

## **SUMMARY REPORT**

### **NATIONAL HIGH SCHOOL SPORTS-RELATED INJURY SURVEILLANCE STUDY**

**2012-2013 School Year**

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# High School RIO™

High School Sports-Related Injury Surveillance Study  
presented by the Center for Injury Research & Policy



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## **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 7.7 million in 2011-12. 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. Through the generous contributions of the Centers for Disease Control and Prevention (CDC), National Operating Committee on Standards for Athletic Equipment (NOCSAE), and the National Federation of State High School Associations (NFHS), the National High School Sports-Related Injury Surveillance System was able to be continued during the 2012-13 school year. Previous study years were funded by the Centers for Disease Control and Prevention (CDC), National Federation of State High School Associations (NFHS), the National Operating Committee on Standards for Athletic Equipment (NOCSAE), the Research Institute at Nationwide Children's Hospital, DonJoy Orthotics, EyeBlack, and The Ohio State University.

### **1.3 Specific Aims**

The continuing objectives of this study are to maintain 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 2011-12 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 (AT) 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 ATs were offered a \$300-\$400 honorarium depending on the number of sports reported along with individualized injury reports following the study's conclusion.

### **1.6 Data Collection**

Each AT 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 AT was asked to complete 45 weekly exposure reports: one for each week from July 30, 2012 through June 9, 2013. 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 AT 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 ATs 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 9.3 and SPSS, version 19.0. 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:

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

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, 2012-13 School Year\***

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Overall total	4,049	1,874,256	2.16	1,361,986
Competition	2,228	517,502	4.31	779,055
Practice	1,821	1,356,754	1.34	582,931
Boys' football total	1,972	509,158	3.87	616,209
Competition	1,094	87,327	12.53	344,097
Practice	878	421,831	2.08	272,112
Boys' soccer total	263	173,442	1.52	149,049
Competition	168	51,168	3.28	89,429
Practice	95	122,274	0.78	59,620
Girls' soccer total	335	146,152	2.29	190,382
Competition	241	43,495	5.54	141,339
Practice	94	102,657	0.92	49,043
Girls' volleyball total	155	174,474	0.89	44,064
Competition	67	61,913	1.08	19,150
Practice	88	112,561	0.78	24,914
Boys' basketball total	337	229,897	1.47	85,819
Competition	171	70,092	2.44	44,095
Practice	166	159,805	1.04	41,724
Girls' basketball total	336	183,377	1.83	83,107
Competition	179	57,201	3.13	45,645
Practice	157	126,176	1.24	37,462
Boys' wrestling total	343	147,208	2.33	85,485
Competition	141	39,857	3.54	35,016
Practice	202	107,351	1.88	50,469
Boys' baseball total	161	182,376	0.88	49,747
Competition	82	62,971	1.30	24,807
Practice	79	119,405	0.66	24,940
Girls' softball total	147	128,172	1.15	58,124
Competition	85	43,478	1.96	35,477
Practice	62	84,694	0.73	22,647

\*Only includes injuries resulting in  $\geq 1$  days' time loss.



**Table 2.2 Proportion of Injuries Resulting in Time Loss, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	≥1 days time loss	<1 day time loss	Total
<b>Overall</b>	98.0%	2.0%	<b>100%</b>
Boys' football	97.9%	2.1%	<b>100%</b>
Boys' soccer	98.5%	1.5%	<b>100%</b>
Girls' soccer	97.4%	2.6%	<b>100%</b>
Girls' volleyball	98.1%	1.9%	<b>100%</b>
Boys' basketball	98.3%	1.7%	<b>100%</b>
Girls' basketball	98.0%	2.0%	<b>100%</b>
Boys' wrestling	99.4%	0.6%	<b>100%</b>
Boys' baseball	97.0%	3.0%	<b>100%</b>
Girls' softball	98.0%	2.0%	<b>100%</b>

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

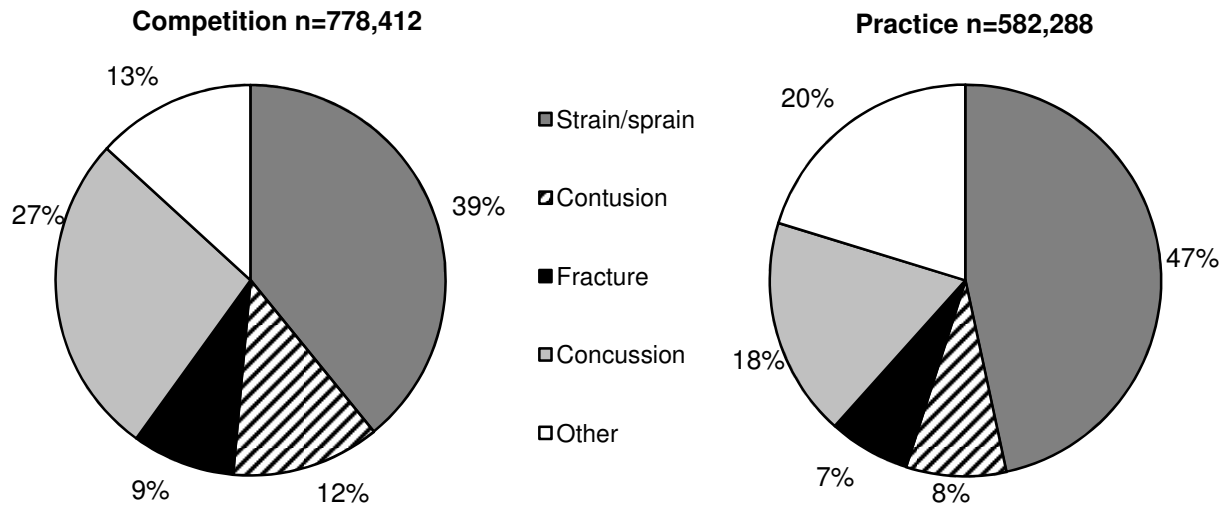
**Table 2.3 Demographic Characteristics of Injured Athletes by Sex, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	<b>Male</b> n= 941,354	<b>Female</b> n= 363,778
<b>Year in School</b>		
Freshman	25.4%	29.3%
Sophomore	23.6%	24.8%
Junior	25.4%	26.5%
Senior	25.6%	19.4%
<b>Total†</b>	<b>100%</b>	<b>100%</b>
<b>Age (years)</b>		
Minimum	13	12
Maximum	19	19
Mean (St. Dev.)	15.8 (1.3)	15.7 (1.1)
<b>BMI</b>		
Minimum	14.5	15.5
Maximum	49.9	42.4
Mean (St. Dev.)	24.7 (4.4)	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 2.1 Injury Diagnosis by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 2.4 Body Site of Injury by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Head/face	226,379	29.1%	123,977	21.3%	350,356	25.7%
Ankle	123,296	15.8%	88,230	15.1%	211,526	15.5%
Knee	130,775	16.8%	70,419	12.1%	201,194	14.8%
Hip/thigh/upper leg	54,772	7.0%	73,928	12.7%	128,700	9.5%
Hand/wrist	51,360	6.6%	49,823	8.5%	101,183	7.4%
Shoulder	47,669	6.1%	40,497	6.9%	88,166	6.5%
Trunk	28,474	3.7%	42,437	7.3%	70,911	5.2%
Lower leg	30,528	3.9%	22,616	3.9%	53,144	3.9%
Arm/elbow	26,523	3.4%	20,668	3.5%	47,191	3.5%
Foot	23,825	3.1%	19,922	3.4%	43,747	3.2%
Neck	18,571	2.4%	13,201	2.3%	31,772	2.3%
Other	16,482	2.1%	17,213	3.0%	33,695	2.5%
<b>Total</b>	<b>778,654</b>	<b>100%</b>	<b>582,931</b>	<b>100%</b>	<b>1,361,585</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 2.5 Most Commonly Injured Ankle Structures, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Male		Female		Total	
	n	% of Ankle Injuries	n	% of Ankle Injuries	n	% of Ankle Injuries
<b>Ankle Ligament Injuries</b>						
Anterior talofibular ligament	92,472	71.8%	56,810	78.5%	149,282	74.2%
Calcaneofibular ligament	40,025	31.1%	24,931	34.4%	64,956	32.3%
Anterior tibiofibular ligament	28,339	22.0%	16,366	22.6%	44,705	22.2%
Deltoid ligament	15,175	11.8%	6,872	9.5%	22,074	10.9%
Posterior talofibular ligament	11,304	8.8%	9,635	13.3%	20,939	10.4%
Posterior tibiofibular ligament	6,924	5.4%	3,424	4.7%	10,348	5.1%
<b>Total Ankle Injuries</b>	<b>128,839</b>		<b>72,409</b>		<b>201,248</b>	

\*Multiple ligament responses allowed per injury report. Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 2.6 Most Commonly Injured Knee Structures, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Male		Female		Total	
	n	% of Knee Injuries	n	% of Knee Injuries	n	% of Knee Injuries
<b>Knee Ligament Injuries</b>						
Medial collateral ligament	46,426	34.6%	12,698	21.4%	59,124	30.5%
Anterior cruciate ligament	26,633	19.8%	22,878	38.6%	49,511	25.6%
Torn cartilage (meniscus)	32,013	23.8%	14,388	24.3%	46,401	24.0%
Patella and/or patellar tendon	19,751	14.7%	10,511	17.7%	30,262	15.6%
Lateral collateral ligament	8,071	6.0%	6,567	11.0%	14,638	7.6%
Posterior cruciate ligament	2,206	1.6%	739	1.2%	2,945	1.5%
<b>Total Knee Injuries</b>	<b>134,281</b>		<b>59,320</b>		<b>193,601</b>	

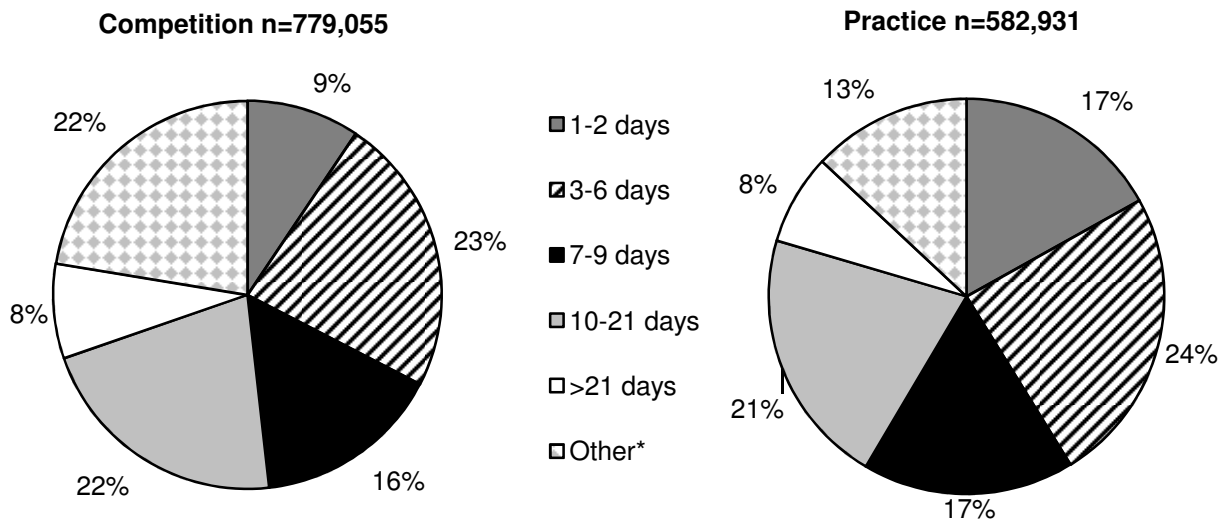
\*Multiple ligament responses allowed per injury report. Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 2.7 Ten Most Common Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n= 778,009		Practice n= 582,287		Overall n= 1,360,296	
	n	%	n	%	n	%
Head/face concussion	208,809	26.8%	105,520	18.1%	314,329	23.1%
Ankle strain/sprain	114,709	14.7%	82,325	14.1%	197,034	14.5%
Knee strain/sprain	79,799	10.3%	32,379	5.6%	112,178	8.2%
Hip/thigh/upper leg strain/sprain	30,694	3.9%	60,022	10.3%	90,716	6.7%
Knee other	28,803	3.7%	27,511	4.7%	56,314	4.1%
Shoulder other	27,852	3.6%	18,528	3.2%	46,380	3.4%
Hand/wrist fracture	22,560	2.9%	20,820	3.6%	43,380	3.2%
Shoulder strain/sprain	16,433	2.1%	18,465	3.2%	34,898	2.6%
Hand/wrist strain/sprain	15,110	1.9%	18,925	3.3%	34,035	2.5%
Trunk strain/sprain	10,349	1.3%	20,269	3.5%	30,618	2.3%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 2.2 Time Loss by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



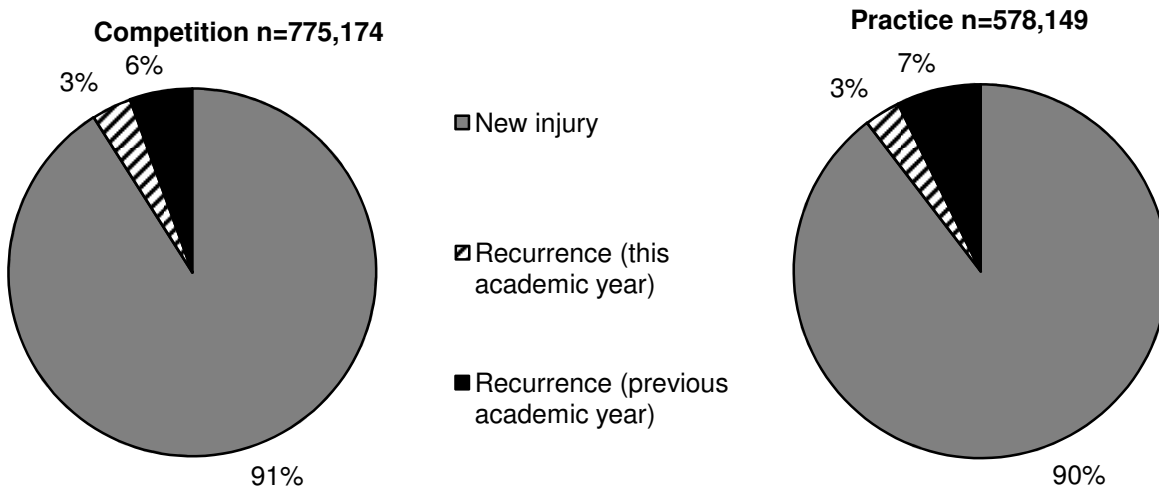
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 2.8 Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	64,267	8.4%	32,726	5.7%	96,993	7.3%
Did not require surgery	698,989	91.6%	541,421	94.3%	1,240,410	92.7%
<b>Total*</b>	<b>763,256</b>	<b>100%</b>	<b>574,147</b>	<b>100%</b>	<b>1,337,403</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 2.3 New and Recurring Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 2.9 Time during Season of Injury, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	290,231	21.4%
Regular season	1,000,878	73.8%
Post season	65,451	4.8%
<b>Total</b>	<b>1,356,559</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 2.10 Practice-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	<b>n</b>	<b>%</b>
<b>Time in Practice</b>		
First ½ hour	65,963	11.9%
Second ½ hour	104,653	18.9%
1-2 hours into practice	324,299	58.5%
>2 hours into practice	59,254	10.7%
<b>Total</b>	<b>554,169</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 2.11 Methods for Injury Evaluation and Assessment, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	n	%
<b>Injuries Evaluated by:*</b>		
Certified athletic trainer	1,284,517	94.3%
General physician	468,808	34.4%
Orthopedic physician	441,288	32.4%
Neurologist/neuropsychologist	23,950	1.8%
Physician's assistant	19,860	1.5%
Chiropractor	13,980	1.0%
Nurse practitioner	5,226	0.4%
Dentist/oral surgeon	3,103	0.2%
Other	55,653	4.1%
<b>Total</b>	<b>1,361,986</b>	<b>100%</b>
<b>Injuries Assessed by:*</b>		
Evaluation	1,343,491	98.6%
X-ray	449,093	33.0%
MRI	154,089	11.3%
CT-scan	47,272	3.5%
Surgery	17,422	1.3%
Blood work/lab test	10,008	0.7%
Other	11,490	0.8%
<b>Total</b>	<b>1,361,986</b>	<b>100%</b>

\*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, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>1,972</b>	<b>509,158</b>	<b>3.87</b>	<b>616,209</b>
Competition	1,094	87,327	12.53	344,097
Practice	878	421,831	2.08	272,112

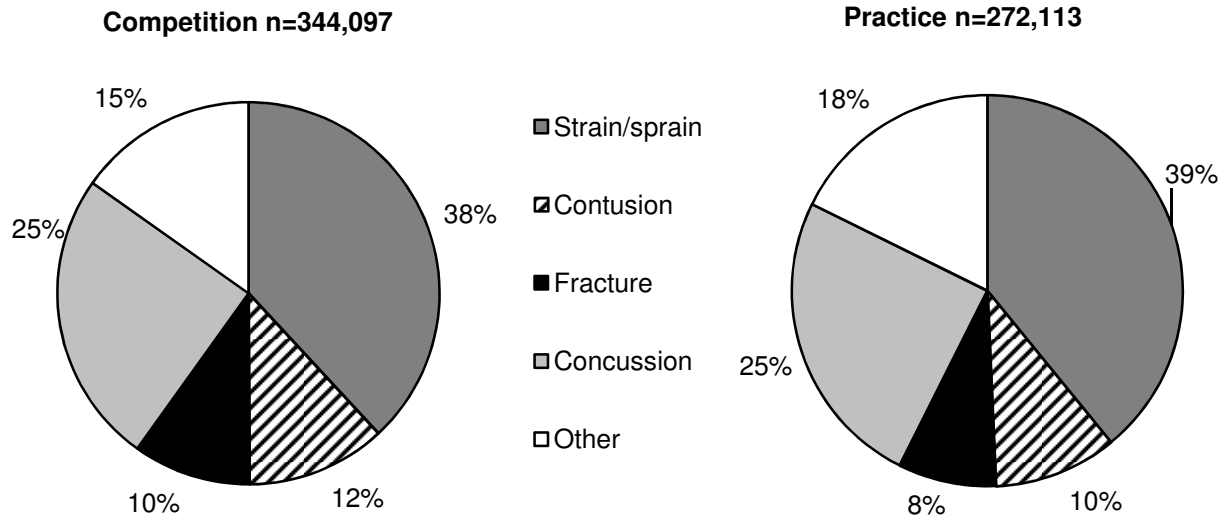
**Table 3.2 Demographic Characteristics of Injured Football Athletes, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

<b>Year in School</b>	<b>n=616,209</b>
Freshman	27.1%
Sophomore	22.5%
Junior	25.7%
Senior	24.6%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.7 (1.3)
<b>BMI</b>	
Minimum	16.0
Maximum	49.9
Mean (St. Dev.)	25.5 (4.4)

\*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, 2012-13 School Year**



**Table 3.3 Body Site of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Head/face	88,094	25.6%	70,978	26.1%	159,072	25.8%
Knee	58,243	16.9%	32,375	11.9%	90,618	14.7%
Ankle	46,475	13.5%	30,377	11.2%	76,852	12.5%
Hand/wrist	29,821	8.7%	27,862	10.2%	57,683	9.4%
Shoulder	32,215	9.4%	19,439	7.1%	51,654	8.4%
Hip/thigh/upper leg	19,736	5.7%	29,842	11.0%	49,578	8.0%
Trunk	12,436	3.6%	21,867	8.0%	34,303	5.6%
Lower leg	12,336	3.6%	10,077	3.7%	22,413	3.6%
Neck	15,226	4.4%	6,866	2.5%	22,092	3.6%
Arm/elbow	12,605	3.7%	8,402	3.1%	21,007	3.4%
Foot	4,356	1.3%	5,002	1.8%	9,358	1.5%
Other	12,554	3.6%	9,026	3.3%	21,580	3.5%
<b>Total</b>	<b>344,097</b>	<b>100%</b>	<b>272,113</b>	<b>100%</b>	<b>616,210</b>	<b>100%</b>

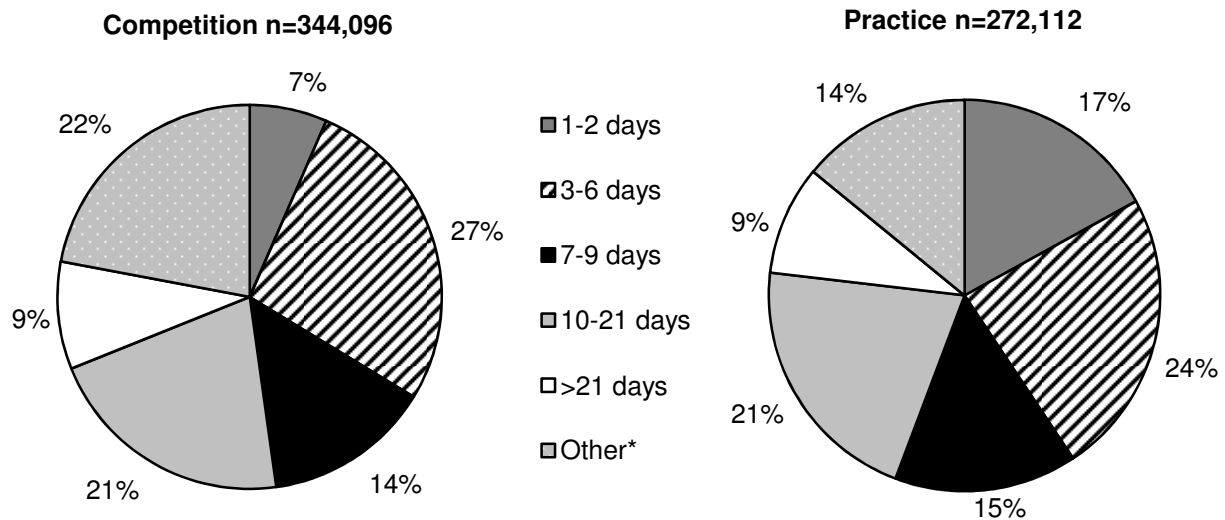
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 3.4 Ten Most Common Football Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=344,095		Practice n=272,113		Total n=616,208	
	n	%	n	%	n	%
Head/face concussion	85,669	24.9%	67,687	24.9%	153,356	24.9%
Ankle strain/sprain	42,738	12.4%	27,859	10.2%	70,597	11.5%
Knee strain/sprain	36,914	10.7%	17,582	6.5%	54,496	8.8%
Hip/thigh/upper leg strain/sprain	8,702	2.5%	20,956	7.7%	29,658	4.8%
Shoulder other	18,335	5.3%	9,498	3.5%	27,833	4.5%
Hand/wrist fracture	13,584	3.9%	13,975	5.1%	27,559	4.5%
Knee other	12,723	3.7%	11,187	4.1%	23,910	3.9%
Should strain/sprain	10,781	3.1%	7,041	2.6%	17,822	2.9%
Hip/thigh/upper leg contusion	8,316	2.4%	7,300	2.7%	15,616	2.5%
Hand/wrist strain/sprain	7,600	2.2%	7,360	2.7%	14,960	2.4%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 3.2 Time Loss of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



