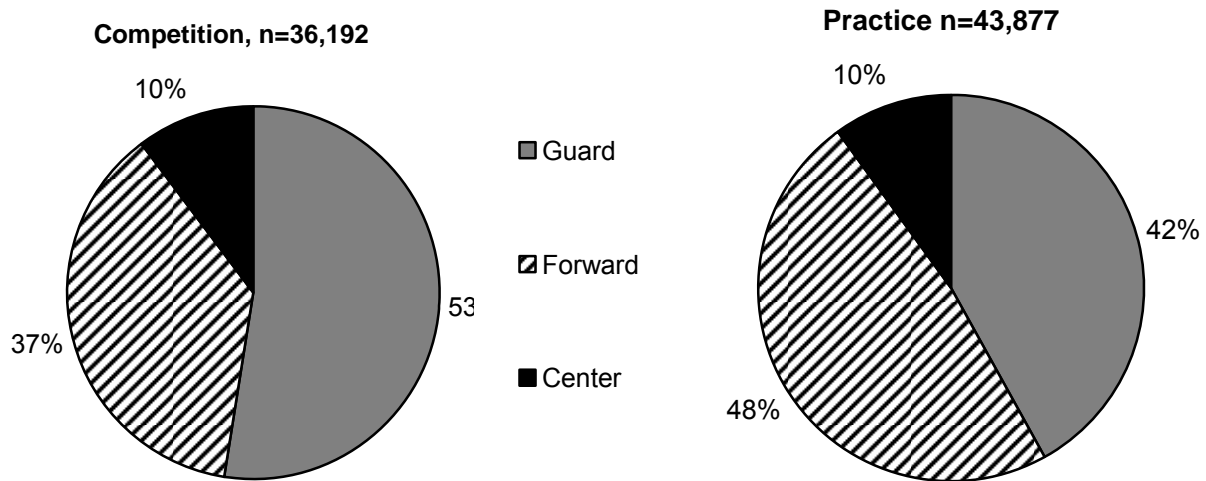
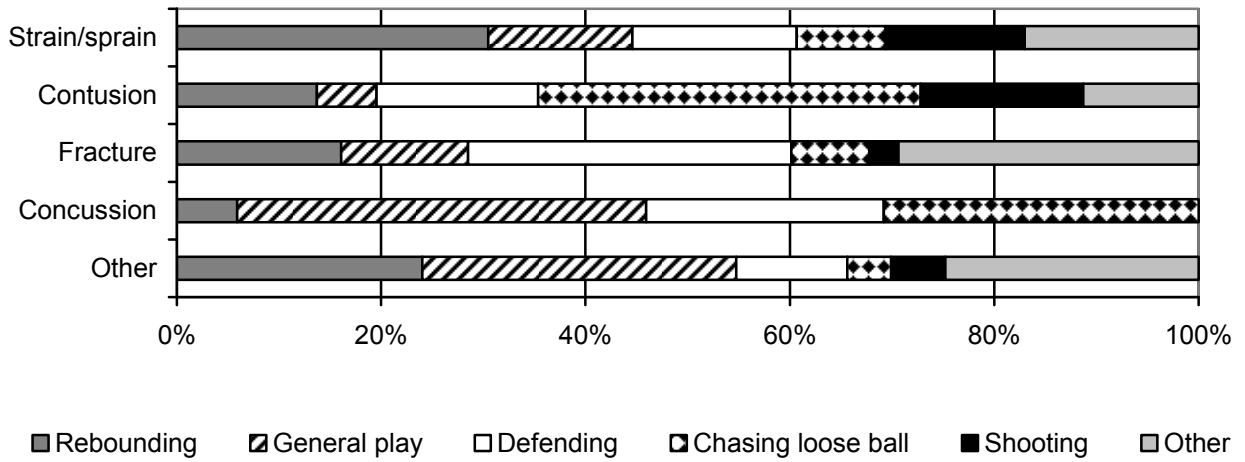


Table 7.9 Activities Leading to Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Rebounding	8,875	24.4%	11,517	25.4%	20,392	25.0%
General play	5,382	14.8%	9,348	20.7%	14,731	18.1%
Defending	7,196	19.8%	6,706	14.8%	13,903	17.0%
Chasing loose ball	5,685	15.7%	3,331	7.4%	9,016	11.1%
Shooting	4,296	11.8%	4,038	8.9%	8,334	10.2%
Conditioning	434	1.2%	3,352	7.4%	3,786	4.6%
Ball handling/dribbling	2,058	5.7%	1,627	3.6%	3,685	4.5%
Receiving pass	885	2.4%	2,569	5.7%	3,454	4.2%
Other	1,502	4.1%	2,768	6.1%	4,270	5.2%
Total	36,313	100%	45,258	100%	81,571	100%

Figure 7.5 Activity Resulting in Boys' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



VIII. Girls' Basketball Injury Epidemiology

Table 8.1 Girls' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	320	198,486	1.61	73,283
Competition	195	59,177	3.30	45,236
Practice	125	139,309	0.90	28,047

Table 8.2 Demographic Characteristics of Injured Girls' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	20,320 (28.6%)
Sophomore	18,614 (26.2%)
Junior	21,369 (30.0%)
Senior	10,827 (15.2%)
Total[†]	71,129 (100%)
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.7 (1.2)
BMI	
Minimum	15.6
Maximum	36.1
Mean (St. Dev.)	22.0 (3.2)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

[†]Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 8.1 Diagnosis of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

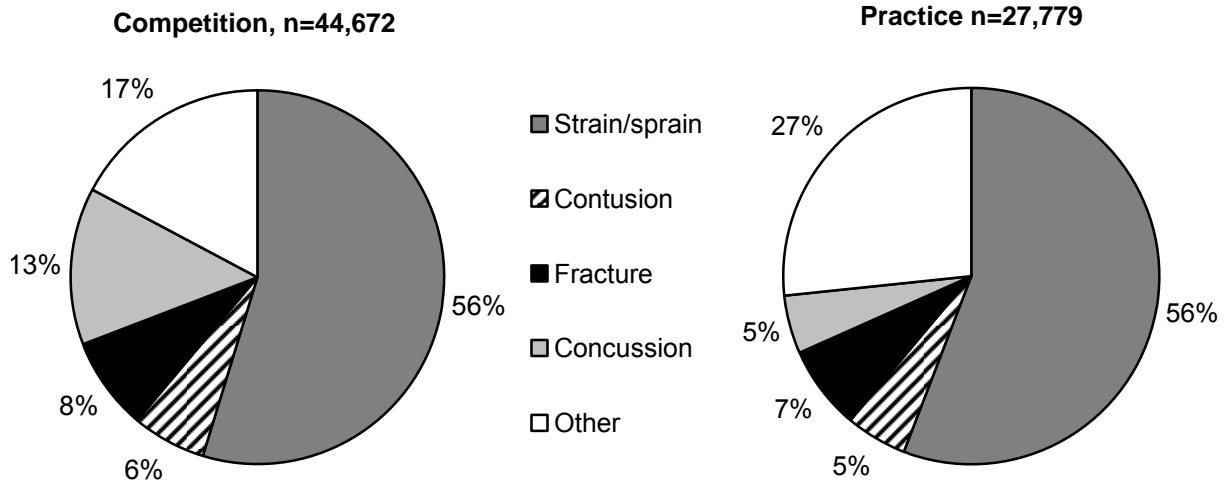


Table 8.3 Body Site of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	14,176	31.7%	7,553	27.2%	21,729	30.0%
Knee	8,204	18.4%	5,060	18.2%	13,263	18.3%
Head/face	9,003	20.2%	1,368	4.9%	10,370	14.3%
Hip/thigh/upper leg	1,208	2.7%	4,798	17.3%	6,006	8.3%
Hand/wrist	4,138	9.3%	2,774	10.0%	6,913	9.5%
Shoulder	1,758	3.9%	1,770	6.4%	3,528	4.9%
Trunk	1,811	4.1%	208	0.7%	2,019	2.8%
Lower leg	2,203	4.9%	1,230	4.4%	3,433	4.7%
Arm/elbow	379	0.8%	0	0.0%	379	0.5%
Foot	1,030	2.3%	2,614	9.4%	3,644	5.0%
Neck	321	0.7%	73	0.3%	395	0.5%
Other	442	1.0%	331	1.2%	773	1.1%
Total	44,673	100%	27,779	100%	72,451	100%

Table 8.4 Ten Most Common Girls' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=44,672		Practice n=27,779		Total n=72,451	
	n	%	n	%	n	%
Ankle strain/sprain	12,813	28.7%	7,111	25.6%	19,923	27.5%
Head/face concussion	6,021	13.5%	1,368	4.9%	7,389	10.2%
Knee strain/sprain	5,254	11.8%	1,705	6.1%	6,959	9.6%
Hip/thigh/upper leg strain/sprain	784	1.8%	4,356	15.7%	5,140	7.1%
Knee other	1,640	3.7%	2,595	9.3%	4,235	5.8%
Hand/wrist strain/sprain	2,178	4.9%	1,026	3.7%	3,204	4.4%
Foot other	822	1.8%	1,908	6.9%	2,730	3.8%
Hand/wrist fracture	1,289	2.9%	1,393	5.0%	2,682	3.7%
Shoulder other	1,048	2.3%	997	3.6%	2,045	2.8%
Lower leg other	746	1.7%	1,144	4.1%	1,889	2.6%

Figure 8.2 Time Loss of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

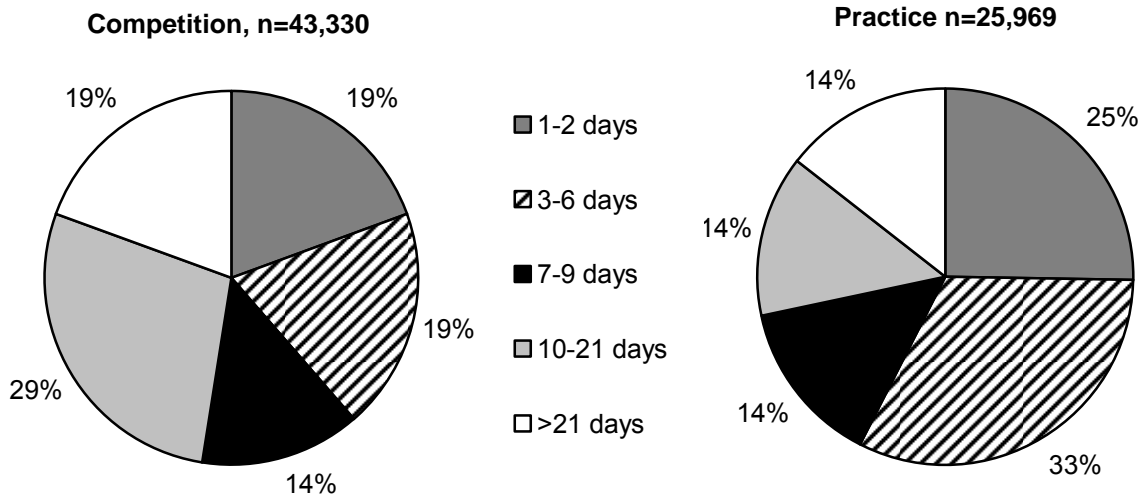


Table 8.5 Girls' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	4,042	9.3%	1,081	4.0%	5,123	7.2%
Did not require surgery	39,424	90.7%	26,318	96.0%	65,743	92.8%
Total	43,466	100%	27,400	100%	70,866	100%

