

## **SUMMARY REPORT**

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

**2013-2014 School Year**

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# **High School RIO<sup>TM</sup>**

**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 2012-13. 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 One) surveillance system. Through the generous contributions of the Centers for Disease Control and Prevention (CDC) 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 2013-14 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 National Athletic Trainer's Association (NATA), 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 2013-14 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 29, 2013 through June 9, 2014. 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 21.0. Although fractures, concussions, heat illnesses 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 ≤ 1,000) west stratum:

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

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:

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

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:

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

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, 2013-14 School Year\***

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
Overall total	4,079	1,873,729	2.18	1,427,315
Competition	2,203	521,903	4.22	790,966
Practice	1,876	1,351,826	1.39	636,349
Boys' football total	1,931	516,501	3.74	624,470
Competition	1,011	88,831	11.38	324,354
Practice	920	427,670	2.15	300,116
Boys' soccer total	277	171,326	1.62	149,278
Competition	180	52,890	3.40	90,683
Practice	97	118,436	0.82	58,595
Girls' soccer total	387	156,781	2.47	227,172
Competition	274	47,868	5.72	167,975
Practice	113	108,913	1.04	59,197
Girls' volleyball total	175	175,911	0.99	45,144
Competition	70	60,861	1.15	16,430
Practice	105	115,050	0.91	28,714
Boys' basketball total	320	220,583	1.45	84,455
Competition	164	68,217	2.40	42,504
Practice	156	152,366	1.02	41,951
Girls' basketball total	328	174,554	1.88	89,451
Competition	198	54,125	3.66	50,864
Practice	130	120,429	1.08	38,587
Boys' wrestling total	341	137,303	2.48	91,203
Competition	144	36,452	3.95	39,378
Practice	197	100,851	1.95	51,825
Boys' baseball total	188	187,034	1.01	62,493
Competition	112	66,805	1.68	37,682
Practice	76	120,229	0.63	24,811
Girls' softball total	132	133,736	0.99	53,649
Competition	50	45,854	1.09	21,096
Practice	82	87,882	0.93	32,553

\*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, 2013-14 School Year\***

	≥1 days time loss	<1 day time loss	Time loss data missing	Total
<b>Overall</b>	<b>93.0%</b>	<b>1.9%</b>	<b>5.1%</b>	<b>100%</b>
Boys' football	93.6%	2.0%	4.4%	100%
Boys' soccer	93.0%	0.7%	6.4%	100%
Girls' soccer	93.9%	1.5%	4.6%	100%
Girls' volleyball	90.7%	2.6%	6.7%	100%
Boys' basketball	89.1%	3.9%	7.0%	100%
Girls' basketball	92.9%	2.5%	4.5%	100%
Boys' wrestling	91.7%	0.5%	7.8%	100%
Boys' baseball	94.5%	2.5%	3.0%	100%
Girls' softball	96.4%	0.7%	2.9%	100%

\*By study definition, non-time loss injuries captured were fractures, concussions, dental injuries, and heat illnesses. Because they accounted for only 1.9% of all injuries overall, they are not included in any other analyses.

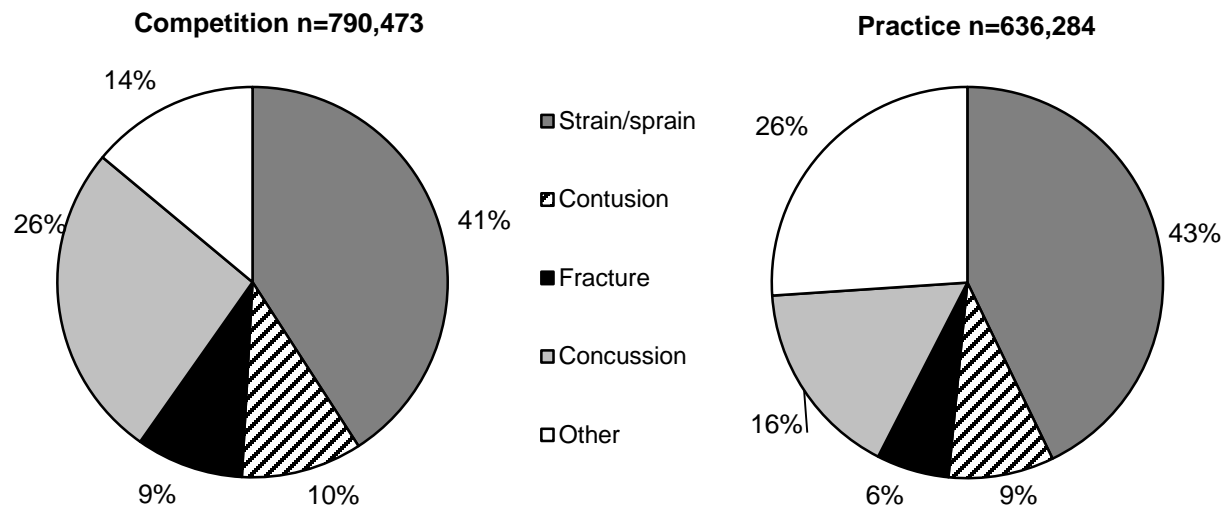
**Table 2.3 Demographic Characteristics of Injured Athletes by Sex, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Male n= 987,151	Female n=412,000
<b>Year in School</b>		
Freshman	24.1%	29.2%
Sophomore	24.0%	25.7%
Junior	25.2%	25.6%
Senior	26.6%	19.6%
<b>Total†</b>	<b>100%</b>	<b>100%</b>
<b>Age (years)</b>		
Minimum	12	13
Maximum	19	18
Mean (St. Dev.)	15.9 (1.3)	15.7 (1.2)
<b>BMI</b>		
Minimum	10.2	15.0
Maximum	57.7	43.8
Mean (St. Dev.)	25.0 (4.7)	22.3 (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 to 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, 2013-14 School Year**



**Table 2.4 Body Site of Injury by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Head/face	232,936	29.5%	128,354	20.2%	361,290	25.3%
Ankle	132,624	16.8%	108,035	17.0%	240,659	16.9%
Knee	124,882	15.8%	80,409	12.6%	205,291	14.4%
Hip/thigh/upper leg	60,600	7.7%	63,477	10.0%	124,077	8.7%
Shoulder	61,403	7.8%	59,968	9.4%	121,371	8.5%
Hand/wrist	58,001	7.3%	52,590	8.3%	110,591	7.8%
Trunk	18,359	2.3%	40,248	6.3%	58,607	4.1%
Lower leg	32,558	4.1%	36,794	5.8%	69,352	4.9%
Arm/elbow	22,422	2.8%	21,511	3.4%	43,933	3.1%
Foot	19,545	2.5%	19,839	3.1%	39,384	2.8%
Neck	9,689	1.2%	7,634	1.2%	17,323	1.2%
Other	17,207	2.2%	17,488	2.7%	34,695	2.4%
<b>Total</b>	<b>790,226</b>	<b>100%</b>	<b>636,347</b>	<b>100%</b>	<b>1,426,573</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, 2013-14 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	104,356	75.3%	79,205	80.5%	183,561	77.5%
Calcaneofibular ligament	32,005	23.1%	31,985	32.5%	63,990	27.0%
Anterior tibiofibular ligament	27,919	20.2%	15,348	15.6%	43,267	18.3%
Posterior talofibular ligament	9,702	7.0%	15,340	15.6%	25,042	10.6%
Deltoid ligament	7,358	5.3%	7,064	7.2%	14,422	6.1%
Posterior tibiofibular ligament	3,439	2.5%	1,953	2.0%	5,392	2.3%
<b>Total Ankle Injuries</b>	<b>138,544</b>		<b>98,425</b>		<b>236,969</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, 2013-14 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	44,667	33.9%	13,341	19.7%	58,008	29.1%
Anterior cruciate ligament	30,313	23.0%	23,499	34.7%	53,812	27.0%
Torn cartilage (meniscus)	28,907	21.9%	12,672	18.7%	41,579	20.8%
Patella and/or patellar tendon	25,715	19.5%	14,899	22.0%	40,614	20.4%
Lateral collateral ligament	6,929	5.3%	1,605	2.4%	8,534	4.3%
Posterior cruciate ligament	1,520	1.2%	798	1.2%	2,318	1.2%
<b>Total Knee Injuries</b>	<b>131,841</b>		<b>67,679</b>		<b>199,520</b>	

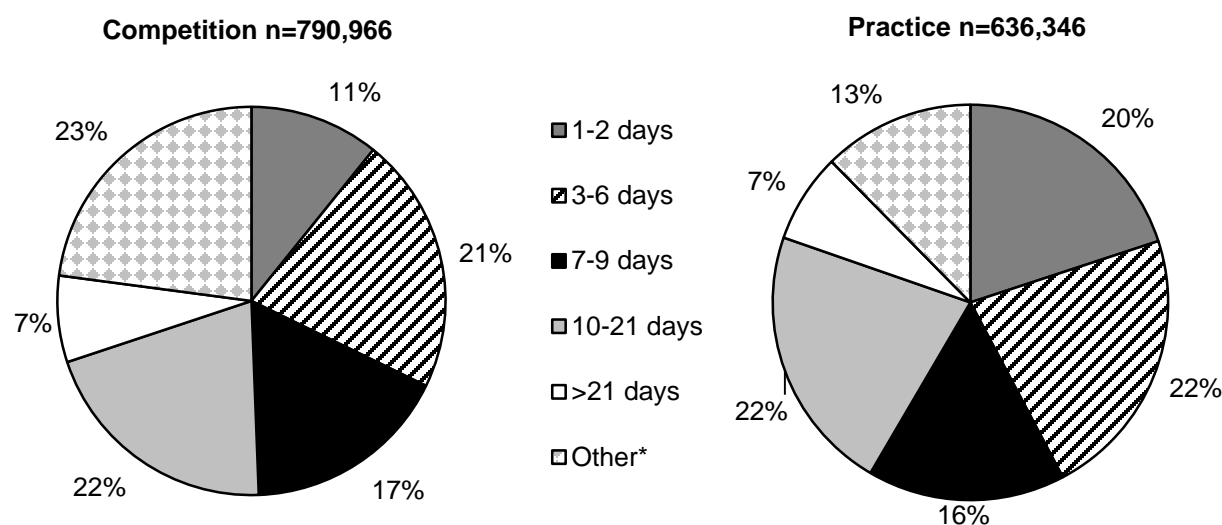
\*Multiple ligament responses allowed per injury report. Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 2.7 Ten Most Common Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Diagnosis	Competition n=789,734		Practice n=636,284		Overall n=1,426,018	
	n	%	n	%	n	%
Head/face concussion	207,756	26.3%	104,323	16.4%	312,079	21.9%
Ankle strain/sprain	119,847	15.2%	102,895	16.2%	222,742	15.6%
Knee strain/sprain	80,187	10.2%	31,178	4.9%	111,365	7.8%
Hip/thigh/upper leg strain/sprain	46,936	5.9%	47,609	7.5%	94,545	6.6%
Knee other	29,342	3.7%	37,680	5.9%	67,022	4.7%
Shoulder other	31,988	4.1%	34,256	5.4%	66,244	4.6%
Shoulder strain/sprain	24,050	3.0%	22,908	3.6%	46,958	3.3%
Hand/wrist fracture	27,900	3.5%	18,828	3.0%	46,728	3.3%
Hand/wrist strain/sprain	18,902	2.4%	20,359	3.2%	39,261	2.8%
Head/face other	13,047	1.7%	16,915	2.7%	29,962	2.1%

\* 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 2.2 Time Loss by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**



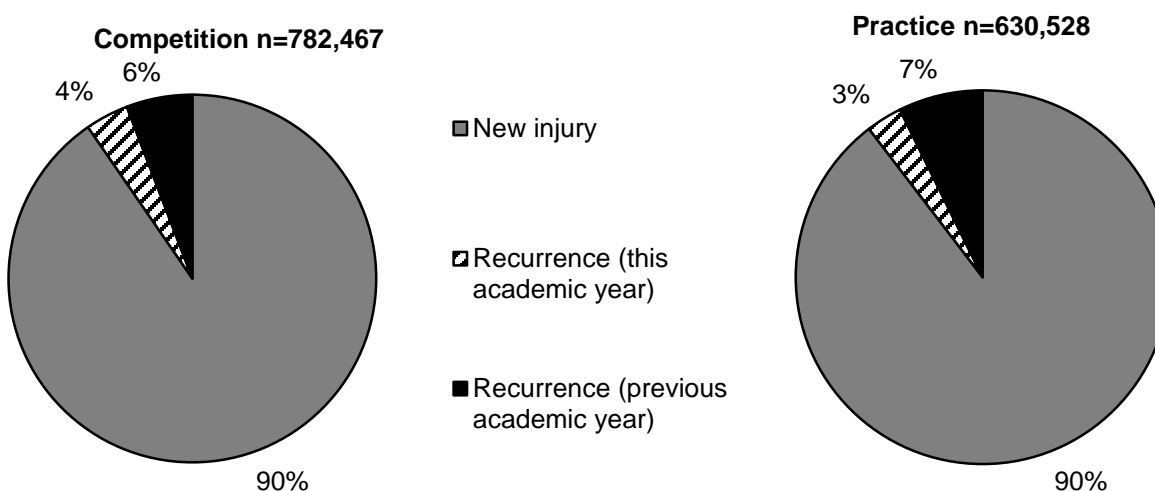
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 2.8 Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	73,289	9.4%	34,279	5.5%	107,568	7.6%
Did not require surgery	708,809	90.6%	591,217	94.5%	1,300,026	92.4%
<b>Total*</b>	<b>782,098</b>	<b>100%</b>	<b>625,496</b>	<b>100%</b>	<b>1,407,594</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, 2013-14 School Year**



**Table 2.9 Time during Season of Injury, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	308,943	22.9%
Regular season	974,648	72.4%
Post season	62,569	4.6%
<b>Total</b>	<b>1,346,160</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.