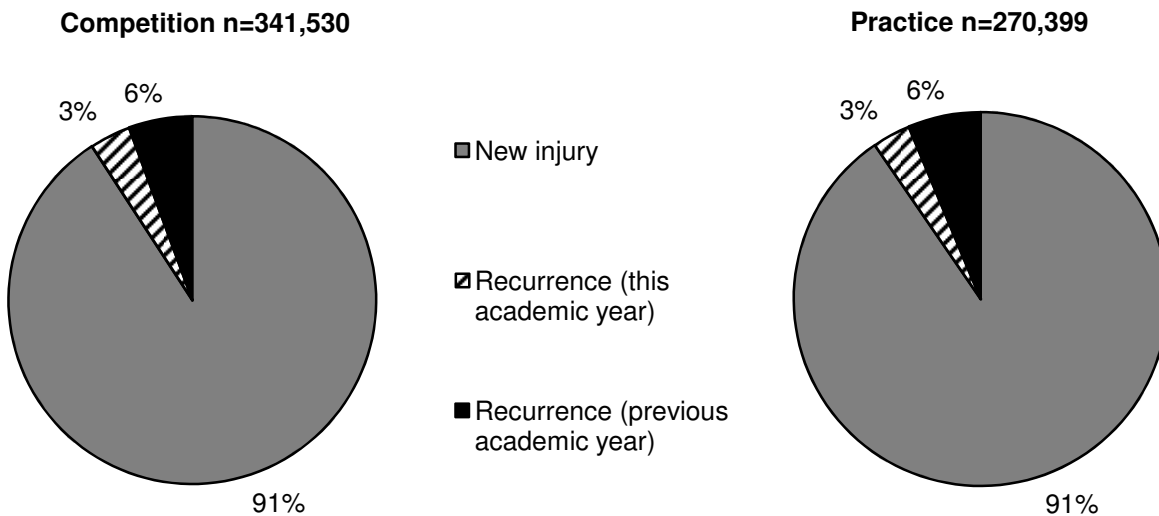
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 3.5 Football Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	34,262	10.2%	13,409	5.0%	47,671	7.9%
Did not require surgery	301,392	89.8%	257,097	95.0%	558,489	92.1%
<b>Total</b>	<b>335,654</b>	<b>100%</b>	<b>270,506</b>	<b>100%</b>	<b>606,160</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 3.3 History of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 3.6 Time during Season of Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	153,584	25.0%
Regular season	427,370	69.5%
Post season	33,980	5.5%
<b>Total</b>	<b>614,933</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 3.7 Competition-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	2,719	0.8%
First quarter	47,580	14.3%
Second quarter	99,262	29.9%
Third quarter	91,833	27.7%
Fourth quarter	89,857	27.1%
Overtime	532	0.2%
<b>Total</b>	<b>331,782</b>	<b>100%</b>
<b>Field Location</b>		
Between the 20 yard lines	262,198	79.6%
Red zone (20 yard line to goal line)	60,088	18.2%
Off the field	3,145	1.0%
End zone	4,005	1.2%
<b>Total</b>	<b>329,436</b>	<b>100%</b>

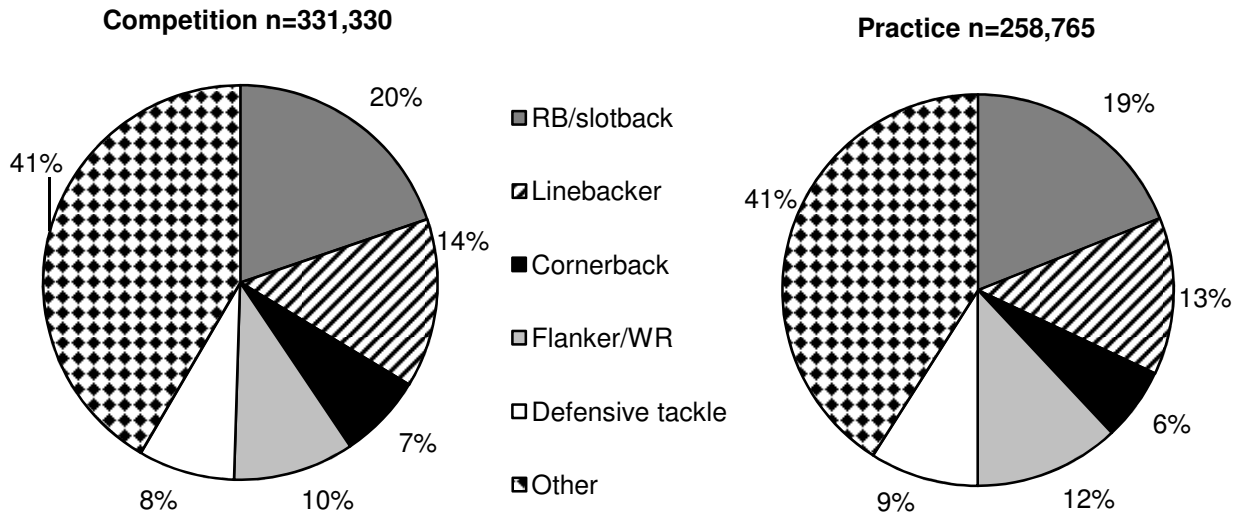
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 3.8 Practice-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	27,791	10.8%
Second 1/2 hour	43,156	16.7%
1-2 hours into practice	150,132	58.2%
>2 hours into practice	36,777	14.3%
<b>Total</b>	<b>257,856</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 3.4 Player Position of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

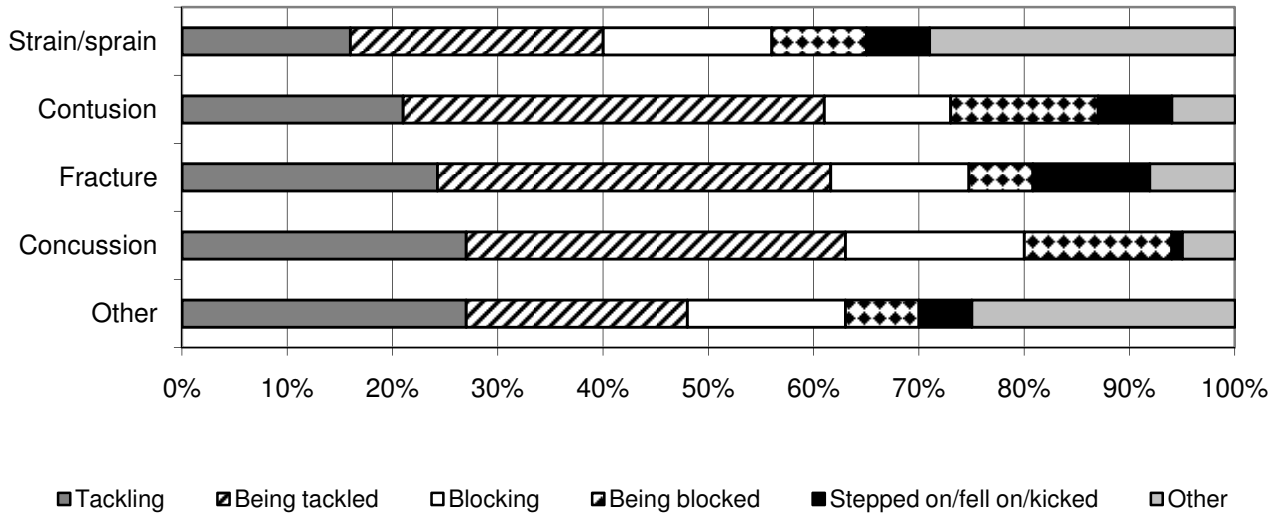


**Table 3.9 Activities Leading to Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Being tackled	116,228	34.7%	60,152	22.5%	176,380	29.3%
Tackling	83,075	24.8%	49,128	18.4%	132,203	21.9%
Blocking	46,954	14.0%	45,482	17.0%	92,436	15.3%
Being blocked	40,916	12.2%	20,959	7.8%	61,875	10.3%
N/A (e.g., overuse, heat illness, etc.)	5,684	1.7%	33,152	12.4%	38,836	6.4%
Stepped on/fell on/kicked	16,369	4.9%	13,920	5.2%	30,289	5.0%
Rotation around a planted foot	11,314	3.4%	15,048	5.6%	26,362	4.4%
Uneven playing surface	1,648	0.5%	8,044	3.0%	9,692	1.6%
Contact with ball	107	0.0%	4,757	1.8%	4,864	0.8%
Contact with blocking sled/dummy	0	0.0%	2,755	1.0%	2,755	0.5%
Contact with out of bounds	376	0.1%	591	0.2%	967	0.2%
Other	12,721	3.8%	13,146	4.9%	25,867	4.3%
<b>Total</b>	<b>335,392</b>	<b>100%</b>	<b>267,134</b>	<b>100%</b>	<b>602,526</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 3.5 Activity Resulting in Football Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 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, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>263</b>	<b>173,442</b>	<b>1.52</b>	<b>149,049</b>
Competition	168	51,168	3.28	89,429
Practice	95	122,274	0.78	59,620

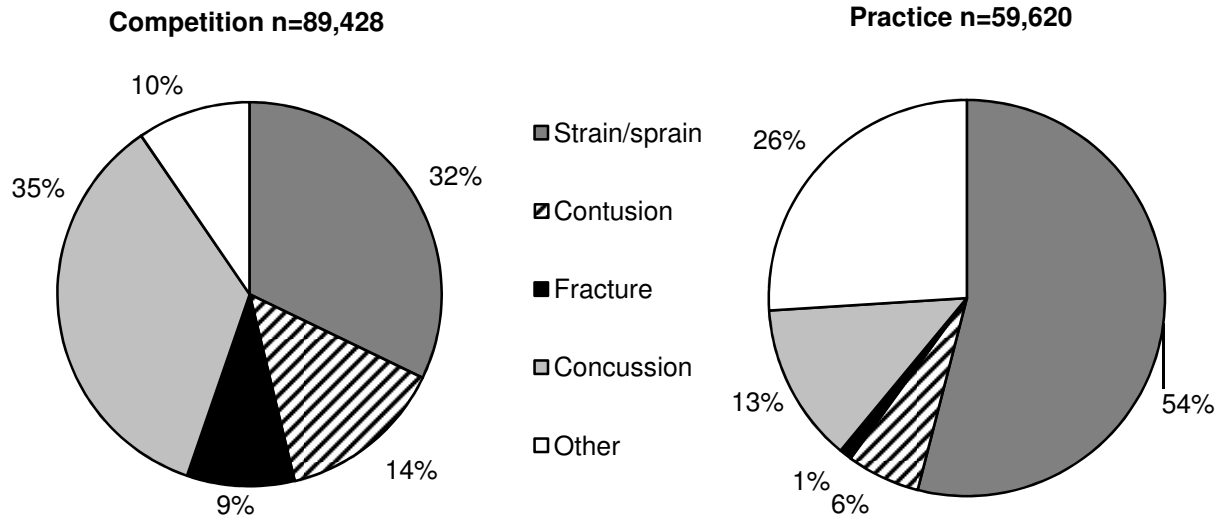
**Table 4.2 Demographic Characteristics of Injured Boys' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

<b>Year in School</b>	<b>n= 142,172</b>
Freshman	22%
Sophomore	29%
Junior	18%
Senior	31%
<b>Total†</b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.8 (1.3)
<b>BMI</b>	
Minimum	15.7
Maximum	40.5
Mean (St. Dev.)	22.7 (3.1)

\*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 4.1 Diagnosis of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 4.3 Body Site of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Head/face	33,863	37.9%	11,290	18.9%	45,153	30.3%
Hip/thigh/upper leg	8,074	9.0%	16,746	28.1%	24,820	16.7%
Ankle	13,431	15.0%	5,042	8.5%	18,473	12.4%
Knee	13,302	14.9%	8,251	13.8%	21,553	14.5%
Foot	8,223	9.2%	2,437	4.1%	10,660	7.2%
Lower leg	4,562	5.1%	4,445	7.5%	9,007	6.0%
Trunk	2,455	2.7%	3,187	5.3%	5,642	3.8%
Hand/wrist	1,721	1.9%	2,226	3.7%	3,947	2.6%
Arm/elbow	1,793	2.0%	1,042	1.7%	2,835	1.9%
Neck	0	0.0%	2,083	3.5%	2,083	1.4%
Shoulder	1,172	1.3%	379	0.6%	1,551	1.0%
Other	832	0.9%	2,492	4.2%	3,324	2.2%
<b>Total</b>	<b>89,428</b>	<b>100%</b>	<b>59,620</b>	<b>100%</b>	<b>149,048</b>	<b>100%</b>

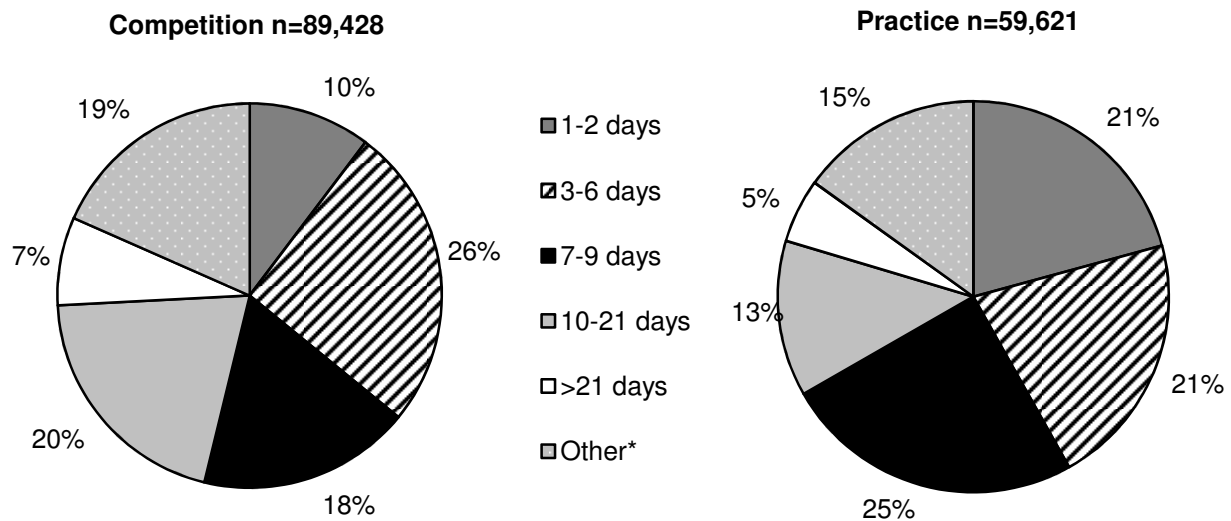
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 4.4 Ten Most Common Boys' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=89,431		Practice n=59,618		Total n=149,049	
	n	%	n	%	n	%
Head/face concussion	30,979	34.6%	7,539	12.6%	38,518	25.8%
Hip/thigh/upper leg strain/sprain	4,763	5.3%	14,378	24.1%	19,141	12.8%
Ankle strain/sprain	11,252	12.6%	5,042	8.5%	16,294	10.9%
Knee other	3,876	4.3%	4,947	8.3%	8,823	5.9%
Knee strain/sprain	6,091	6.8%	2,262	3.8%	8,353	5.6%
Foot strain/sprain	4,063	4.5%	1,258	2.1%	5,321	3.6%
Head/face other	1,712	1.9%	3,341	5.6%	5,053	3.4%
Knee contusion	3,336	3.7%	1,042	1.7%	4,378	2.9%
Lower leg contusion	2,663	3.0%	818	1.4%	3,481	2.3%
Trunk strain/sprain	818	0.9%	2,492	4.2%	3,310	2.2%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 4.2 Time Loss of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



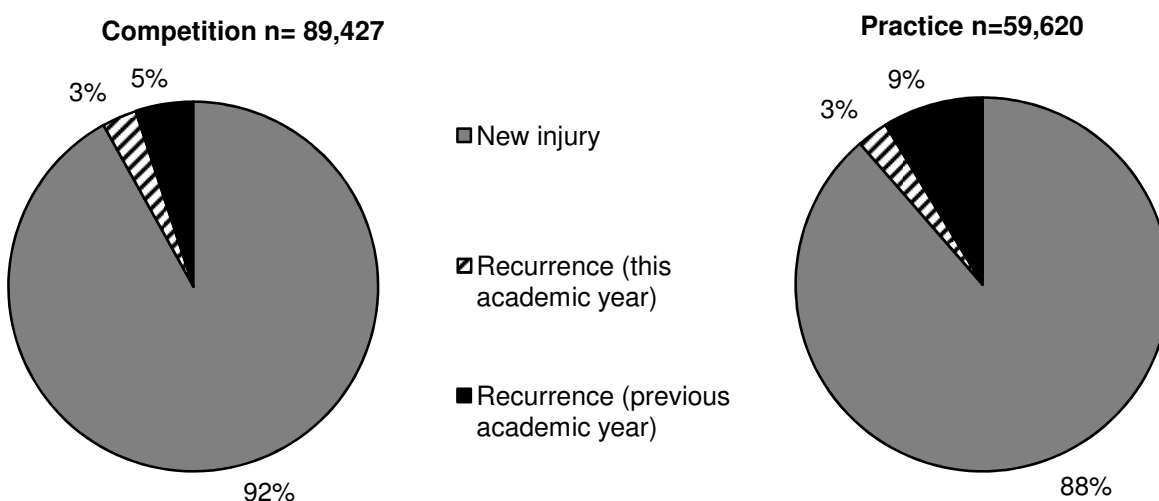
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 4.5 Boys' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	6,661	7.7%	3,466	6.2%	10,127	7.1%
Did not require surgery	79,872	92.3%	52,873	93.8%	132,745	92.9%
<b>Total</b>	<b>86,533</b>	<b>100%</b>	<b>56,339</b>	<b>100%</b>	<b>142,872</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 4.3 History of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 4.6 Time during Season of Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	37,289	25.7%
Regular season	101,914	70.1%
Post season	6,124	4.2%
<b>Total</b>	<b>145,326</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 4.7 Competition-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	1,682	2.0%
First half	22,353	26.9%
Second half	58,503	70.5%
Overtime	409	0.5%
<b>Total</b>	<b>82,947</b>	<b>100%</b>
<b>Field Location</b>		
Top of goal box extended to center line (offense)	27,962	34.6%
Goal box (defense)	15,159	18.7%
Top of goal box extended to center line (defense)	16,814	20.8%
Goal box (offense)	6,245	7.7%
Off the field	1,042	1.3%
Side of goal box (defense)	5,488	6.8%
Side of goal box (offense)	8,185	10.1%
<b>Total</b>	<b>80,894</b>	<b>100%</b>

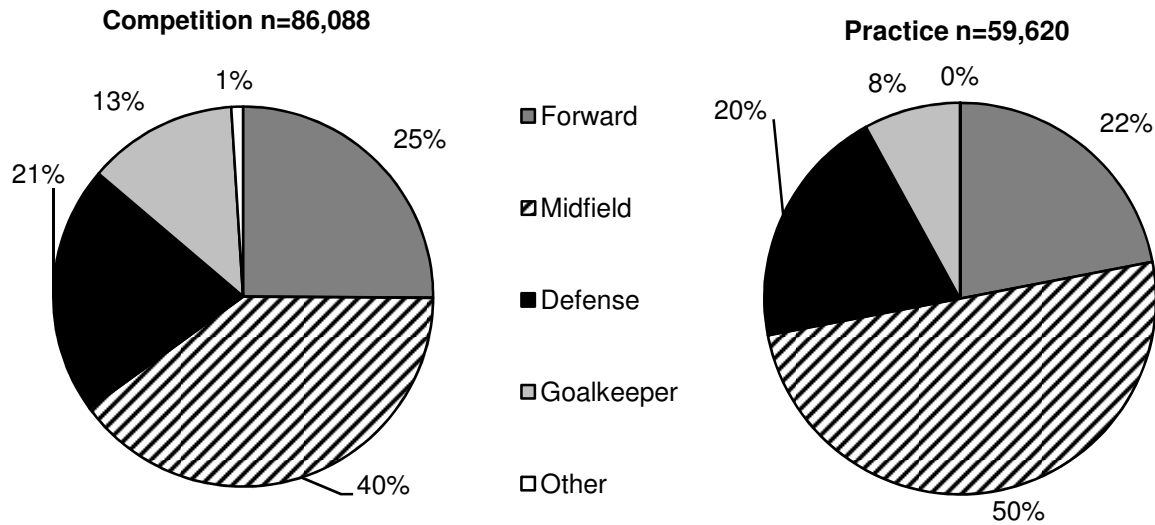
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 4.8 Practice-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	5,766	9.8%
Second 1/2 hour	9,184	15.6%
1-2 hours into practice	38,421	65.1%
>2 hours into practice	5,624	9.5%
<b>Total</b>	<b>58,994</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 4.4 Player Position of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

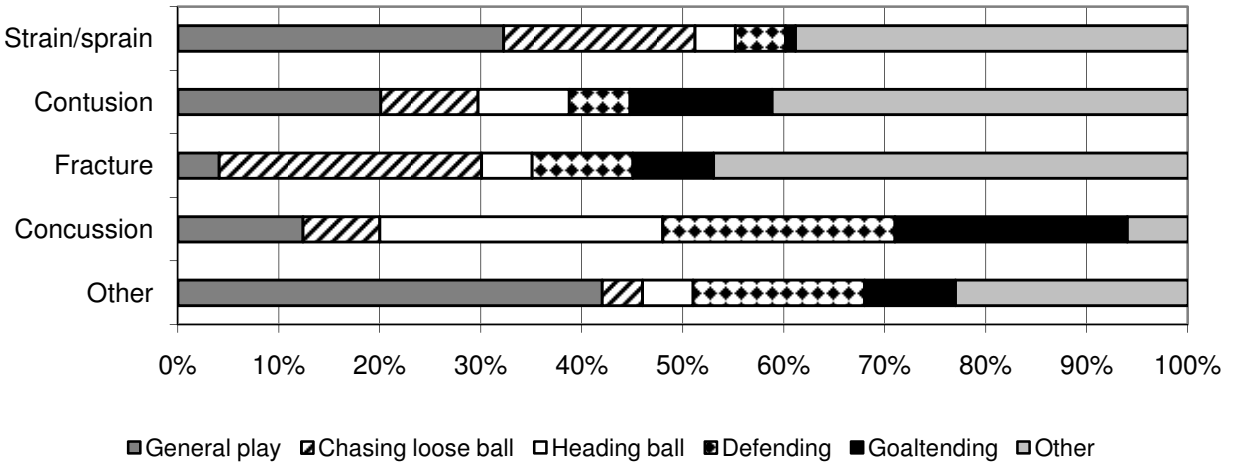


**Table 4.9 Activities Leading to Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	17,268	19.5%	20,972	35.2%	38,240	25.8%
Chasing loose ball	13,310	15.0%	5,750	9.6%	19,060	12.9%
Defending	14,698	16.6%	2,678	4.5%	17,376	11.7%
Heading ball	9,093	10.3%	7,031	11.8%	16,124	10.9%
Goaltending	10,404	11.8%	4,012	6.7%	14,416	9.7%
Receiving pass	7,947	9.0%	3,193	5.4%	11,140	7.5%
Ball handling/dribbling	7,251	8.2%	2,963	5.0%	10,214	6.9%
Conditioning	0	0.0%	6,157	10.3%	6,157	4.2%
Passing (foot)	3,413	3.9%	1,451	2.4%	4,864	3.3%
Shooting (foot)	1,483	1.7%	2,554	4.3%	4,037	2.7%
Receiving a slide tackle	1,860	2.1%	1,035	1.7%	2,895	2.0%
Blocking shot	626	0.7%	379	0.6%	1,005	0.7%
Attempting a slide tackle	788	0.9%	0	0.0%	788	0.5%
Other	386	0.4%	1,444	2.4%	1,830	1.2%
<b>Total</b>	<b>90,948</b>	<b>100%</b>	<b>71,219</b>	<b>100%</b>	<b>162,167</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 4.5 Activity Resulting in Boys' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 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, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>335</b>	<b>146,152</b>	<b>2.29</b>	<b>190,382</b>
Competition	241	43,495	5.54	141,339
Practice	94	102,657	0.92	49,043