Figure 8.3 History of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

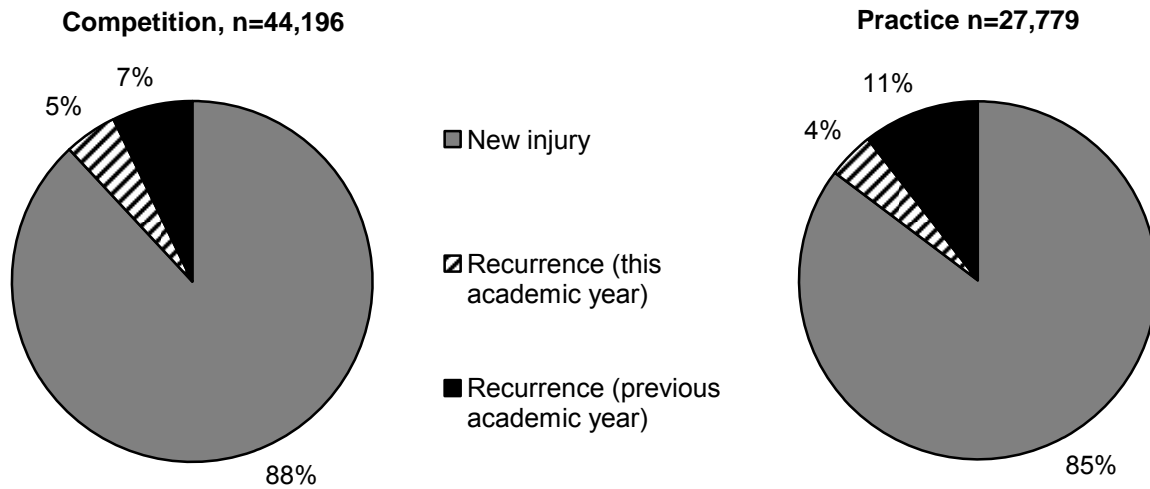


Table 8.6 Time during Season of Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	15,919	21.7%
Regular season	55,198	75.3%
Post season	2,166	3.0%
Total	73,283	100%

Table 8.7 Competition-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	1,630	3.7%
Beginning	7,679	17.2%
Middle	21,607	48.5%
End	13,610	30.6%
Total	44,526	100%
Competition Location		
Home	20,064	44.9%
Away	23,411	52.4%
Neutral site	1,197	2.7%
Total	44,672	100%
Injury Related to Foul Play		
No	38,665	86.6%
Yes, and ruled foul play	3,075	6.9%
Yes, but not ruled foul play	1,967	4.4%
Unknown	966	2.2%
Total	44,672	100%
Court Location		
Inside lane (offense)	8,812	20.2%
Inside lane (defense)	9,645	22.1%
Between 3 pt arc and lane (offense)	6,624	15.2%
Between 3 pt arc and lane (defense)	7,012	16.1%
Outside 3 point arc (offense)	5,324	12.2%
Outside 3 point arc (defense)	4,278	9.8%
Out of bounds	1,117	2.6%
Off the court	847	1.9%
Total	43,660	100%

Table 8.8 Practice-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	4,745	17.2%
Second 1/2 hour	5,914	21.4%
Third 1/2 hour	9,100	33.0%
Fourth 1/2 hour	5,866	21.3%
>2 hours into practice	1,959	7.1%
Total	27,584	100%
Practice Type		
Noncontact skills practice	7,656	27.6%
Noncontact partial numbers scrimmage	408	1.5%
Noncontact full scrimmage	1,847	6.7%
Partial contact skills practice	4,370	15.7%
Partial contact partial numbers scrimmage	1,371	4.9%
Partial contact full scrimmage	2,290	8.2%
Full contact skills practice	4,007	14.4%
Full contact partial numbers scrimmage	1,124	4.0%
Full contact full scrimmage	2,713	9.8%
Other	1,992	7.2%
Total	27,779	100%

Figure 8.4 Player Position of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

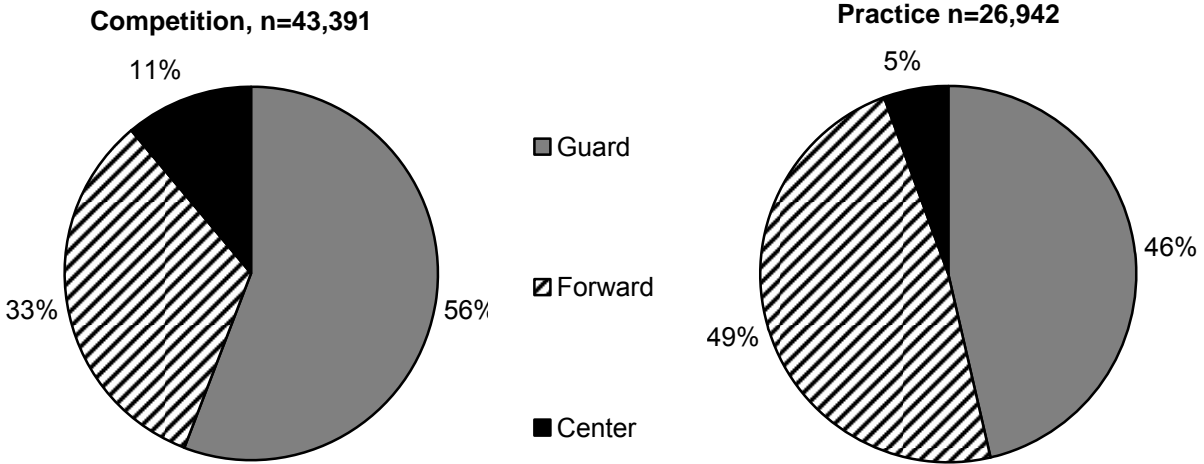
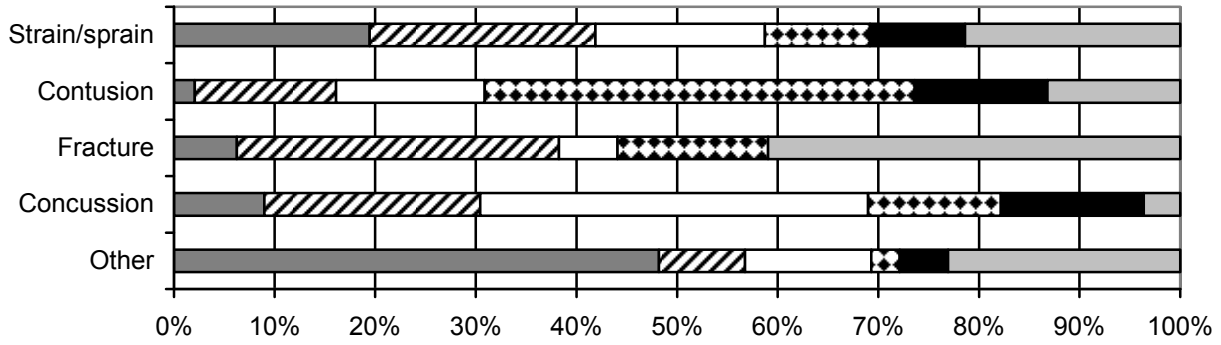


Table 8.9 Activities Leading to Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	6,232	14.5%	9,475	34.6%	15,707	22.3%
Rebounding	10,115	23.5%	3,761	13.7%	13,877	19.7%
Defending	10,576	24.6%	1,486	5.4%	12,061	17.1%
Chasing loose ball	4,664	10.8%	3,380	12.3%	8,044	11.4%
Shooting	3,608	8.4%	2,952	10.8%	6,561	9.3%
Ball handling/dribbling	4,173	9.7%	1,759	6.4%	5,932	8.4%
Receiving pass	947	2.2%	1,606	5.9%	2,553	3.6%
Other	2,733	6.3%	2,965	10.8%	5,698	8.1%
Total	43,050	100%	27,384	100%	70,434	100%

Figure 8.5 Activity Resulting in Girls' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



General play
 Rebounding
 Defending
 Chasing loose ball
 Ball handling/dribbling
 Other

IX. Wrestling Injury Epidemiology

Table 9.1 Wrestling Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	408	179,427	2.27	91,625
Competition	175	47,327	3.70	40,698
Practice	233	132,100	1.76	50,927

Table 9.2 Demographic Characteristics of Injured Wrestlers, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	18,453 (20.3%)
Sophomore	22,602 (24.9%)
Junior	26,127 (28.8%)
Senior	23,673 (26.1%)
Total[†]	90,856 (100%)
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	16.0 (1.2)
BMI	
Minimum	14.3
Maximum	47.9
Mean (St. Dev.)	23.7 (4.8)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

[†]Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 9.1 Diagnosis of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

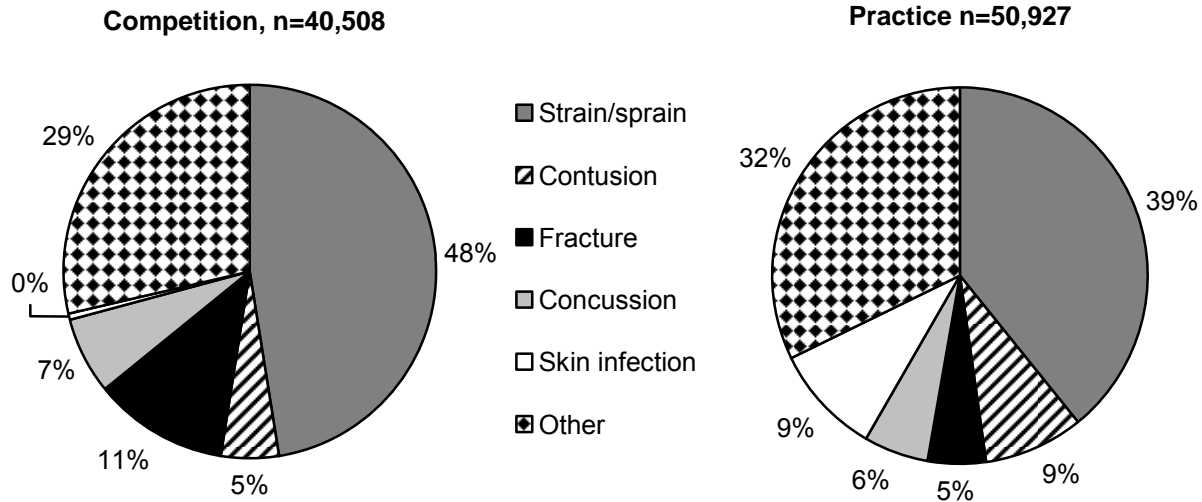


Table 9.3 Body Site of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	2,368	5.8%	2,631	5.2%	4,999	5.5%
Knee	7,120	17.5%	9,753	19.2%	16,872	18.4%
Head/face	5,476	13.5%	6,263	12.3%	11,739	12.8%
Hip/thigh/upper leg	984	2.4%	1,507	3.0%	2,491	2.7%
Hand/wrist	1,456	3.6%	4,749	9.3%	6,204	6.8%
Shoulder	9,742	23.9%	8,468	16.7%	18,211	19.9%
Trunk	5,402	13.3%	7,594	14.9%	12,996	14.2%
Lower leg	379	0.9%	879	1.7%	1,258	1.4%
Arm/elbow	4,899	12.0%	3,900	7.7%	8,798	9.6%
Foot	793	1.9%	742	1.5%	1,535	1.7%
Neck	1,941	4.8%	3,232	6.4%	5,174	5.7%
Other	138	0.3%	1,124	2.2%	1,262	1.4%
Total	40,698	100%	50,841	100%	91,539	100%