**Table 2.10 Practice-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First ½ hour	62,417	11.1%
Second ½ hour	115,146	20.5%
1-2 hours into practice	323,234	57.5%
>2 hours into practice	61,820	11.0%
<b>Total</b>	<b>562,617</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, 2013-14 School Year**

	n	%
<b>Injuries Evaluated by:*</b>		
Certified athletic trainer	1,345,542	94.3%
General physician	482,266	33.8%
Orthopedic physician	465,638	32.6%
Neurologist/neuropsychologist	23,037	1.6%
Physician's assistant	11,906	0.8%
Chiropractor	11,395	0.8%
Nurse practitioner	8,437	0.6%
Dentist/oral surgeon	4,962	0.3%
Other	50,765	3.6%
<b>Total</b>	<b>1,427,313</b>	
<b>Injuries Assessed by:*</b>		
Evaluation	1,408,597	98.7%
X-ray	452,534	31.7%
MRI	151,254	10.6%
CT-scan	42,035	2.9%
Surgery	20,317	1.4%
Blood work/lab test	13,513	0.9%
Other	5,551	0.4%
<b>Total</b>	<b>1,427,313</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, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>1,931</b>	<b>516,501</b>	<b>3.74</b>	<b>624,470</b>
Competition	1,011	88,831	11.38	324,354
Practice	920	427,670	2.15	300,116

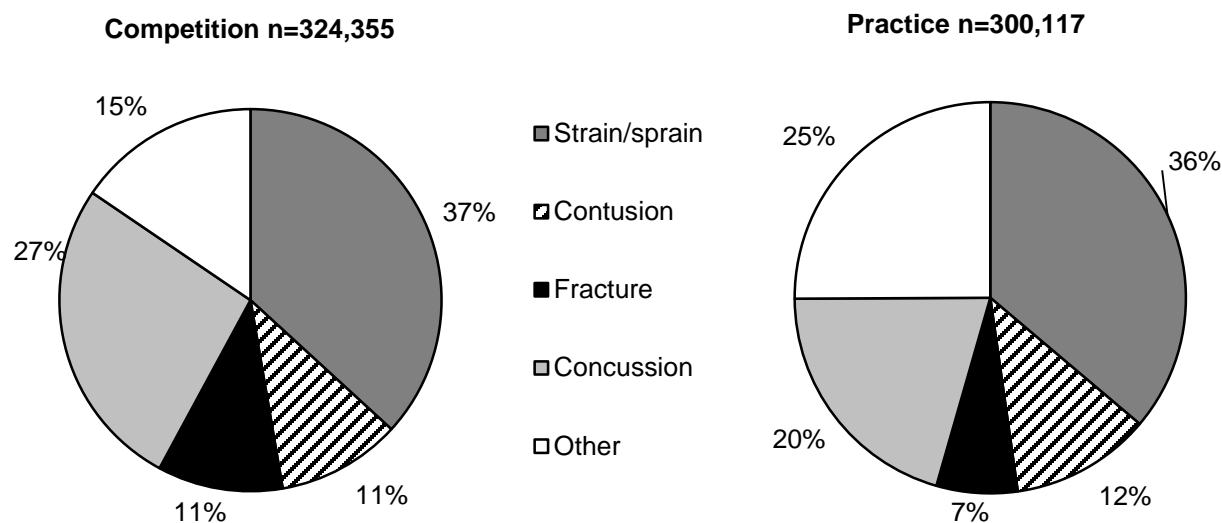
**Table 3.2 Demographic Characteristics of Injured Football Athletes, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

<b>Year in School</b>	<b>n=618,698</b>
Freshman	25.4%
Sophomore	22.1%
Junior	25.3%
Senior	27.2%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.8 (1.3)
<b>BMI</b>	
Minimum	16.5
Maximum	57.7
Mean (St. Dev.)	25.9 (4.8)

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

<sup>†</sup>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, 2013-14 School Year**



**Table 3.3 Body Site of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Head/face	88,003	27.2%	68,834	22.9%	156,837	25.1%
Knee	50,735	15.7%	38,120	12.7%	88,855	14.2%
Shoulder	42,443	13.1%	35,551	11.8%	77,994	12.5%
Ankle	39,782	12.3%	34,068	11.4%	73,850	11.8%
Hand/wrist	26,426	8.2%	29,536	9.8%	55,962	9.0%
Hip/thigh/upper leg	15,937	4.9%	26,745	8.9%	42,682	6.8%
Trunk	10,327	3.2%	21,760	7.3%	32,087	5.1%
Lower leg	13,280	4.1%	12,461	4.2%	25,741	4.1%
Arm/elbow	8,406	2.6%	9,055	3.0%	17,461	2.8%
Foot	9,405	2.9%	6,463	2.2%	15,868	2.5%
Neck	7,830	2.4%	6,155	2.1%	13,985	2.2%
Other	11,040	3.4%	11,369	3.8%	22,409	3.6%
<b>Total</b>	<b>323,614</b>	<b>100%</b>	<b>300,117</b>	<b>100%</b>	<b>623,731</b>	<b>100%</b>

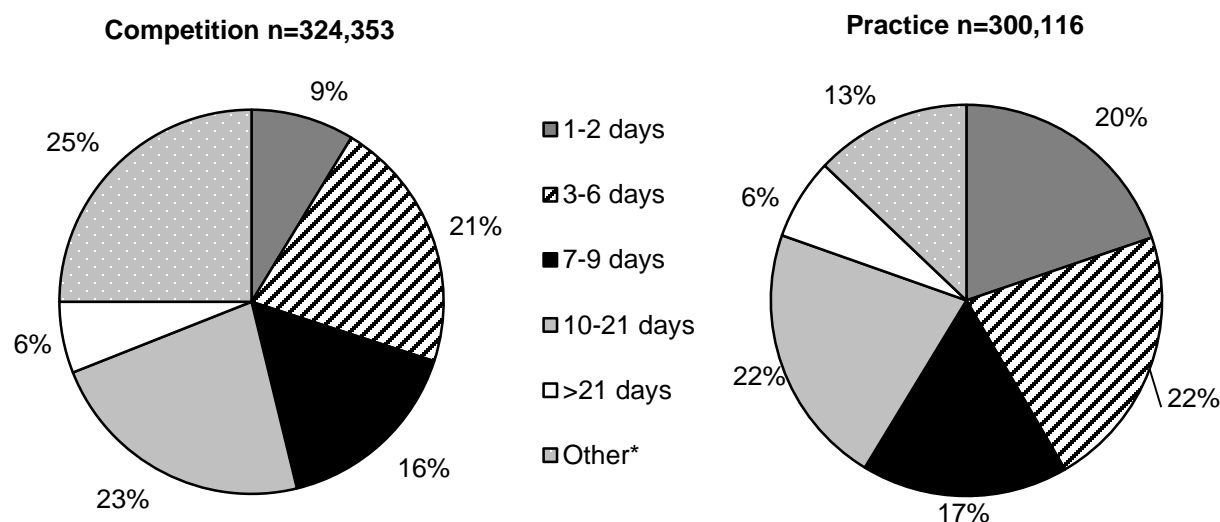
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 3.4 Ten Most Common Football Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Diagnosis	Competition n=323,612		Practice n=300,121		Total n=623,733	
	n	%	n	%	n	%
Head/face concussion	86,424	26.7%	61,414	20.5%	147,838	23.7%
Ankle strain/sprain	35,609	11.0%	32,134	10.7%	67,743	10.9%
Knee strain/sprain	35,246	10.9%	16,248	5.4%	51,494	8.3%
Shoulder other	23,717	7.3%	21,674	7.2%	45,391	7.3%
Hip/thigh/upper leg strain/sprain	10,523	3.3%	18,424	6.1%	28,947	4.6%
Shoulder strain/sprain	14,835	4.6%	11,172	3.7%	26,007	4.2%
Hand/wrist fracture	13,739	4.2%	12,013	4.0%	25,752	4.1%
Knee other	9,351	2.9%	15,747	5.2%	25,098	4.0%
Hand/wrist strain/sprain	6,604	2.0%	9,221	3.1%	15,825	2.5%
Trunk contusion	7,228	2.2%	7,724	2.6%	14,952	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, 2013-14 School Year**



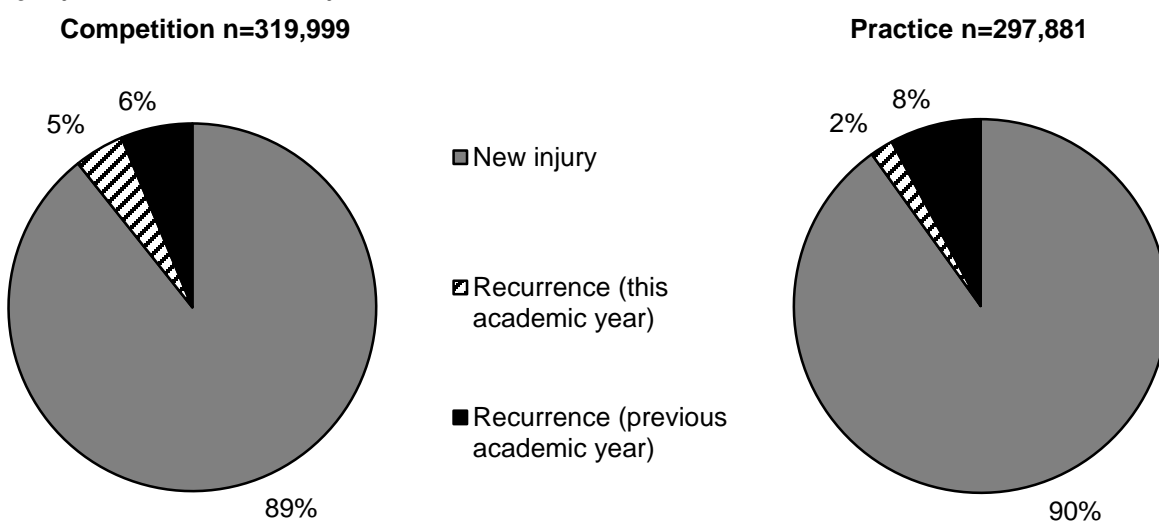
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 3.5 Football Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	33,938	10.6%	17,324	5.9%	51,262	8.3%
Did not require surgery	287,319	89.4%	275,858	94.1%	563,187	91.7%
<b>Total</b>	<b>321,257</b>	<b>100%</b>	<b>293,192</b>	<b>100%</b>	<b>614,449</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, 2013-14 School Year**



**Table 3.6 Time during Season of Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	165,894	28.0%
Regular season	397,427	67.2%
Post season	28,150	4.8%
<b>Total</b>	<b>591,471</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, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	2,805	1.0%
First quarter	42,175	14.6%
Second quarter	87,560	30.3%
Third quarter	77,392	26.7%
Fourth quarter	78,802	27.2%
Overtime	679	0.2%
<b>Total</b>	<b>289,413</b>	<b>100%</b>
<b>Field Location</b>		
Between the 20 yard lines	220,922	77.6%
Red zone (20 yard line to goal line)	59,704	21.0%
End zone	3,510	1.2%
Off the field	377	0.1%
<b>Total</b>	<b>284,513</b>	<b>100%</b>

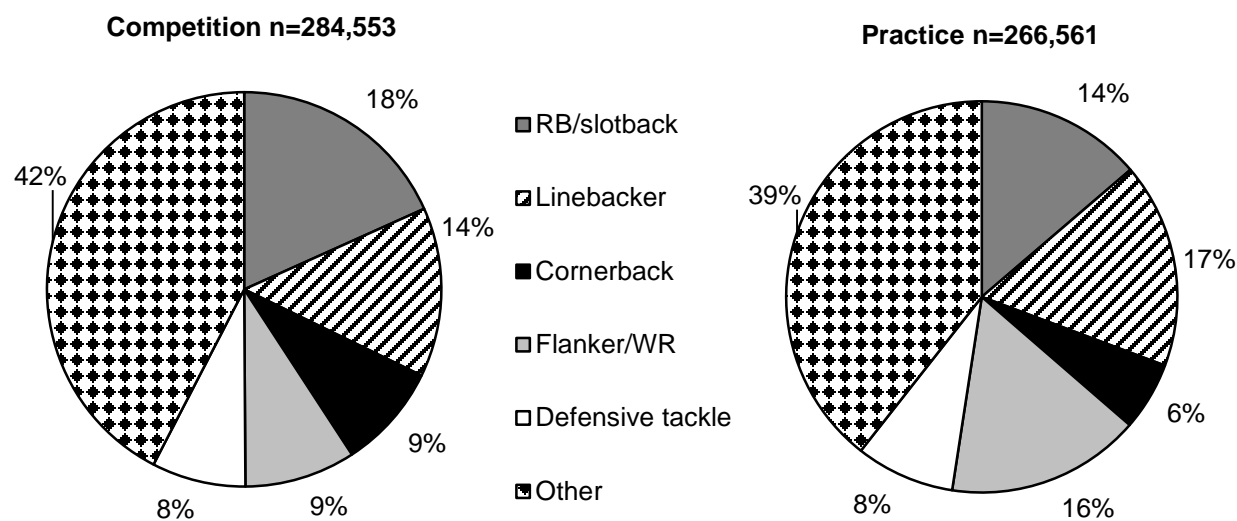
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 3.8 Practice-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	26,671	9.7%
Second 1/2 hour	44,627	16.2%
1-2 hours into practice	166,635	60.6%
>2 hours into practice	37,212	13.5%
<b>Total</b>	<b>275,145</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, 2013-14 School Year**

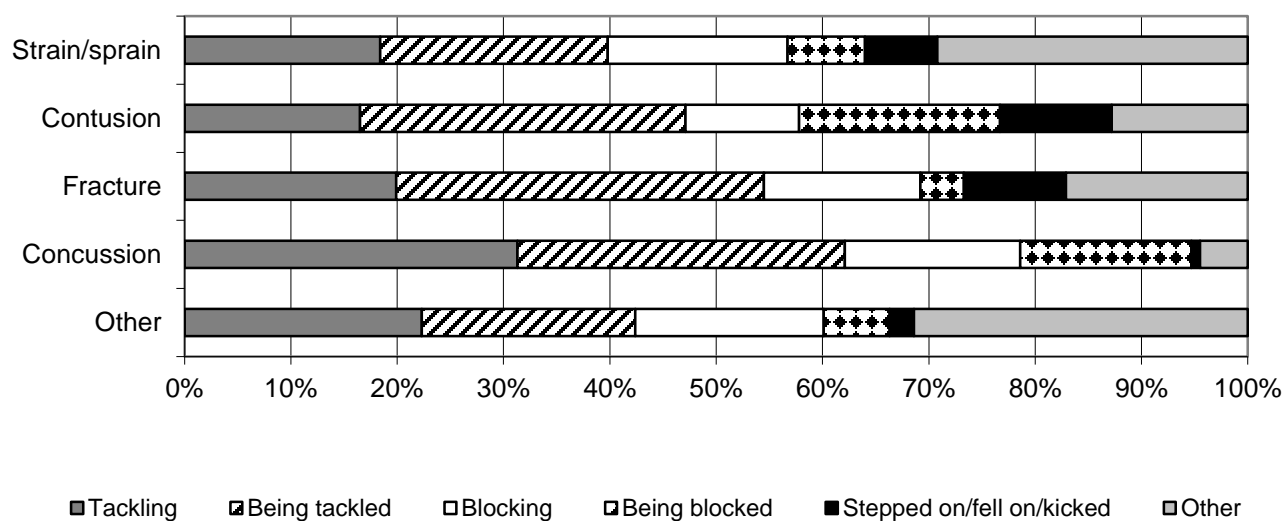


**Table 3.9 Activities Leading to Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Being tackled	91,899	30.6%	55,636	20.2%	147,525	25.6%
Tackling	73,223	24.4%	54,402	19.7%	127,625	22.2%
Blocking	47,307	15.8%	45,099	16.4%	92,406	16.1%
Being blocked	34,925	11.6%	24,179	8.8%	59,104	10.3%
N/A (e.g., overuse, heat illness, etc.)	8,572	2.9%	39,548	14.4%	48,120	8.4%
Rotation around a planted foot	18,093	6.0%	12,288	4.5%	30,381	5.3%
Stepped on/fell on/kicked	15,071	5.0%	14,617	5.3%	29,688	5.2%
Contact with ball	1,923	0.6%	4,379	1.6%	6,302	1.1%
Uneven playing surface	348	0.1%	3,421	1.2%	3,769	0.7%
Contact with blocking sled/dummy	0	0.0%	3,563	1.3%	3,563	0.6%
Contact with out of bounds object	0	0.0%	348	0.1%	348	0.1%
Other	8,793	2.9%	18,026	6.5%	26,819	4.7%
<b>Total</b>	<b>300,154</b>	<b>100%</b>	<b>275,506</b>	<b>100%</b>	<b>575,660</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, 2013-14 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, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>277</b>	<b>171,326</b>	<b>1.62</b>	<b>149,278</b>
Competition	180	52,890	3.40	90,683
Practice	97	118,436	0.82	58,595