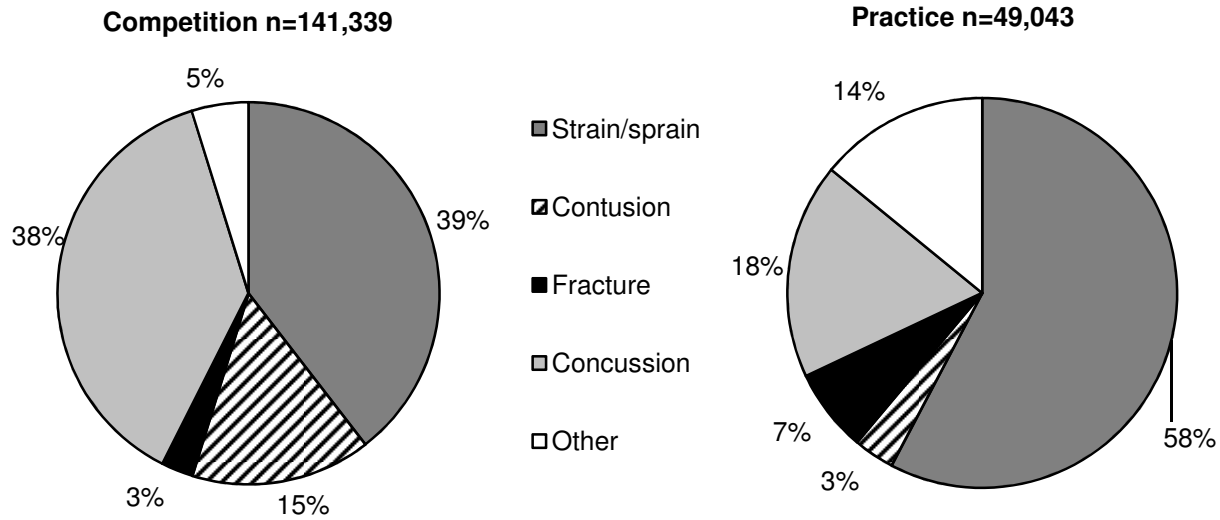
**Table 5.2 Demographic Characteristics of Injured Girls' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

<b>Year in School</b>	<b>n=183,946</b>
Freshman	29.8%
Sophomore	20.8%
Junior	31.0%
Senior	18.4%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	12
Maximum	18
Mean (St. Dev.)	15.6 (1.1)
<b>BMI</b>	
Minimum	16.3
Maximum	40.3
Mean (St. Dev.)	21.4 (2.5)

\*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, 2012-13 School Year**



**Table 5.3 Body Site of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Head/face	54,568	38.6%	9,047	18.4%	63,615	33.4%
Knee	27,575	19.5%	5,788	11.8%	33,363	17.5%
Hip/thigh/upper leg	16,810	11.9%	13,616	27.8%	30,426	16.0%
Ankle	20,635	14.6%	6,187	12.6%	26,822	14.1%
Foot	6,837	4.8%	6,281	12.8%	13,118	6.9%
Lower leg	7,453	5.3%	2,641	5.4%	10,094	5.3%
Hand/wrist	2,617	1.9%	2,201	4.5%	4,818	2.5%
Trunk	2,826	2.0%	1,975	4.0%	4,801	2.5%
Arm/elbow	1,308	0.9%	887	1.8%	2,195	1.2%
Shoulder	491	0.3%	75	0.2%	566	0.3%
Neck	220	0.2%	75	0.2%	566	0.2%
Other	0	0.0%	271	0.6%	271	0.1%
<b>Total</b>	<b>141,340</b>	<b>100%</b>	<b>49,044</b>	<b>100%</b>	<b>190,384</b>	<b>100%</b>

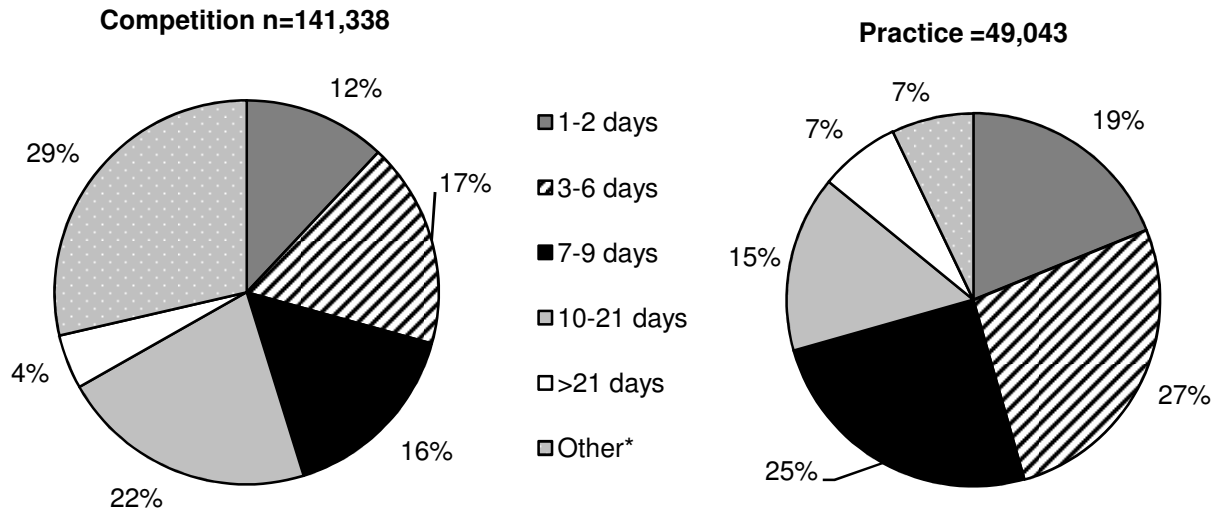
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 5.4 Ten Most Common Girls' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=141,339		Practice n=49,044		Total n=190,383	
	n	%	n	%	n	%
Head/face concussion	53,329	37.7%	8,776	17.9%	62,105	32.6%
Ankle strain/sprain	20,169	14.3%	6,187	12.6%	26,356	13.8%
Hip/thigh/upper leg strain/sprain	9,762	6.9%	13,541	27.6%	23,303	12.2%
Knee strain/sprain	18,904	13.3%	1,423	2.9%	20,327	10.7%
Foot strain/sprain	3,439	2.4%	4,081	8.3%	7,520	3.9%
Hip/thigh/upper leg contusion	7,048	5.0%	75	0.2%	7,123	3.7%
Knee contusion	5,709	4.0%	1,239	2.5%	6,948	3.6%
Knee other	2,962	2.1%	3,127	6.4%	6,089	3.2%
Lower leg contusion	4,320	3.1%	0	0.0%	4,320	2.3%
Lower leg strain/sprain	2,471	1.7%	691	1.4%	3,162	1.7%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 5.2 Time Loss of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



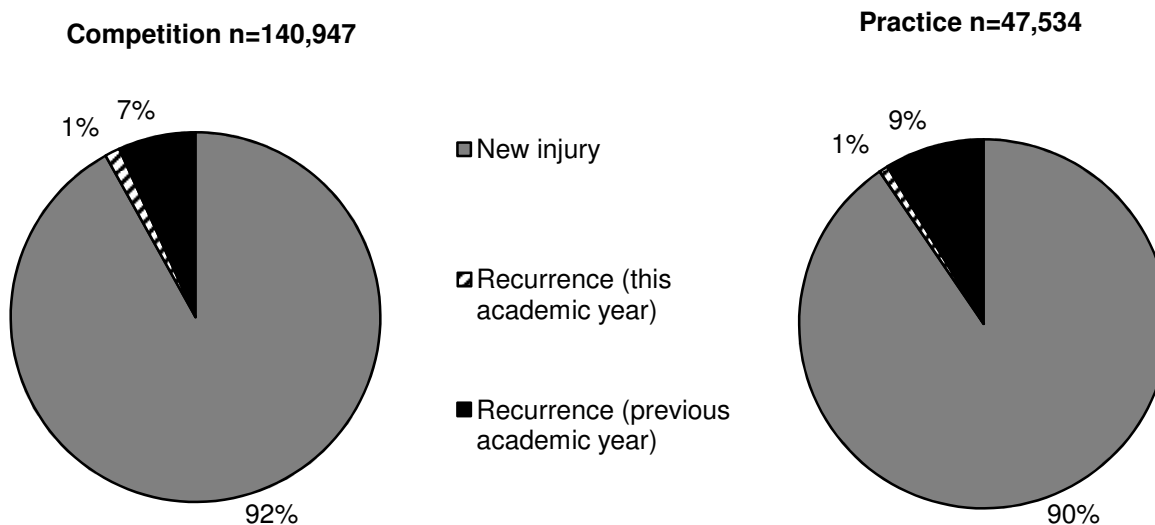
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 5.5 Girls' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	8,910	6.4%	1,850	3.8%	10,760	5.7%
Did not require surgery	131,127	93.6%	47,193	96.2%	178,320	94.3%
<b>Total</b>	<b>140,037</b>	<b>100%</b>	<b>49,043</b>	<b>100%</b>	<b>189,080</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 5.3 History of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 5.6 Time during Season of Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	27,293	14.3%
Regular season	148,963	78.2%
Post season	14,127	7.4%
<b>Total</b>	<b>190,382</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 5.7 Competition-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	391	0.3%
First half	49,044	35.7%
Second half	88,010	64.0%
Overtime	0	0.0%
<b>Total</b>	<b>137,446</b>	<b>100%</b>
<b>Field Location</b>		
top of goal box extended to center line (offense)	56,572	41.9%
top of goal box extended to center line (defense)	37,155	27.5%
goal box (defense)	15,139	11.2%
side of goal box (defense)	12,289	9.1%
side of goal box (offense)	6,909	5.1%
goal box (offense)	6,529	4.8%
off the field	391	0.3%
<b>Total</b>	<b>134,985</b>	<b>100%</b>

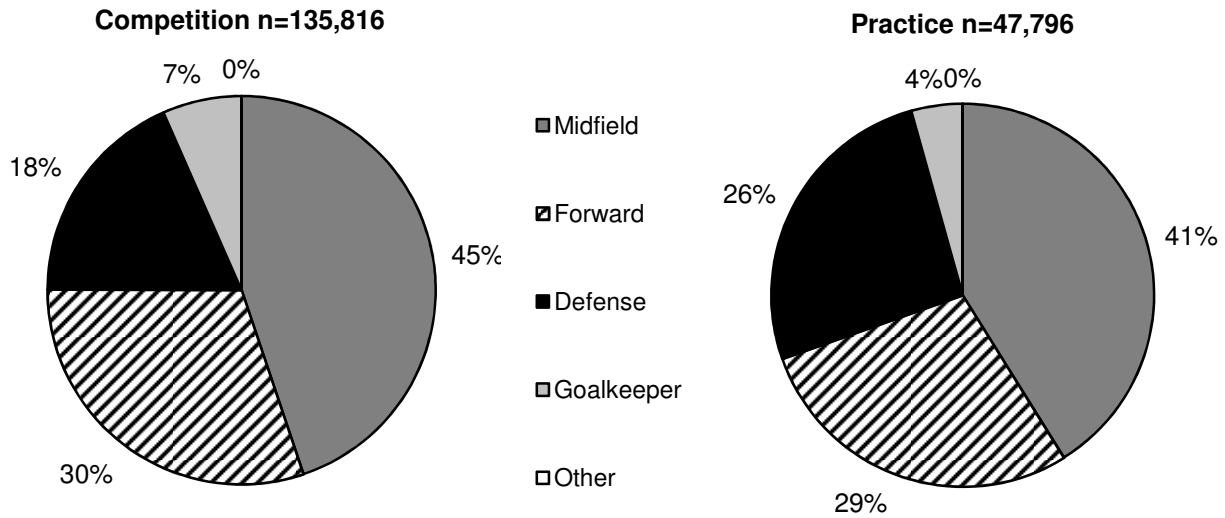
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 5.8 Practice-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	3,737	8.2%
Second 1/2 hour	13,744	30.0%
1-2 hours into practice	26,355	57.5%
>2 hours into practice	2,015	4.4%
<b>Total</b>	<b>45,851</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 5.4 Player Position of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

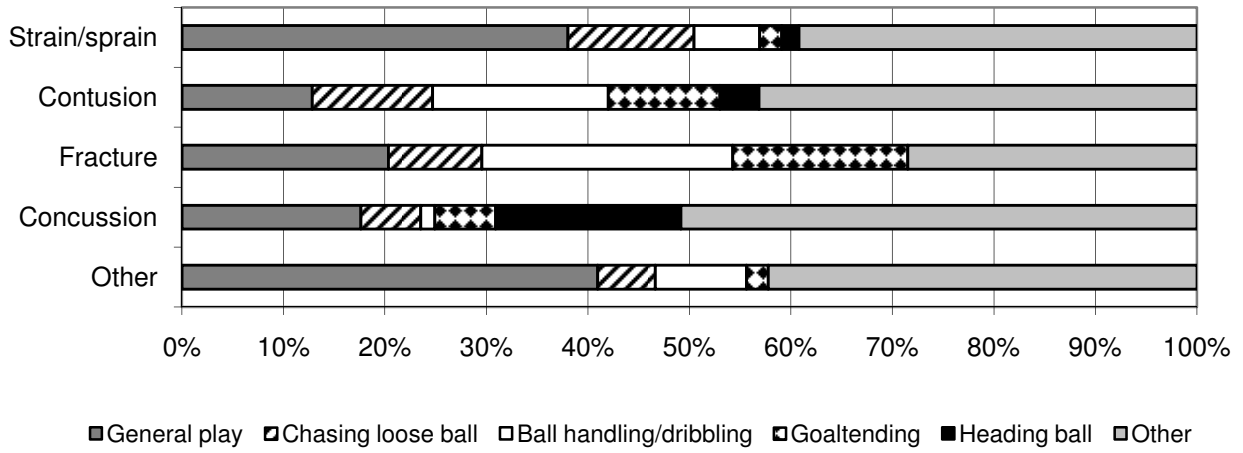


**Table 5.9 Activities Leading to Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	34,943	25.1%	17,447	35.9%	52,390	27.9%
Defending	32,446	23.3%	6,225	12.8%	38,671	20.6%
Chasing loose ball	15,730	11.3%	2,360	4.9%	18,090	9.6%
Receiving pass	15,239	10.9%	2,621	5.4%	17,860	9.5%
Heading ball	11,830	8.5%	1,518	3.1%	13,348	7.1%
Ball handling/dribbling	10,936	7.9%	2,299	4.7%	13,235	7.0%
Goaltending	8,006	5.8%	1,510	3.1%	9,516	5.1%
Passing (foot)	4,090	2.9%	3,383	7.0%	7,473	4.0%
Conditioning	0	0.0%	6,072	12.5%	6,072	3.2%
Shooting (foot)	2,511	1.8%	2,752	5.7%	5,263	2.8%
Blocking shot	1,158	0.8%	1,158	2.4%	2,316	1.2%
Attempting a slide tackle	391	0.3%	421	0.9%	812	0.4%
Receiving a slide tackle	782	0.6%	0	0.0%	782	0.4%
Other	1,158	0.8%	812	1.7%	1,970	1.0%
<b>Total</b>	<b>139,220</b>	<b>100%</b>	<b>48,578</b>	<b>100%</b>	<b>187,798</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 5.5 Activity Resulting in Girls' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



## **VI. Volleyball Injury Epidemiology**



**Table 6.1 Volleyball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>155</b>	<b>174,474</b>	<b>0.89</b>	<b>44,064</b>
Competition	67	61,913	1.08	19,150
Practice	88	112,561	0.78	24,914

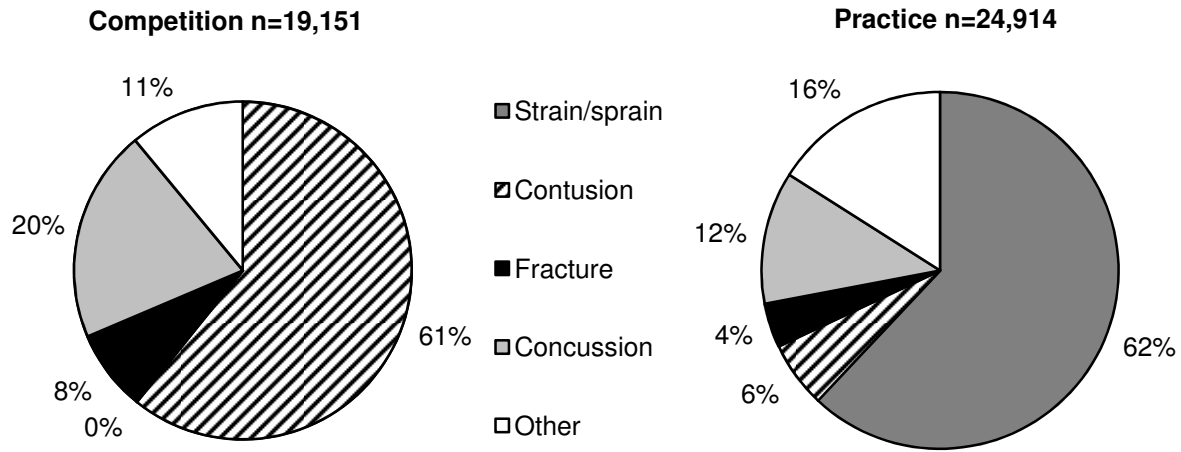
**Table 6.2 Demographic Characteristics of Injured Volleyball Athletes, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

<b>Year in School</b>	<b>n=42,488</b>
Freshman	23.7%
Sophomore	34.0%
Junior	21.5%
Senior	20.9%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.6 (1.2)
<b>BMI</b>	
Minimum	17.5
Maximum	42.4
Mean (St. Dev.)	21.9 (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, 2012-13 School Year**



**Table 6.3 Body Site of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	7,624	39.8%	11,878	47.7%	19,502	44.3%
Head/face	3,909	20.4%	3,010	12.1%	6,919	15.7%
Hand/wrist	3,221	16.8%	1,758	7.1%	4,979	11.3%
Knee	1,901	9.9%	2,503	10.0%	4,404	10.0%
Trunk	955	5.0%	1,555	6.2%	2,510	5.7%
Hip/thigh/upper leg	491	2.6%	1,657	6.7%	2,148	4.9%
Foot	149	0.8%	1,517	6.1%	1,666	3.8%
Shoulder	606	3.2%	768	3.1%	1,374	3.1%
Arm/elbow	294	1.5%	0	0.0%	294	0.7%
Lower leg	0	0.0%	269	1.1%	269	0.6%
Other	0	0.0%	0	0.0%	0	0.0%
<b>Total</b>	<b>19,150</b>	<b>100%</b>	<b>24,915</b>	<b>100%</b>	<b>44,065</b>	<b>100%</b>

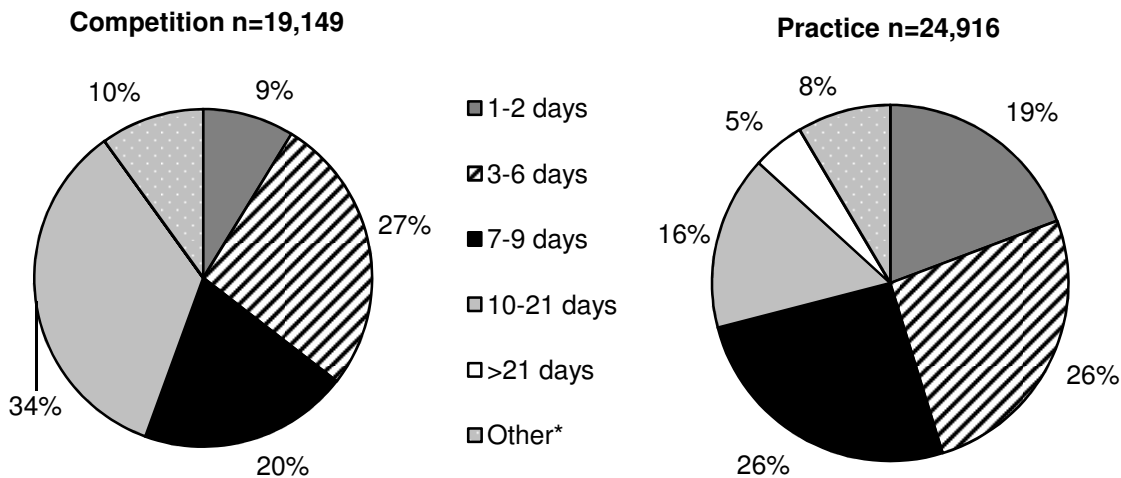
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 6.4 Ten Most Common Volleyball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=19,150		Practice n=24,915		Total n=44,065	
	n	%	n	%	n	%
Ankle strain/sprain	7,624	39.8%	10,635	42.7%	18,259	41.4%
Head/face concussion	3,909	20.4%	3,010	12.1%	6,919	15.7%
Hand/wrist strain/sprain	1,872	9.8%	1,433	5.8%	3,305	7.5%
Knee strain/sprain	959	5.0%	1,046	4.2%	2,005	4.6%
Knee other	942	4.9%	942	3.8%	1,884	4.3%
Hand/wrist fracture	1,200	6.3%	325	1.3%	1,525	3.5%
Hip/thigh/upper leg strain/sprain	491	2.6%	841	3.4%	1,332	3.0%
Ankle other	0	0.0%	1,243	5.0%	1,243	2.8%
Trunk strain/sprain	464	2.4%	655	2.6%	1,119	2.5%
Trunk other	491	2.6%	606	2.4%	1,097	2.5%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 6.2 Time Loss of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