Table 9.4 Ten Most Common Wrestling Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=40,508		Practice n=50,841		Total n=91,349	
	n	%	n	%	n	%
Shoulder strain/sprain	5,642	13.9%	3,895	7.7%	9,538	10.4%
Knee other	3,737	9.2%	4,093	8.1%	7,830	8.6%
Knee strain/sprain	2,713	6.7%	4,487	8.8%	7,200	7.9%
Shoulder other	2,718	6.7%	3,487	6.9%	6,204	6.8%
Head/face concussion	2,784	6.9%	3,113	6.1%	5,896	6.5%
Trunk strain/sprain	2,604	6.4%	2,851	5.6%	5,455	6.0%
Trunk other	1,772	4.4%	2,749	5.4%	4,521	4.9%
Head/face other	1,744	4.3%	2,703	5.3%	4,447	4.9%
Ankle strain/sprain	1,921	4.7%	2,232	4.4%	4,154	4.5%
Arm/elbow strain/sprain	1,842	4.5%	2,073	4.1%	3,914	4.3%

Figure 9.2 Time Loss of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

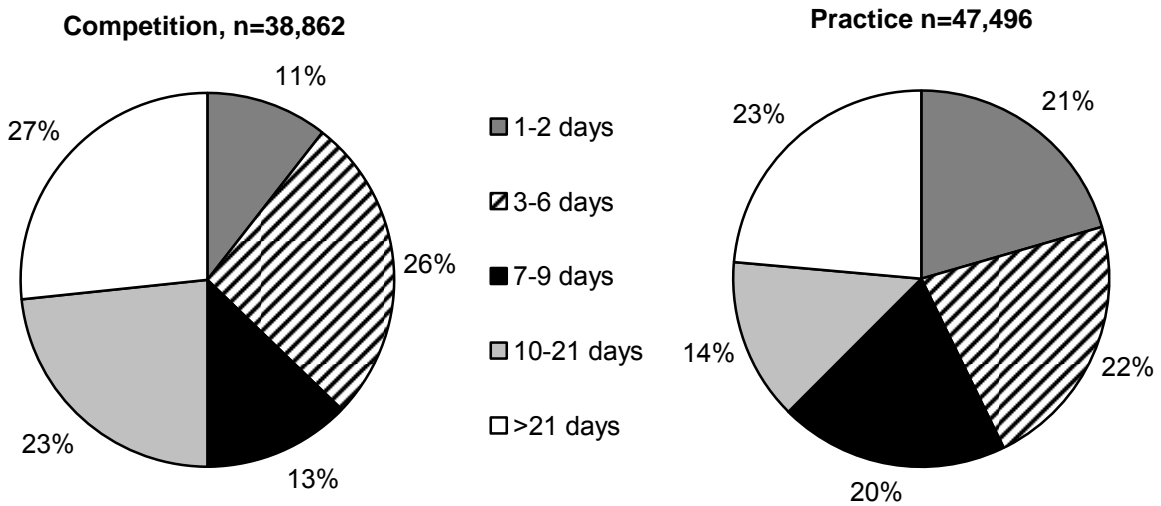


Table 9.5 Wrestling Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	4,864	12.0%	3,716	7.7%	8,579	9.7%
Did not require surgery	35,696	88.0%	44,463	92.3%	80,159	90.3%
Total	40,560	100%	48,179	100%	88,739	100%

Figure 9.3 History of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

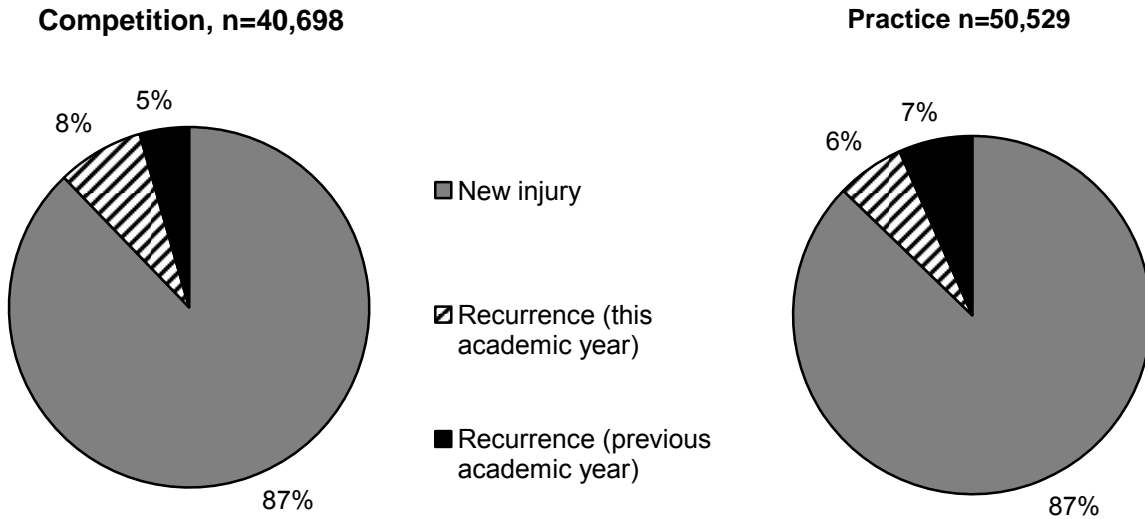


Table 9.6 Time during Season of Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	14,324	15.6%
Regular season	73,573	80.3%
Post season	3,728	4.1%
Total	91,625	100%

Table 9.7 Competition-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	876	2.2%
Beginning	5,889	14.5%
Middle	22,864	56.3%
End	10,983	27.0%
Total	40,612	100%
Competition Location		
Home	13,858	34.1%
Away	24,179	59.4%
Neutral site	2,660	6.5%
Total	40,698	100%
Injury Related to Foul Play		
No	35,521	87.3%
Yes, and ruled foul play	2,208	5.4%
Yes, but not ruled foul play	2,089	5.1%
Unknown	881	2.2%
Total	40,698	100%
Mat Location*		
Within circle	77,871	88.8%
Out of bounds	3,982	4.5%
Off mat	5,836	6.7%
Total	87,689	100%

*ATCs were asked to provide the mat location for both competition- and practice-related wrestling injuries.

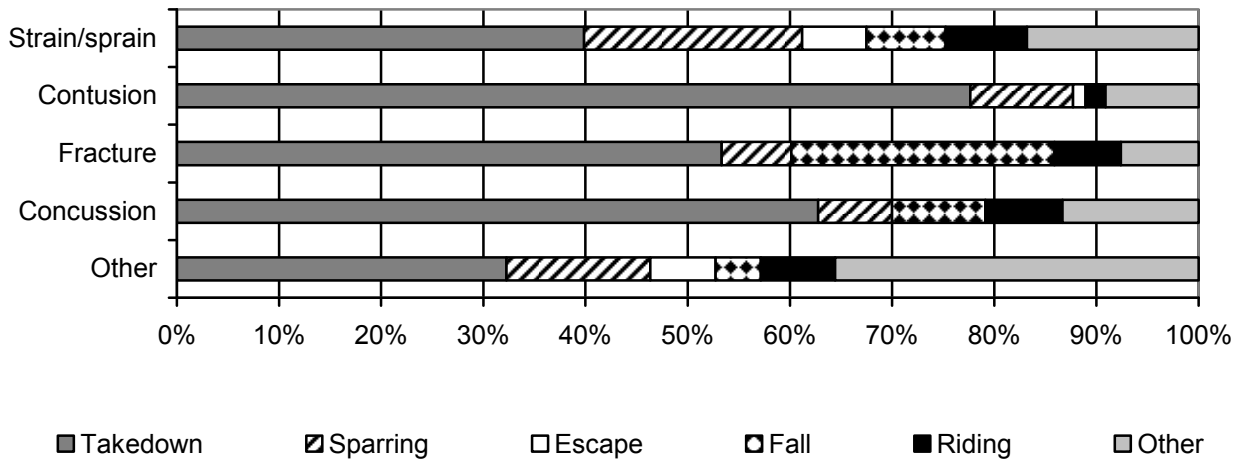
Table 9.8 Practice-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	8,004	16.0%
Second 1/2 hour	11,313	22.6%
Third 1/2 hour	19,596	39.2%
Fourth 1/2 hour	8,917	17.9%
>2 hours into practice	2,121	4.2%
Total	49,951	100%
Practice Type		
Noncontact skills practice	2,051	4.1%
Partial contact skills practice	6,688	13.3%
Partial contact full scrimmage	1,105	2.2%
Full contact skills practice	26,727	53.2%
Full contact partial numbers scrimmage	568	1.1%
Full contact full scrimmage	8,279	16.5%
Other	4,811	9.6%
Total	50,230	100%

Table 9.9 Activities Leading to Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Takedown	18,045	45.7%	20,157	40.6%	38,203	42.9%
Sparring	4,668	11.8%	9,643	19.4%	14,311	16.1%
Fall	4,063	10.3%	2,866	5.8%	6,929	7.8%
N/A,	756	1.9%	5,990	12.1%	6,746	7.6%
Riding	4,413	11.2%	1,920	3.9%	6,334	7.1%
Conditioning	438	1.1%	4,576	9.2%	5,014	5.6%
Escape	2,032	5.2%	2,420	4.9%	4,452	5.0%
Reversal	2,187	5.5%	1,897	3.8%	4,084	4.6%
Other	2,853	7.2%	209	0.4%	3,062	3.4%
Total	39,457	100%	49,677	100%	89,134	100%

Figure 9.5 Activity Resulting in Wrestling Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



X. Baseball Injury Epidemiology

Table 10.1 Baseball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	173	186,264	0.93	44,760
Competition	92	67,167	1.37	22,803
Practice	81	119,097	0.68	21,957

Table 10.2 Demographic Characteristics of Injured Baseball Athletes, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	7,266 (16.6%)
Sophomore	10,125 (23.1%)
Junior	11,953 (27.3%)
Senior	14,480 (33.0%)
Total[†]	43,824 (100%)
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	16.3 (1.3)
BMI	
Minimum	17.9
Maximum	38.7
Mean (St. Dev.)	24.2 (3.7)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

[†]Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 10.1 Diagnosis of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