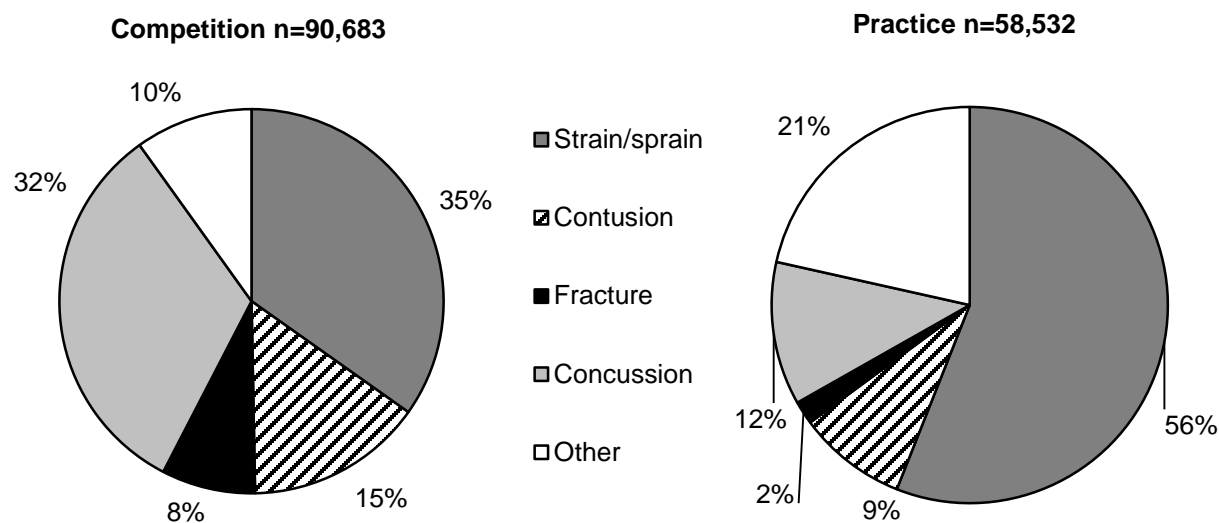
**Table 4.2 Demographic Characteristics of Injured Boys' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

<b>Year in School</b>	<b>n= 148,772</b>
Freshman	20%
Sophomore	29%
Junior	27%
Senior	23%
<b>Total†</b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	18
Mean (St. Dev.)	16.0 (1.3)
<b>BMI</b>	
Minimum	10.2
Maximum	36.0
Mean (St. Dev.)	22.5 (3.6)

\*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 4.1 Diagnosis of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**



**Table 4.3 Body Site of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Head/face	33,221	36.6%	7,316	12.5%	40,537	27.2%
Hip/thigh/upper leg	11,552	12.7%	19,526	33.3%	31,078	20.8%
Ankle	15,696	17.3%	9,958	17.0%	25,654	17.2%
Knee	12,479	13.8%	5,455	9.3%	17,934	12.0%
Lower leg	5,687	6.3%	7,950	13.6%	13,637	9.1%
Foot	4,141	4.6%	2,359	4.0%	6,500	4.4%
Hand/wrist	2,249	2.5%	2,718	4.6%	4,967	3.3%
Trunk	1,259	1.4%	1,847	3.2%	3,106	2.1%
Shoulder	2,161	2.4%	443	0.8%	2,604	1.7%
Neck	871	1.0%	0	0.0%	871	0.6%
Arm/elbow	363	0.4%	215	0.4%	578	0.4%
Other	1,004	1.1%	808	1.4%	1,812	1.2%
<b>Total</b>	<b>90,683</b>	<b>100%</b>	<b>58,595</b>	<b>100%</b>	<b>149,278</b>	<b>100%</b>

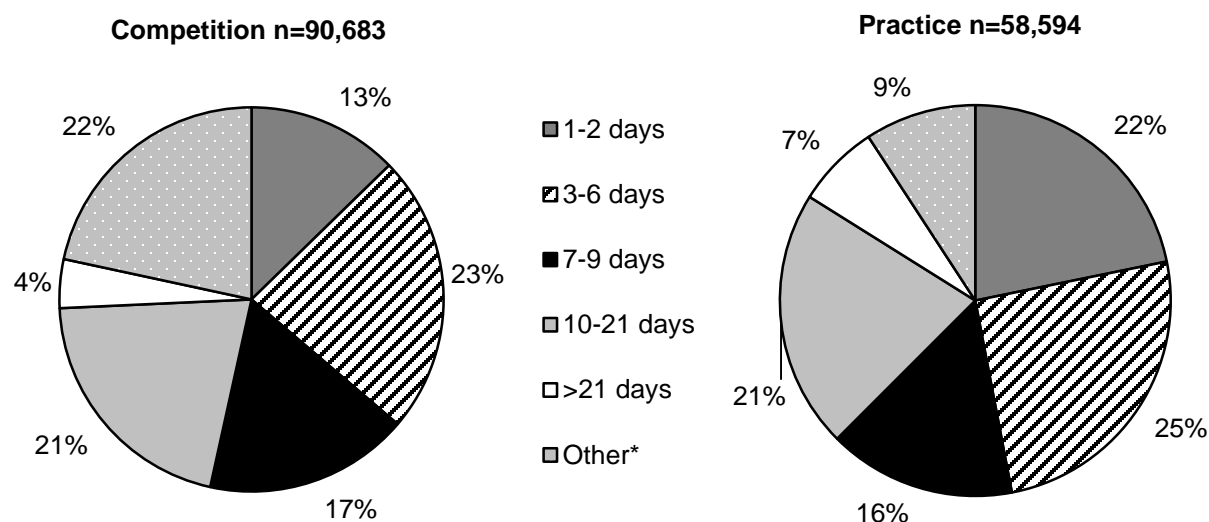
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 4.4 Ten Most Common Boys' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Diagnosis	Competition N=90,686		Practice n=58,532		Total n=149,218	
	n	%	n	%	n	%
Head/face concussion	29,458	32.5%	6,858	11.7%	36,316	24.3%
Hip/thigh/upper leg strain/sprain	7,793	8.6%	14,398	24.6%	22,191	14.9%
Ankle strain/sprain	12,552	13.8%	8,856	15.1%	21,408	14.3%
Knee strain/sprain	6,875	7.6%	2,525	4.3%	9,400	6.3%
Knee other	4,631	5.1%	1,844	3.2%	6,475	4.3%
Foot contusion	3,926	4.3%	1,551	2.6%	5,477	3.7%
Hip/thigh/upper leg contusion	2,357	2.6%	2,655	4.5%	5,012	3.4%
Lower leg other	0	0.0%	4,666	8.0%	4,666	3.1%
Hip/thigh/upper leg other	1,403	1.5%	2,473	4.2%	3,876	2.6%
Lower leg contusion	3,747	4.1%	0	0.0%	3,747	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 4.2 Time Loss of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***



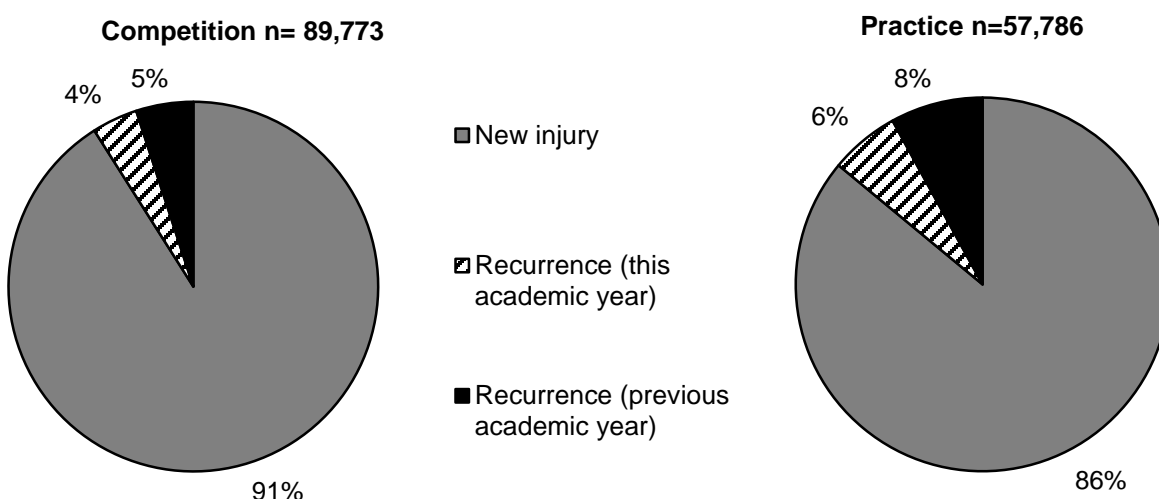
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 4.5 Boys' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	6,648	7.4%	363	0.6%	7,011	4.7%
Did not require surgery	82,927	92.6%	58,168	99.4%	141,095	95.3%
<b>Total</b>	<b>89,575</b>	<b>100%</b>	<b>58,531</b>	<b>100%</b>	<b>148,106</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, 2013-14 School Year**



**Table 4.6 Time during Season of Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	30,500	21.4%
Regular season	106,921	74.9%
Post season	5,394	3.8%
<b>Total</b>	<b>142,816</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, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	1,184	1.5%
First half	28,837	35.7%
Second half	50,660	62.8%
Overtime	0	0.0%
<b>Total</b>	<b>80,681</b>	<b>100%</b>
<b>Field Location</b>		
Top of goal box extended to center line (offense)	23,059	29.9%
Top of goal box extended to center line (defense)	18,825	24.4%
Goal box (offense)	9,711	12.6%
Side of goal box (defense)	8,358	10.8%
Side of goal box (offense)	8,045	10.4%
Goal box (defense)	6,989	9.1%
Off the field	2,129	2.8%
<b>Total</b>	<b>77,117</b>	<b>100%</b>

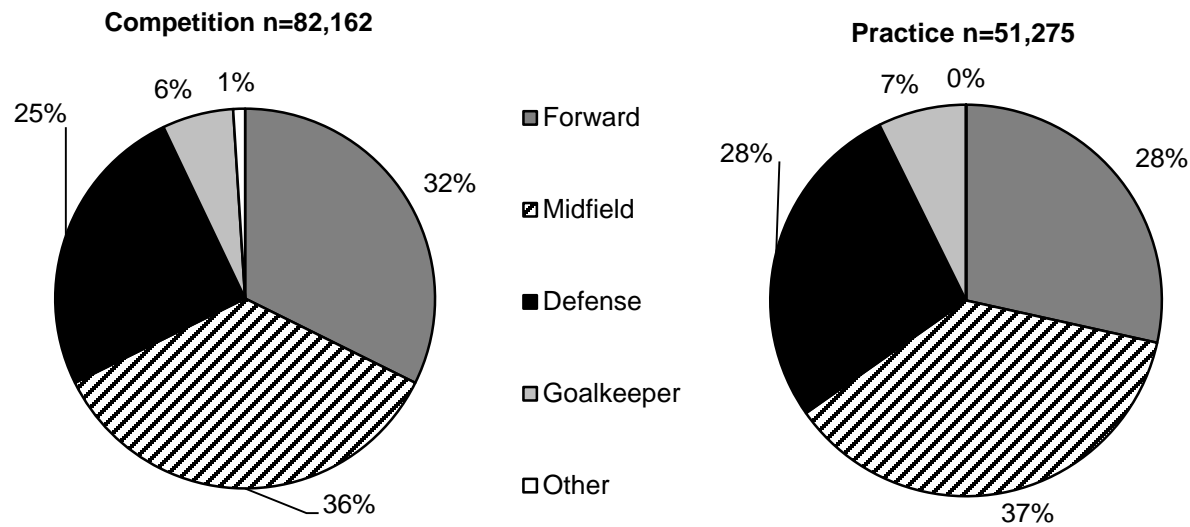
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 4.8 Practice-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	5,750	10.5%
Second 1/2 hour	16,118	29.5%
1-2 hours into practice	24,705	45.2%
>2 hours into practice	8,055	14.7%
<b>Total</b>	<b>54,628</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, 2013-14 School Year**

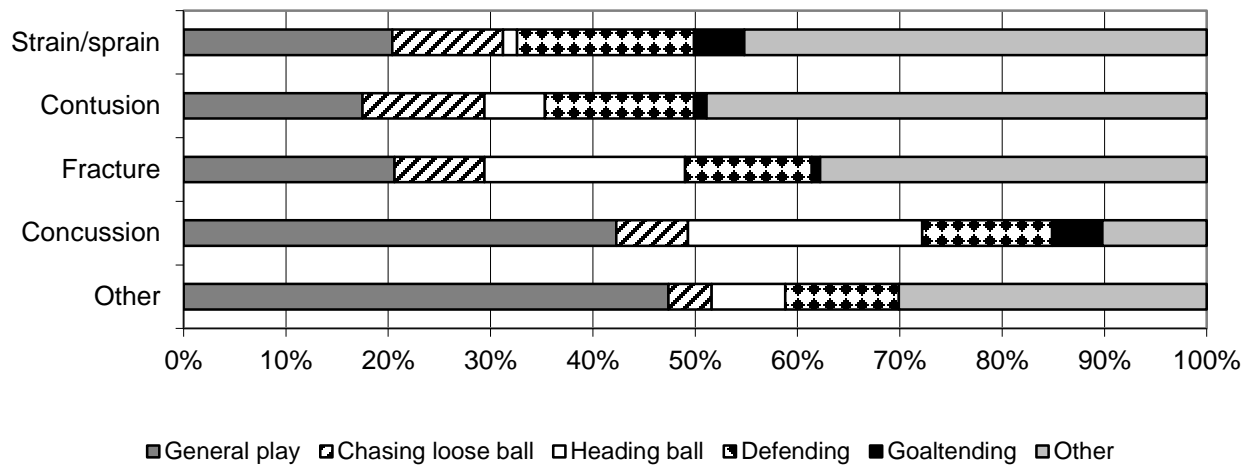


**Table 4.9 Activities Leading to Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	23,054	26.9%	18,458	33.4%	41,512	29.5%
Defending	14,089	16.4%	6,490	11.8%	20,579	14.6%
Heading ball	10,951	12.8%	2,030	3.7%	12,981	9.2%
Chasing loose ball	6,633	7.7%	5,888	10.7%	12,521	8.9%
Ball handling/dribbling	5,815	6.8%	3,041	5.5%	8,856	6.3%
Receiving pass	6,251	7.3%	2,585	4.7%	8,836	6.3%
Shooting (foot)	4,553	5.3%	3,250	5.9%	7,803	5.5%
Conditioning	0	0.0%	6,250	11.3%	6,250	4.4%
Goaltending	3,250	3.8%	1,644	3.0%	4,894	3.5%
Passing (foot)	2,663	3.1%	2,224	4.0%	4,887	3.5%
Receiving a slide tackle	2,055	2.4%	0	0.0%	2,055	1.5%
Attempting a slide tackle	1,783	2.1%	0	0.0%	1,783	1.3%
Blocking shot	808	0.9%	934	1.7%	1,742	1.2%
Other	3,793	4.4%	2,423	4.4%	6,216	4.4%
<b>Total</b>	<b>85,698</b>	<b>100%</b>	<b>55,217</b>	<b>100%</b>	<b>140,915</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, 2013-14 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, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>387</b>	<b>156,781</b>	<b>2.47</b>	<b>227,172</b>
Competition	274	47,868	5.72	167,975
Practice	113	108,913	1.04	59,197