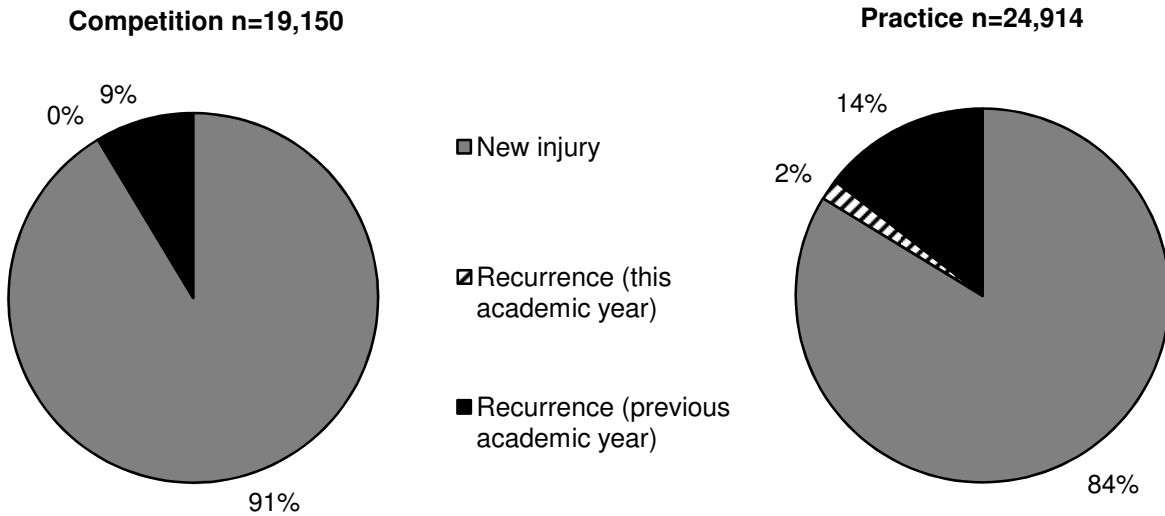
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 6.5 Volleyball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	768	4.0%	515	2.1%	1,283	2.9%
Did not require surgery	18,382	96.0%	24,399	97.9%	42,781	97.1%
<b>Total</b>	<b>19,150</b>	<b>100%</b>	<b>24,914</b>	<b>100%</b>	<b>44,064</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 6.3 History of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 6.6 Time during Season of Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	9,875	22.4%
Regular season	33,508	76.0%
Post season	682	1.5%
<b>Total</b>	<b>44,065</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 6.7 Competition-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	2,813	15.3%
First set	1,835	10.0%
Second set	6,867	37.3%
Third set	5,815	31.6%
Fourth set	1,097	6.0%
<b>Total</b>	<b>18,426</b>	<b>100%</b>
<b>Court Location</b>		
Middle forward	4,802	26.0%
Left back	4,129	22.3%
Right forward	3,628	19.6%
Left forward	2,682	14.5%
At the net	1,564	8.5%
Off the court	959	5.2%
Outside court (your side)	721	3.9%
Right back (server)	0	0.0%
Outside court (opponent's side)	0	0.0%
<b>Total</b>	<b>18,485</b>	<b>100%</b>

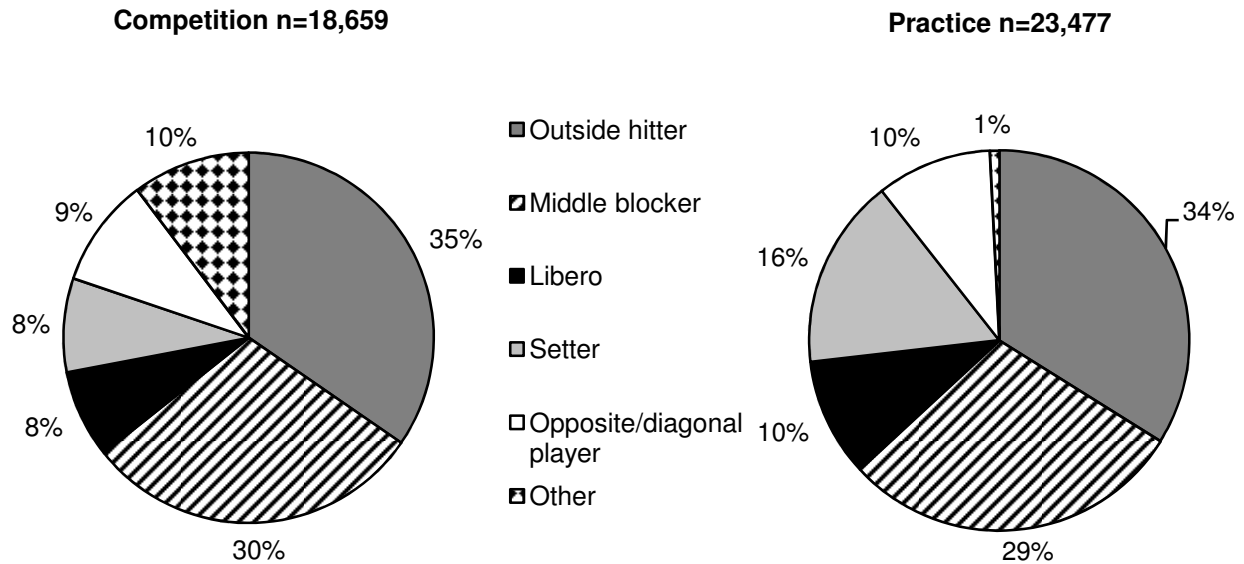
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 6.8 Practice-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	3,864	15.6%
Second 1/2 hour	3,052	12.3%
1-2 hours into practice	14,748	59.6%
>2 hours into practice	3,071	12.4%
<b>Total</b>	<b>24,735</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 6.4 Player Position of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

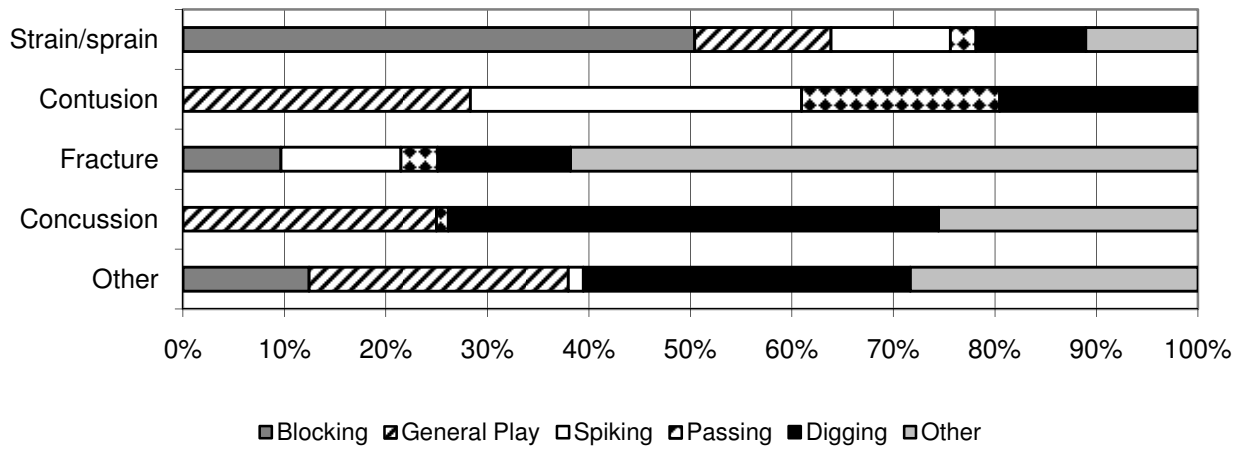


**Table 6.9 Activities Leading to Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Blocking	6,224	32.5%	7,998	33.4%	14,222	33.0%
Digging	5,078	26.5%	3,599	15.1%	8,677	20.1%
General play	2,074	10.8%	5,115	21.4%	7,189	16.7%
Spiking	2,167	11.3%	1,792	7.5%	3,959	9.2%
Setting	426	2.2%	2,073	8.7%	2,499	5.8%
Serving	1,007	5.3%	768	3.2%	1,775	4.1%
Passing	575	3.0%	553	2.3%	1,128	2.6%
Conditioning	0	0.0%	1,049	4.4%	1,049	2.4%
Other	1,600	8.4%	965	4.0%	2,565	6.0%
<b>Total</b>	<b>19,151</b>	<b>100%</b>	<b>23,912</b>	<b>100%</b>	<b>43,063</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 6.5 Activity Resulting in Volleyball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 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, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>337</b>	<b>229,897</b>	<b>1.47</b>	<b>85,819</b>
Competition	171	70,092	2.44	44,095
Practice	166	159,805	1.04	41,724

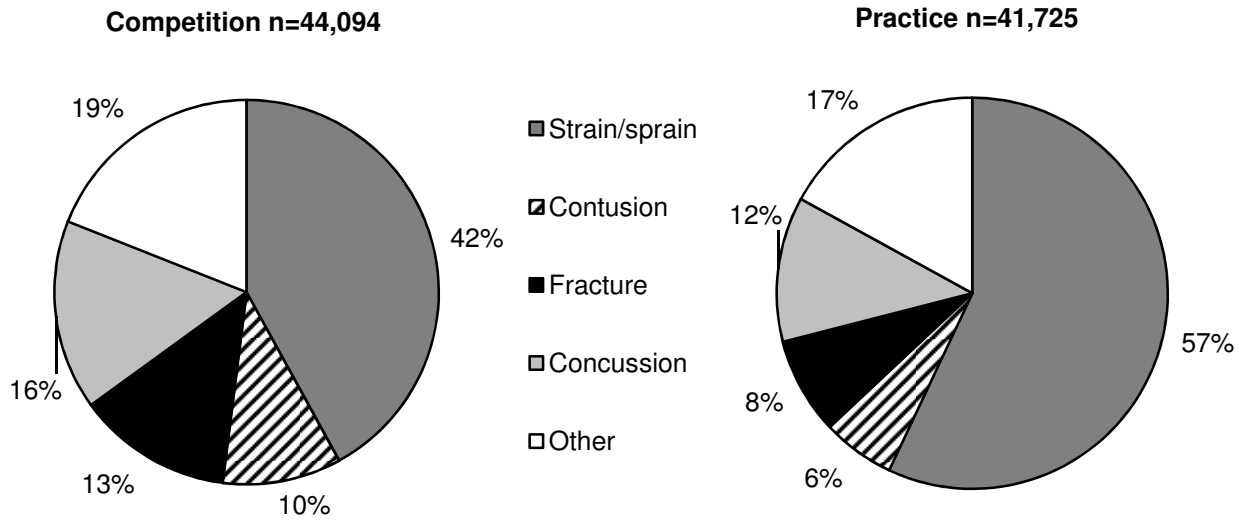
**Table 7.2 Demographic Characteristics of Injured Boys' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

<b>Year in School</b>	<b>n=84,026</b>
Freshman	22.5%
Sophomore	26.5%
Junior	30.2%
Senior	20.8%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.9 (1.2)
<b>BMI</b>	
Minimum	15.8
Maximum	38.7
Mean (St. Dev.)	23.1 (3.5)

\*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, 2012-13 School Year**



**Table 7.3 Body Site of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	11,118	25.2%	14,690	35.2%	25,808	30.1%
Head/face	12,661	28.7%	7,437	17.8%	20,098	23.4%
Knee	6,167	14.0%	4,471	10.7%	10,638	12.4%
Hand/wrist	2,440	5.5%	4,794	11.5%	7,234	8.4%
Hip/thigh/upper leg	2,669	6.1%	2,702	6.5%	5,371	6.3%
Trunk	3,278	7.4%	1,491	3.6%	4,769	5.6%
Foot	1,727	3.9%	1,066	2.6%	2,793	3.3%
Lower leg	958	2.2%	1,626	3.9%	2,584	3.0%
Shoulder	901	2.0%	1,484	3.6%	2,385	2.8%
Arm/elbow	1,275	2.9%	191	0.5%	1,466	1.7%
Neck	901	2.0%	0	0.0%	901	1.0%
Other	0	0.0%	1,771	4.2%	1,771	2.1%
<b>Total</b>	<b>44,095</b>	<b>100%</b>	<b>41,723</b>	<b>100%</b>	<b>85,818</b>	<b>100%</b>

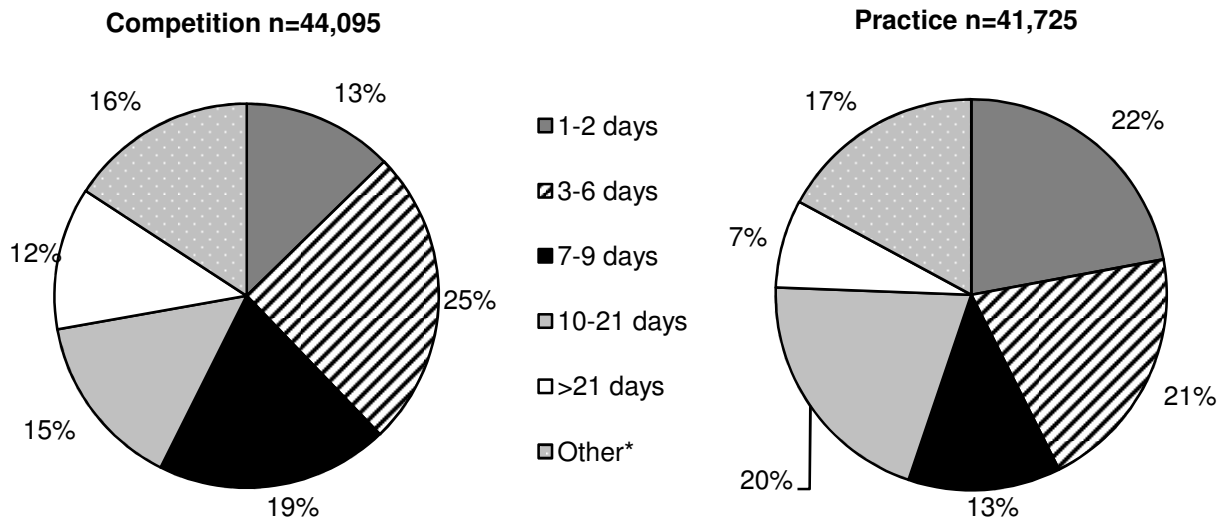
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 7.4 Ten Most Common Boys' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=44,093		Practice n=41,723		Total n=85,816	
	n	%	n	%	n	%
Ankle strain/sprain	10,252	23.3%	13,536	32.4%	23,788	27.8%
Head/face concussion	6,903	15.7%	4,926	11.8%	11,829	13.8%
Head/face other	3,727	8.5%	2,048	4.9%	5,775	6.7%
Knee strain/sprain	3,306	7.5%	1,776	4.3%	5,082	5.9%
Knee other	1,939	4.4%	1,930	4.6%	3,869	4.5%
Hip/thigh/upper leg strain/sprain	911	2.1%	2,317	5.6%	3,228	3.8%
Hand/wrist fracture	1,348	3.1%	1,629	3.9%	2,977	3.5%
Hand/wrist strain/sprain	537	1.2%	2,345	5.6%	2,882	3.4%
Trunk contusion	1,602	3.6%	826	2.0%	2,428	2.8%
Trunk strain/sprain	1,581	3.6%	664	1.6%	2,245	2.6%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 7.2 Time Loss of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



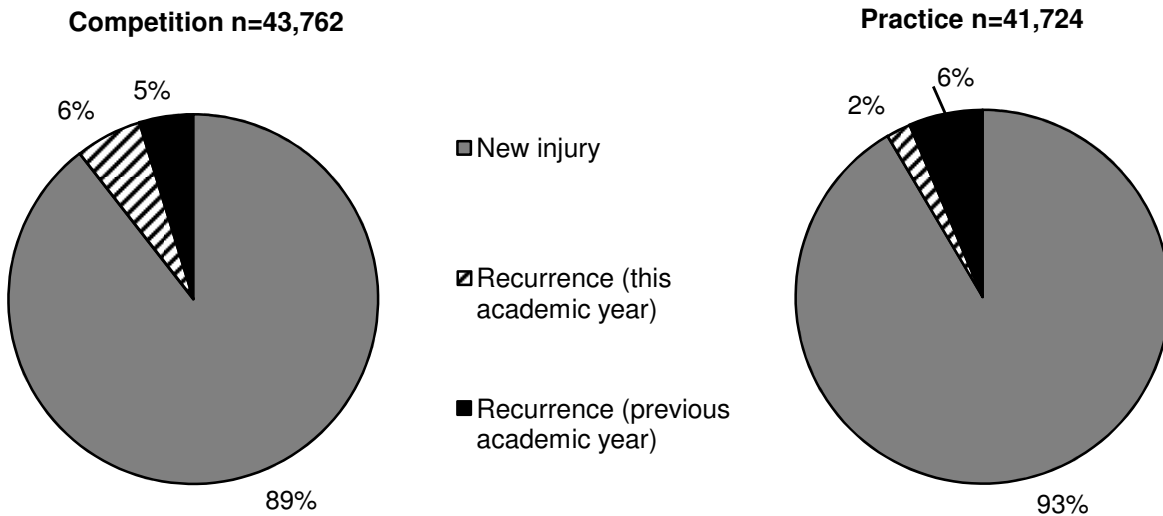
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 7.5 Boys' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	3,436	7.9%	3,031	7.5%	6467	7.7%
Did not require surgery	40,174	92.1%	37,204	92.5%	77,378	92.3%
<b>Total</b>	<b>43,610</b>	<b>100%</b>	<b>40,235</b>	<b>100%</b>	<b>83,845</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 7.3 History of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 7.6 Time during Season of Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	13,489	15.8%
Regular season	69,479	81.3%
Post season	2,519	2.9%
<b>Total</b>	<b>85,487</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 7.7 Competition-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	774	1.8%
First quarter	2,809	6.5%
Second quarter	15,878	36.6%
Third quarter	12,909	15.0%
Fourth quarter	10,961	25.3%
<b>Total</b>	<b>43,330</b>	<b>100%</b>
<b>Court Location</b>		
Inside lane (offense)	12,198	28.7%
Inside lane (defense)	10,186	23.9%
Between 3 point arc and lane (offense)	5,825	13.7%
Between 3 point arc and lane (defense)	4,947	11.6%
Outside 3 point arc - offense	3,650	8.6%
Outside 3 point arc - defense	3,176	7.5%
Backcourt	1,786	4.2%
Out of bounds	775	1.8%
<b>Total</b>	<b>42,543</b>	<b>100%</b>

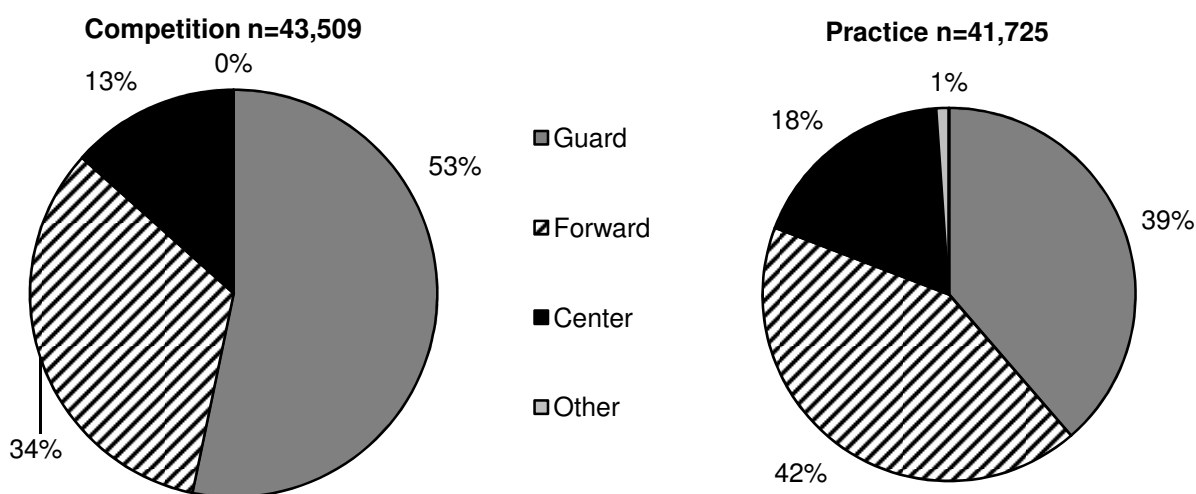
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 7.8 Practice-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	3,976	10.1%
Second 1/2 hour	9,628	24.4%
1-2 hours into practice	22,899	58.1%
>2 hours into practice	2,904	7.4%
<b>Total</b>	<b>39,407</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 7.4 Player Position of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

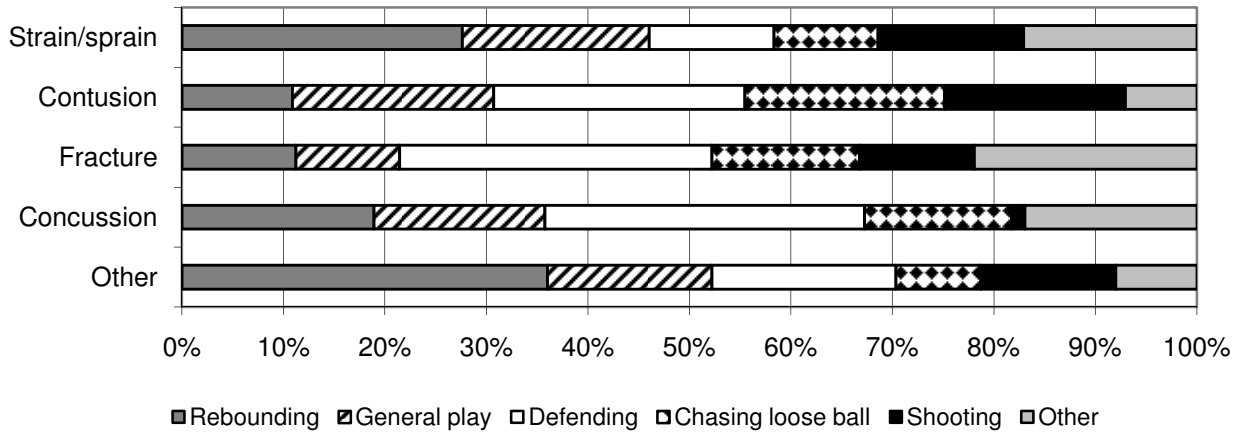


**Table 7.9 Activities Leading to Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Rebounding	9,184	21.0%	11,681	28.8%	20,865	24.8%
Defending	10,767	24.7%	5,223	12.9%	15,990	19.0%
General play	5,224	12.0%	9,138	22.5%	14,362	17.1%
Shooting	6,534	15.0%	3,854	9.5%	10,388	12.3%
Chasing loose ball	6,737	15.4%	3,149	7.8%	9,886	11.7%
Ball handling/dribbling	3,571	8.2%	503	1.2%	4,074	4.8%
Receiving pass	393	0.9%	2,937	7.2%	3,330	4.0%
Conditioning	0	0.0%	2,227	5.5%	2,227	2.6%
Passing	0	0.0%	427	1.1%	427	0.5%
Other	1,251	2.9%	1,415	3.5%	2,666	3.2%
<b>Total</b>	<b>43,661</b>	<b>100%</b>	<b>40,554</b>	<b>100%</b>	<b>84,215</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 7.5 Activity Resulting in Boys' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 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, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>336</b>	<b>183,377</b>	<b>1.83</b>	<b>83,107</b>
Competition	179	57,201	3.13	45,645
Practice	157	126,176	1.24	37,462