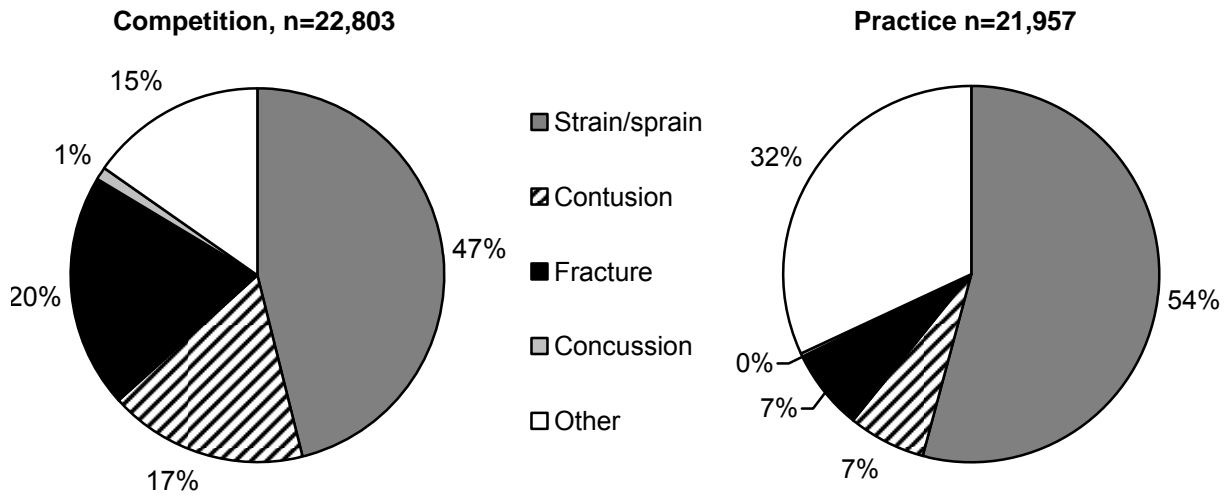


Table 10.3 Body Site of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	2,810	12.3%	3,335	15.2%	6,145	13.7%
Knee	1,403	6.2%	2,601	11.8%	4,004	8.9%
Head/face	2,374	10.4%	1,392	6.3%	3,766	8.4%
Hip/thigh/upper leg	2,367	10.4%	2,630	12.0%	4,997	11.2%
Hand/wrist	4,500	19.7%	3,392	15.4%	7,891	17.6%
Shoulder	4,007	17.6%	3,134	14.3%	7,141	16.0%
Trunk	402	1.8%	1,315	6.0%	1,717	3.8%
Lower leg	1,307	5.7%	1,739	7.9%	3,046	6.8%
Arm/elbow	2,938	12.9%	2,113	9.6%	5,051	11.3%
Foot	0	0.0%	0	0.0%	0	0.0%
Neck	64	0.3%	0	0.0%	64	0.1%
Other	633	2.8%	306	1.4%	938	2.1%
Total	22,803	100%	21,957	100%	44,760	100%

Table 10.4 Ten Most Common Baseball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=22,803		Practice n=21,957		Total n=44,760	
	n	%	n	%	n	%
Ankle strain/sprain	2,375	10.4%	2,766	12.6%	5,142	11.5%
Hip/thigh/upper leg strain/sprain	2,366	10.4%	2,630	12.0%	4,997	11.2%
Shoulder other	2,460	10.8%	1,207	5.5%	3,667	8.2%
Hand/wrist strain/sprain	2,283	10.0%	644	2.9%	2,927	6.5%
Shoulder strain/sprain	915	4.0%	1,927	8.8%	2,842	6.3%
Hand/wrist fracture	1,648	7.2%	939	4.3%	2,587	5.8%
Arm/elbow strain/sprain	1,241	5.4%	644	2.9%	1,884	4.2%
Arm/elbow other	686	3.0%	1,102	5.0%	1,788	4.0%
Knee other	0	0.0%	1,664	7.6%	1,664	3.7%
Trunk strain/sprain	249	1.1%	1,315	6.0%	1,564	3.5%

Figure 10.2 Time Loss of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

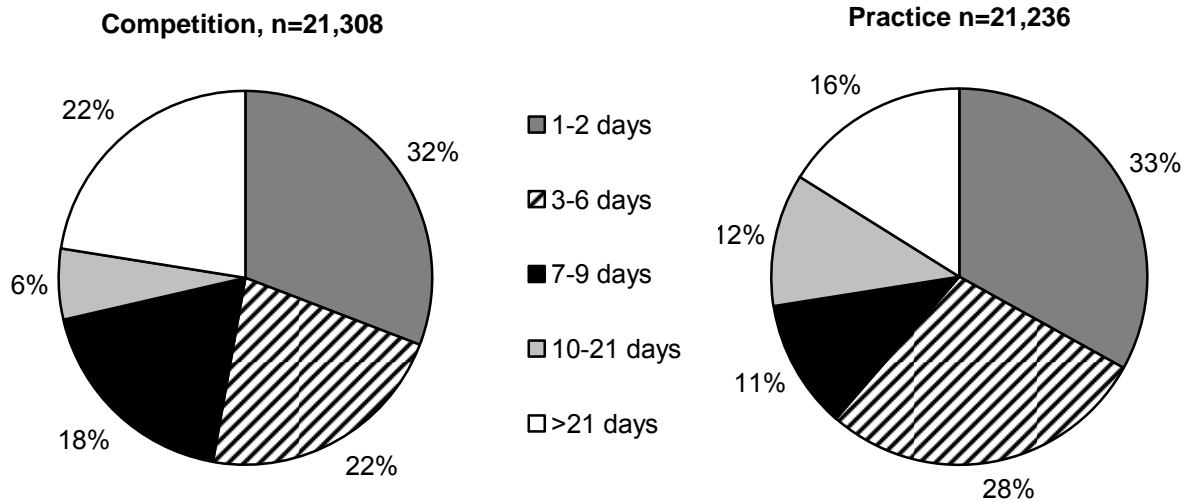


Table 10.5 Baseball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	2,363	10.6%	2,187	10.0%	4,550	10.3%
Did not require surgery	19,907	89.4%	19,643	90.0%	39,549	89.7%
Total	22,270	100%	21,829	100%	44,099	100%

Figure 10.3 History of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

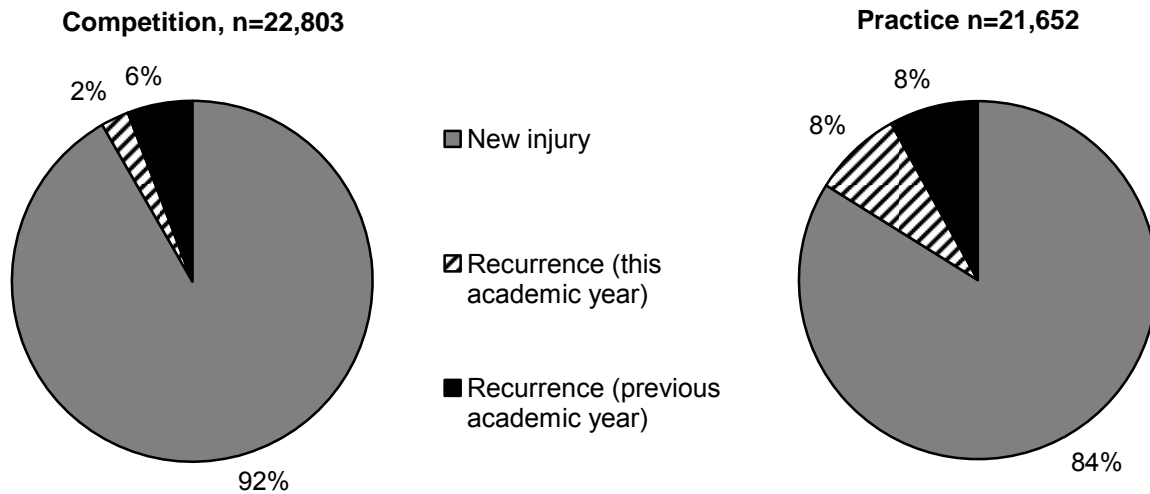


Table 10.6 Time during Season of Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	13,055	29.2%
Regular season	30,324	67.7%
Post season	1,381	3.1%
Total	44,760	100%

Table 10.7 Competition-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	250	1.1%
Beginning	1,911	8.4%
Middle	16,212	71.1%
End	4,429	19.4%
Total	22,803	100%
Competition Location		
Home	10,646	46.7%
Away	10,690	46.9%
Neutral site	1,467	6.4%
Total	22,803	100%
Injury Related to Foul Play		
Yes, and ruled foul play	0	100%
Yes, but not ruled foul play	0	100%
No	22,050	99.2%
Unknown	185	0.8%
Total	22,234	100%
Field Location		
Home plate	6,555	29.5%
Pitchers mound	3,185	14.3%
Second base	3,046	13.7%
First base	2,912	13.1%
Outfield	2,823	12.7%
Infield	1,459	6.6%
Third base	1,435	6.5%
Foul territory	633	2.8%
Other	186	0.8%
Total	22,234	100%

Table 10.8 Practice-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	4,728	21.9%
Second 1/2 hour	6,160	28.5%
Third 1/2 hour	7,719	35.7%
Fourth 1/2 hour	2,717	12.6%
>2 hours into practice	313	1.4%
Total	21,637	100%
Practice Type		
Noncontact skills practice	14,687	67.5%
Noncontact partial numbers scrimmage	1,492	6.9%
Noncontact full scrimmage	1,322	6.1%
Partial contact skills practice	619	2.8%
Partial contact partial numbers scrimmage	569	2.6%
Full contact skills practice	1,393	6.4%
Full contact partial numbers scrimmage	569	2.6%
Full contact full scrimmage	185	0.8%
Other	938	4.3%
Total	21,773	100%

Figure 10.4 Player Position of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