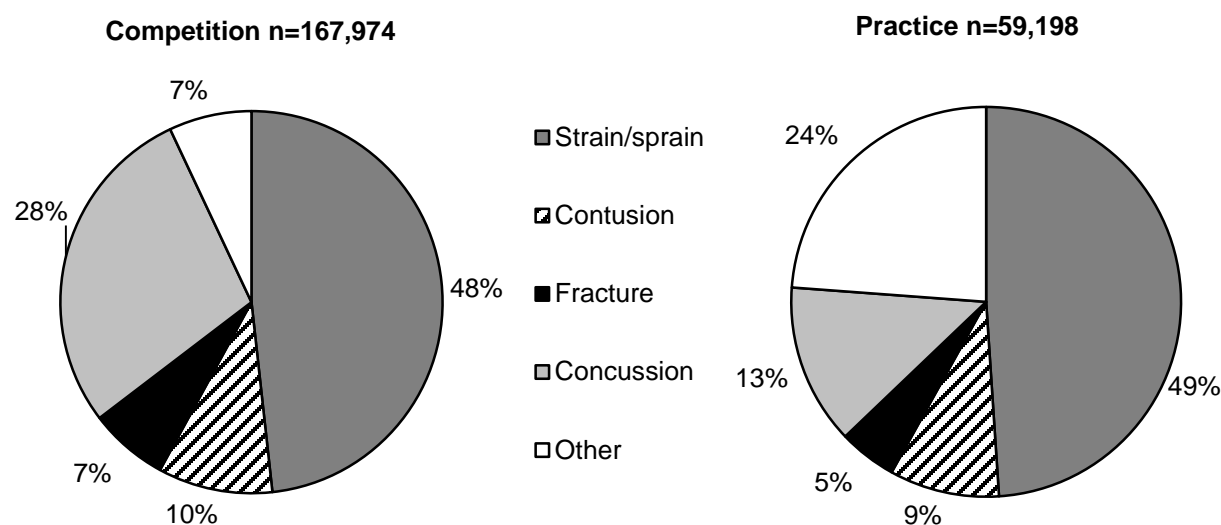
**Table 5.2 Demographic Characteristics of Injured Girls' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

<b>Year in School</b>	<b>n=223,742</b>
Freshman	27.7%
Sophomore	23.7%
Junior	26.1%
Senior	22.5%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.8 (1.3)
<b>BMI</b>	
Minimum	16.5
Maximum	43.8
Mean (St. Dev.)	22.1 (3.3)

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

<sup>†</sup>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, 2013-14 School Year**



**Table 5.3 Body Site of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Head/face	52,012	31.0%	8,095	13.7%	60,107	26.5%
Ankle	36,539	21.8%	17,421	29.4%	53,960	23.8%
Knee	30,806	18.3%	9,395	15.9%	40,201	17.7%
Hip/thigh/upper leg	19,457	11.6%	4,382	7.4%	23,839	10.5%
Lower leg	8,394	5.0%	4,939	8.3%	13,333	5.9%
Hand/wrist	9,071	5.4%	0	0.0%	9,071	4.0%
Foot	2,016	1.2%	6,818	11.5%	8,834	3.9%
Shoulder	3,428	2.0%	2,129	3.6%	5,557	2.4%
Trunk	1,393	0.8%	3,087	5.2%	4,480	2.0%
Arm/elbow	930	0.6%	443	0.7%	1,373	0.6%
Neck	257	0.2%	0	0.0%	257	0.1%
Other	3,673	2.2%	2,488	4.2%	6,161	2.7%
<b>Total</b>	<b>167,976</b>	<b>100%</b>	<b>59,197</b>	<b>100%</b>	<b>227,173</b>	<b>100%</b>

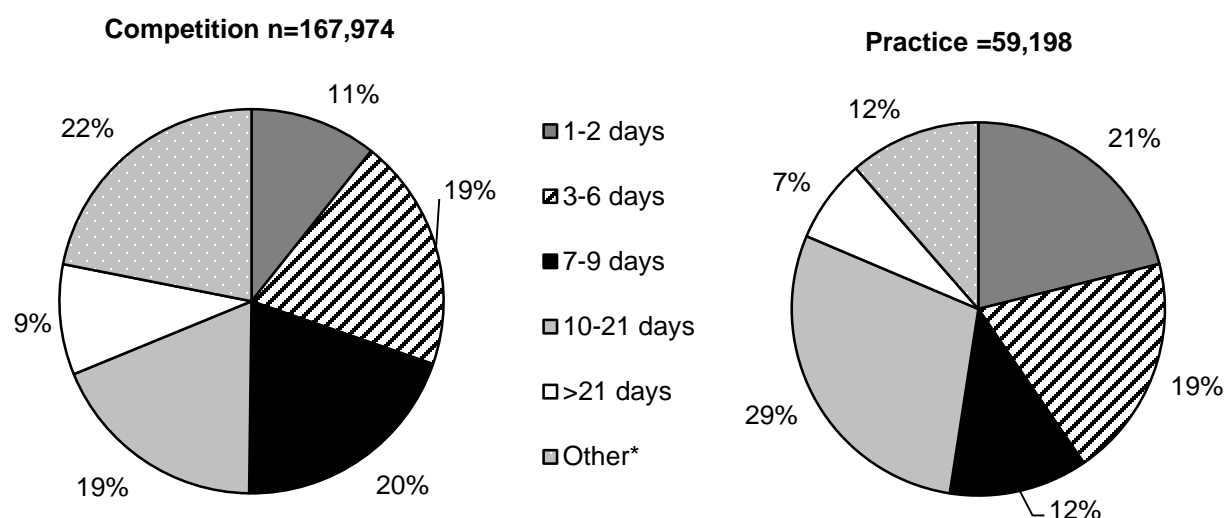
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 5.4 Ten Most Common Girls' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition n=167,973		Practice n=59,196		Total n=227,169	
	n	%	n	%	n	%
<b>Diagnosis</b>						
Head/face concussion	47,701	28.4%	7,897	13.3%	55,598	24.5%
Ankle strain/sprain	33,172	19.7%	16,641	28.1%	49,813	21.9%
Knee strain/sprain	20,341	12.1%	3,346	5.7%	23,687	10.4%
Hip/thigh/upper leg strain/sprain	18,043	10.7%	4,382	7.4%	22,425	9.9%
Knee other	6,118	3.6%	3,861	6.5%	9,979	4.4%
Knee contusion	3,856	2.3%	2,188	3.7%	6,044	2.7%
Lower leg contusion	4,161	2.5%	808	1.4%	4,969	2.2%
Hand/wrist fracture	4,677	2.8%	0	0.0%	4,677	2.1%
Hand/wrist strain/sprain	4,102	2.4%	0	0.0%	4,102	1.8%
Ankle contusion	3,366	2.0%	429	0.7%	3,795	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, 2013-14 School Year**



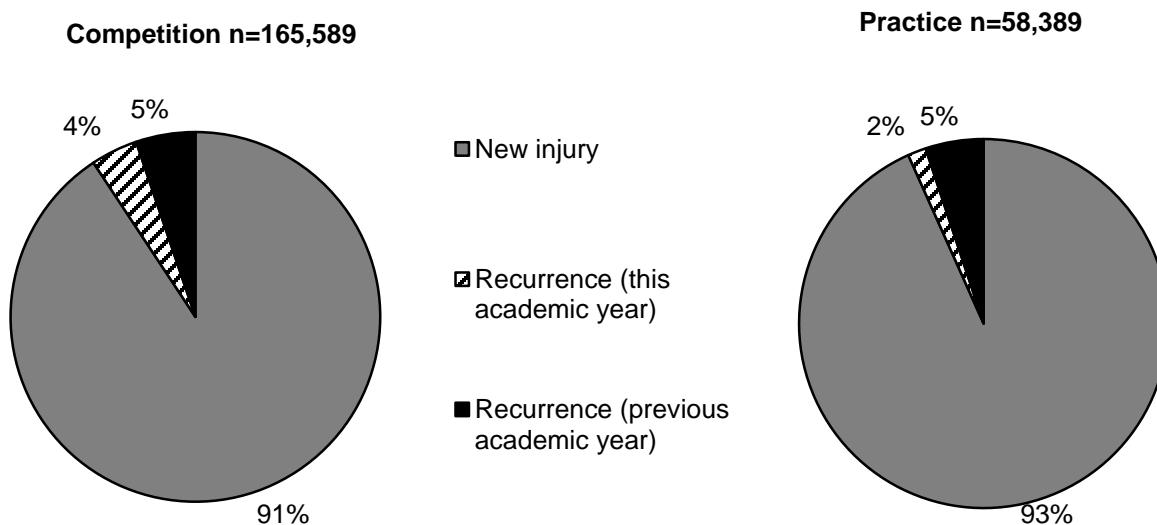
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 5.5 Girls' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	14,959	9.0%	3,373	5.8%	18,332	8.2%
Did not require surgery	150,697	91.0%	55,089	94.2%	205,786	91.8%
<b>Total</b>	<b>165,656</b>	<b>100%</b>	<b>58,462</b>	<b>100%</b>	<b>224,118</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, 2013-14 School Year**



**Table 5.6 Time during Season of Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	36,971	16.9%
Regular season	168,719	77.1%
Post season	13,119	6.0%
<b>Total</b>	<b>218,809</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, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	6,080	3.9%
First half	55,677	35.6%
Second half	94,245	60.2%
Overtime	429	0.3%
<b>Total</b>	<b>156,431</b>	<b>100%</b>
<b>Field Location</b>		
Top of goal box extended to center line (offense)	44,860	32.9%
Top of goal box extended to center line (defense)	34,219	25.1%
Goal box (defense)	22,793	16.7%
Side of goal box (defense)	12,728	9.3%
Goal box (offense)	8,798	6.5%
Side of goal box (offense)	8,452	6.2%
Off the field	4,474	3.3%
<b>Total</b>	<b>136,326</b>	<b>100%</b>

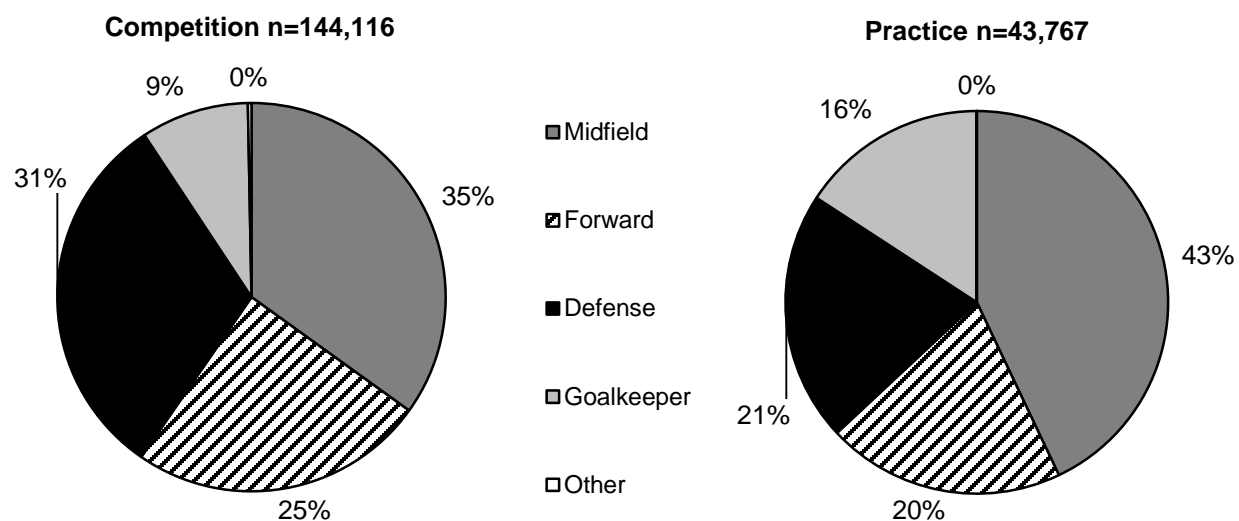
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 5.8 Practice-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	3,554	7.0%
Second 1/2 hour	10,079	19.9%
1-2 hours into practice	35,243	69.5%
>2 hours into practice	1,836	3.6%
<b>Total</b>	<b>50,712</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, 2013-14 School Year**

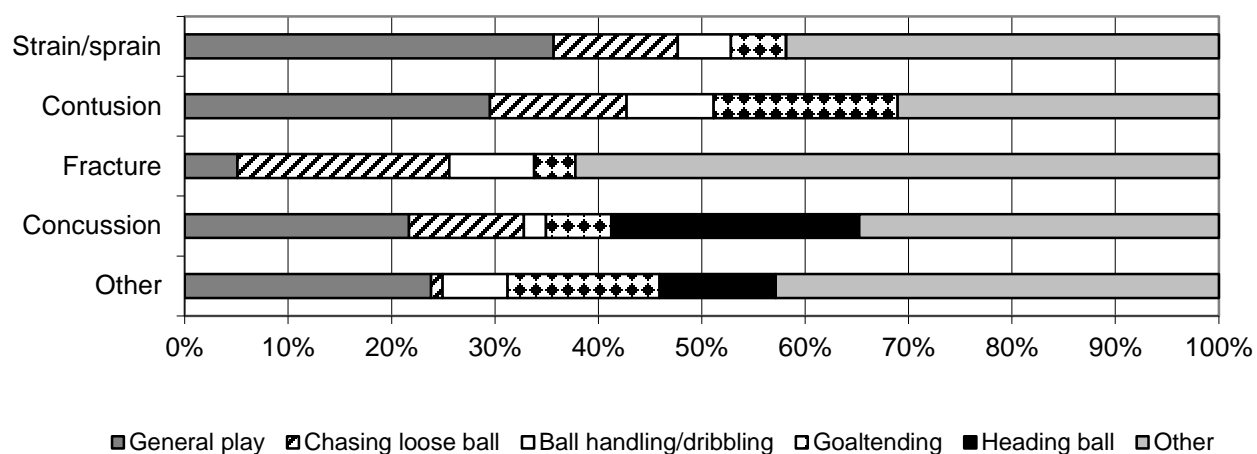


**Table 5.9 Activities Leading to Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Activity</b>						
General play	47,395	29.1%	13,559	26.6%	60,954	28.5%
Defending	29,661	18.2%	5,013	9.8%	34,674	16.2%
Chasing loose ball	18,210	11.2%	5,788	11.3%	23,998	11.2%
Goaltending	10,276	6.3%	6,109	12.0%	16,385	7.7%
Heading ball	14,253	8.7%	1,494	2.9%	15,747	7.4%
Passing (foot)	12,256	7.5%	1,891	3.7%	14,147	6.6%
Ball handling/dribbling	6,737	4.1%	3,894	7.6%	10,631	5.0%
Conditioning	292	0.2%	8,419	16.5%	8,711	4.1%
Receiving pass	7,053	4.3%	808	1.6%	7,861	3.7%
Shooting (foot)	5,556	3.4%	808	1.6%	6,364	3.0%
Receiving a slide tackle	3,439	2.1%	858	1.7%	4,297	2.0%
Blocking shot	2,540	1.6%	1,616	3.2%	4,156	1.9%
Attempting a slide tackle	2,251	1.4%	0	0.0%	2,251	1.1%
Other	2,985	1.8%	808	1.6%	3,793	1.8%
<b>Total</b>	<b>162,904</b>	<b>100%</b>	<b>51,065</b>	<b>100%</b>	<b>213,969</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, 2013-14 School Year**



## **VI. Volleyball Injury Epidemiology**



**Table 6.1 Volleyball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>175</b>	<b>175,911</b>	<b>0.99</b>	<b>45,144</b>
Competition	70	60,861	1.15	16,430
Practice	105	115,050	0.91	28,714

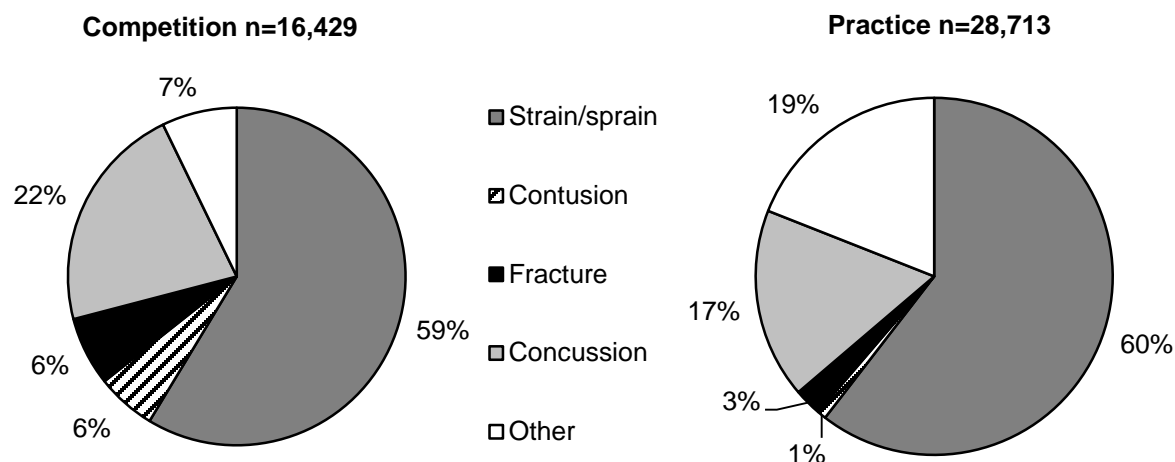
**Table 6.2 Demographic Characteristics of Injured Volleyball Athletes, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