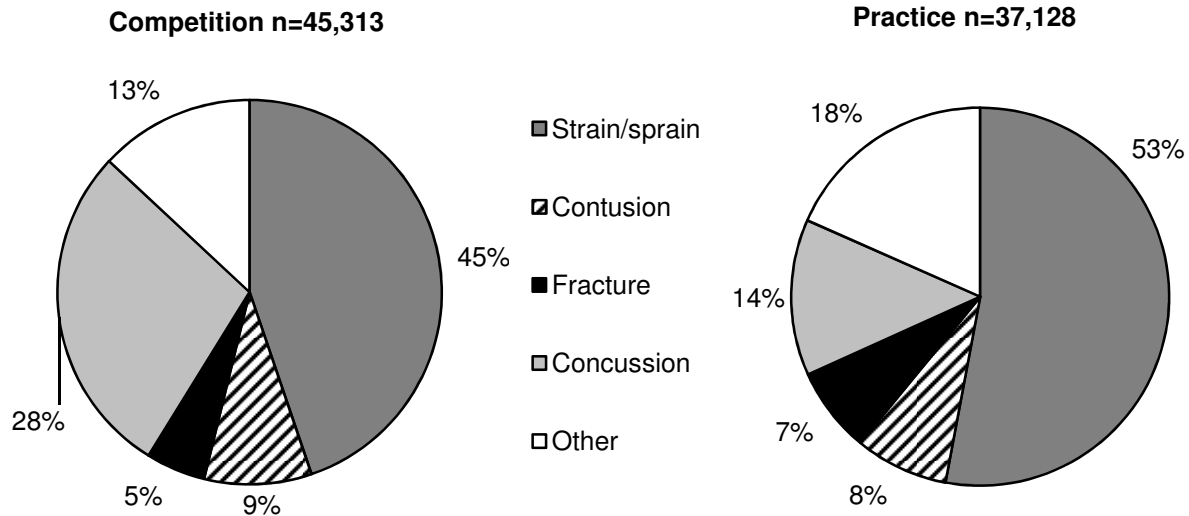
**Table 8.2 Demographic Characteristics of Injured Girls' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

<b>Year in School</b>	<b>n=80,997</b>
Freshman	30.9%
Sophomore	30.2%
Junior	20.1%
Senior	18.8%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.6 (1.1)
<b>BMI</b>	
Minimum	15.5
Maximum	38.8
Mean (St. Dev.)	22.1 (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 8.1 Diagnosis of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 8.3 Body Site of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Ankle	11,906	26.1%	10,744	28.7%	22,650	27.3%
Head/face	15,425	33.8%	5,773	15.4%	21,198	25.5%
Knee	8,874	19.4%	4,698	12.5%	13,572	16.3%
Hip/thigh/upper leg	2,270	5.0%	3,625	9.7%	5,895	7.1%
Trunk	1,110	2.4%	3,996	10.7%	5,106	6.1%
Hand/wrist	1,909	4.2%	2,406	6.4%	4,315	5.2%
Lower leg	709	1.6%	1,058	2.8%	1,767	2.1%
Foot	1,281	2.8%	1,674	4.5%	2,955	3.6%
Shoulder	903	2.0%	1,990	5.3%	2,893	3.5%
Arm/elbow	1,257	2.8%	896	2.4%	2,153	2.6%
Neck	0	0.0%	268	0.7%	268	0.7%
Other	0	0.0%	333	0.9%	333	0.4%
<b>Total</b>	<b>45,644</b>	<b>100%</b>	<b>37,461</b>	<b>100%</b>	<b>83,105</b>	<b>100%</b>

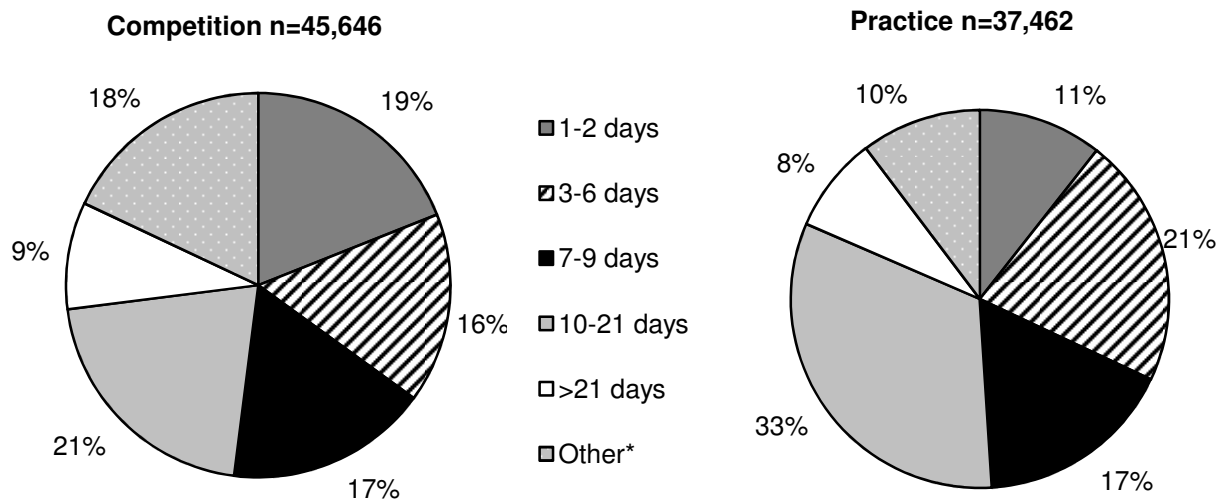
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 8.4 Ten Most Common Girls' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=37,211		Practice n=29,980		Total n=67,191	
	n	%	n	%	n	%
Ankle strain/sprain	11,479	25.3%	10,418	28.1%	21,897	26.6%
Head/face concussion	12,544	27.7%	4,970	13.4%	17,514	21.2%
Knee strain/sprain	3,961	8.7%	1,883	5.1%	5,844	7.1%
Hip/thigh/upper leg strain/sprain	1,851	4.1%	3,357	9.0%	5,208	6.3%
Knee other	3,291	7.3%	1,159	3.1%	4,450	5.4%
Knee contusion	1,623	3.6%	1,322	3.6%	2,945	3.6%
Trunk other	333	0.7%	2,382	6.4%	2,715	3.3%
Trunk strain/sprain	444	1.0%	1,615	4.3%	2,059	2.5%
Head/face fracture	1,191	2.6%	802	2.1%	1,993	2.4%
Shoulder other	520	1.1%	1,278	3.4%	1,798	2.2%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 8.2 Time Loss of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



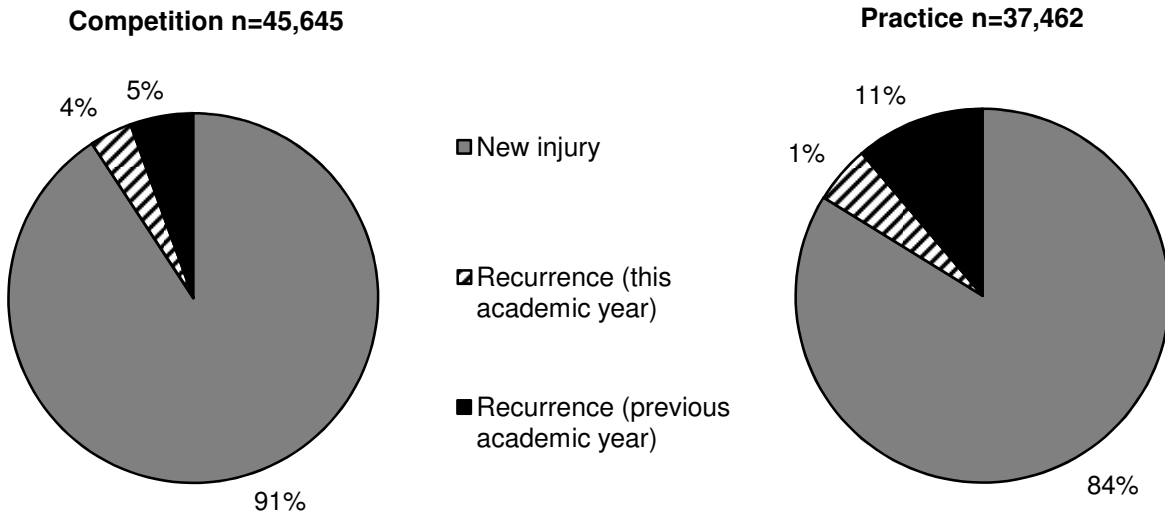
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 8.5 Girls' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	4,436	9.8%	3,044	8.1%	7,480	9.0%
Did not require surgery	40,876	90.2%	34,418	91.9%	75,294	91.0%
<b>Total</b>	<b>45,312</b>	<b>100%</b>	<b>37,462</b>	<b>100%</b>	<b>82,774</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 8.3 History of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 8.6 Time during Season of Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	13,094	15.8%
Regular season	69,050	83.1%
Post season	963	1.2%
<b>Total</b>	<b>83,108</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 8.7 Competition-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year \***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	1,254	2.9%
First quarter	2,972	6.8%
Second quarter	14,593	33.2%
Third quarter	12,503	28.5%
Fourth quarter	12,591	28.7%
<b>Total</b>	<b>43,913</b>	<b>100%</b>
<b>Court Location</b>		
Inside lane (defense)	10,918	26.3%
Inside lane (offense)	8,214	19.8%
Outside 3 point arc - offense	6,059	14.6%
Between 3 point arc and lane (offense)	5,146	12.4%
Between 3 point arc and lane (defense)	3,609	8.7%
Outside 3 point arc - defense	3,012	7.2%
Backcourt	2,954	7.1%
Out of bounds	1,665	4.0%
<b>Total</b>	<b>41,578</b>	<b>100%</b>

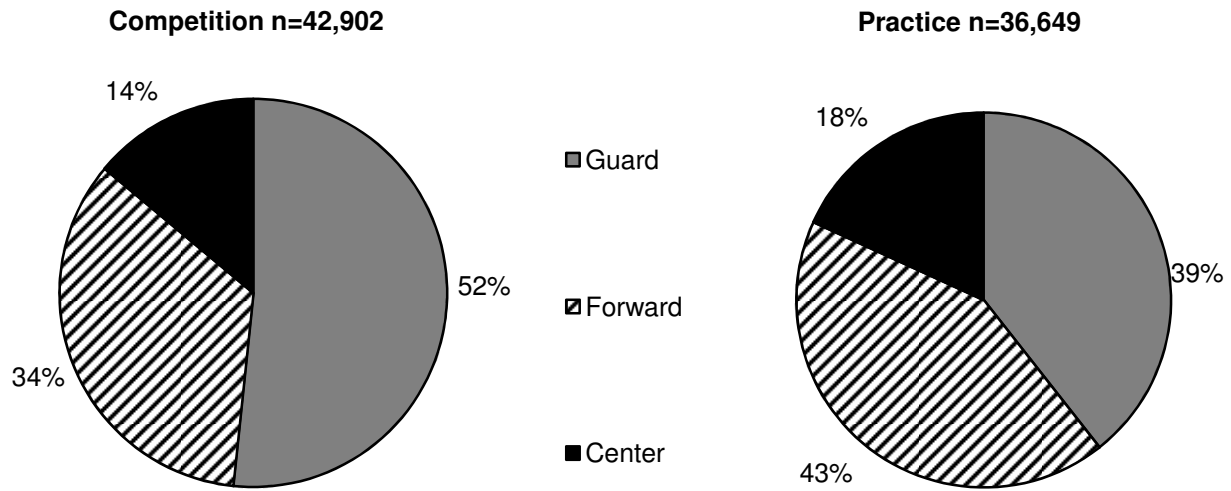
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 8.8 Practice-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	3,797	10.8%
Second 1/2 hour	8,334	23.7%
1-2 hours into practice	22,523	64.1%
>2 hours into practice	507	1.4%
<b>Total</b>	<b>35,160</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 8.4 Player Position of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

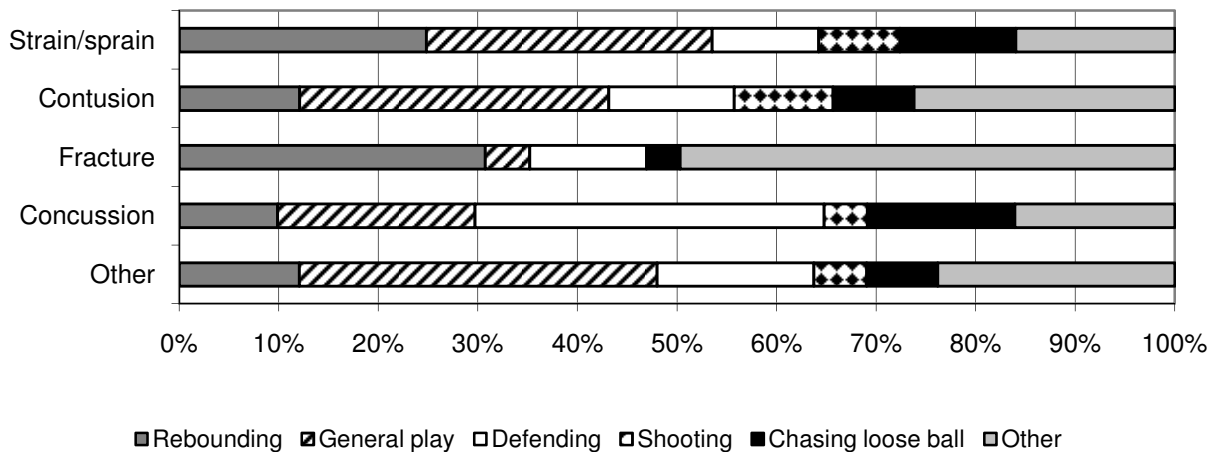


**Table 8.9 Activities Leading to Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	9,482	22.0%	11,652	31.8%	21,134	26.5%
Rebounding	7,335	17.0%	7,826	21.3%	15,161	19.0%
Defending	9,969	23.2%	3,646	9.9%	13,615	17.1%
Chasing loose ball	5,775	13.4%	2,793	7.6%	8,568	10.7%
Ball handling/dribbling	4,907	11.4%	2,048	5.6%	6,955	8.7%
Shooting	2,860	6.6%	2,350	6.4%	5,210	6.5%
Receiving pass	1,823	4.2%	3,102	8.5%	4,925	6.2%
Conditioning	0	0.0%	1,344	3.7%	1,344	1.7%
Passing	569	1.3%	762	2.1%	1,331	1.7%
Other	333	0.8%	1,153	3.1%	1,486	1.9%
<b>Total</b>	<b>43,053</b>	<b>100%</b>	<b>36,676</b>	<b>100%</b>	<b>79,729</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 8.5 Activity Resulting in Girls' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



## **IX. Wrestling Injury Epidemiology**



**Table 9.1 Wrestling Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>343</b>	<b>147,208</b>	<b>2.33</b>	<b>85,485</b>
Competition	141	39,857	3.54	35,016
Practice	202	107,351	1.88	50,469

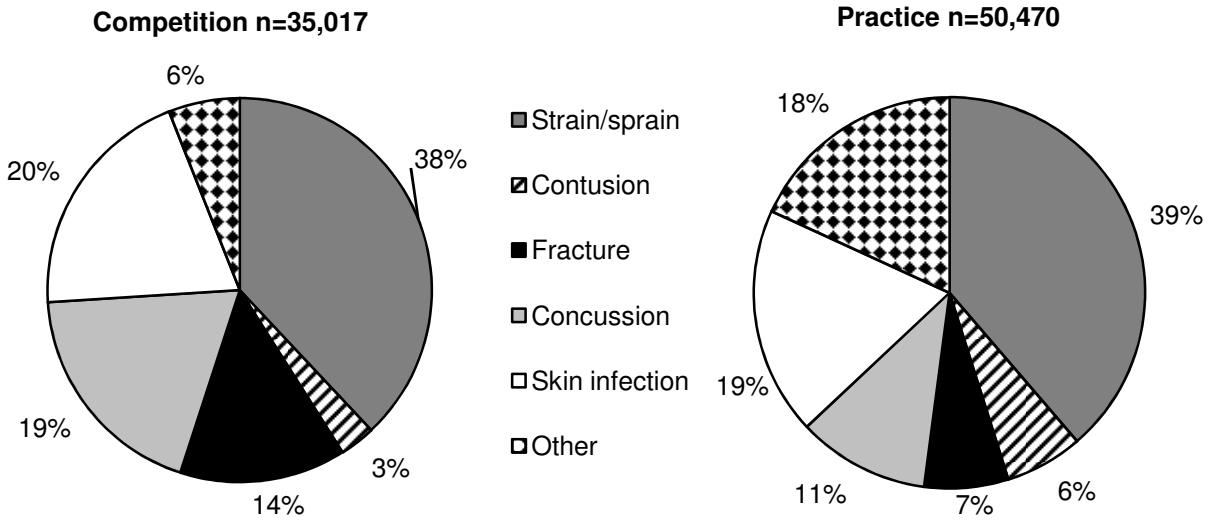
**Table 9.2 Demographic Characteristics of Injured Wrestlers, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

<b>Year in School</b>	<b>n=82,784</b>
Freshman	27.2%
Sophomore	18.1%
Junior	27.5%
Senior	27.2%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	18
Mean (St. Dev.)	16.0 (1.3)
<b>BMI</b>	
Minimum	14.5
Maximum	39.6
Mean (St. Dev.)	23.5 (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 9.1 Diagnosis of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 9.3 Body Site of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Head/face	7,526	21.0%	10,276	20.4%	17,532	20.6%
Knee	5,979	17.3%	7,201	14.3%	13,180	15.5%
Shoulder	4,987	14.4%	6,142	12.2%	11,129	13.1%
Trunk	3,097	8.9%	5,681	11.3%	8,778	10.3%
Arm/elbow	2,849	8.2%	4,745	9.4%	7,594	8.9%
Ankle	3,237	9.4%	4,067	8.1%	7,304	8.6%
Hand/wrist	2,383	6.9%	4,534	9.0%	6,917	8.1%
Neck	773	2.2%	2,775	5.5%	3,548	4.2%
Hip/thigh/upper leg	1,120	3.2%	1,375	2.7%	2,495	2.9%
Lower leg	507	1.5%	1,114	2.2%	1,621	1.9%
Foot	451	1.3%	710	1.4%	1,161	1.4%
Other	1,975	5.7%	1,848	3.7%	3,823	4.5%
<b>Total</b>	<b>34,614</b>	<b>100%</b>	<b>50,648</b>	<b>100%</b>	<b>85,082</b>	<b>100%</b>

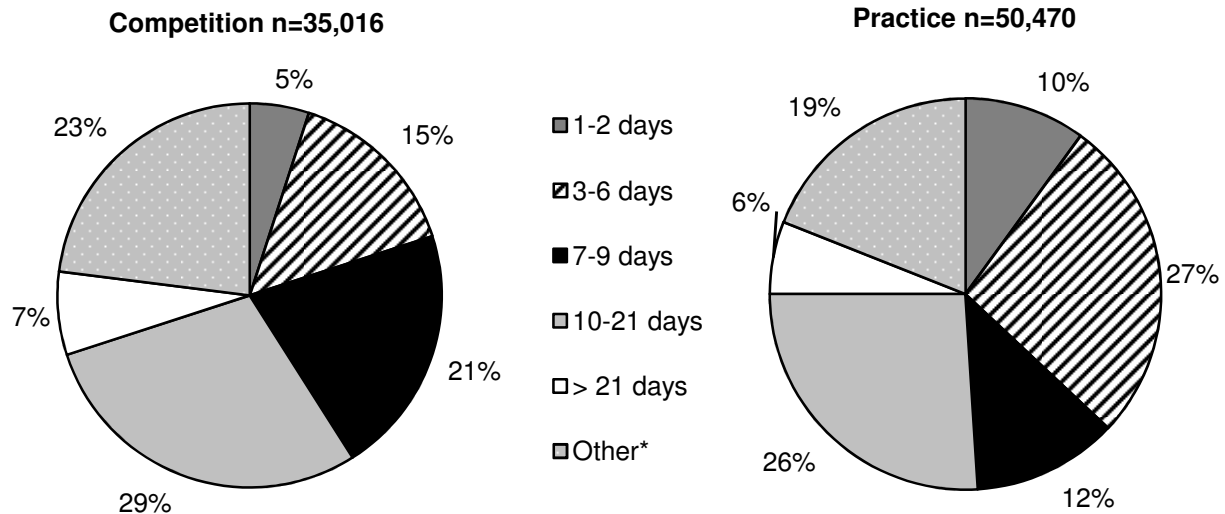
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 9.4 Ten Most Common Wrestling Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=34,616		Practice n=50,470		Total n=85,086	
	n	%	n	%	n	%
Head/face concussion	6,793	19.6%	5,650	11.2%	12,443	14.6%
Ankle strain/sprain	2,689	7.8%	4,067	8.1%	6,756	7.9%
Knee strain/sprain	2,872	8.3%	3,380	6.7%	6,252	7.3%
Shoulder strain/sprain	2,222	6.4%	3,159	6.3%	5,381	6.3%
Shoulder skin infection	2,766	8.0%	2,532	5.0%	5,298	6.2%
Knee skin infection	2,655	7.7%	2,447	4.8%	5,102	6.0%
Head/face other	310	0.9%	3,000	5.9%	3,310	3.9%
Arm/elbow strain/sprain	902	2.6%	2,244	4.4%	3,146	3.7%
Hand/wrist strain/sprain	684	2.0%	2,063	4.1%	2,747	3.2%
Hand/wrist fracture	1,351	3.9%	1,135	2.2%	2,486	2.9%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 9.2 Time Loss of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