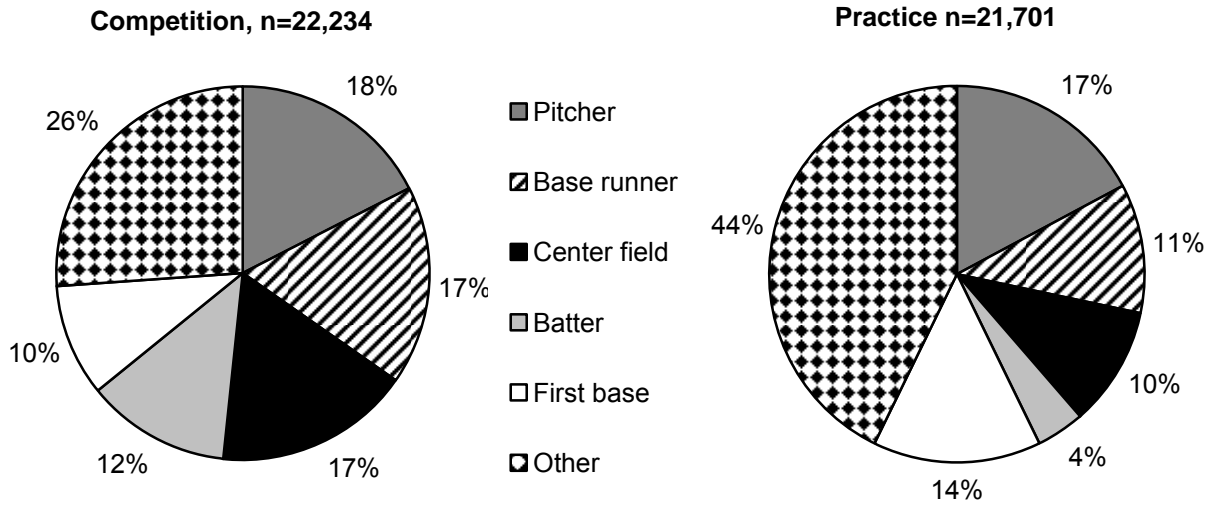
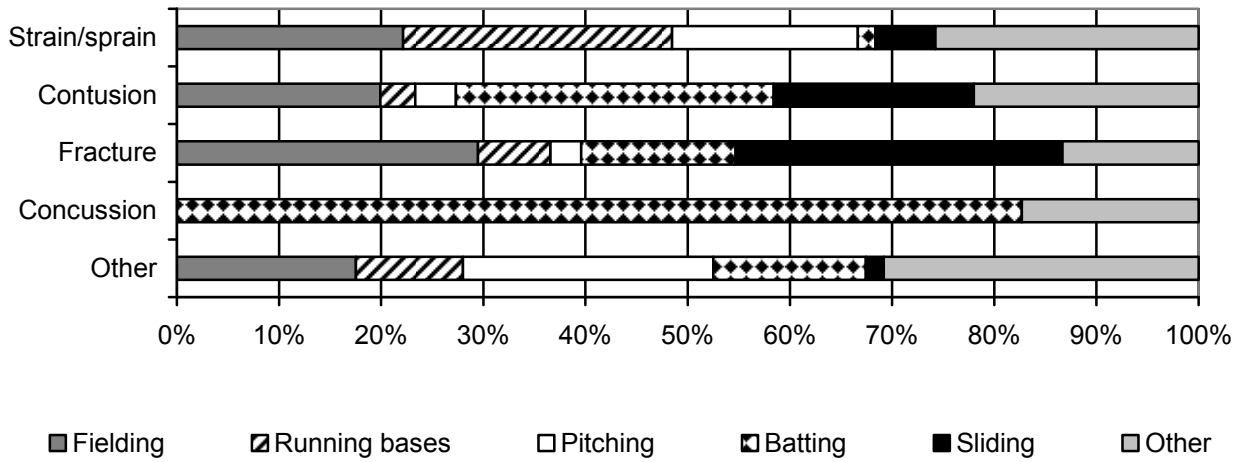


Table 10.9 Activities Leading to Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Fielding	4,855	21.8%	4,652	21.4%	9,507	21.6%
Running bases	2,738	12.3%	4,667	21.4%	7,404	16.8%
Pitching	3,754	16.9%	3,137	14.4%	6,891	15.7%
Batting	3,595	16.2%	1,255	5.8%	4,850	11.0%
Sliding	3,581	16.1%	906	4.2%	4,487	10.2%
Throwing (not pitching)	1,426	6.4%	1,851	8.5%	3,277	7.4%
General play	881	4.0%	1,578	7.2%	2,459	5.6%
Conditioning	186	0.8%	2,196	10.1%	2,382	5.4%
Catching	847	3.8%	1,218	5.6%	2,065	4.7%
Other	372	1.7%	306	1.4%	678	1.5%
Total	22,234	100%	21,765	100%	44,000	100%

Figure 10.5 Activity Resulting in Baseball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



XI. Softball Injury Epidemiology

Table 11.1 Softball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Total	187	144,954	1.29	63,316
Competition	96	51,670	1.86	33,325
Practice	91	93,284	0.98	29,991

Table 11.2 Demographic Characteristics of Injured Softball Athletes, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year*

Year in School	
Freshman	16,111 (25.6%)
Sophomore	14,809 (23.5%)
Junior	22,031 (35.0%)
Senior	10,048 (16.0%)
Total†	62,998 (100%)
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.8 (1.2)
BMI	
Minimum	16.7
Maximum	42.2
Mean (St. Dev.)	23.6 (4.1)

*All remaining analyses in this chapter present data weighted to provide national injury estimates.

†Throughout this chapter, totals and n's represent the total weighted number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Figure 11.1 Diagnosis of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

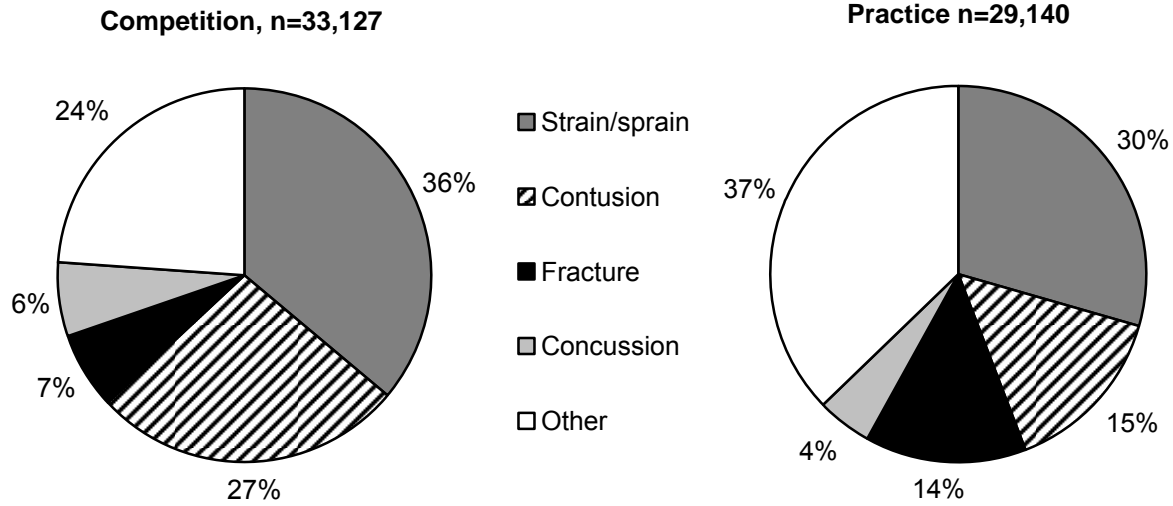


Table 11.3 Body Site of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	6,177	18.6%	2,877	9.9%	9,055	14.5%
Knee	3,035	9.2%	3,001	10.3%	6,037	9.7%
Head/face	6,676	20.2%	3,546	12.2%	10,221	16.4%
Hip/thigh/upper leg	5,574	16.8%	4,162	14.3%	9,735	15.6%
Hand/wrist	3,310	10.0%	4,221	14.5%	7,531	12.1%
Shoulder	1,310	4.0%	2,224	7.6%	3,534	5.7%
Trunk	416	1.3%	1,012	3.5%	1,428	2.3%
Lower leg	3,041	9.2%	3,804	13.1%	6,845	11.0%
Arm/elbow	3,304	10.0%	2,871	9.9%	6,175	9.9%
Foot	285	0.9%	1,223	4.2%	1,508	2.4%
Neck	0	0.0%	0	0.0%	0	0.0%
Other	0	0.0%	199	0.7%	199	0.3%
Total	33,128	100%	29,140	100%	62,267	100%

Table 11.4 Ten Most Common Softball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Diagnosis	Competition n=33,127		Practice n=29,140		Total n=62,267	
	n	%	n	%	n	%
Hip/thigh/upper leg strain/sprain	4,723	14.3%	3,138	10.8%	7,861	12.6%
Ankle strain/sprain	4,523	13.7%	2,681	9.2%	7,204	11.6%
Arm/elbow other	2,553	7.7%	2,479	8.5%	5,032	8.1%
Lower leg contusion	2,494	7.5%	1,678	5.8%	4,172	6.7%
Knee other	2,114	6.4%	1,822	6.3%	3,937	6.3%
Head/face concussion	2,119	6.4%	1,309	4.5%	3,428	5.5%
Head/face other	2,071	6.3%	784	2.7%	2,854	4.6%
Shoulder other	1,046	3.2%	1,765	6.1%	2,810	4.5%
Hand/wrist fracture	947	2.9%	1,850	6.4%	2,798	4.5%
Hand/wrist contusion	1,586	4.8%	787	2.7%	2,373	3.8%

Figure 11.2 Time Loss of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

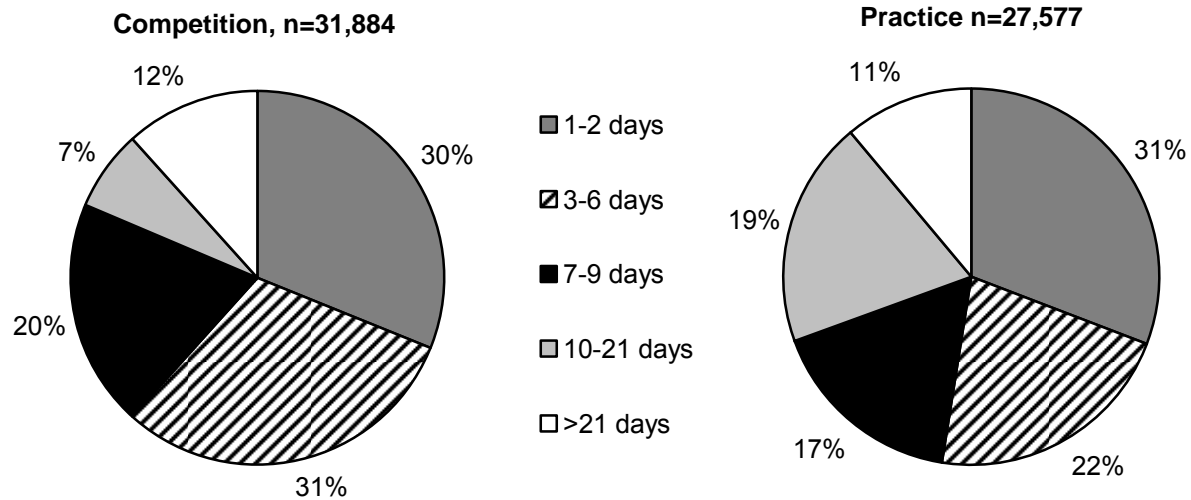


Table 11.5 Softball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	1,905	5.8%	1,636	5.6%	3,541	5.7%
Did not require surgery	30,785	94.2%	27,307	94.4%	58,093	94.3%
Total	32,690	100%	28,944	100%	61,634	100%