<b>Year in School</b>	<b>n=44,900</b>
Freshman	37.8%
Sophomore	27.0%
Junior	17.3%
Senior	17.9%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.4 (1.1)
<b>BMI</b>	
Minimum	16.8
Maximum	34.5
Mean (St. Dev.)	21.8 (3.0)

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

<sup>†</sup>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, 2013-14 School Year**



**Table 6.3 Body Site of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Ankle	5,989	36.4%	7,604	26.5%	13,593	30.1%
Head/face	4,295	26.1%	5,008	17.4%	9,303	20.6%
Hand/wrist	1,736	10.6%	3,248	11.3%	4,984	11.0%
Knee	1,165	7.1%	4,037	14.1%	5,202	11.5%
Shoulder	1,547	9.6%	2,067	7.2%	3,641	8.1%
Trunk	444	2.7%	2,352	8.2%	2,796	6.2%
Arm/elbow	605	3.7%	1,645	5.7%	2,250	5.0%
Hip/thigh/upper leg	447	2.7%	1,750	6.1%	2,197	4.9%
Foot	0	0.0%	827	2.9%	827	1.8%
Other	176	1.1%	176	0.6%	352	0.8%
<b>Total</b>	<b>16,431</b>	<b>100%</b>	<b>28,714</b>	<b>100%</b>	<b>45,145</b>	<b>100%</b>

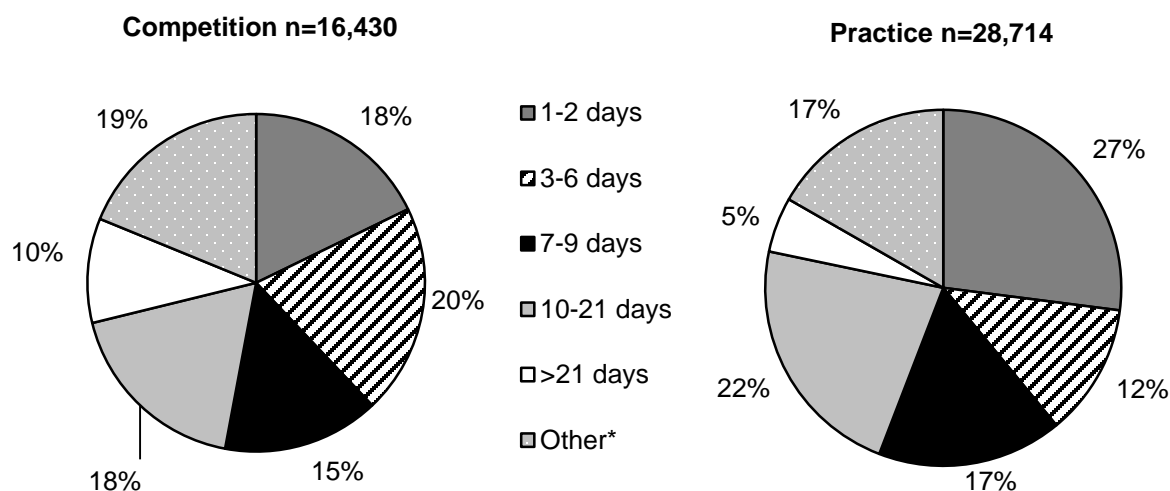
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 6.4 Ten Most Common Volleyball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition n=16,430		Practice n=28,714		Total n=45,144	
	n	%	n	%	n	%
<b>Diagnosis</b>						
Ankle strain/sprain	5,921	36.2%	7,604	26.5%	13,525	30.0%
Head/face concussion	3,597	22.0%	4,941	17.2%	8,538	18.9%
Hand/wrist strain/sprain	1,008	6.2%	1,961	6.8%	2,969	6.6%
Knee other	431	2.6%	2,399	8.4%	2,830	6.3%
Shoulder strain/sprain	1,243	7.6%	1,460	5.1%	2,703	6.0%
Trunk strain/sprain	444	2.7%	1,618	5.6%	2,062	4.6%
Knee strain/sprain	401	2.5%	1,638	5.7%	2,039	4.5%
Hip/thigh/upper leg strain/sprain	447	2.7%	1,574	5.5%	2,021	4.5%
Arm/elbow strain/sprain	0	0.0%	1,216	4.2%	1,216	2.7%
Shoulder other	330	2.0%	607	2.1%	937	2.1%

\* 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 6.2 Time Loss of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**



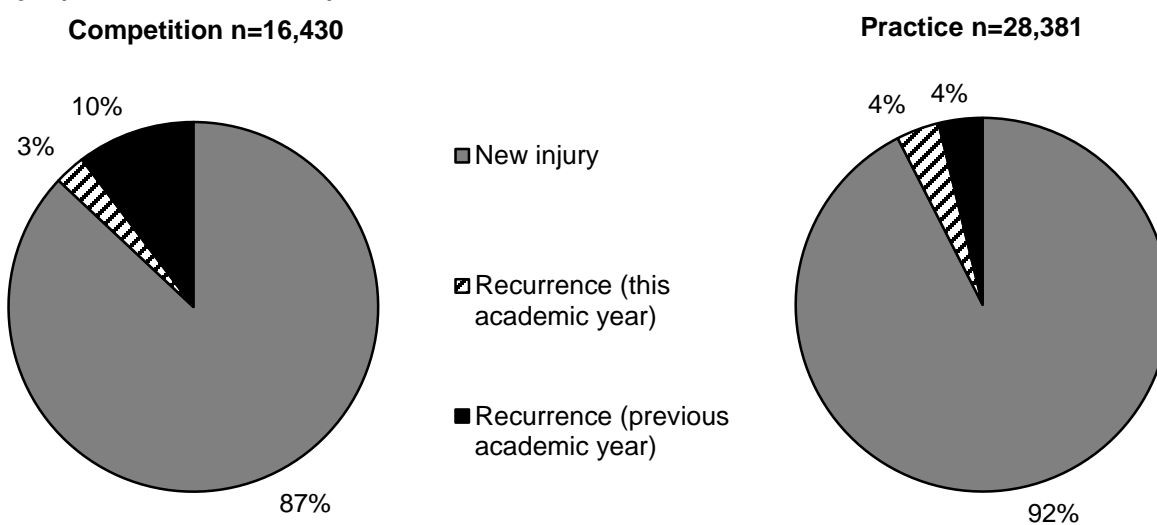
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 6.5 Volleyball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	499	3.1%	1,251	4.5%	1,750	4.0%
Did not require surgery	15,422	96.9%	26,577	95.5%	41,999	96.0%
<b>Total</b>	<b>15,921</b>	<b>100%</b>	<b>27,828</b>	<b>100%</b>	<b>43,749</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, 2013-14 School Year**



**Table 6.6 Time during Season of Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	8,170	18.1%
Regular season	36,366	80.6%
Post season	607	1.3%
<b>Total</b>	<b>45,144</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, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	3,967	26.1%
First set	1,982	13.1%
Second set	6,199	40.8%
Third set	2,701	17.8%
Fourth set	0	0.0%
Fifth set	333	2.2%
<b>Total</b>	<b>15,182</b>	<b>100%</b>
<b>Court Location</b>		
Middle forward	4,175	30.0%
Right forward	2,552	18.3%
At the net	2,197	15.8%
Left back	2,114	15.2%
Left forward	1,076	7.7%
Right back (server)	796	5.7%
Off the court	777	5.6%
Outside court (your side)	234	1.7%
Outside court (opponent's side)	0	0.0%
<b>Total</b>	<b>13,923</b>	<b>100%</b>

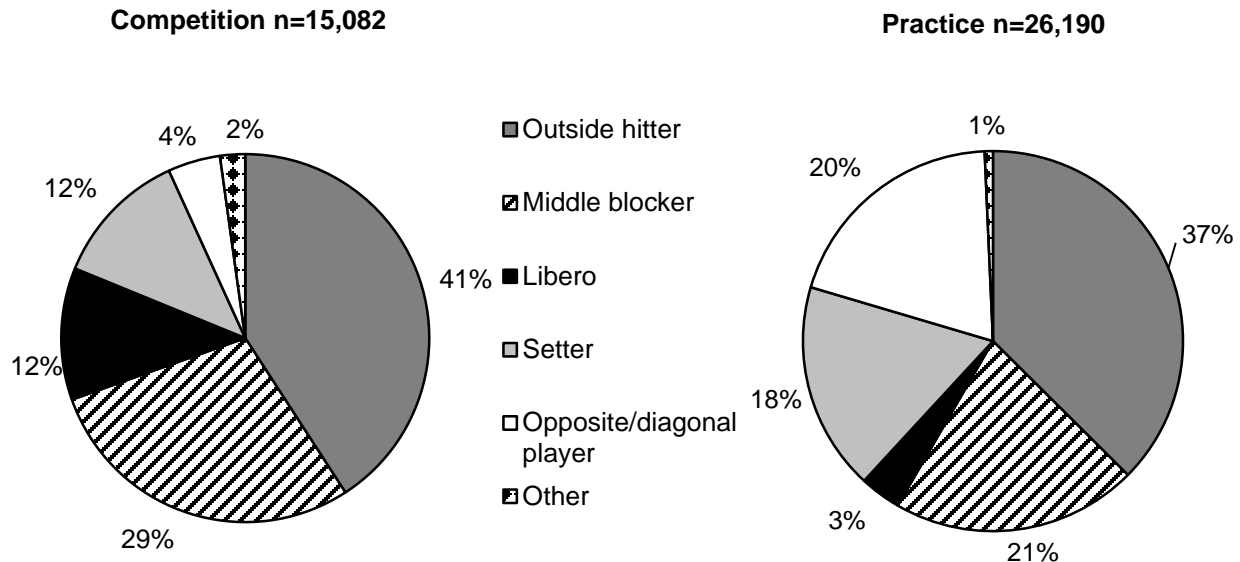
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 6.8 Practice-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	4,905	17.4%
Second 1/2 hour	6,607	23.5%
1-2 hours into practice	14,955	53.1%
>2 hours into practice	1,701	6.0%
<b>Total</b>	<b>28,168</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, 2013-14 School Year**

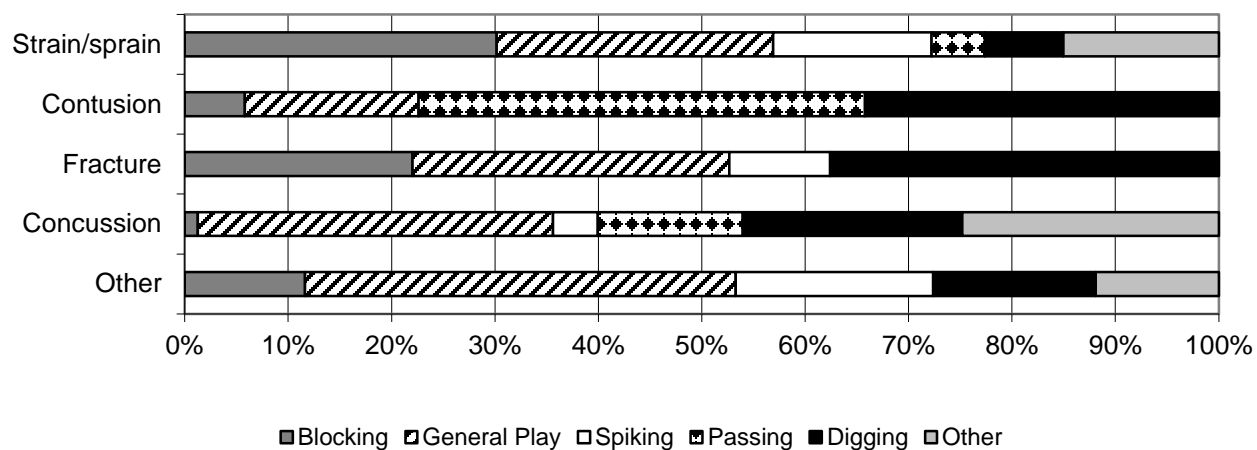


**Table 6.9 Activities Leading to Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	2,792	18.0%	10,351	36.8%	13,143	30.1%
Blocking	5,142	33.2%	4,194	14.9%	9,336	21.4%
Spiking	999	6.5%	4,796	17.0%	5,795	13.3%
Digging	2,345	15.1%	3,379	12.0%	5,724	13.1%
Serving	1,427	9.2%	1,725	6.1%	3,152	7.2%
Passing	1,179	7.6%	1,785	6.3%	2,964	6.8%
Setting	1,076	6.9%	777	2.8%	1,853	4.2%
Conditioning	0	0.0%	577	2.1%	577	1.3%
Other	525	3.4%	553	2.0%	1,078	2.5%
<b>Total</b>	<b>15,485</b>	<b>100%</b>	<b>28,137</b>	<b>100%</b>	<b>43,622</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, 2013-14 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, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>320</b>	<b>220,583</b>	<b>1.45</b>	<b>84,455</b>
Competition	164	68,217	2.40	42,504
Practice	156	152,366	1.02	41,951

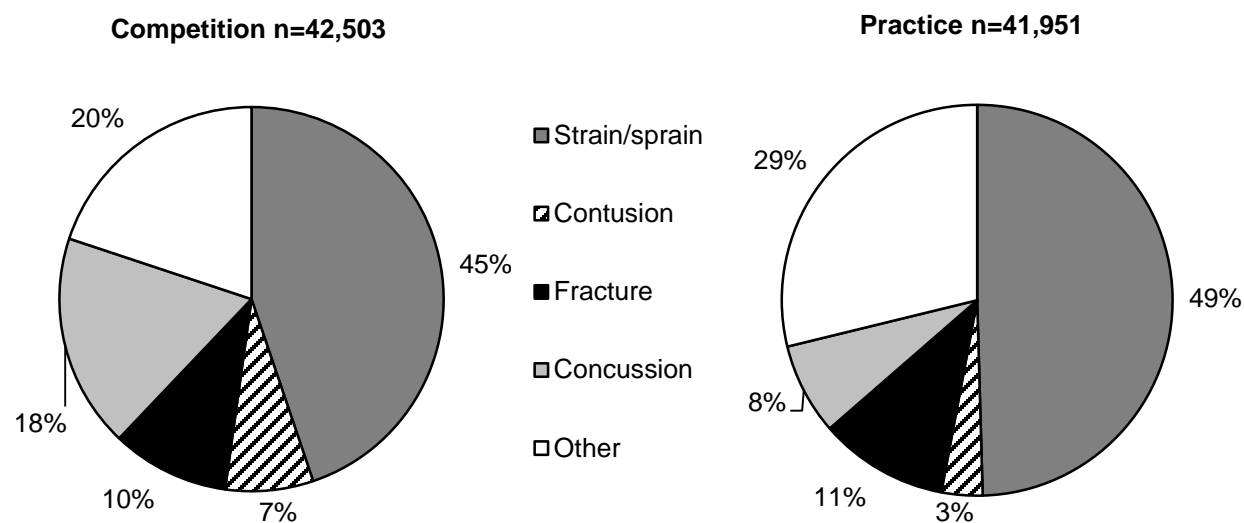
**Table 7.2 Demographic Characteristics of Injured Boys' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