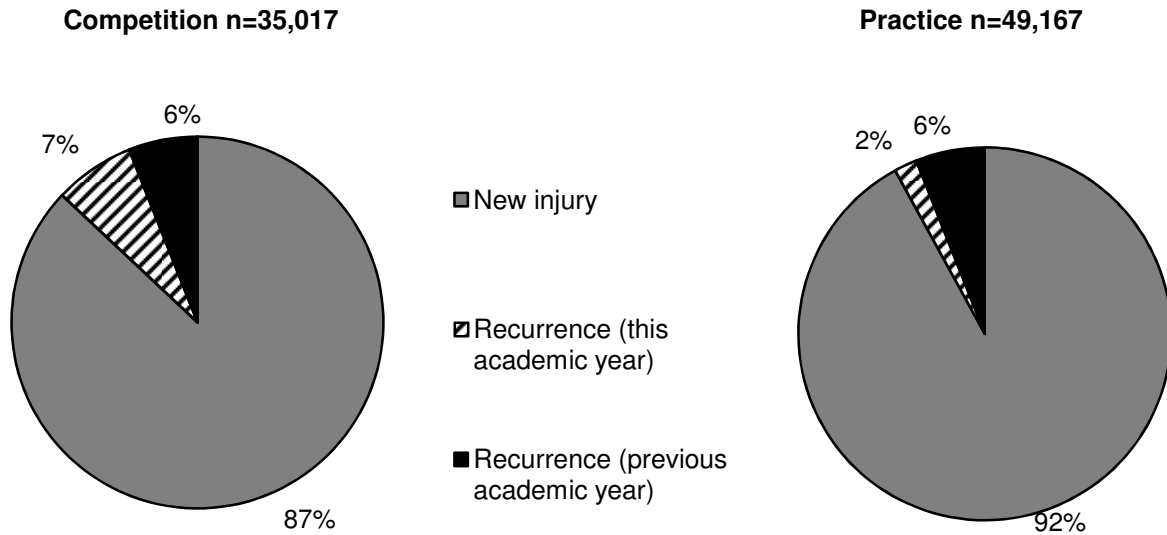
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 9.5 Wrestling Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	1,399	4.1%	2,972	6.0%	4,371	5.3%
Did not require surgery	32,517	95.9%	46,291	94.0%	78,808	94.7%
<b>Total</b>	<b>33,916</b>	<b>100%</b>	<b>49,263</b>	<b>100%</b>	<b>83,179</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 9.3 History of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 9.6 Time during Season of Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	12,009	14.1%
Regular season	69,751	81.7%
Post season	3,628	4.2%
<b>Total</b>	<b>85,388</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 9.7 Competition-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	853	2.7%
First period	3,072	9.8%
Second period	14,192	45.3%
Third period	12,841	41.0%
Overtime	354	1.1%
<b>Total</b>	<b>31,312</b>	<b>100%</b>
<b>Mat Location</b>		
Within 28 ft. circle	31,822	96.0%
Off the mat	1,063	3.2%
Out of bounds	251	0.8%
<b>Total</b>	<b>33,137</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 9.8 Practice-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	10,786	22.1%
Second 1/2 hour	8,482	17.4%
1-2 hours into practice	22,680	46.5%
>2 hours into practice	6,836	14.0%
<b>Total</b>	<b>48,783</b>	<b>100%</b>

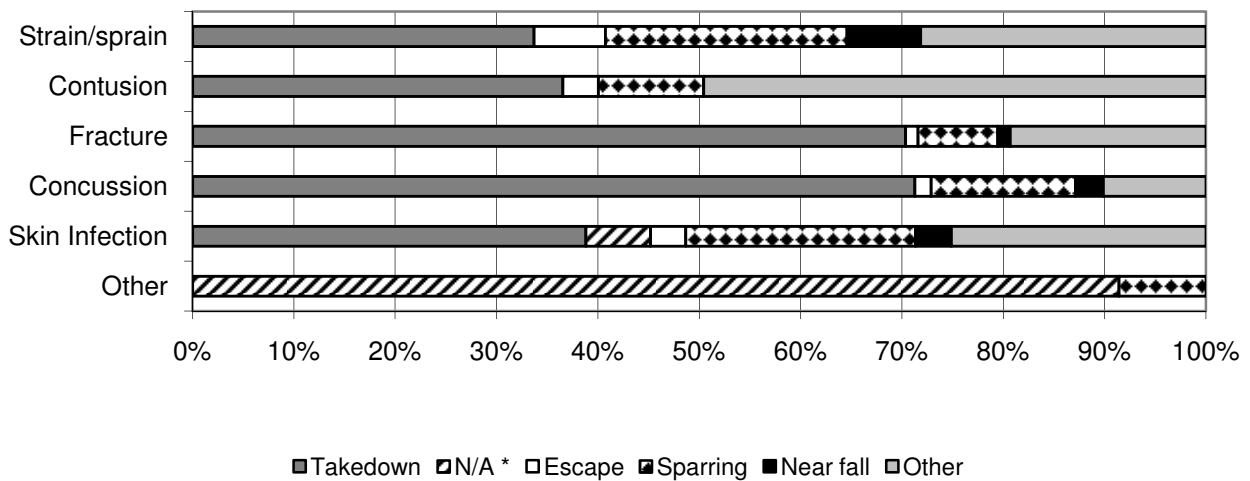
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 9.9 Activities Leading to Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Takedown	16,056	48.7%	16,556	33.5%	32,612	39.5%
Sparring	6,124	18.6%	8,684	17.5%	14,808	18.0%
N/A (e.g., skin infection, overuse, etc.)	1,816	5.5%	9,012	18.2%	10,828	13.1%
Fall	378	1.1%	3,837	7.8%	4,215	5.1%
Riding	2,647	8.0%	1,230	2.5%	3,877	4.7%
Reversal	1,604	4.9%	1,889	3.8%	3,493	4.2%
Near fall	2,674	8.1%	593	1.2%	3,267	4.0%
Escape	1,504	4.6%	1,701	3.4%	3,205	3.9%
Conditioning	0	0.0%	2,896	5.9%	2,896	3.5%
Other	168	0.5%	3,096	6.3%	3,264	4.0%
<b>Total</b>	<b>37,768</b>	<b>100%</b>	<b>62,803</b>	<b>100%</b>	<b>100,571</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 9.4 Activities Resulting in Wrestling Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



\*N/A category consists of skin infections, overuse injuries, heat illness, etc.

## **X. Baseball Injury Epidemiology**

**Table 10.1 Baseball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>161</b>	<b>182,376</b>	<b>0.88</b>	<b>49,747</b>
Competition	82	62,971	1.30	24,807
Practice	79	119,405	0.66	24,940

**Table 10.2 Demographic Characteristics of Injured Baseball Athletes, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

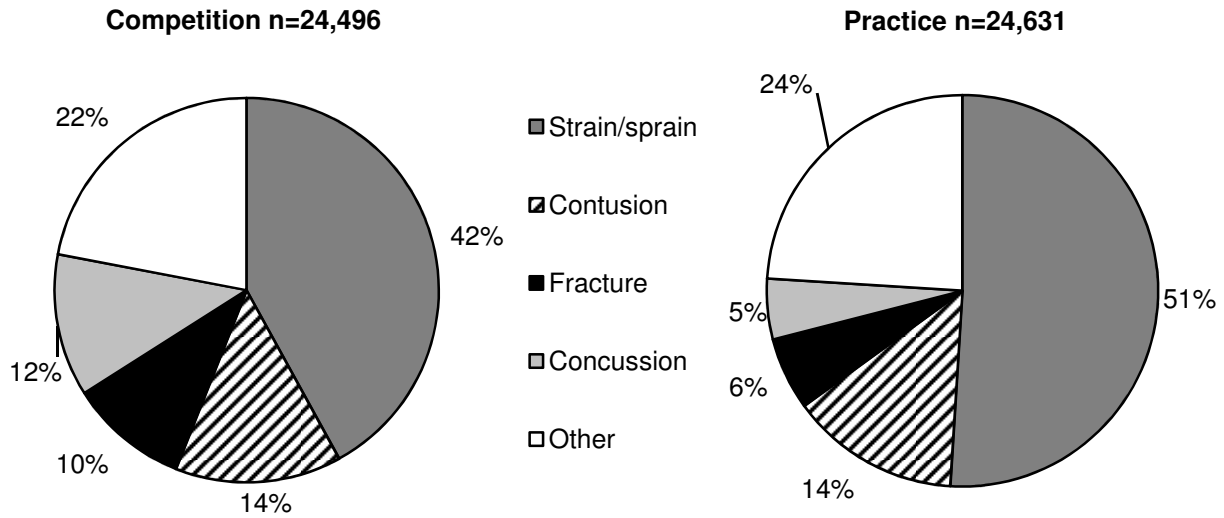
<b>Year in School</b>	<b>n=48,643</b>
Freshman	22.9%
Sophomore	22.4%
Junior	28.7%
Senior	26.1%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	19
Mean (St. Dev.)	16.2 (1.2)
<b>BMI</b>	
Minimum	18.0
Maximum	34.4
Mean (St. Dev.)	23.6 (2.9)

\*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 10.1 Diagnosis of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 10.3 Body Site of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Shoulder	3,445	13.9%	5,537	22.2%	8,982	18.1%
Head/face	2,927	11.8%	3,846	15.4%	6,773	13.6%
Arm/elbow	2,471	10.0%	3,098	12.4%	5,569	11.2%
Hand/wrist	3,456	13.9%	1,840	7.4%	5,296	10.6%
Hip/thigh/upper leg	2,648	10.7%	2,471	9.9%	5,119	10.3%
Knee	2,639	10.6%	2,310	9.3%	4,949	9.9%
Ankle	2,919	11.8%	1,706	6.8%	4,625	9.3%
Trunk	1,701	6.9%	1,295	5.2%	2,996	6.0%
Neck	1,113	4.5%	1,134	4.5%	2,247	4.5%
Other	683	2.8%	0	0.0%	683	1.4%
Foot	0	0.0%	577	2.3%	577	1.2%
Lower leg	804	3.2%	1,127	4.5%	1,931	3.9%
<b>Total</b>	<b>24,806</b>	<b>100%</b>	<b>24,941</b>	<b>100%</b>	<b>49,747</b>	<b>100%</b>

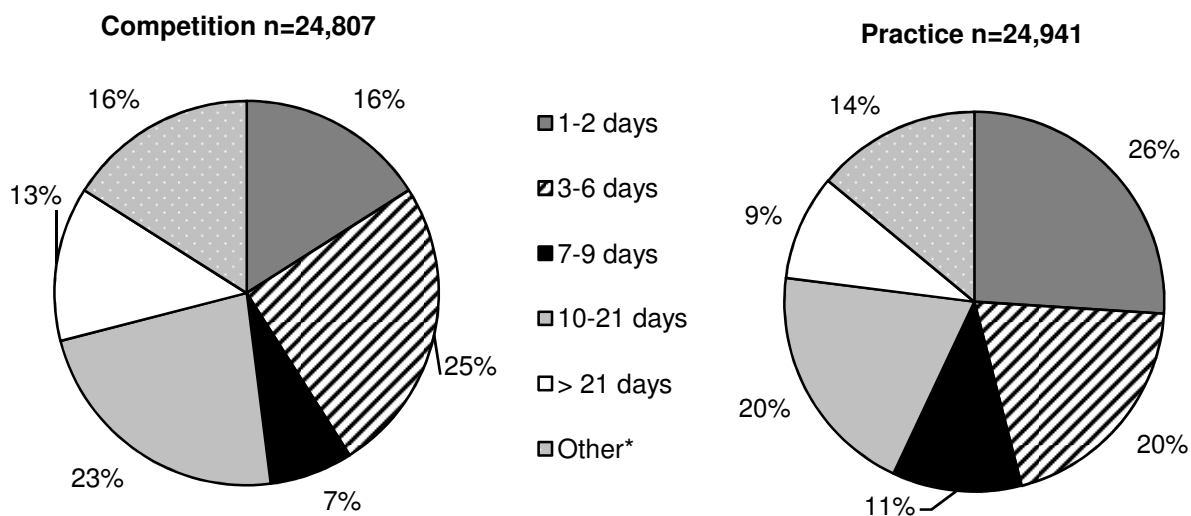
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 10.4 Ten Most Common Baseball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=24,495		Practice n=24,629		Total n=49,124	
	n	%	n	%	n	%
Shoulder other	2,697	11.0%	1,878	7.6%	4,575	9.3%
Head/face concussion	2,843	11.6%	1,219	4.9%	4,062	8.3%
Ankle strain/sprain	2,813	11.5%	1,220	5.0%	4,033	8.2%
Hip/thigh/upper leg strain/sprain	2,140	8.7%	1,852	7.5%	3,992	8.1%
Shoulder strain/sprain	641	2.6%	3,350	13.6%	3,991	8.1%
Trunk strain/sprain	1,701	6.9%	1,295	5.3%	2,996	6.1%
Knee strain/sprain	1,133	4.6%	1,817	7.4%	2,950	6.0%
Hand/wrist fracture	1,604	6.5%	711	2.9%	2,315	4.7%
Arm/elbow contusion	1,562	6.4%	492	2.0%	2,054	4.2%
Hand/wrist fracture	894	3.6%	641	2.6%	1,535	3.1%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 10.2 Time Loss of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



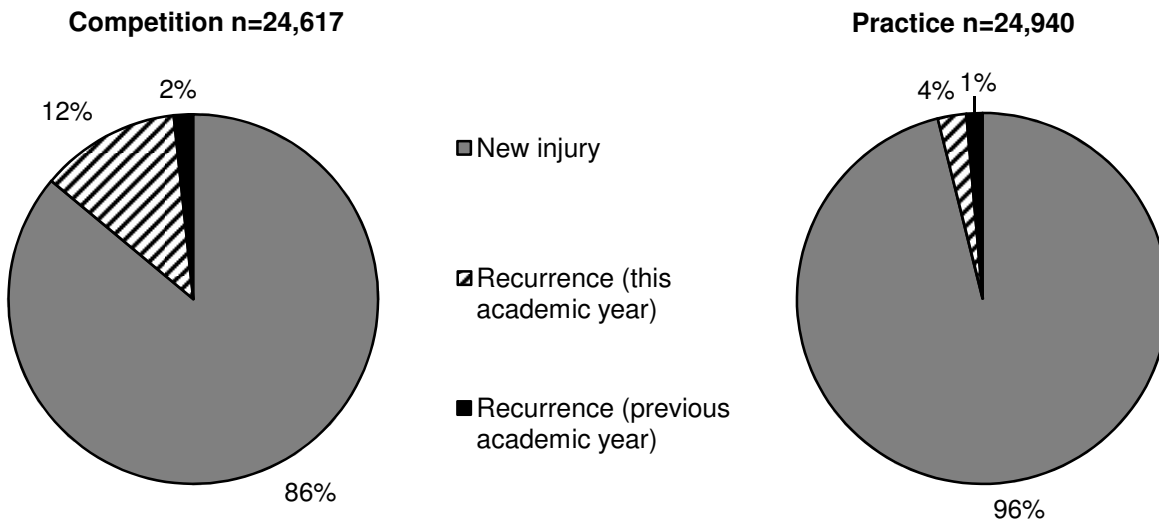
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 10.5 Baseball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	1,789	7.3%	4,002	16.3%	5,791	11.8%
Did not require surgery	22,730	92.7%	20,429	83.6%	43,159	88.2%
<b>Total</b>	<b>24,519</b>	<b>100%</b>	<b>24,431</b>	<b>100%</b>	<b>48,950</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 10.3 History of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 10.6 Time during Season of Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	11,701	23.5%
Regular season	37,044	74.5%
Post season	1,001	2.0%
<b>Total</b>	<b>49,746</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 10.7 Competition-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	802	3.4%
First inning	1,387	5.9%
Second inning	2,559	10.9%
Third inning	3,843	16.3%
Fourth inning	5,671	24.0%
Fifth inning	6,001	25.5%
Sixth inning	1,306	5.5%
Seventh inning	1,520	6.4%
Extra innings	492	2.1%
<b>Total</b>	<b>23,581</b>	<b>100%</b>
<b>Field Location</b>		
Home plate	8,078	33.1%
First base	3,921	16.1%
Second base	3,620	14.8%
Pitcher's mound	3,500	14.3%
Infield	1,787	7.3%
Third base	1,428	5.9%
Outfield	1,256	5.1%
Other	802	3.3%
<b>Total</b>	<b>24,391</b>	<b>100%</b>

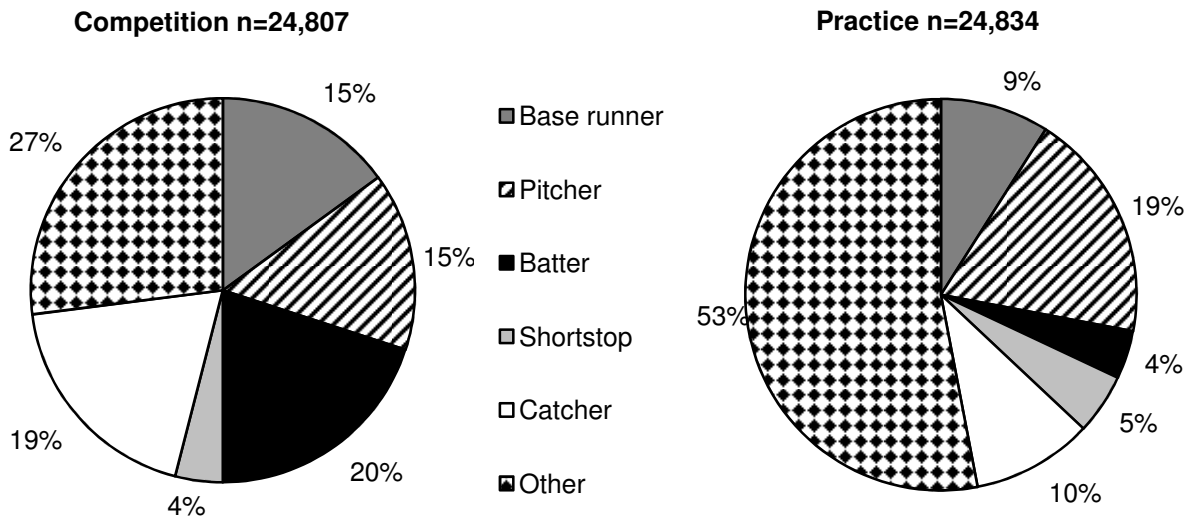
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 10.8 Practice-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	3,885	16.3%
Second 1/2 hour	4,491	18.9%
1-2 hours into practice	14,278	59.9%
>2 hours into practice	1,166	4.9%
<b>Total</b>	<b>23,821</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 10.4 Player Position of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

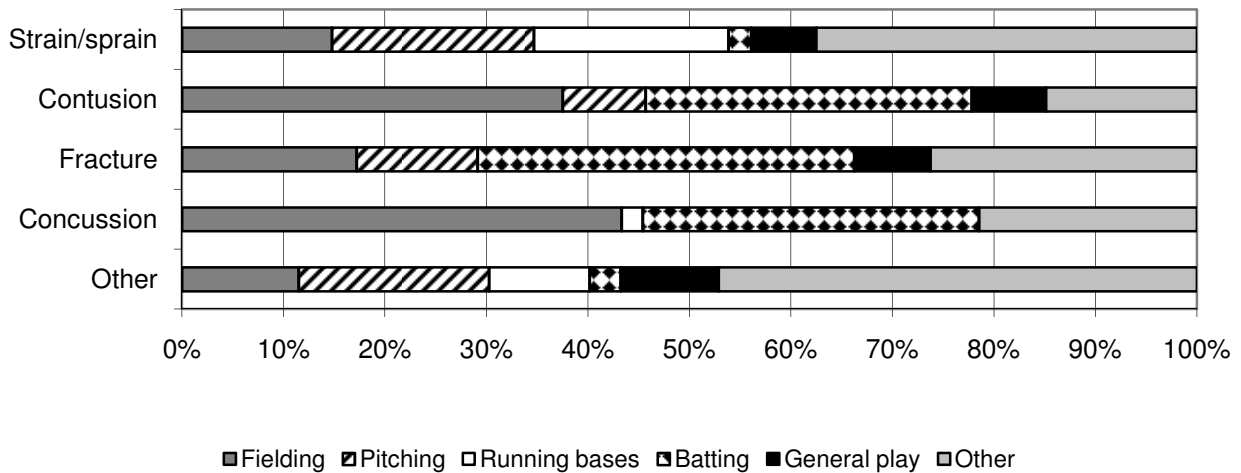


**Table 10.9 Activities Leading to Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Pitching	3,500	14.2%	4,196	16.8%	7,696	15.5%
Fielding a batted ball	2,760	11.2%	4,286	17.2%	7,046	14.2%
Running bases	4,608	18.7%	1,291	5.2%	5,899	11.9%
Batting	4,521	18.3%	1,373	5.5%	5,894	11.9%
Sliding	2,748	11.1%	2,000	8.0%	4,748	9.6%
Throwing (not pitching)	802	3.2%	3,164	12.7%	3,966	8.0%
Catching	2,144	8.7%	1,419	5.7%	3,563	7.2%
Other	492	2.0%	2,911	11.7%	3,403	6.9%
General play	1,127	4.6%	2,225	8.9%	3,352	6.8%
Fielding a thrown ball	1,998	8.1%	619	2.5%	2,617	5.3%
Conditioning	0	0.0%	1,457	5.8%	1,457	2.9%
<b>Total</b>	<b>24,700</b>	<b>100%</b>	<b>24,941</b>	<b>100%</b>	<b>49,641</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 10.5 Activity Resulting in Baseball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



## **XI. Softball Injury Epidemiology**

**Table 11.1 Softball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>147</b>	<b>128,172</b>	<b>1.15</b>	<b>58,124</b>
Competition	85	43,478	1.96	35,477
Practice	62	84,694	0.73	22,647

**Table 11.2 Demographic Characteristics of Injured Softball Athletes, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

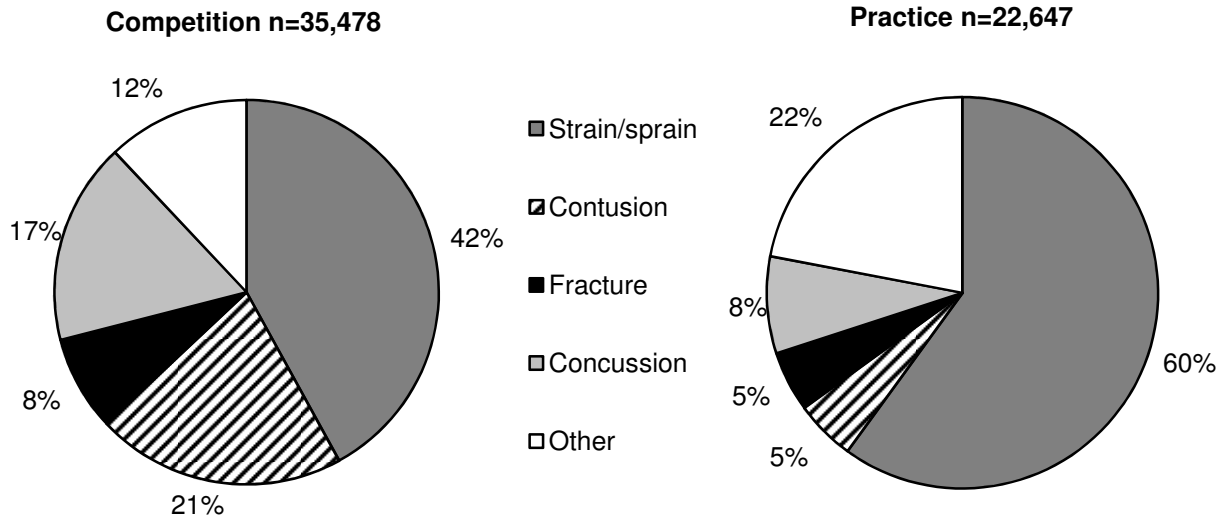
<b>Year in School</b>	<b>n=58,124</b>
Freshman	27.2%
Sophomore	24.3%
Junior	26.3%
Senior	22.2%
<b>Total†</b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.9 (1.1)
<b>BMI</b>	
Minimum	17.2
Maximum	40.4
Mean (St. Dev.)	22.8 (4.0)