Figure 11.3 History of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

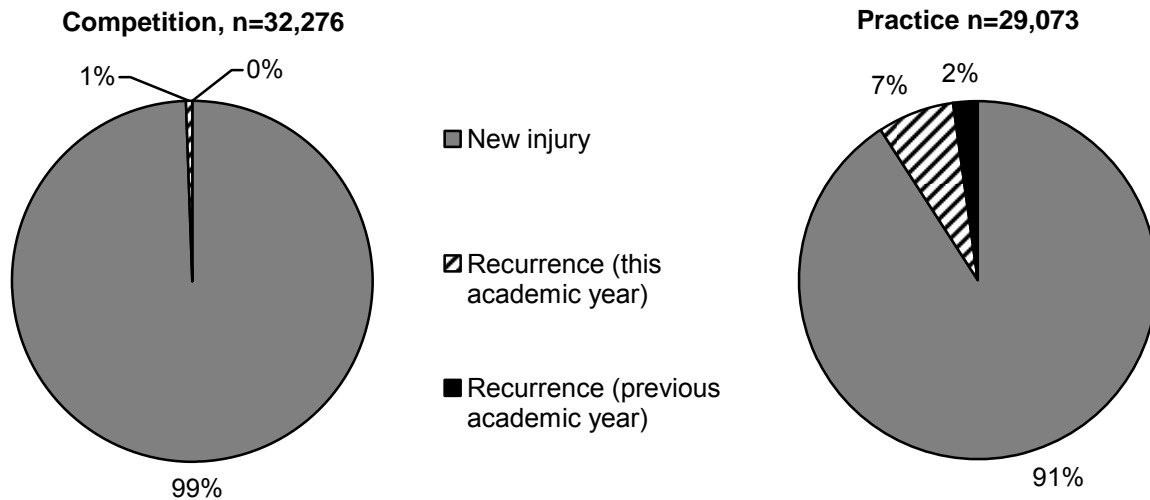


Table 11.6 Time during Season of Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Season		
Preseason	20,359	32.2%
Regular season	42,105	66.5%
Post season	851	1.3%
Total	63,316	100%

Table 11.7 Competition-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Competition		
Warm-ups	973	3.0%
Beginning	6,015	18.4%
Middle	22,007	67.2%
End	2,908	8.9%
Overtime	827	2.5%
Total	32,731	100%
Competition Location		
Home	18,274	55.2%
Away	12,281	37.1%
Neutral site	2,573	7.8%
Total	33,127	100%
Injury Related to Foul Play		
No	32,081	96.8%
Yes, and ruled foul play	196	0.6%
Yes, but not ruled foul play	851	2.6%
Unknown	0	0%
Total	33,127	100%
Field Location		
Home plate	6,555	29.5
First base	2,912	13.1
Second base	3,046	13.7
Third base	1,435	6.5
Infield	1,459	6.6
Pitchers mound	3,185	14.3
Outfield	2,823	12.7
Foul territory	633	2.8
Other	186	0.8
Total	22,234	100

Table 11.8 Practice-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	n	%
Time in Practice		
First 1/2 hour	6,458	22.2%
Second 1/2 hour	5,252	18.1%
Third 1/2 hour	9,546	32.8%
Fourth 1/2 hour	5,790	19.9%
>2 hours into practice	2,028	7.0%
Total	29,073	100%
Practice Type		
Noncontact skills practice	17,411	62.4%
Noncontact partial numbers scrimmage	1,636	5.9%
Noncontact full scrimmage	392	1.4%
Partial contact skills practice	1,673	6.0%
Partial contact partial numbers scrimmage	1,219	4.4%
Partial contact full scrimmage	1,244	4.5%
Full contact skills practice	2,360	8.5%
Full contact partial numbers scrimmage	196	0.7%
Full contact full scrimmage	785	2.8%
Other	979	3.5%
Total	27,895	100%

Figure 11.4 Player Position of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

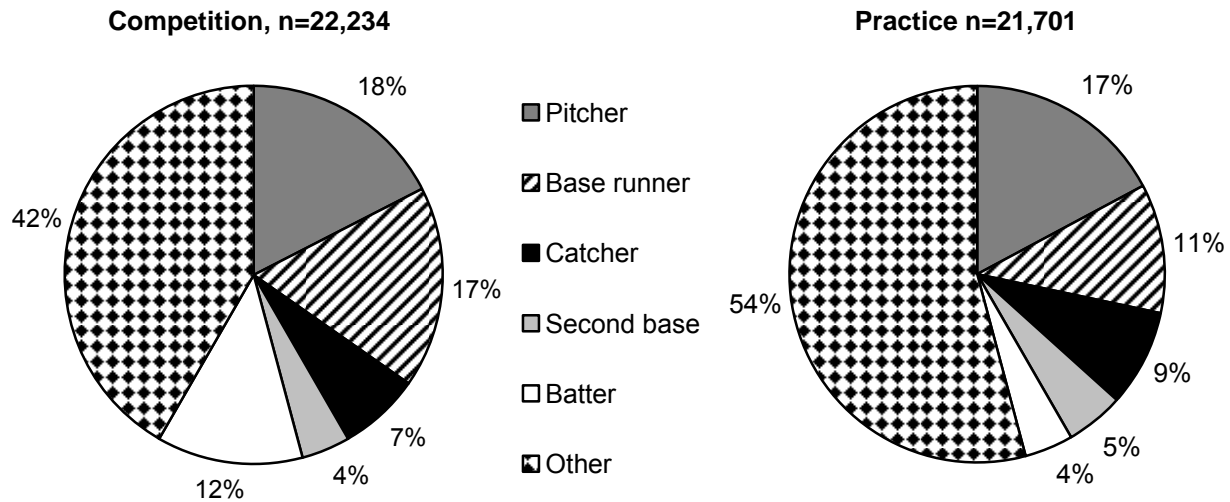
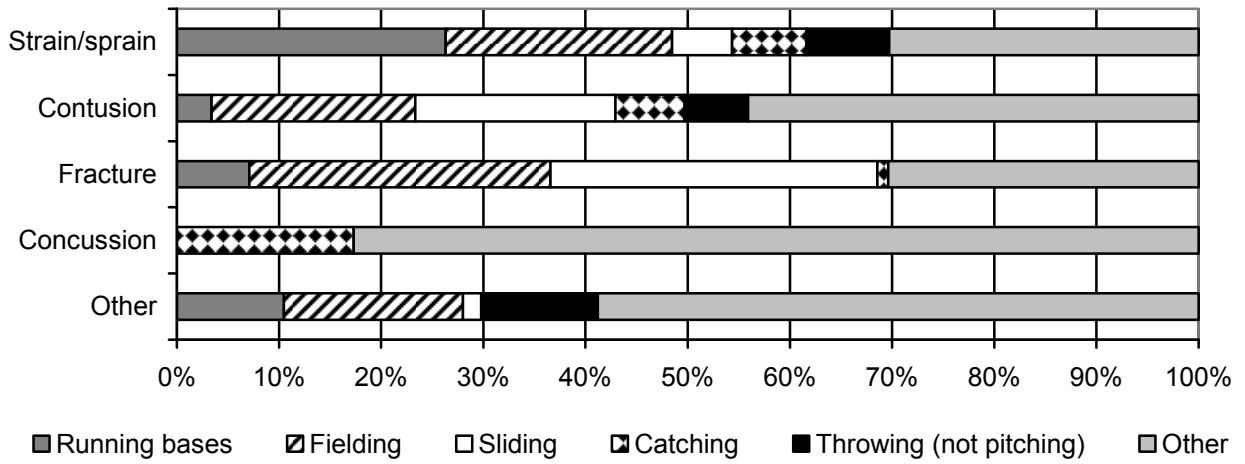


Table 11.9 Activities Leading to Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Running bases	7,831	23.6%	4,153	14.3%	11,984	19.3%
Throwing (not pitching)	4,909	14.8%	4,558	15.7%	9,467	15.3%
Catching	4,066	12.3%	4,787	16.5%	8,853	14.3%
Fielding	3,145	9.5%	3,796	13.1%	6,941	11.2%
Sliding	3,910	11.8%	2,487	8.6%	6,398	10.3%
Pitching	4,089	12.3%	908	3.1%	4,997	8.1%
Batting	3,221	9.7%	1,442	5.0%	4,663	7.5%
Conditioning	0	0.0%	4,010	13.9%	4,010	6.5%
General play	1,561	4.7%	1,582	5.5%	3,143	5.1%
Other	396	1.2%	1,219	4.2%	1,616	2.6%
Total	33,128	100%	28,944	100%	62,071	100%

Figure 11.5 Activity Resulting in Softball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year



XII. Gender Differences within Sports

12.1 Boys' and Girls' Soccer

Table 12.1 Comparison of Boys' and Girls' Soccer Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' soccer	Girls' soccer*	RR (95% CI) [†]
Total	1.75	2.35	1.34 (1.16-1.55)
Competition	3.63	5.15	1.42 (1.19-1.69)
Practice	0.96	1.16	1.21 (0.96-1.53)

*Throughout this chapter, rate ratios (RR) and injury proportion ratios (IPR) compare the gender with a higher injury rate/proportion (bolded) to the gender with a lower injury rate/proportion.

[†]Throughout this chapter, statistically significant RR and IPR are bolded.

Table 12.2 Comparison of Body Sites of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Boys' soccer	Girls' soccer	IPR (95% CI)
Ankle	21.1%	23.3%	1.10 (0.80-1.52)
Knee	13.5%	21.0%	1.56 (0.84-0.99)
Head/face	16.4%	12.7%	1.29 (0.86-1.94)
Hip/thigh/upper leg	14.7%	15.5%	1.05 (0.70-1.59)
Hand/wrist	3.2%	6.7%	2.08 (0.90-4.80)
Shoulder	4.3%	1.3%	3.25 (1.15-9.17)
Trunk	6.6%	1.2%	5.63 (1.76-18.0)
Lower leg	8.2%	7.7%	1.06 (0.58-1.94)
Arm/elbow	1.8%	2.8%	1.56 (0.48-5.06)
Foot	7.2%	5.5%	1.30 (0.65-2.63)
Neck	0.7%	0.8%	1.14 (0.12-10.5)
Other	2.2%	1.5%	1.53 (0.41-5.68)
Total	100%	100%	---

Table 12.3 Comparison of Diagnoses of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Diagnosis			
Strain/sprain	49.5%	55.3%	1.12 (0.94-1.32)
Contusion	12.7%	11.5%	1.11 (0.69-1.77)
Fracture	10.7%	7.1%	1.51 (0.87-2.64)
Concussion	10.3%	10.3%	1.00 (0.60-1.65)
Other	16.8%	15.9%	1.06 (0.70-1.59)
Total	100%	100%	---

Table 12.4 Most Common Boys' and Girls' Soccer Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Diagnosis			
Ankle strain/sprain	20.2%	22.4%	1.11 (0.80-1.54)
Hip/thigh/upper leg strain/sprain	10.6%	11.9%	1.13 (0.70-1.81)
Head/face concussion	10.4%	10.3%	1.01 (0.61-1.67)
Knee strain/sprain	7.8%	11.7%	1.50 (0.85-2.64)
Knee other	4.2%	6.7%	1.57 (0.75-3.29)

*Only includes diagnoses accounting for >5% of boys' or girls' soccer injuries.