<b>Year in School</b>	<b>n=83,436</b>
Freshman	23.8%
Sophomore	29.0%
Junior	22.3%
Senior	24.9%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	12
Maximum	18
Mean (St. Dev.)	15.9 (1.3)
<b>BMI</b>	
Minimum	16.6
Maximum	32.9
Mean (St. Dev.)	23.1 (3.1)

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

<sup>†</sup>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, 2013-14 School Year**



**Table 7.3 Body Site of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Ankle	13,321	31.3%	15,149	36.1%	28,470	33.7%
Head/face	11,558	27.2%	6,858	16.3%	18,416	21.8%
Knee	4,808	11.3%	5,922	14.1%	10,730	12.7%
Hand/wrist	3,386	8.0%	3,848	9.2%	7,234	8.6%
Arm/elbow	2,362	5.6%	1,920	4.6%	4,282	5.1%
Foot	1,659	3.9%	2,496	5.9%	4,155	4.9%
Hip/thigh/upper leg	1,593	3.7%	1,948	4.6%	3,541	4.2%
Lower leg	1,321	3.1%	1,231	2.9%	2,552	3.0%
Shoulder	1,789	4.2%	539	1.3%	2,328	2.8%
Trunk	294	0.7%	1,568	3.7%	1,862	2.2%
Neck	324	0.8%	0	0.0%	324	0.4%
Other	89	0.2%	471	1.1%	560	0.7%
<b>Total</b>	<b>42,504</b>	<b>100%</b>	<b>41,590</b>	<b>100%</b>	<b>84,454</b>	<b>100%</b>

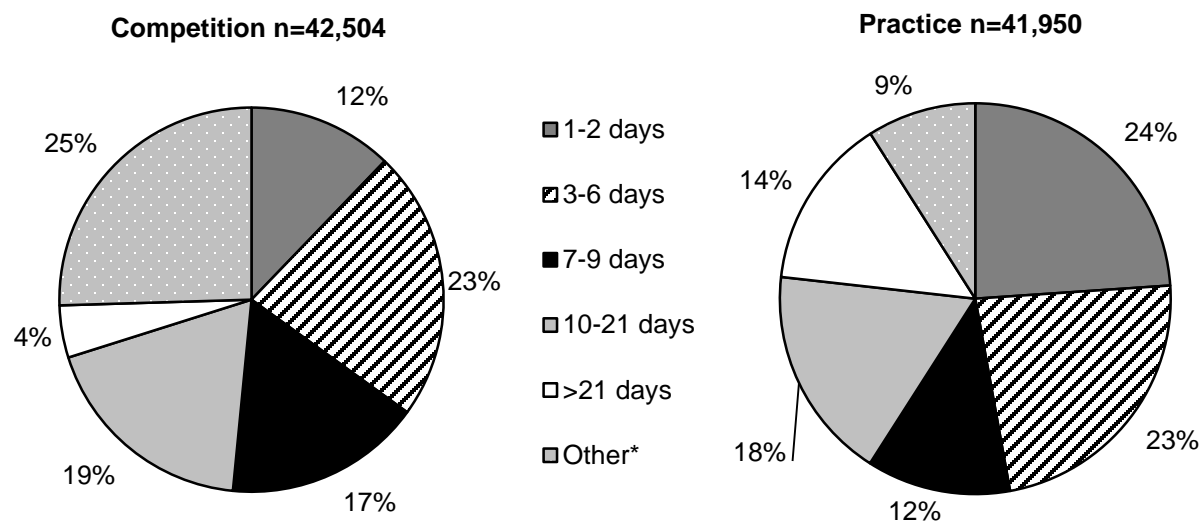
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 7.4 Ten Most Common Boys' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition n=42,502		Practice n=41,951		Total n=84,453	
	n	%	n	%	n	%
<b>Diagnosis</b>						
Ankle strain/sprain	11,842	27.9%	15,003	35.8%	26,845	31.8%
Head/face concussion	7,660	18.0%	3,190	7.6%	10,850	12.8%
Knee other	1,538	3.6%	4,063	9.7%	5,601	6.6%
Hand/wrist strain/sprain	1,991	4.7%	1,877	4.5%	3,868	4.6%
Head/face other	2,048	4.8%	1,790	4.3%	3,838	4.5%
Head/face fracture	1,849	4.4%	1,732	4.1%	3,581	4.2%
Arm/elbow other	1,619	3.8%	1,595	3.8%	3,214	3.8%
Knee strain/sprain	2,449	5.8%	714	1.7%	3,163	3.7%
Hip/thigh/upper leg strain/sprain	452	1.1%	1,802	4.3%	2,254	2.7%
Foot strain/sprain	1,030	2.4%	1,029	2.5%	2,059	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 7.2 Time Loss of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***



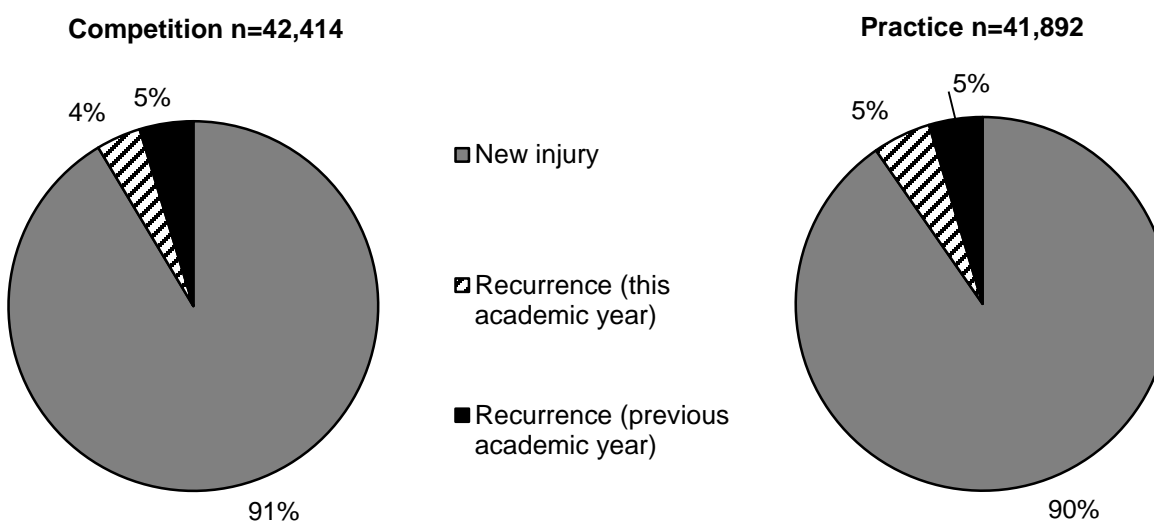
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 7.5 Boys' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	2,309	5.5%	3,903	9.4%	6,212	7.4%
Did not require surgery	39,840	94.5%	37,458	90.6%	77,298	92.6%
<b>Total</b>	<b>42,149</b>	<b>100%</b>	<b>41,361</b>	<b>100%</b>	<b>83,510</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, 2013-14 School Year**



**Table 7.6 Time during Season of Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	15,602	19.8%
Regular season	60,581	77.0%
Post season	2,525	3.2%
<b>Total</b>	<b>78,708</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, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	236	0.7%
First quarter	4,320	12.2%
Second quarter	9,502	26.8%
Third quarter	13,352	37.6%
Fourth quarter	8,080	22.8%
<b>Total</b>	<b>35,490</b>	<b>100%</b>
<b>Court Location</b>		
Inside lane (defense)	11,257	34.0%
Inside lane (offense)	9,912	29.9%
Between 3 point arc and lane (offense)	4,014	12.1%
Between 3 point arc and lane (defense)	3,030	9.1%
Outside 3 point arc – offense	2,735	8.3%
Outside 3 point arc – defense	883	2.7%
Backcourt	883	2.7%
Out of bounds /off the court	420	1.2%
<b>Total</b>	<b>33,134</b>	<b>100%</b>

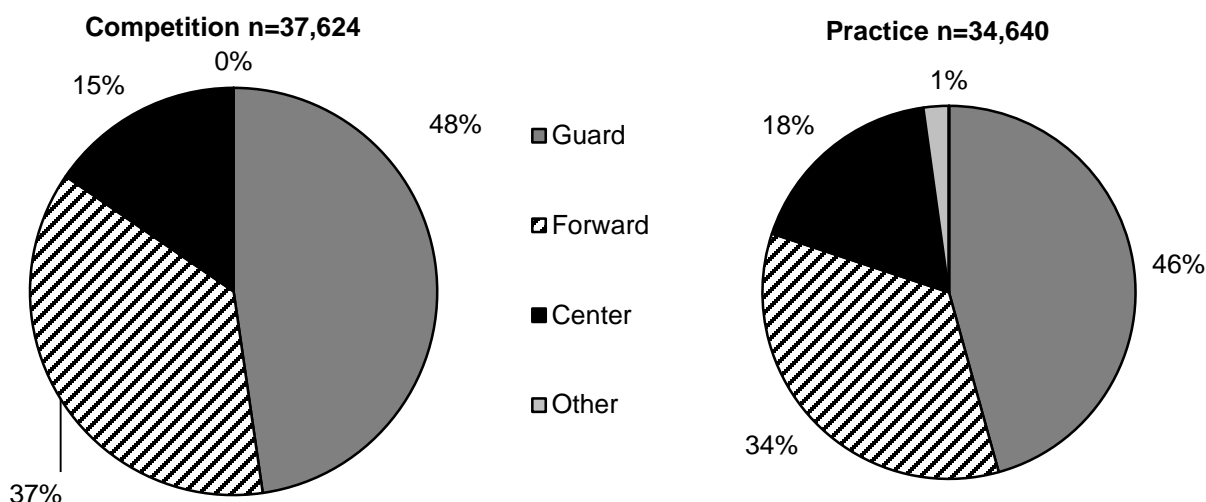
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 7.8 Practice-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	4,839	13.9%
Second 1/2 hour	6,667	19.2%
1-2 hours into practice	22,135	63.8%
>2 hours into practice	1,060	3.1%
<b>Total</b>	<b>34,700</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, 2013-14 School Year**

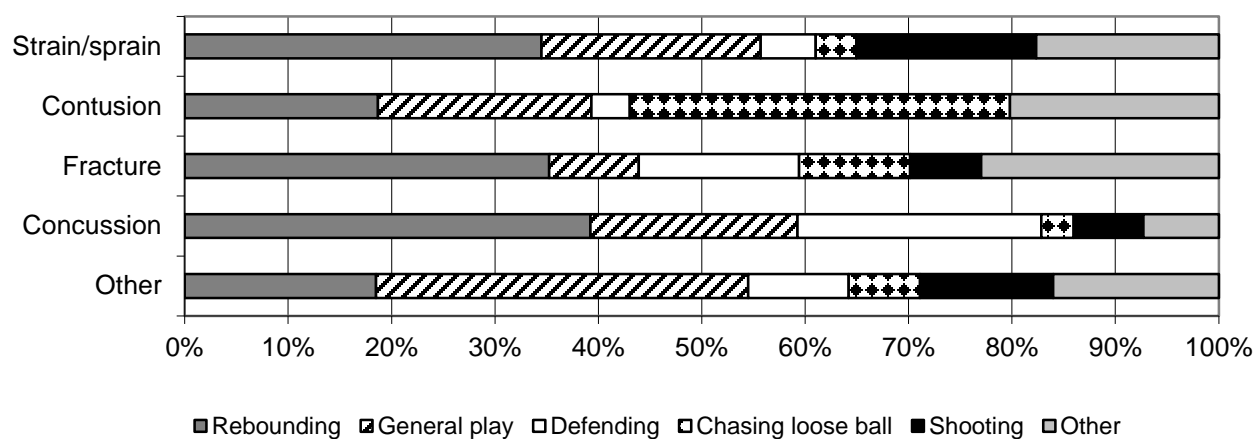


**Table 7.9 Activities Leading to Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Rebounding	14,196	38.1%	8,637	24.0%	22,833	31.2%
Defending	3,964	10.6%	3,281	9.1%	7,245	9.9%
General play	4,572	12.3%	11,870	33.0%	16,442	22.5%
Shooting	4,861	13.1%	4,491	12.5%	9,352	12.8%
Chasing loose ball	3,532	9.5%	1,590	4.4%	5,122	7.0%
Ball handling/dribbling	3,564	9.6%	1,298	3.6%	4,862	6.6%
Receiving pass	1,505	4.0%	2,466	6.9%	3,971	5.4%
Conditioning	0	0.0%	1,547	4.3%	1,547	2.1%
Screening	0	0.0%	147	0.4%	147	0.2%
Other	1,030	2.8%	598	1.7%	1,628	2.2%
<b>Total</b>	<b>37,224</b>	<b>100%</b>	<b>35,925</b>	<b>100%</b>	<b>73,149</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, 2013-14 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, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>328</b>	<b>174,554</b>	<b>1.88</b>	<b>89,451</b>
Competition	198	54,125	3.66	50,864
Practice	130	120,429	1.08	38,587

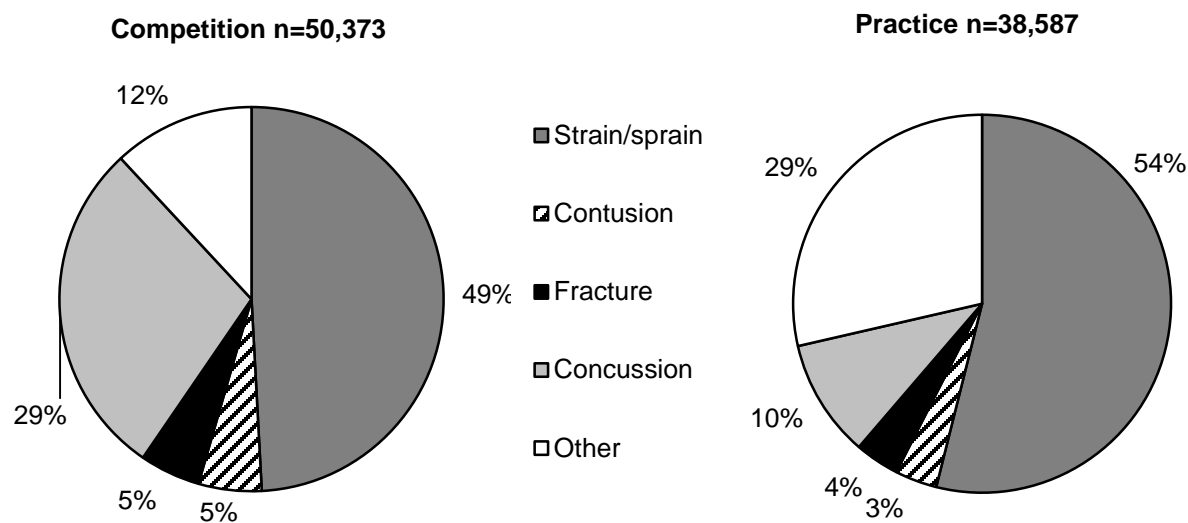
**Table 8.2 Demographic Characteristics of Injured Girls' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

<b>Year in School</b>	
Freshman	33.2%
Sophomore	26.8%
Junior	25.9%
Senior	14.1%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.5 (1.2)
<b>BMI</b>	
Minimum	15.2
Maximum	35.5
Mean (St. Dev.)	22.3 (3.3)