\*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 11.1 Diagnosis of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 11.3 Body Site of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Body Site	Competition		Practice		Overall	
	n	%	n	%	n	%
Head/face	7,676	21.6%	2,322	10.3%	9,998	17.2%
Ankle	5,949	16.8%	3,539	15.6%	9,488	16.3%
Knee	6,096	17.2%	2,821	12.5%	8,917	15.3%
Shoulder	2,949	8.3%	4,684	20.7%	7,633	13.1%
Hand/wrist	3,793	10.7%	2,203	9.7%	5,996	10.3%
Arm/elbow	2,672	7.5%	1,408	6.2%	4,080	7.0%
Lower leg	3,198	9.0%	258	1.1%	3,456	5.9%
Hip/thigh/upper leg	953	2.7%	1,893	8.4%	2,846	4.9%
Trunk	615	1.7%	1,390	6.1%	2,005	3.4%
Foot	801	2.3%	658	2.9%	1,459	2.5%
Neck	338	1.0%	0	0.0%	338	0.6%
Other	437	1.2%	1,471	6.5%	1,908	3.3%
<b>Total</b>	<b>35,477</b>	<b>100%</b>	<b>22,647</b>	<b>100%</b>	<b>58,124</b>	<b>100%</b>

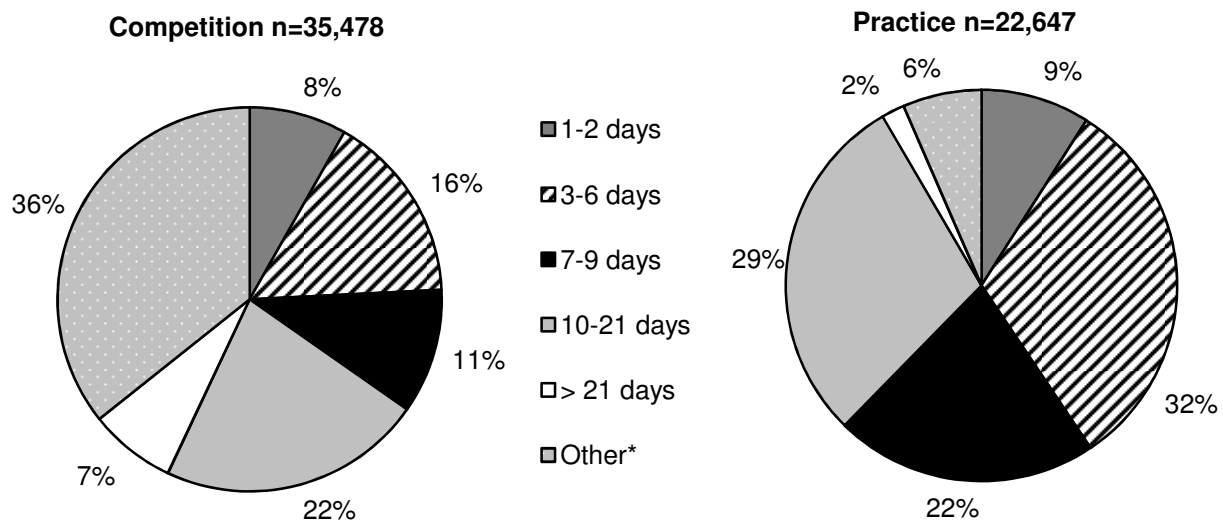
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 11.4 Ten Most Common Softball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Diagnosis	Competition n=35,482		Practice n=22,651		Total n=58,133	
	n	%	n	%	n	%
Ankle strain/sprain	5,692	16.0%	3,362	14.8%	9,054	15.6%
Head/face concussion	5,841	15.5%	1,744	7.7%	7,585	13.0%
Knee strain/sprain	5,659	15.9%	1,210	5.3%	6,869	11.8%
Shoulder other	2,513	7.1%	1,419	6.3%	3,932	6.8%
Shoulder strain/sprain	258	0.7%	3,265	14.4%	3,523	6.1%
Lower leg contusion	3,198	9.0%	0	0.0%	3,198	5.5%
Hand/wrist strain/sprain	1,353	3.8%	1,435	6.3%	2,788	4.8%
Hip/thigh/upper leg strain/sprain	953	2.7%	1,715	7.6%	2,668	4.6%
Hand/wrist fracture	1,554	4.4%	431	1.9%	1,985	3.4%
Other other	437	1.2%	1,471	6.5%	1,908	3.3%

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 11.2 Time Loss of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



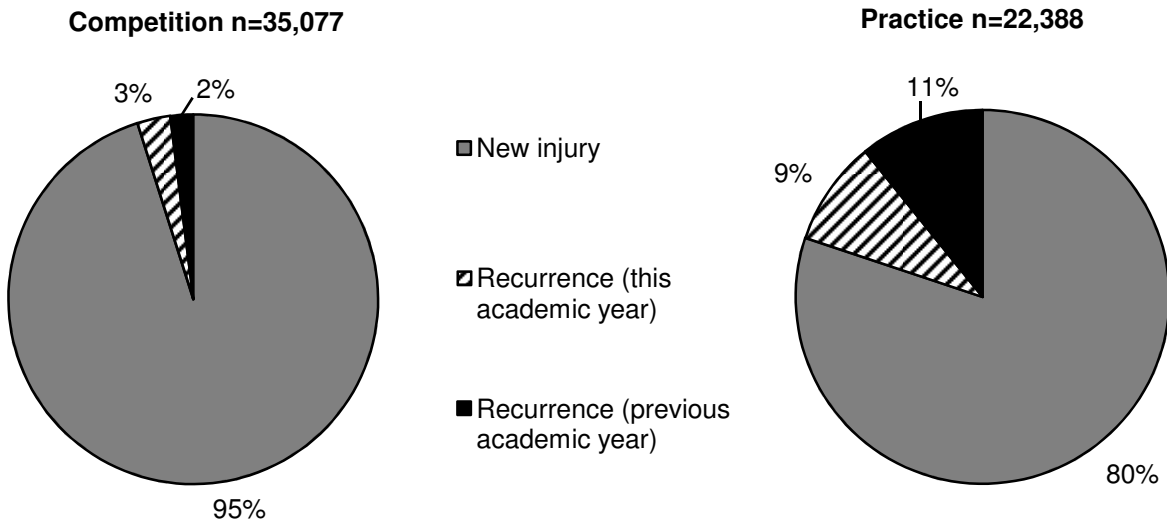
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 11.5 Softball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	2,607	7.6%	435	2.0%	3,042	5.4%
Did not require surgery	31,918	92.4%	21,516	98.0%	53,434	94.6%
<b>Total</b>	<b>34,525</b>	<b>100%</b>	<b>21,951</b>	<b>100%</b>	<b>56,476</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 11.3 History of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**



**Table 11.6 Time during Season of Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	11,897	20.5%
Regular season	43,800	75.4%
Post season	2,427	4.2%
<b>Total</b>	<b>58,124</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 11.7 Competition-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	3,239	9.8%
First inning	2,645	8.0%
Second inning	3,082	9.4%
Third inning	6,907	21.0%
Fourth inning	8,529	25.9%
Fifth inning	4,356	13.2%
Sixth inning	2,182	6.6%
Seventh inning	1,548	4.7%
Extra innings	401	1.2%
<b>Total</b>	<b>32,889</b>	<b>100%</b>
<b>Field Location</b>		
Home plate	9,056	26.4%
Outfield	5,657	16.5%
Third base	5,051	14.7%
Second base	4,566	13.3%
First base	4,278	12.5%
Infield	2,784	8.1%
Pitcher's mound	1,124	3.3%
Foul territory	979	2.9%
Other	780	2.3%
<b>Total</b>	<b>34,274</b>	<b>100%</b>

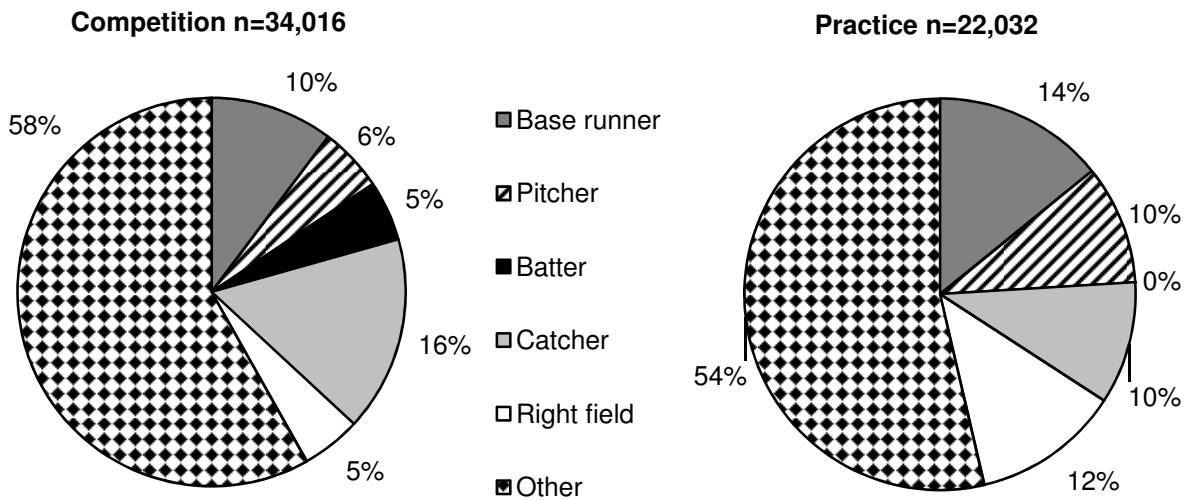
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 11.8 Practice-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	2,360	12.1%
Second 1/2 hour	4,583	23.4%
1-2 hours into practice	12,264	62.7%
>2 hours into practice	355	1.8%
<b>Total</b>	<b>19,563</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 11.4 Player Position of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

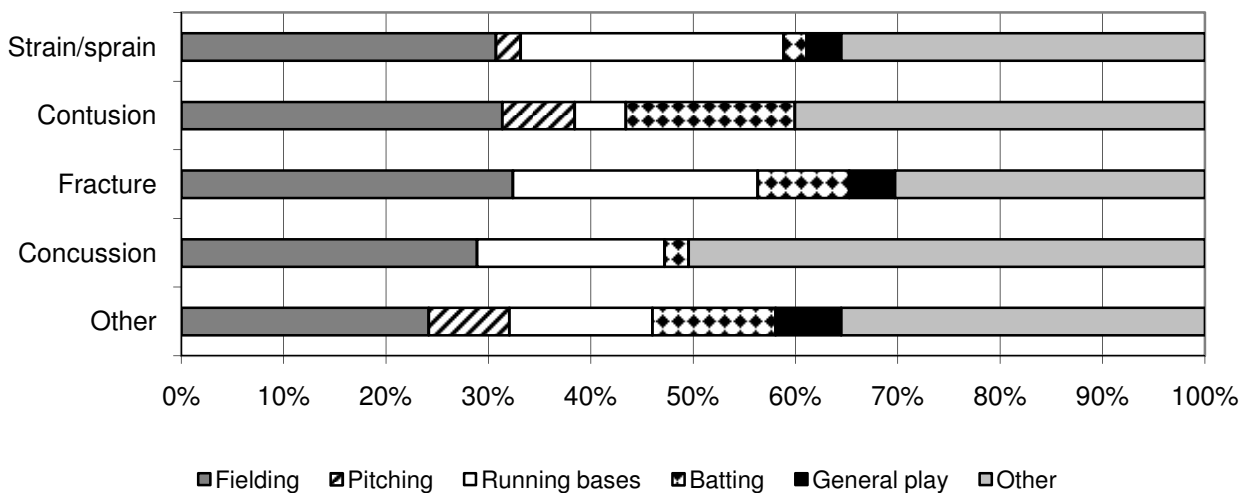


**Table 11.9 Activities Leading to Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Running bases	6,944	20.3%	4,154	18.3%	11,098	19.5%
Fielding a batted ball	6,441	18.8%	3,432	15.2%	9,873	17.3%
Catching	5,899	17.2%	2,472	10.9%	8,371	14.7%
Fielding a thrown ball	5,119	14.9%	1,872	8.3%	6,991	12.3%
Throwing (not pitching)	1,037	3.0%	4,253	18.8%	5,290	9.3%
Sliding	1,726	5.0%	2,163	9.6%	3,889	6.8%
Batting	3,097	9.0%	615	2.7%	3,712	6.5%
Pitching	1,124	3.3%	886	3.9%	2,010	3.5%
General Play	437	1.3%	1,263	5.6%	1,700	3.0%
Conditioning	0	0.0%	1,453	6.4%	1,453	2.6%
Other	2,449	7.1%	85	0.4%	2,534	4.5%
<b>Total</b>	<b>34,273</b>	<b>100%</b>	<b>22,648</b>	<b>100%</b>	<b>56,921</b>	<b>100%</b>

\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. 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 11.5 Activity Resulting in Softball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2012-13 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, 2012-13 School Year**

	Boys' soccer	Girls' soccer*	RR (95% CI) <sup>†</sup>
<b>Total</b>	1.52	<b>2.29</b>	<b>1.51 (1.29, 1.78)</b>
Competition	3.28	<b>5.54</b>	<b>1.69 (1.39, 2.06)</b>
Practice	0.78	<b>0.92</b>	1.18 (0.89, 1.57)

\*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.

<sup>†</sup>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, 2012-13 School Year**

Body Site	Boys' soccer	Girls' soccer	IPR (95% CI)
Hip/thigh/upper leg	<b>16.7%</b>	16.0%	1.04 (0.64, 1.70)
Head/face	30.3%	<b>33.4%</b>	1.10 (0.80, 1.53)
Ankle	12.4%	<b>14.1%</b>	1.14 (0.66, 1.95)
Knee	14.5%	<b>17.5%</b>	1.21 (0.75, 1.95)
Hand/wrist	<b>2.6%</b>	2.5%	1.05 (0.28, 3.88)
Foot	<b>7.2%</b>	6.9%	1.04 (0.45, 2.39)
Lower leg	<b>6.0%</b>	5.3%	1.14 (0.53, 2.46)
Trunk	<b>3.8%</b>	2.5%	1.50 (0.54, 4.19)
Arm/elbow	<b>1.9%</b>	1.2%	1.65 (0.35, 7.70)
Shoulder	<b>1.0%</b>	0.3%	3.50 (0.63, 19.41)
Neck	<b>1.4%</b>	0.2%	<b>9.03 (1.14, 71.71)</b>
Other	<b>2.2%</b>	0.1%	<b>15.68 (1.78, 138.07)</b>
<b>Total</b>	<b>100%</b>	<b>100%</b>	--



**Table 12.3 Comparison of Diagnoses of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Diagnosis</b>			
Strain/sprain	41.0%	<b>44.2%</b>	1.08 (0.84, 1.38)
Contusion	11.1%	<b>12.2%</b>	1.10 (0.62, 1.95)
Fracture	<b>5.9%</b>	3.8%	1.55 (0.66, 3.67)
Concussion	25.8%	<b>32.6%</b>	1.26 (0.89, 1.79)
Other	<b>16.2%</b>	7.2%	<b>2.24 (1.25, 4.02)</b>
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.4 Most Common Boys' and Girls' Soccer Injury Diagnoses\*, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Diagnosis</b>			
Ankle strain/sprain	10.9%	<b>13.8%</b>	1.27 (0.73, 2.19)
Head/face concussion	25.8%	<b>32.6%</b>	1.26 (0.89, 1.79)
Hip/thigh/upper leg strain/sprain	<b>12.8%</b>	12.2%	1.05 (0.61, 1.82)
Knee strain/sprain	5.6%	<b>10.7%</b>	1.91 (0.92, 3.93)
Knee other	<b>5.9%</b>	3.2%	1.85 (0.75, 4.58)

\*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, 2012-13 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Time Loss</b>			
1-2 days	<b>14.5%</b>	13.8%	1.05 (0.61, 1.82)
3-6 days	<b>23.8%</b>	19.7%	1.21 (0.79, 1.85)
7-9 days	<b>20.7%</b>	18.3%	1.13 (0.73, 1.77)
10-21 days	17.4%	<b>20.0%</b>	1.15 (0.76, 1.74)
22 days or more	<b>6.5%</b>	5.2%	1.25 (0.57, 2.76)
Other	17.1%	<b>23.1%</b>	1.35 (0.87, 2.10)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.6 Comparison of Mechanisms of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Soccer Mechanism</b>			
Contact with another player	<b>38.4%</b>	32.7%	1.17 (0.88, 1.57)
Stepped on/fell on/kicked	9.3%	<b>9.6%</b>	1.03 (0.54, 1.98)
Rotation around a planted foot/inversion	7.3%	<b>12.1%</b>	1.67 (0.84, 3.30)
Overuse, heat illness, conditioning, etc.	<b>20.1%</b>	14.2%	1.42 (0.88, 2.27)
Contact with ball	8.4%	<b>19.0%</b>	<b>2.26 (1.27, 4.03)</b>
Uneven playing surface	<b>2.8%</b>	1.2%	2.31 (0.62, 8.57)
Slide tackle	<b>5.2%</b>	2.0%	2.56 (0.99, 6.62)
Contact with goal	<b>0.1%</b>	--	--
Other	8.4%	<b>9.2%</b>	1.09 (0.54, 2.20)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.7 Comparison of Activities of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Soccer Activity</b>			
General play	25.8%	<b>27.9%</b>	1.08 (0.75, 1.55)
Defending	11.7%	<b>20.6%</b>	<b>1.76 (1.02, 3.03)</b>
Chasing loose ball	<b>12.9%</b>	<b>9.6%</b>	1.34 (0.69, 2.58)
Ball handling/dribbling	6.9%	<b>7.0%</b>	1.02 (0.50, 2.11)
Goaltending	<b>9.7%</b>	5.1%	1.92 (0.90, 4.08)
Shooting (foot)	2.7%	<b>2.8%</b>	1.03 (0.36, 2.94)
Heading ball	<b>10.9%</b>	7.1%	1.53 (0.78, 3.00)
Passing (foot)	3.3%	<b>4.0%</b>	1.21 (0.47, 3.11)
Receiving pass	7.5%	<b>9.5%</b>	1.27 (0.60, 2.65)
Conditioning	<b>4.2%</b>	3.2%	1.29 (0.50, 3.34)
Other	<b>4.4%</b>	3.1%	1.41 (0.61, 3.26)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

## 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, 2012-13 School Year**

	Boys' basketball	Girls' basketball	RR (95% CI)*
<b>Total</b>	1.47	<b>1.83</b>	<b>1.25 (1.08, 1.45)</b>
Competition	2.44	<b>3.13</b>	<b>1.28 (1.04, 1.58)</b>
Practice	1.04	<b>1.24</b>	1.20 (0.96, 1.49)

**Table 12.9 Comparison of Body Sites of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

Body Site	Boys' basketball	Girls' basketball	IPR (95% CI)
Ankle	<b>30.1%</b>	27.3%	1.10 (0.84, 1.45)
Knee	12.4%	<b>16.3%</b>	1.32 (0.86, 2.01)
Head/face	23.4%	<b>25.5%</b>	1.09 (0.81, 1.47)
Hip/thigh/upper leg	6.3%	<b>7.1%</b>	1.13 (0.60, 2.16)
Hand/wrist	<b>8.4%</b>	5.2%	1.62 (0.84, 3.15)
Shoulder	2.8%	<b>3.5%</b>	1.25 (0.47, 3.37)
Trunk	5.6%	<b>6.1%</b>	1.11 (0.54, 2.28)
Lower leg	<b>3.0%</b>	2.1%	1.42 (0.54, 3.73)
Arm/elbow	1.7%	<b>2.6%</b>	1.52 (0.50, 4.62)
Foot	3.3%	<b>3.6%</b>	1.09 (0.45, 2.67)
Neck	<b>1.0%</b>	0.3%	3.25 (0.32, 33.51)
Other	<b>2.1%</b>	0.4%	5.15 (0.60, 44.32)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.10 Comparison of Diagnoses of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	<b>Boys' basketball</b>	<b>Girls' basketball</b>	<b>IPR (95% CI)</b>
<b>Diagnosis</b>			
Strain/sprain	<b>49.3%</b>	48.4%	1.02 (0.85, 1.21)
Contusion	8.4%	<b>8.6%</b>	1.05 (0.58, 1.80)
Fracture	<b>10.5%</b>	6.2%	1.68 (0.93, 3.05)
Concussion	13.8%	<b>21.2%</b>	<b>1.54 (1.06, 2.24)</b>
Other	<b>18.0%</b>	15.5%	1.17 (0.79, 1.72)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.11 Most Common Boys' and Girls' Basketball Injury Diagnoses\*, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	<b>Boys' basketball</b>	<b>Girls' basketball</b>	<b>IPR (95% CI)</b>
<b>Diagnosis</b>			
Ankle strain/sprain	<b>27.7%</b>	26.3%	1.05 (0.80, 1.39)
Head/face concussion	13.8%	<b>21.1%</b>	<b>1.53 (1.05, 2.22)</b>
Knee strain/sprain	5.9%	<b>7.0%</b>	1.19 (0.63, 2.25)
Knee other	4.5%	<b>5.4%</b>	1.19 (0.55, 2.56)