Table 12.5 Comparison of Time Loss of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Time Loss			
1-2 days	20.1%	16.2%	1.24 (0.85-1.81)
3-6 days	31.8%	33.9%	1.07 (0.83-1.38)
7-9 days	17.6%	17.9%	1.01 (0.70-1.48)
10-21 days	16.5%	18.5%	1.12 (0.76-1.65)
22 days or more	14.1%	13.6%	1.04 (0.67-1.61)
Total	100.0%	100.0%	---

Table 12.6 Comparison of Mechanisms of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Soccer Mechanism			
Contact with another player	28.8%	31.3%	1.09 (0.83-1.42)
Stepped on/fell on/kicked	14.8%	13.4%	1.10 (0.73-1.68)
Rotation around a planted foot/inversion	12.3%	13.0%	1.06 (0.66-1.70)
Overuse, heat illness, conditioning, etc.	12.6%	12.8%	1.01 (0.63-1.62)
Contact with ball	12.0%	11.3%	1.06 (0.65-1.71)
Uneven playing surface	4.1%	3.4%	1.20 (0.55-2.61)
Slide tackle	6.7%	3.2%	2.11 (1.04-4.31)
Contact with goal	0.0%	0.6%	---
Other	8.8%	11.0%	1.26 (0.73-2.18)
Total	100%	100%	---

Table 12.7 Comparison of Activities of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Soccer Activity			
General play	19.4%	20.5%	1.05 (0.74-1.49)
Defending	11.8%	15.1%	1.28 (0.81-2.01)
Ball handling/dribbling	10.0%	13.5%	1.35 (0.86-2.12)
Chasing loose ball	10.9%	11.4%	1.04 (0.64-1.70)
Goaltending	9.5%	11.1%	1.17 (0.66-2.06)
Passing (foot)	6.7%	5.3%	1.24 (0.60-2.60)
Shooting (foot)	7.9%	3.5%	2.26 (1.09-4.67)
Receiving pass	6.6%	4.2%	1.57 (0.79-3.11)
Heading ball	7.9%	2.9%	2.73 (1.36-5.47)
Other	9.3%	12.6%	1.35 (0.82-2.24)
Total	100%	100%	---

12.2 Boys' and Girls' Basketball

Table 12.8 Comparison of Boys' and Girls' Basketball Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' basketball	Girls' basketball	RR (95% CI)*
Total	1.39	1.61	1.16 (0.99-1.35)
Competition	2.23	3.30	1.48 (1.20-1.82)
Practice	1.04	0.90	1.16 (0.92-1.45)

Table 12.9 Comparison of Body Sites of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Boys' basketball	Girls' basketball	IPR (95% CI)
Ankle	33.2%	30.0%	1.11 (0.85-1.44)
Knee	14.8%	18.3%	1.24 (0.83-1.83)
Head/face	10.3%	14.3%	1.39 (0.87-2.21)
Hip/thigh/upper leg	4.3%	8.3%	1.94 (0.98-3.84)
Hand/wrist	12.5%	9.5%	1.31 (0.80-2.16)
Shoulder	4.7%	4.9%	1.03 (0.47-2.24)
Trunk	4.8%	2.8%	1.72 (0.73-4.07)
Lower leg	1.2%	4.7%	3.87 (1.23-12.2)
Arm/elbow	3.8%	0.5%	7.31 (1.47-36.4)
Foot	7.7%	5.0%	1.53 (0.76-3.07)
Neck	0.2%	0.5%	2.65 (0.31-22.8)
Other	2.4%	1.1%	2.28 (0.52-10.0)
Total	100%	100%	---

Table 12.10 Comparison of Diagnoses of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Diagnosis			
Strain/sprain	55.6%	55.2%	1.01 (0.86-1.18)
Contusion	7.8%	5.9%	1.32 (0.70-2.50)
Fracture	10.8%	7.8%	1.38 (0.78-2.46)
Concussion	5.1%	10.2%	2.01 (1.09-3.70)
Other	20.7%	20.9%	1.01 (0.71-1.42)
Total	100%	100%	---

Table 12.11 Most Common Boys' and Girls' Basketball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Diagnosis			
Ankle strain/sprain	32.1%	27.5%	1.17 (0.89-1.53)
Knee strain/sprain	6.1%	9.6%	1.58 (0.85-2.94)
Head/face concussion	5.1%	10.2%	2.01 (1.09-3.70)
Knee other	5.9%	5.8%	1.01 (0.51-2.03)
Hand/wrist fracture	5.4%	3.7%	1.47 (0.65-3.33)

*Only includes diagnoses accounting for >5% of boys' or girls' basketball injuries.

Table 12.12 Comparison of Time Loss of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Time Loss			
1-2 days	30.6%	21.7%	1.42 (1.03-1.94)
3-6 days	26.1%	24.0%	1.09 (0.80-1.48)
7-9 days	15.0%	14.1%	1.07 (0.70-1.64)
10-21 days	13.6%	22.8%	1.67 (1.14-2.45)
22 days or more	14.6%	17.5%	1.20 (0.80-1.80)
Total	100%	100%	---

Table 12.13 Comparison of Mechanisms of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Basketball Mechanism			
Collision with another player	28.8%	23.8%	1.21 (0.90-1.63)
Jumping/landing	22.6%	21.6%	1.05 (0.75-1.46)
Overuse, heat illness, conditioning, etc.	9.1%	15.2%	1.67 (1.03-2.71)
Rotation around a planted foot/inversion	11.0%	11.2%	1.02 (0.62-1.68)
Stepped on/fell on/kicked	11.8%	9.3%	1.26 (0.76-2.11)
Contact with ball	5.7%	6.6%	1.15 (0.57-2.33)
Other	11.0%	12.3%	1.12 (0.69-1.82)
Total	100%	100%	---

Table 12.14 Comparison of Activities of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Basketball Activity			
Rebounding	25.0%	19.7%	1.27 (0.91-1.78)
General play	18.1%	22.3%	1.24 (0.87-1.76)
Defending	17.0%	17.1%	1.01 (0.68-1.49)
Chasing loose ball	11.1%	11.4%	1.03 (0.64-1.68)
Shooting	10.2%	9.3%	1.10 (0.63-1.90)
Ball handling/dribbling	4.5%	8.4%	1.86 (0.94-3.72)
Receiving pass	4.2%	3.6%	1.17 (0.50-2.75)
Other	9.9%	8.1%	1.22 (0.70-2.14)
Total	100%	100%	---

12.3 Boys' Baseball and Girls' Softball

Table 12.15 Comparison of Baseball and Softball Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Baseball	Softball	RR (95% CI)
Total	0.93	1.29	1.39 (1.13-1.71)
Competition	1.37	1.86	1.36 (1.02-1.81)
Practice	0.68	0.98	1.43 (1.06-1.93)

Table 12.16 Comparison of Body Sites of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

Body Site	Baseball	Softball	IPR (95% CI)
Ankle	13.7%	14.5%	1.06 (0.56-2.01)
Knee	8.9%	9.7%	1.08 (0.50-2.34)
Head/face	8.4%	16.4%	1.95 (0.99-3.83)
Hip/thigh/upper leg	11.2%	15.6%	1.40 (0.69-2.84)
Hand/wrist	17.6%	12.1%	1.46 (0.78-2.74)
Shoulder	16.0%	5.7%	2.81 (1.18-6.72)
Trunk	3.8%	2.3%	1.67 (0.52-5.42)
Lower leg	6.8%	11.0%	1.62 (0.69-3.77)
Arm/elbow	11.3%	9.9%	1.14 (0.52-2.51)
Foot	0.0%	2.4%	---
Neck	0.1%	0.0%	---
Other	2.1%	0.3%	6.57 (1.12-38.5)
Total	100%	100%	---

Table 12.17 Comparison of Diagnoses of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Baseball	Softball	IPR (95% CI)
Diagnosis			
Strain/sprain	50.0%	33.0%	1.51 (1.10-2.07)
Contusion	12.1%	21.3%	1.76 (0.98-3.15)
Fracture	13.7%	10.0%	1.38 (0.65-2.92)
Concussion	0.8%	5.5%	6.66 (1.60-27.7)
Other	23.4%	30.2%	1.29 (0.83-2.03)
Total	100%	100%	---

Table 12.18 Most Common Baseball and Softball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Baseball	Softball	IPR (95% CI)
Diagnosis			
Ankle strain/sprain	11.5%	11.6%	1.01 (0.50-2.03)
Hip/thigh/upper leg strain/sprain	11.2%	12.6%	1.13 (0.54-2.37)
Shoulder other	8.2%	4.5%	1.82 (0.59-5.59)
Hand/wrist strain/sprain	6.5%	2.1%	3.15 (1.04-9.59)
Arm/elbow other	4.0%	8.1%	2.02 (0.58-7.11)
Lower leg contusion	1.4%	6.7%	4.85 (1.30-18.1)

*Only includes diagnoses accounting for >5% of baseball or softball injuries.

Table 12.19 Comparison of Time Loss of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Baseball	Softball	IPR (95% CI)
Time Loss			
1-2 days	32.0%	30.9%	1.03 (0.69-1.54)
3-6 days	25.2%	26.4%	1.05 (0.67-1.64)
7-9 days	14.7%	18.5%	1.26 (0.67-2.35)
10-21 days	8.9%	12.8%	1.44 (0.68-3.05)
22 days or more	19.3%	11.4%	1.69 (0.89-3.24)
Total	100%	100%	---

Table 12.20 Comparison of Mechanisms of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Baseball	Softball	IPR (95% CI)
Baseball/Softball Mechanism			
Overuse, heat illness, conditioning, etc.	10.6%	20.0%	1.88 (0.98-3.63)
Contact with another player	12.7%	12.3%	1.03 (0.50-2.12)
Contact with bases	11.9%	9.8%	1.21 (0.60-2.47)
Throwing - not pitching	5.5%	9.0%	1.63 (0.61-4.37)
Throwing - pitching	10.8%	4.0%	2.71 (1.03-7.10)
Contact with thrown ball (non-pitch)	1.9%	8.3%	4.40 (1.52-12.8)
Rotation around a planted foot/inversion	10.9%	1.4%	7.92 (2.67-23.5)
Hit by batted ball (line drive)	3.2%	6.1%	1.92 (0.59-6.24)
Hit by pitch	5.4%	3.4%	1.57 (0.48-5.17)
Other	27.1%	25.6%	1.06 (0.69-1.63)
Total	100%	100%	---

Table 12.21 Comparison of Activities of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2007-08 School Year

	Baseball	Softball	IPR (95% CI)
Baseball/Softball Activity			
Running bases	16.8%	19.3%	1.15 (0.65-2.02)
Fielding	21.6%	11.2%	1.94 (1.08-3.48)
Throwing (not pitching)	7.4%	15.3%	2.04 (0.96-4.35)
Pitching	15.7%	8.1%	2.71 (1.03-7.10)
Catching	4.7%	14.3%	3.03 (1.17-7.85)
Sliding	10.2%	10.3%	1.01 (0.47-2.14)
Batting	11.0%	7.5%	1.47 (0.63-3.46)
Conditioning	5.4%	6.5%	1.19 (0.37-3.85)
General play	5.6%	5.1%	1.11 (0.40-3.03)
Other	1.5%	2.6%	1.66 (0.34-8.31)
Total	100%	100%	---

XIII. Trends over Time

Table 13.1 Injury Rates by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005-08 School Years

	2005-06	2006-07	2007-08	p-value for trend*
Overall total	2.51	2.59	2.31	0.512
Competition	4.63	4.88	4.45	0.726
Practice	1.69	1.75	1.52	0.495
Boys' football total	4.36	4.45	4.18	0.546
Competition	12.09	13.5	12.8	0.680
Practice	2.54	2.68	2.47	0.788
Boys' soccer total	2.43	2.27	1.75	0.189
Competition	4.22	4.31	3.63	0.411
Practice	1.58	1.45	0.96	0.206
Girls' soccer total	2.36	2.51	2.35	0.964
Competition	5.21	5.43	5.15	0.870
Practice	1.10	1.31	1.16	0.821
Girls' volleyball total	1.64	1.37	1.22	0.104
Competition	1.92	1.40	1.43	0.366
Practice	1.48	1.36	1.12	0.121
Boys' basketball total	1.89	1.75	1.39	0.158
Competition	2.98	2.87	2.23	0.247
Practice	1.46	1.28	1.04	0.052
Girls' basketball total	2.01	2.09	1.61	0.433
Competition	3.60	3.60	3.30	0.333
Practice	1.37	1.44	0.90	0.409
Boys' wrestling total	2.50	2.51	2.27	0.357
Competition	3.93	3.80	3.70	0.048
Practice	2.04	2.06	1.76	0.371
Boys' baseball total	1.19	1.25	0.93	0.446
Competition	1.77	2.01	1.37	0.575
Practice	0.87	0.82	0.68	0.170
Girls' softball total	1.13	1.11	1.29	0.398
Competition	1.78	1.96	1.86	0.707
Practice	0.79	0.65	0.98	0.611

*Statistically significant tests for trend are bolded.