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

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

**Figure 8.1 Diagnosis of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**



**Table 8.3 Body Site of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Ankle	13,106	25.8%	10,356	26.8%	23,462	26.2%
Head/face	16,982	33.4%	5,170	13.4%	22,152	24.8%
Knee	10,357	20.4%	7,649	19.8%	18,006	20.1%
Hand/wrist	3,825	7.5%	3,477	9.0%	7,302	8.2%
Lower leg	0	0.0%	5,027	13.0%	5,027	5.6%
Hip/thigh/upper leg	1,643	3.2%	3,258	8.4%	4,901	5.5%
Trunk	2,295	4.5%	1,117	3.1%	3,472	3.9%
Shoulder	1,277	2.5%	939	2.4%	2,216	2.5%
Arm/elbow	640	1.3%	65	0.2%	705	0.8%
Foot	476	0.9%	0	0.0%	476	0.5%
Neck	262	0.5%	0	0.0%	262	0.3%
Other	0	0.0%	1,469	3.8%	1,469	1.6%
<b>Total</b>	<b>50,863</b>	<b>100%</b>	<b>38,587</b>	<b>100%</b>	<b>89,450</b>	<b>100%</b>

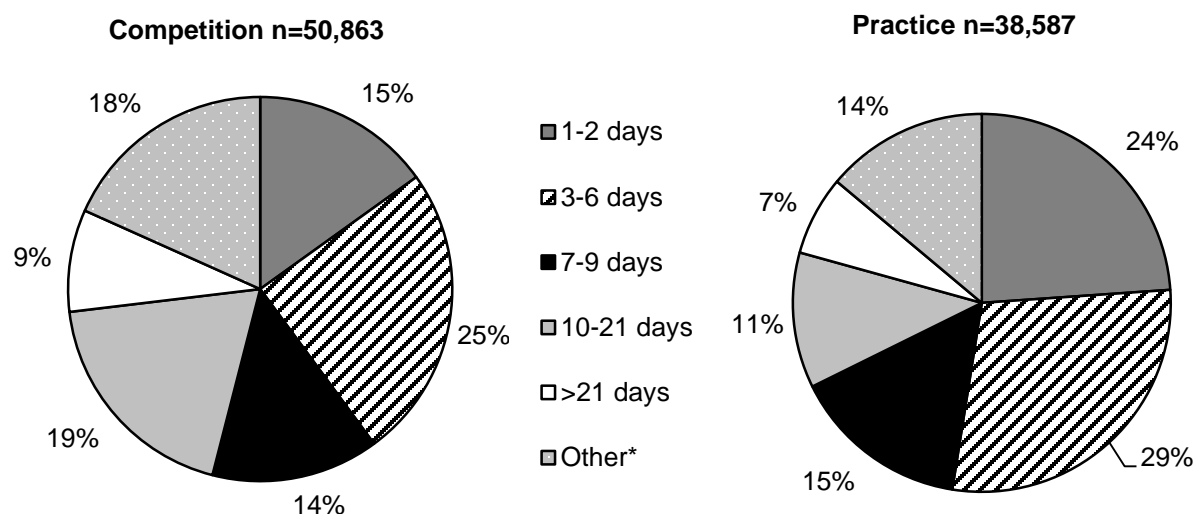
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 8.4 Ten Most Common Girls' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition n=50,372		Practice n=38,586		Total n=88,958	
	n	%	n	%	n	%
<b>Diagnosis</b>						
Ankle strain/sprain	12,844	25.5%	10,356	26.8%	23,200	26.1%
Head/face concussion	14,368	28.5%	3,891	10.1%	18,259	20.5%
Knee strain/sprain	5,662	11.2%	2,994	7.8%	8,656	9.7%
Knee other	3,506	7.0%	4,215	10.9%	7,721	8.7%
Hand/wrist strain/sprain	2,752	5.5%	2,019	5.2%	4,771	5.4%
Hip/thigh/upper leg strain/sprain	1,151	2.3%	3,258	8.4%	4,409	5.0%
Lower leg other	0	0.0%	3,610	9.4%	3,610	4.1%
Hand/wrist fracture	925	1.8%	1,458	3.8%	2,383	2.7%
Head/face other	966	1.9%	489	1.3%	1,455	1.6%
Lower leg strain/sprain	0	0.0%	1,416	3.7%	1,416	1.6%

\* 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 8.2 Time Loss of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**



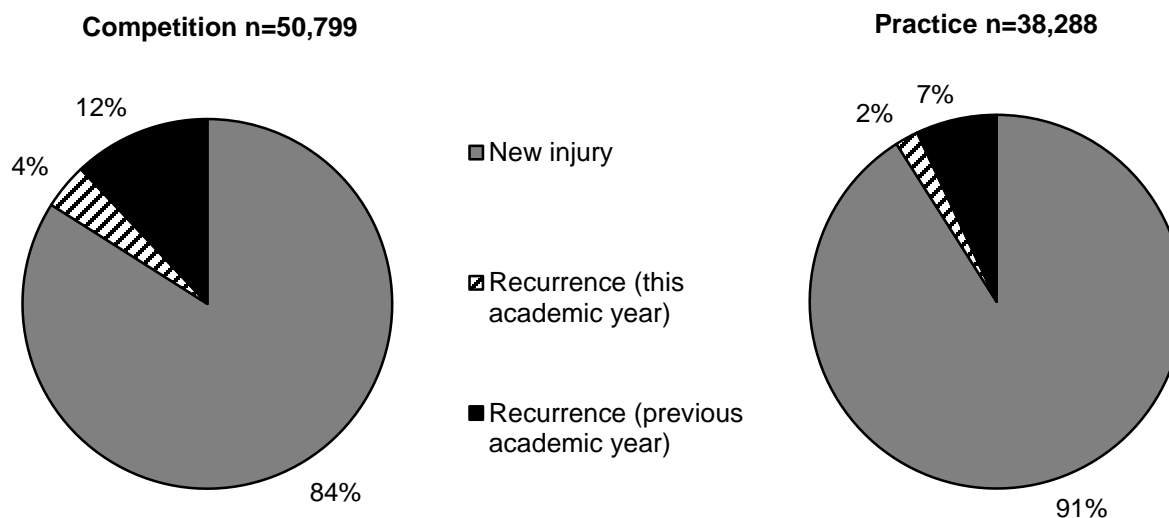
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 8.5 Girls' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	4,980	9.8%	3,292	8.7%	8,272	9.3%
Did not require surgery	45,622	90.2%	34,697	91.3%	80,319	90.7%
<b>Total</b>	<b>50,602</b>	<b>100%</b>	<b>37,989</b>	<b>100%</b>	<b>88,591</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, 2013-14 School Year**



**Table 8.6 Time during Season of Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	12,932	16.3%
Regular season	63,696	80.2%
Post season	2,821	3.6%
<b>Total</b>	<b>79,449</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, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	1,194	3.0%
First quarter	3,653	9.2%
Second quarter	12,126	30.4%
Third quarter	13,404	33.6%
Fourth quarter	9,549	23.9%
<b>Total</b>	<b>39,926</b>	<b>100%</b>
<b>Court Location</b>		
Inside lane (defense)	11,736	30.9%
Inside lane (offense)	7,798	20.5%
Between 3 point arc and lane (defense)	6,060	15.9%
Between 3 point arc and lane (offense)	3,969	10.4%
Outside 3 point arc – offense	3,846	10.1%
Outside 3 point arc – defense	2,743	7.2%
Backcourt	1,179	3.1%
Out of bounds / off the court	695	1.9%
<b>Total</b>	<b>38,025</b>	<b>100%</b>

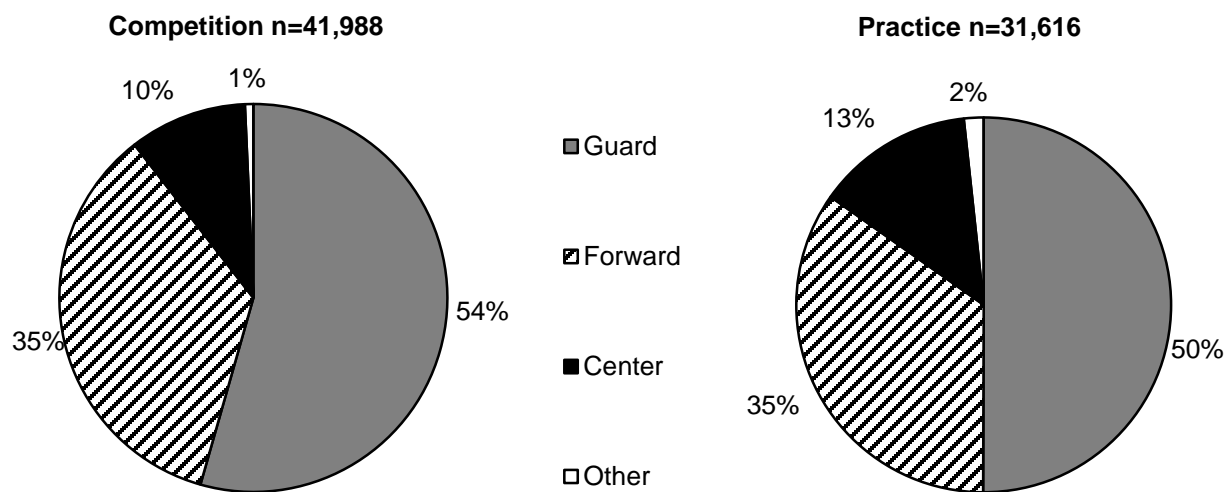
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 8.8 Practice-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	6,422	21.1%
Second 1/2 hour	7,605	24.9%
1-2 hours into practice	14,634	48.0%
>2 hours into practice	1,837	6.0%
<b>Total</b>	<b>30,498</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, 2013-14 School Year**

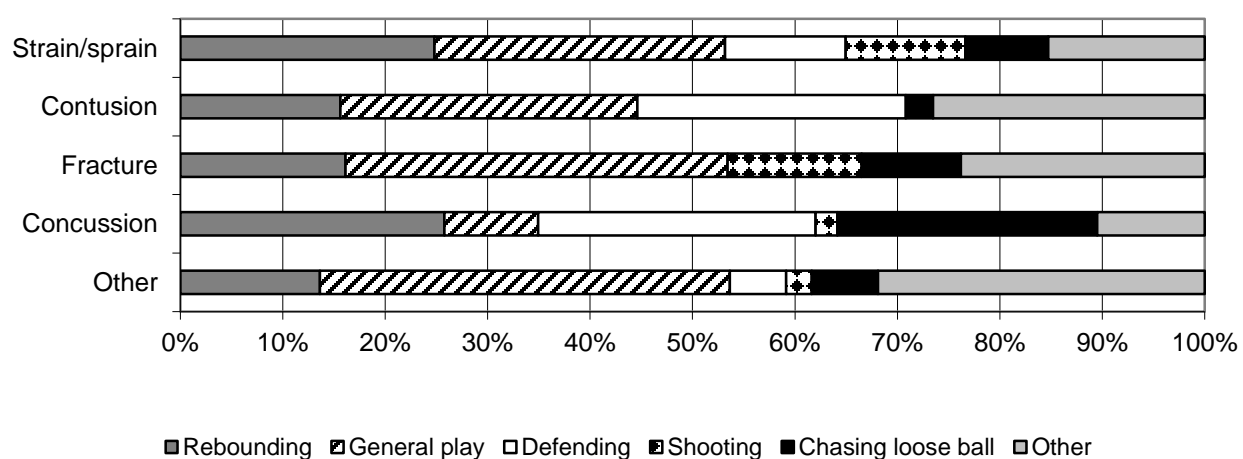


**Table 8.9 Activities Leading to Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
General play	7,264	16.9%	12,992	41.6%	20,256	27.3%
Rebounding	11,434	26.6%	4,891	15.6%	16,325	22.0%
Defending	7,586	17.6%	2,822	9.0%	10,408	14.0%
Chasing loose ball	7,193	16.7%	1,180	3.8%	8,373	11.3%
Ball handling/dribbling	3,440	8.0%	2,283	7.3%	5,723	7.7%
Shooting	3,479	8.1%	2,022	6.5%	5,501	7.4%
Receiving pass	1,131	2.6%	1,161	3.7%	2,282	3.1%
Conditioning	0	0.0%	2,737	8.8%	2,737	3.7%
Passing	262	0.6%	526	1.7%	788	1.1%
Screening	100	0.2%	0	0.0%	100	0.1%
Other	1,165	2.7%	639	2.0%	1,804	2.4%
<b>Total</b>	<b>43,054</b>	<b>100%</b>	<b>31,253</b>	<b>100%</b>	<b>74,307</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, 2013-14 School Year**



## **IX. Wrestling Injury Epidemiology**



**Table 9.1 Wrestling Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>341</b>	<b>137,303</b>	<b>2.48</b>	<b>91,203</b>
Competition	144	36,452	3.95	39,378
Practice	197	100,851	1.95	51,825

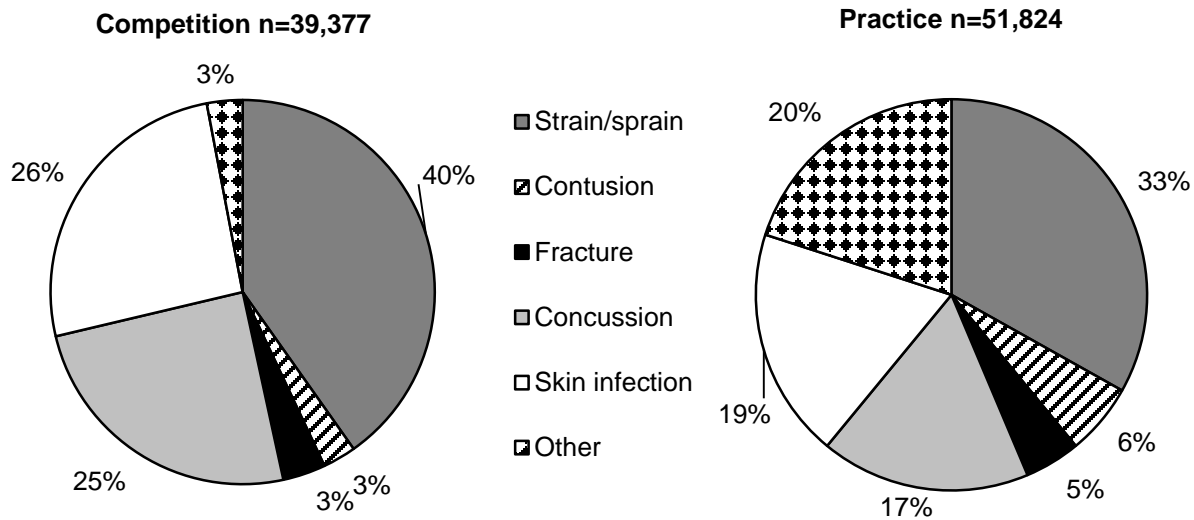
**Table 9.2 Demographic Characteristics of Injured Wrestlers, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

<b>Year in School</b>	<b>n=89,844</b>
Freshman	22.5%
Sophomore	24.3%
Junior	26.5%
Senior	26.7%
<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	10.7
Maximum	49.3
Mean (St. Dev.)	23.7 (4.5)

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

<sup>†</sup>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, 2013-14 School Year**



**Table 9.3 Body Site of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Head/face	12,484	31.7%	15,800	30.5%	28,284	31.0%
Knee	6,460	16.4%	6,312	12.2%	12,772	14.0%
Shoulder	6,686	17.0%	6,696	12.9%	13,382	14.7%
Trunk	1,034	2.6%	5,775	11.1%	6,809	7.5%
Arm/elbow	5,149	13.1%	5,141	9.9%	10,290	11.3%
Ankle	1,868	4.7%	2,715	5.2%	4,583	5.0%
Hand/wrist	1,213	3.1%	3,846	7.4%	5,059	5.5%
Neck	144	0.4%	735	1.4%	879	1.0%
Hip/thigh/upper leg	1,706	4.3%	1,247	2.4%	2,953	3.2%
Lower leg	349	0.9%	2,358	4.5%	2,707	3.0%
Foot	1,060	2.7%	493	1.0%	1,553	1.7%
Other	1,224	3.1%	707	1.4%	1,931	2.1%
<b>Total</b>	<b>39,377</b>	<b>100%</b>	<b>51,825</b>	<b>100%</b>	<b>91,202</b>	<b>100%</b>