\*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, 2012-13 School Year**

	<b>Boys' basketball</b>	<b>Girls' basketball</b>	<b>IPR (95% CI)</b>
<b>Time Loss</b>			
1-2 days	<b>17.3%</b>	15.2%	1.14 (0.76, 1.69)
3-6 days	<b>22.9%</b>	18.5%	1.23 (0.88, 1.73)
7-9 days	16.2%	<b>17.2%</b>	1.06 (0.73, 1.56)
10-21 days	17.5%	<b>26.0%</b>	<b>1.48 (1.06, 2.07)</b>
22 days or more	<b>9.7%</b>	8.6%	1.13 (0.66, 1.95)
Other	<b>16.4%</b>	14.5%	1.14 (0.76, 1.69)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.13 Comparison of Mechanisms of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	Boys' basketball	Girls' basketball	IPR (95% CI)
<b>Basketball Mechanism</b>			
Collision with another player	<b>30.8%</b>	28.0%	1.10 (0.84, 1.43)
Jumping/landing	<b>26.1%</b>	18.6%	<b>1.40 (1.00, 1.95)</b>
Overuse, heat illness, conditioning, etc.	8.4%	<b>10.8%</b>	1.28 (0.75, 2.20)
Rotation around a planted foot/inversion	12.2%	<b>15.1%</b>	1.24 (0.81, 1.91)
Stepped on/fell on/kicked	<b>8.2%</b>	7.3%	1.12 (0.60, 2.10)
Contact with ball	4.6%	<b>6.6%</b>	1.44 (0.70, 2.97)
Other	9.7%	<b>13.6%</b>	1.39 (0.86, 2.24)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.14 Comparison of Activities of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	Boys' basketball	Girls' basketball	IPR (95% CI)
<b>Basketball Activity</b>			
Rebounding	<b>24.8%</b>	19.0%	1.30 (0.93, 1.83)
General play	17.1%	<b>26.5%</b>	<b>1.55 (1.11, 2.17)</b>
Defending	<b>19.0%</b>	17.1%	1.11 (0.77, 1.61)
Chasing loose ball	<b>11.7%</b>	10.7%	1.09 (0.67, 1.77)
Shooting	<b>12.3%</b>	6.5%	<b>1.89 (1.06, 3.37)</b>
Conditioning	<b>2.6%</b>	1.7%	1.57 (0.49, 4.98)
Ball handling/dribbling	4.8%	<b>8.7%</b>	1.80 (0.90, 3.63)
Receiving pass	4.0%	<b>6.2%</b>	1.56 (0.74, 3.30)
Other	<b>3.7%</b>	3.5%	1.04 (0.45, 2.42)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

### 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, 2012-13 School Year**

	<b>Baseball</b>	<b>Softball</b>	<b>RR (95% CI)</b>
<b>Total</b>	0.88	<b>1.15</b>	<b>1.30 (1.04, 1.63)</b>
Competition	1.30	<b>1.96</b>	<b>1.50 (1.11, 2.04)</b>
Practice	0.66	<b>0.73</b>	1.11 (0.79, 1.54)

**Table 12.16 Comparison of Body Sites of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

<b>Body Site</b>	<b>Baseball</b>	<b>Softball</b>	<b>IPR (95% CI)</b>
Ankle	9.3%	<b>16.3%</b>	1.76 (0.86, 3.57)
Knee	9.9%	<b>15.3%</b>	1.54 (0.75, 3.17)
Head/face	13.6%	<b>17.2%</b>	1.26 (0.69, 2.32)
Hip/thigh/upper leg	<b>10.3%</b>	4.9%	2.10 (0.91, 4.88)
Hand/wrist	<b>10.6%</b>	10.3%	1.03 (0.47, 2.27)
Shoulder	<b>18.1%</b>	13.1%	1.38 (0.72, 2.61)
Trunk	<b>6.0%</b>	3.4%	1.75 (0.46, 6.61)
Lower leg	3.9%	<b>5.9%</b>	1.53 (0.43, 5.46)
Arm/elbow	<b>11.2%</b>	7.0%	1.60 (0.64, 4.00)
Foot	1.2%	<b>2.5%</b>	2.17 (0.31, 15.29)
Neck	<b>4.5%</b>	0.6%	<b>7.77 (1.35, 44.63)</b>
Other	1.4%	<b>3.3%</b>	2.39 (0.36, 15.91)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.17 Comparison of Diagnoses of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	<b>Baseball</b>	<b>Softball</b>	<b>IPR (95% CI)</b>
<b>Diagnosis</b>			
Strain/sprain	46.6%	<b>49.0%</b>	1.05 (0.80, 1.39)
Contusion	13.9%	<b>15.0%</b>	1.08 (0.55, 2.11)
Fracture	<b>8.4%</b>	6.8%	1.23 (0.47, 3.20)
Concussion	8.3%	<b>13.0%</b>	1.58 (0.75, 3.33)
Other	<b>22.9%</b>	16.1%	1.42 (0.83, 2.44)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.18 Most Common Baseball and Softball Injury Diagnoses\*, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	<b>Baseball</b>	<b>Softball</b>	<b>IPR (95% CI)</b>
<b>Diagnosis</b>			
Ankle strain/sprain	8.1%	<b>15.6%</b>	1.92 (0.90, 4.11)
Hand/wrist fracture	<b>4.7%</b>	3.4%	1.36 (0.35, 5.28)
Head/face concussion	8.2%	<b>13.0%</b>	1.60 (0.76, 3.37)
Hip/thigh/upper leg strain/sprain	<b>8.0%</b>	4.6%	1.75 (0.70, 4.39)
Knee strain/sprain	5.9%	<b>11.8%</b>	1.99 (0.77, 5.14)

\*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, 2012-13 School Year**

	<b>Baseball</b>	<b>Softball</b>	<b>IPR (95% CI)</b>
<b>Time Loss</b>			
1-2 days	<b>21.0%</b>	8.5%	<b>2.46 (1.27, 4.79)</b>
3-6 days	<b>22.4%</b>	22.0%	1.02 (0.61, 1.69)
7-9 days	9.3%	<b>14.9%</b>	1.59 (0.78, 3.27)
10-21 days	21.1%	<b>25.0%</b>	1.19 (0.74, 1.92)
22 days or more	<b>11.1%</b>	5.2%	2.14 (0.72, 6.35)
Other	15.1%	<b>24.3%</b>	1.61 (0.93, 2.79)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.20 Comparison of Mechanisms of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	Baseball	Softball	IPR (95% CI)
<b>Baseball/Softball Mechanism</b>			
Overuse, heat illness, conditioning, etc.	14.1%	11.4%	1.24 (0.64, 2.39)
Contact with another player	8.1%	15.0%	1.86 (0.86, 4.02)
Contact with bases	9.9%	11.4%	1.15 (0.53, 2.52)
Throwing - not pitching	8.0%	9.3%	1.16 (0.49, 2.77)
Throwing - pitching	12.4%	3.6%	<b>3.47 (1.10, 10.91)</b>
Contact with thrown ball (non-pitch)	3.8%	6.5%	1.72 (0.60, 4.92)
Rotation around a planted foot/inversion	6.7%	8.2%	1.22 (0.47, 3.20)
Hit by batted ball	6.9%	14.5%	2.11 (0.94, 4.72)
Hit by pitch	11.9%	4.5%	2.66 (0.94, 7.53)
Other	18.3%	18.5%	1.01 (0.57, 1.78)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---

**Table 12.21 Comparison of Activities of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2012-13 School Year**

	Baseball	Softball	IPR (95% CI)
<b>Baseball/Softball Activity</b>			
Fielding a batted ball	14.2%	17.3%	1.22 (0.66, 2.27)
Fielding a thrown ball	5.3%	12.3%	2.33 (0.86, 6.29)
Running bases	11.9%	19.5%	1.64 (0.89, 3.01)
Pitching	15.5%	3.5%	<b>4.39 (1.87, 10.29)</b>
Batting	11.9%	6.5%	1.82 (0.73, 4.57)
Sliding	9.6%	6.8%	1.40 (0.52, 3.77)
Throwing (not pitching)	8.0%	9.3%	1.16 (0.49, 2.77)
General play	6.8%	3.0%	2.26 (0.78, 6.54)
Conditioning	2.9%	2.6%	1.15 (0.29, 4.60)
Catching	7.2%	14.7%	2.05 (0.91, 4.61)
Other	6.9%	4.5%	1.54 (0.50, 4.79)
<b>Total</b>	<b>100%</b>	<b>100%</b>	---



### **XIII. Trends over Time**

**Table 13.1 Injury Rates by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2012/13 School Years**

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	p-value for trend*
<b>Overall total</b>	<b>2.51</b>	<b>2.59</b>	<b>2.31</b>	<b>2.01</b>	<b>2.10</b>	<b>1.97</b>	<b>2.17</b>	<b>2.16</b>	<b>0.049</b>
<b>Competition</b>	4.63	4.88	4.45	4.05	4.19	4.10	4.26	4.31	0.083
<b>Practice</b>	<b>1.69</b>	<b>1.75</b>	<b>1.52</b>	<b>1.26</b>	<b>1.32</b>	<b>1.16</b>	<b>1.40</b>	<b>1.34</b>	<b>0.038</b>
Boys' football total	4.36	4.45	4.18	3.50	3.81	3.50	3.78	3.87	0.063
Competition	12.09	13.50	12.80	11.26	12.95	12.30	12.41	12.53	0.820
Practice	2.54	2.68	2.47	1.92	2.06	1.74	2.16	2.08	0.051
Boys' soccer total	<b>2.43</b>	<b>2.27</b>	<b>1.75</b>	<b>1.62</b>	<b>1.75</b>	<b>1.56</b>	<b>1.64</b>	<b>1.52</b>	<b>0.007</b>
Competition	<b>4.22</b>	<b>4.31</b>	<b>3.63</b>	<b>3.43</b>	<b>3.39</b>	<b>3.08</b>	<b>3.47</b>	<b>3.28</b>	<b>0.011</b>
Practice	<b>1.58</b>	<b>1.45</b>	<b>0.96</b>	<b>0.87</b>	<b>1.04</b>	<b>0.90</b>	<b>0.90</b>	<b>0.78</b>	<b>0.010</b>
Girls' soccer total	2.36	2.51	2.35	2.07	2.00	1.93	2.42	2.29	0.453
Competition	5.21	5.43	5.15	4.59	4.67	4.13	5.68	5.54	0.941
Practice	1.10	1.31	1.16	1.00	0.85	0.93	1.09	0.92	0.099
Girls' volleyball total	<b>1.64</b>	<b>1.37</b>	<b>1.22</b>	<b>0.89</b>	<b>0.99</b>	<b>0.96</b>	<b>1.00</b>	<b>0.89</b>	<b>0.008</b>
Competition	1.92	1.40	1.43	0.90	1.00	1.18	1.27	1.08	0.079
Practice	<b>1.48</b>	<b>1.36</b>	<b>1.12</b>	<b>0.88</b>	<b>0.99</b>	<b>0.85</b>	<b>0.85</b>	<b>0.78</b>	<b>0.001</b>
Boys' basketball total	1.89	1.75	1.39	1.35	1.45	1.34	1.40	1.47	0.063
Competition	2.98	2.87	2.23	2.32	2.72	2.30	2.60	2.44	0.239
Practice	<b>1.46</b>	<b>1.28</b>	<b>1.04</b>	<b>0.95</b>	<b>0.92</b>	<b>0.91</b>	<b>0.91</b>	<b>1.04</b>	<b>0.031</b>
Girls' basketball total	2.01	2.09	1.61	1.54	1.58	1.73	1.57	1.83	0.233
Competition	3.60	3.60	3.30	3.13	2.84	3.59	3.03	3.13	0.155
Practice	1.37	1.44	0.90	0.87	1.02	0.92	0.98	1.24	0.341
Boys' wrestling total	2.50	2.51	2.27	2.17	1.98	2.01	2.50	2.33	0.473
Competition	3.93	3.80	3.70	3.35	3.09	3.32	3.56	3.54	0.146
Practice	2.04	2.06	1.76	1.75	1.56	1.55	2.10	1.88	0.580
Boys' baseball total	<b>1.19</b>	<b>1.25</b>	<b>0.93</b>	<b>0.78</b>	<b>0.82</b>	<b>0.81</b>	<b>0.83</b>	<b>0.88</b>	<b>0.037</b>
Competition	<b>1.77</b>	<b>2.01</b>	<b>1.37</b>	<b>1.32</b>	<b>1.27</b>	<b>1.49</b>	<b>1.14</b>	<b>1.30</b>	<b>0.038</b>
Practice	0.87	0.82	0.68	0.48	0.57	0.46	0.65	0.66	0.135
Girls' softball total	1.13	1.11	1.29	1.04	1.12	0.94	1.46	1.15	0.688
Competition	1.78	1.96	1.86	1.62	1.66	1.45	2.04	1.96	0.873
Practice	0.79	0.65	0.98	0.72	0.85	0.69	1.16	0.73	0.574

\*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, 2005/06-2012/13 School Years**

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
<b>Overall total</b>	<b>1,442,533</b>	<b>1,472,849</b>	<b>1,419,723</b>	<b>1,248,126</b>	<b>1,359,897</b>	<b>1,195,815</b>	<b>1,392,262</b>	<b>1,361,986</b>
<b>Competition</b>	<b>759,334</b>	<b>766,512</b>	<b>763,034</b>	<b>690,525</b>	<b>754,091</b>	<b>711,642</b>	<b>740,493</b>	<b>779,055</b>
<b>Practice</b>	<b>683,199</b>	<b>706,337</b>	<b>656,689</b>	<b>557,601</b>	<b>605,805</b>	<b>484,173</b>	<b>651,769</b>	<b>582,931</b>
Boys' football total	516,150	574,367	616,665	527,321	581,414	483,016	559,064	616,209
Competition	280,919	292,316	311,780	288,637	322,801	296,199	287,710	344,097
Practice	235,231	282,051	304,885	238,684	258,614	186,817	271,354	272,112
Boys' soccer total	218,760	171,874	159,351	149,229	153,485	138,974	172,070	149,049
Competition	119,703	93,295	99,785	87,082	83,985	81,238	97,540	89,429
Practice	99,058	78,579	59,566	62,147	69,500	57,736	74,530	59,620
Girls' soccer total	185,770	230,769	215,850	192,108	181,159	180,254	222,679	190,382
Competition	122,803	149,231	146,102	123,312	129,754	124,674	145,469	141,339
Practice	62,967	81,538	69,748	68,796	51,405	55,580	77,210	49,043
Girls' volleyball total	81,813	80,493	72,261	56,609	67,760	50,711	52,662	44,064
Competition	32,677	27,423	26,539	19,764	21,728	21,416	24,439	19,150
Practice	49,136	53,069	45,722	36,845	46,032	29,295	28,223	24,914

(cont). next page

**Table 13.2 Nationally Estimated Number of Injuries by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2012/13 School Years (continued)**

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Boys' basketball total	100,058	96,670	82,612	79,230	85,063	79,762	75,872	85,819
Competition	44,826	46,109	36,766	40,152	46,787	41,252	41,978	44,095
Practice	55,232	50,561	45,846	39,078	38,276	38,510	33,894	41,724
Girls' basketball total	103,566	102,831	73,283	64,933	78,709	83,033	67,280	83,107
Competition	53,812	53,703	45,236	38,277	44,026	53,931	37,213	45,645
Practice	49,753	49,128	28,047	26,656	34,684	29,102	30,067	37,462
Boys' wrestling total	105,542	101,139	91,625	88,996	80,390	80,569	107,992	85,485
Competition	36,259	38,750	40,698	39,029	37,742	36,536	40,235	35,016
Practice	69,283	62,389	50,927	49,967	42,647	44,033	67,757	50,469
Boys' baseball total	67,560	60,296	44,760	39,869	64,053	46,796	43,590	49,747
Competition	33,639	33,494	22,803	25,584	36,502	29,789	20,818	24,807
Practice	33,922	26,802	21,957	14,285	27,551	17,008	22,772	24,940
Girls' softball total	63,313	54,411	63,316	49,831	67,862	52,700	91,053	58,124
Competition	34,696	32,191	33,325	28,688	30,767	26,607	45,091	35,477
Practice	28,618	22,220	29,991	21,143	37,096	26,093	45,962	22,647

**Table 13.3 Body Site of Injury by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2012/13 School Years\***

	2005-06 n=1,442,048	2006-07 n=1,464,926	2007-08 n=1,411,621	2008-09 n=1,248,126	2009-10 n=1,359,897	2010-11 n=1,194,319	2011-12 n=1,391,577	2012-13 n=1,361,584
<b>Body Site</b>								
Ankle	22.7%	19.8%	18.5%	16.4%	17.5%	17.7%	16.1%	15.5%
Knee	14.2%	16.6%	14.6%	14.8%	15.7%	14.2%	13.4%	14.8%
Head/face	12.3%	12.4%	12.4%	15.3%	17.2%	23.3%	25.1%	25.7%
Hip/thigh/upper leg	10.8%	10.5%	10.2%	10.3%	9.2%	8.3%	9.8%	9.5%
Shoulder	7.9%	8.0%	10.1%	9.3%	8.4%	7.0%	6.6%	6.5%
Hand/wrist	8.0%	7.5%	9.1%	8.5%	10.3%	8.9%	8.5%	7.4%
Trunk	6.2%	6.7%	6.5%	6.6%	5.8%	4.7%	4.9%	5.2%
Lower leg	4.6%	5.2%	5.7%	5.8%	4.7%	5.0%	4.5%	3.9%
Arm/elbow	4.1%	3.9%	4.6%	4.1%	4.0%	3.1%	4.0%	3.5%
Foot	4.0%	4.0%	4.2%	5.0%	4.1%	4.0%	3.4%	3.2%
Neck	2.2%	1.9%	1.8%	1.9%	1.9%	1.8%	1.7%	2.3%
Other	3.2%	3.6%	2.4%	2.1%	1.2%	2.1%	2.0%	2.5%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

\*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, 2005/06-2012/13 School Years**

	2005-06, n=1,444,172	2006-07, n=1,466,398	2007-08 n=1,414,139	2008-09 n=1,248,126	2009-10 n=1,359,897	2010-11 n=1,191,484	2011-12 n=1,392,262	2012-13 n=1,360,701
<b>Diagnosis</b>								
Strain/sprain	52.0%	48.2%	48.3%	45.7%	44.7%	43.2%	42.2%	42.3%
Contusion	12.2%	13.7%	12.4%	11.5%	14.0%	9.6%	10.8%	10.6%
Fracture	9.8%	8.9%	10.2%	10.9%	9.9%	10.2%	7.7%	7.8%
Concussion	9.1%	8.4%	9.2%	11.8%	14.0%	20.0%	22.2%	23.1%
Other	16.8%	20.9%	19.9%	20.2%	17.5%	17.0%	17.1%	16.2%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Table 13.5 Most Common Injury Diagnoses by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2012/13 School Years**

	2005-06 n=1,435,954	2006-07 n=1,463,273	2007-08 n=1,410,654	2008-09 n=1,248,126	2009-10 n=1,359,897	2010-11 n=1,189,985	2011-12 n=1,388,873	2012-13 n=1,360,303
<b>Diagnosis</b>								
Ankle strain/sprain	20.6%	17.8%	17.3%	15.0%	16.0%	16.3%	14.7%	14.5%
Head/face concussion	9.0%	8.4%	9.2%	11.7%	13.9%	20.0%	22.2%	23.1%
Knee strain/sprain	7.6%	8.8%	7.8%	7.9%	8.0%	7.7%	7.6%	8.2%
Hip/thigh/upper leg strain/sprain	7.9%	7.7%	7.3%	7.7%	6.5%	6.4%	6.9%	6.7%
Knee other	4.3%	4.9%	4.7%	4.5%	5.2%	4.8%	3.9%	4.1%
Shoulder other	3.1%	3.7%	4.1%	4.0%	3.3%	3.7%	3.1%	3.4%
Hand/wrist fracture	3.2%	3.3%	4.0%	4.0%	4.2%	4.0%	3.7%	3.2%
Shoulder strain/sprain	3.4%	2.9%	3.4%	3.7%	3.3%	2.2%	2.9%	2.6%
Trunk strain/sprain	2.8%	2.7%	3.2%	2.8%	2.5%	2.4%	1.9%	2.3%
Hand/wrist strain/sprain	3.1%	2.5%	3.8%	2.9%	2.8%	2.8%	3.0%	2.5%

**Table 13.6 Time Loss of Injuries by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2012/13 School Years**

	2005-06 n=1,378,145	2006-07 n=1,423,183	2007-08 n=1,355,981	2008-09 n= 1,248,126	2009-10 n= 1,359,897	2010-11 n=1,195,815	2011-12 n=1,392,262	2012-13 n=1,361,986
<b>Time Loss</b>								
1-2 days	22.5%	26.6%	22.8%	13.7%	14.7%	12.8%	15.9%	12.6%
3-6 days	30.0%	28.5%	28.8%	28.5%	27.3%	25.2%	23.3%	23.6%
7-9 days	15.3%	14.7%	15.8%	17.7%	16.1%	16.7%	16.1%	16.3%
10-21 days	14.9%	14.1%	16.7%	19.7%	16.9%	19.2%	19.6%	21.3%
≥22 days	17.2%	16.1%	15.9%	20.3%	25.0%	26.1%	25.0%	26.2%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

**Table 13.7 Injuries Requiring Surgery by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2012/13 School Years**

	2005-06 n=1,429,072	2006-07 n=1,428,960	2007-08 n=1,380,872	2008-09 n= 1,248,126	2009-10 n= 1,359,897	2010-11 n=1,169,423	2011-12 n=1,392,262	2012-13 n=1,337,403
<b>Need for surgery</b>								
Required surgery	5.3%	6.4%	6.1%	6.7%	8.0%	8.2%	6.7%	7.3%
Did not require surgery	94.7%	93.6%	93.9%	93.3%	92.0%	91.8%	93.3%	92.7%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

#### **XIV. Reporter Demographics & Compliance**



During the 2012-13 school year, 108 ATs were invited to participate in the study at the beginning of the school year. ATs were expected to report for every week in which they were enrolled. For example, an AT who joined the study as a replacement school in week 10 was not expected to report for weeks 1-9. Overall, 100 enrolled ATs reported an average of 43 study weeks. The majority of ATs (73.0%) reported all the weeks during which they were enrolled, with only 4 ATs (4.0%) missing over 10 weeks. Internal validity checks during the 2012-13 academic year yielded 95.8% sensitivity, 100.0% specificity, a positive predictive value of 100.0%, and a negative predictive value of 98.2%.

Prior to the start of the 2012-13 High School RIO™ study, participating ATs were asked to complete a short demographics survey. Three-quarters (81.0%) of participating high schools were public schools, with the remainder being private. All ATs except one provided services to athletes of their high school on 5 or more days each week. Over 80% (84.0%) of ATs participating during the 2012-13 study year had previously participated in the High School RIO™ study.

An online “End of Season” survey gave all participating ATs (both in the original study as well as in the expanded study (n=216 including those ATs who did not report any data)) the opportunity to provide feedback on their experiences with High School RIO™. This survey was completed by 138 ATs (63.9%). Average reporting time burdens were 17 minutes for the weekly exposure report and 9 minutes for the injury report form. Using a 5 point Likert scale, RIO™ was overwhelmingly reported to be either very easy (56.5%) or somewhat easy (37.0%) to use (5 and 4 on the Likert scale, respectively), with ATs being either very satisfied (70.0%) or somewhat satisfied (24.6%) with the study (5 and 4 on the Likert scale, respectively). Suggestions provided by ATs, 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 2013-14 school year.

## **XV. 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.