Table 13.2 Nationally Estimated Number of Injuries by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005-08 School Years

	2005-06	2006-07	2007-08
Overall total	1,442,533	1,472,849	1,419,723
Competition	759,334	766,512	763,034
Practice	683,199	706,337	656,689
Boys' football total	516,150	574,367	616,665
Competition	280,919	292,316	311,780
Practice	235,231	282,051	304,885
Boys' soccer total	218,760	171,874	159,351
Competition	119,703	93,295	99,785
Practice	99,058	78,579	59,566
Girls' soccer total	185,770	230,769	215,850
Competition	122,803	149,231	146,102
Practice	62,967	81,538	69,748
Girls' volleyball total	81,813	80,493	72,261
Competition	32,677	27,423	26,539
Practice	49,136	53,069	45,722
Boys' basketball total	100,058	96,670	82,612
Competition	44,826	46,109	36,766
Practice	55,232	50,561	45,846
Girls' basketball total	103,566	102,831	73,283
Competition	53,812	53,703	45,236
Practice	49,753	49,128	28,047
Boys' wrestling total	105,542	101,139	91,625
Competition	36,259	38,750	40,698
Practice	69,283	62,389	50,927
Boys' baseball total	67,560	60,296	44,760
Competition	33,639	33,494	22,803
Practice	33,922	26,802	21,957
Girls' softball total	63,313	54,411	63,316
Competition	34,696	32,191	33,325
Practice	28,618	22,220	29,991

Table 13.3 Body Site of Injury by Year, High School Sports-Related Injury Surveillance Study, US, 2005-08 School Years

	2005-06 n=1,480,557	2006-07 n=1,464,926	2007-08 n=1,411,621
Body Site			
Ankle	22.7%	19.8%	18.5%
Knee	14.2%	16.6%	14.6%
Head/face	12.3%	12.4%	12.4%
Hip/thigh/upper leg	10.8%	10.5%	10.2%
Shoulder	7.9%	8.0%	10.1%
Hand/wrist	8.0%	7.5%	9.1%
Trunk	6.2%	6.7%	6.5%
Lower leg	4.6%	5.2%	5.7%
Arm/elbow	4.1%	3.9%	4.6%
Foot	4.0%	4.0%	4.2%
Neck	2.2%	1.9%	1.8%
Other	3.2%	3.6%	2.4%
Total	100%	100%	100%

*Throughout this chapter, n's represent the total number of injury reports containing a valid response for the particular question. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 13.4 Injury Diagnosis by Year, High School Sports-Related Injury Surveillance Study, US, 2005-08 School Years

	2005-06, n=1,444,172	2006-07, n=1,466,398	2007-08 n=1,414,139
Diagnosis			
Strain/sprain	52.0%	48.2%	48.3%
Contusion	12.2%	13.7%	12.4%
Fracture	9.8%	8.9%	10.2%
Concussion	9.1%	8.4%	9.2%
Other	16.8%	20.9%	19.9%
Total	100%	100%	100%

Table 13.5 Most Common Injury Diagnoses by Year, High School Sports-Related Injury Surveillance Study, US, 2005-08 School Years

	2005-06 n=1,435,954	2006-07 n=1,463,273	2007-08 n=1,410,654
Diagnosis			
Ankle strain/sprain	20.6%	17.8%	17.3%
Head/face concussion	9.0%	8.4%	9.2%
Knee strain/sprain	7.6%	8.8%	7.8%
Hip/thigh/upper leg strain/sprain	7.9%	7.7%	7.3%
Knee other	4.3%	4.9%	4.7%
Shoulder other	3.1%	3.7%	4.1%
Hand/wrist fracture	3.2%	3.3%	4.0%
Shoulder strain/sprain	3.4%	2.9%	3.4%
Trunk strain/sprain	2.8%	2.7%	3.2%
Hand/wrist strain/sprain	3.1%	2.5%	3.8%

Table 13.6 Time Loss of Injuries by Year, High School Sports-Related Injury Surveillance Study, US, 2005-07 School Years

	2005-06 n=1,378,145	2006-07 n=1,423,183	2007-08 n=1,355,981
Time Loss			
1-2 days	22.5%	26.6%	22.8%
3-6 days	30.0%	28.5%	28.8%
7-9 days	15.3%	14.7%	15.8%
10-21 days	14.9%	14.1%	16.7%
22 days or more	17.2%	16.1%	15.9%
Total	100%	100%	100%

Table 13.7 Injuries Requiring Surgery by Year, High School Sports-Related Injury Surveillance Study, US, 2005-08 School Years

	2005-06 n=1,429,072	2006-07 n=1,428,960	2007-08 n=1,380,872
Need for surgery			
Required surgery	5.3%	6.4%	6.1%
Did not require surgery	94.7%	93.6%	93.9%
Total	100%	100%	100%

IX. Reporter Demographics & Compliance

During the 2007-08 school year, 100 ATCs were invited to participate in the study at the beginning of the school year. In addition, 20 ATCs were invited to participate during the school year to replace a previously enrolled ATC who was no longer able to participate. ATCs were expected to report for every week in which they were enrolled. For example, an ATC who joined the study as a replacement school in week 10 was not expected to report for weeks 1-9. Overall, 113 enrolled ATCs reported an average of 42 study weeks. The majority of ATCs (87%) reported all the weeks during which they were enrolled, with only 6 ATCs (5%) missing over 10 weeks. Internal validity checks yielded 96.7% sensitivity, 100% specificity, a positive predictive value of 100%, and a negative predictive value of 99.4%.

Prior to the start of the 2007-08 High School RIO™ study, participating ATCs were asked to complete a short demographics survey. Three-quarters (79%) of participating high schools were public schools, with the remainder being private. All participating ATCs provided services to athletes of their high school on 5 or more days each week. Over half (62%) of ATCs participating during the 2007-08 study year had participated during the 2005-06 school year.

An online “End of Season” survey gave all participating ATCs the opportunity to provide feedback on their experiences with High School RIO™. This survey was completed by 73 ATCs (63%). Average reporting time burdens were 15 minutes for the weekly exposure report and 7 minutes for the injury report form. Using a 5 point Likert scale, RIO™ was overwhelmingly reported to be either very easy (70.0%) or somewhat easy (24.7%) to use (5 and 4 on the Likert scale, respectively), with ATCs being either very satisfied (70.0%) or somewhat satisfied (26.0%) with the study (5 and 4 on the Likert scale, respectively). Suggestions provided by ATCs, such as the addition or clarification of questions or answer choices, will be used to improve the National High School Sports-Related Injury Surveillance Study for the 2008-09 school year.

X. Summary

High school sports play an important role in the adoption and maintenance of a physically active lifestyle among millions of US adolescents. Too often injury prevention in this population is overlooked as sports-related injuries are thought to be unavoidable. In reality, sports-related injuries are largely preventable through the application of evidence-based preventive interventions. Such preventive interventions can include educational campaigns, introduction of new/improved protective equipment, rule changes, other policy changes, etc. The morbidity, mortality, and disability caused by high school sports-related injuries can be reduced through the development and implementation of improved injury diagnosis and treatment modalities as well as through effective prevention strategies. However, surveillance of exposure based injury rates in a nationally representative sample of high school athletes and subsequent epidemiologic analysis of patterns of injury are needed to drive evidence-based prevention practices.

Prior to the implementation of the High School Sports-Related Injury Surveillance Study by Dr. Comstock, the study of high school sports-related injuries had largely been limited by an inability to calculate injury rates due to a lack of exposure data (i.e., frequency of participation in athletic activities including training, practice, and competition), an inability to compare findings across groups (i.e., sports/activities, genders, schools, and levels of competition), or an inability to generalize findings from small non-representative samples. The value of national injury surveillance studies that collect injury, exposure, and risk factor data from representative samples has been well demonstrated by the National Collegiate Athletic Association's Injury Surveillance System (NCAA ISS). Data collected by the NCAA ISS since 1982 has been used to develop preventive interventions including changes in coaching habits, increased use of protective equipment, and rule changes which have had proven success in reducing injuries among collegiate athletes. For example, NCAA ISS data has been used to develop several interventions

intended to reduce the number of preseason heat-related football injuries including the elimination of consecutive days of multiple practices, daily hour limitations, and a gradual increase in equipment for conditioning and heat acclimation. Additionally, several committees have considered NCAA ISS data when making recommendations including the NCAA Committee on Competitive Safeguards and Medical Aspects of Sports' recommendation for mandatory eye protection in women's lacrosse, the NCAA Men's Ice Hockey Rules Committee's recommendation for stricter penalties for hitting from behind, checking into the boards, and not wearing a mouthpiece, and the NCAA Men's Basketball Rules Committee's recent discussions of widening the free-throw lane to prevent injuries related to player contact. Unfortunately, because an equivalent injury surveillance system to collect injury and exposure data from a nationally representative sample of high school athletes had not previously existed, injury prevention efforts targeted to reduce injury rates in this population were based largely upon data collected from collegiate athletes. This is unacceptable because distinct biophysiological differences (e.g., lower muscle mass, immature growth plates, etc.) means high school athletes are not merely miniature versions of their collegiate counterparts.

The successful implementation and maintenance of the National High School Sports-Related Injury Surveillance Study demonstrates the value of a national injury surveillance system at the high school level. Dr. Comstock and her research staff are committed to maintaining a permanent national high school sports injury surveillance system.

While the health benefits of a physically active lifestyle including sports participation are undeniable, participants are at risk of injury because a certain endemic level of injury can be expected during any physical activity, especially those with a competitive component. However, injury rates among high school athletes should be reduced to the lowest possible level without

discouraging adolescents from engaging in this important form of physical activity. This goal can best be accomplished by monitoring injury rates and patterns of injury among high school athletes over time; investigating the etiology of preventable injuries; and developing, implementing, and evaluating evidence-based preventive interventions. Surveillance systems such as the model used for this study are critical in achieving these goals.