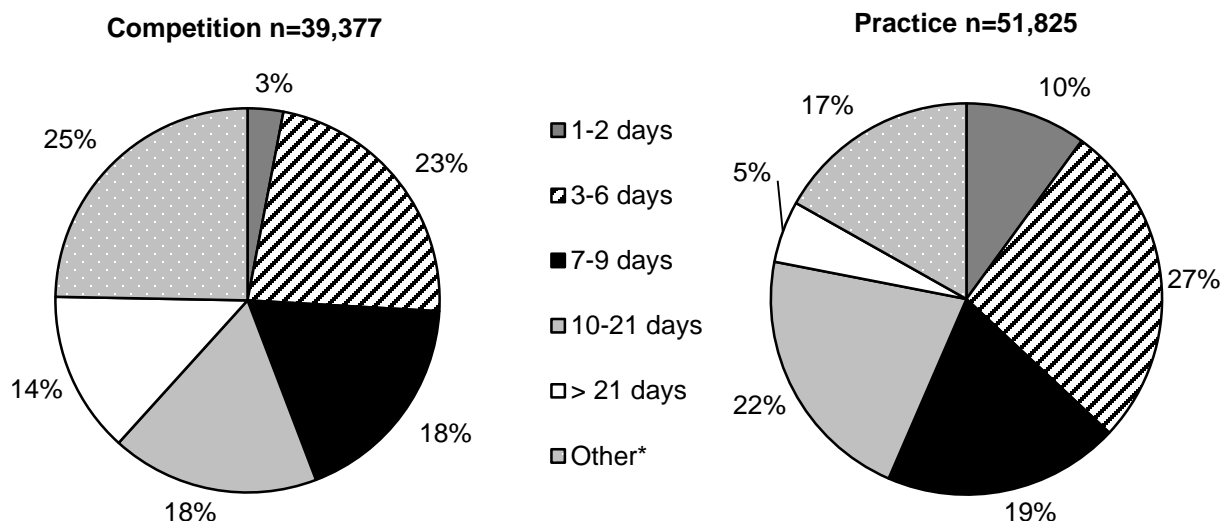
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 9.4 Ten Most Common Wrestling Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition n=39,375		Practice n=51,823		Total n=91,198	
	n	%	n	%	n	%
<b>Diagnosis</b>						
Head/face concussion	9,721	24.7%	8,981	17.3%	18,702	20.5%
Knee strain/sprain	5,450	13.8%	1,664	3.2%	7,114	7.8%
Shoulder strain/sprain	2,572	6.5%	4,127	8.0%	6,699	7.3%
Shoulder skin infection	3,765	9.6%	2,569	5.0%	6,334	6.9%
Head/face other	899	2.3%	4,792	9.2%	5,691	6.2%
Knee skin infection	788	2.0%	4,081	7.9%	4,869	5.3%
Arm/elbow strain/sprain	3,247	8.2%	1,517	2.9%	4,764	5.2%
Ankle strain/sprain	1,868	4.7%	2,715	5.2%	4,583	5.0%
Trunk strain/sprain	144	0.4%	3,665	7.1%	3,809	4.2%
Arm/elbow other	211	0.5%	2,574	5.0%	2,785	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 9.2 Time Loss of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**



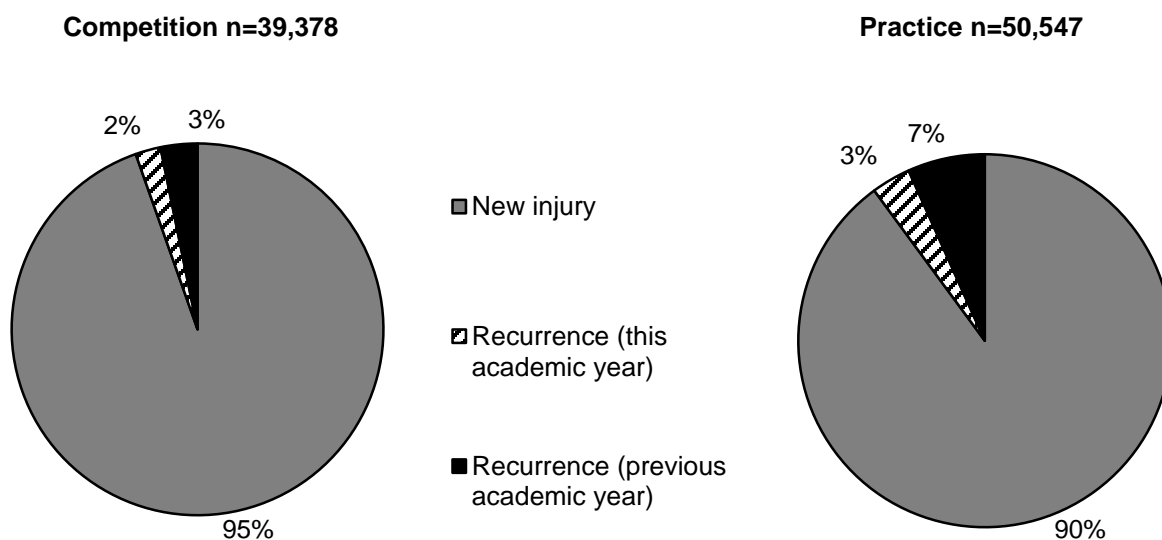
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 9.5 Wrestling Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	3,672	9.5%	2,455	4.8%	6,127	6.8%
Did not require surgery	34,832	90.5%	49,125	95.2%	83,957	93.2%
<b>Total</b>	<b>38,504</b>	<b>100%</b>	<b>51,580</b>	<b>100%</b>	<b>90,084</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, 2013-14 School Year**



**Table 9.6 Time during Season of Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	14,610	17.5%
Regular season	63,884	76.7%
Post season	4,776	5.7%
<b>Total</b>	<b>83,271</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, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	614	1.9%
First period	5,612	17.3%
Second period	17,815	54.9%
Third period	8,421	25.9%
<b>Total</b>	<b>32,463</b>	<b>100%</b>
<b>Mat Location</b>		
Within 28 ft. circle	66,034	90.3%
Off the mat	4,286	5.9%
Out of bounds	2,839	3.9%
<b>Total</b>	<b>73,159</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, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	6,938	17.2%
Second 1/2 hour	9,739	24.2%
1-2 hours into practice	16,837	41.9%
>2 hours into practice	6,708	16.7%
<b>Total</b>	<b>40,221</b>	<b>100%</b>

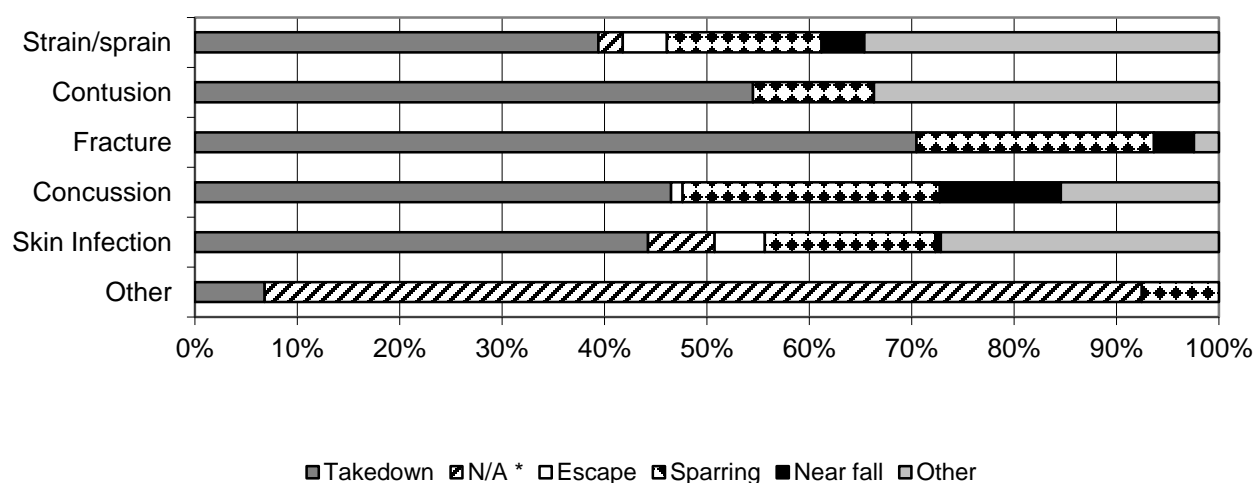
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 9.9 Activities Leading to Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Takedown	17,030	48.4%	13,326	32.0%	30,356	39.5%
Sparring	4,437	12.6%	8,451	20.3%	12,888	16.8%
N/A (e.g., skin infection, overuse, etc.)	2,174	6.2%	8,651	20.8%	10,825	14.1%
Conditioning	0	0.0%	3,946	9.5%	3,946	5.1%
Riding	2,346	6.7%	1,426	3.4%	3,772	4.9%
Near fall	2,845	8.1%	435	1.0%	3,280	4.3%
Fall	1,639	4.7%	1,543	3.7%	3,182	4.1%
Escape	1,205	3.4%	933	2.2%	2,138	2.8%
Reversal	1,061	3.0%	1,072	2.6%	2,133	2.8%
Other	2,443	6.9%	1,889	4.5%	4,332	5.6%
<b>Total</b>	<b>35,180</b>	<b>100%</b>	<b>41,672</b>	<b>100%</b>	<b>76,852</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, 2013-14 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, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>188</b>	<b>187,034</b>	<b>1.01</b>	<b>62,493</b>
Competition	112	66,805	1.68	37,682
Practice	76	120,229	0.63	24,811

**Table 10.2 Demographic Characteristics of Injured Baseball Athletes, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

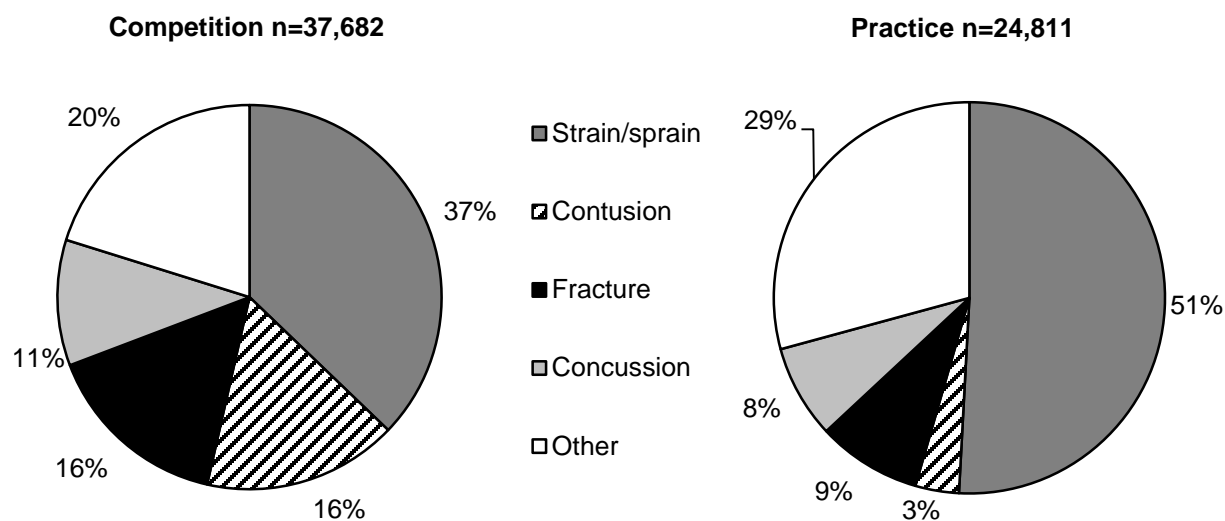
<b>Year in School</b>	<b>n=62,102</b>
Freshman	21.5%
Sophomore	27.9%
Junior	20.3%
Senior	30.3%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	14
Maximum	18
Mean (St. Dev.)	16.0 (1.2)
<b>BMI</b>	
Minimum	17.2
Maximum	41.9
Mean (St. Dev.)	24.6 (3.9)

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

<sup>†</sup>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, 2013-14 School Year**



**Table 10.3 Body Site of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Head/face	7,037	18.7%	4,020	16.2%	11,057	17.7%
Hand/wrist	8,495	22.5%	1,927	7.8%	10,422	16.7%
Ankle	3,081	8.2%	4,987	20.1%	8,068	12.9%
Shoulder	1,226	3.3%	6,778	27.3%	8,004	12.8%
Hip/thigh/upper leg	5,202	13.8%	1,888	7.6%	7,090	11.3%
Arm/elbow	3,814	10.1%	1,864	7.5%	5,678	9.1%
Knee	4,996	13.3%	654	2.6%	5,650	9.0%
Lower leg	1,728	4.6%	1,528	6.2%	3,256	5.2%
Trunk	1,313	3.5%	420	1.7%	1,733	2.8%
Foot	790	2.1%	0	0.0%	790	1.3%
Neck	0	0.0%	744	3.0%	744	1.2%
<b>Total</b>	<b>37,682</b>	<b>100%</b>	<b>24,810</b>	<b>100%</b>	<b>62,492</b>	<b>100%</b>

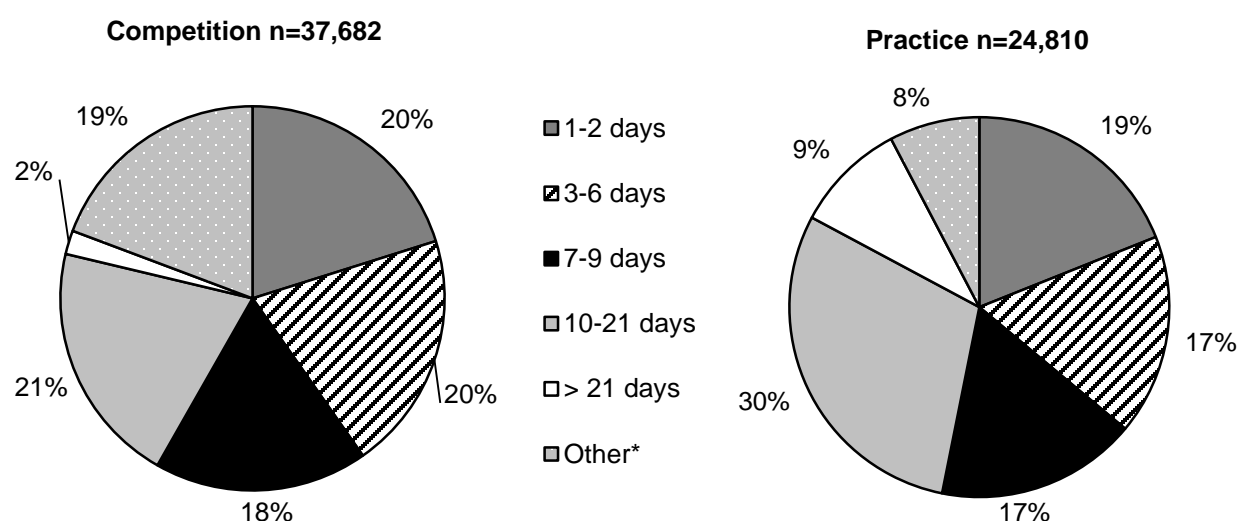
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 10.4 Ten Most Common Baseball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Diagnosis	Competition n=37,682		Practice n=24,812		Total n=62,494	
	n	%	n	%	n	%
Ankle strain/sprain	3,081	8.2%	4,596	18.5%	7,677	12.3%
Head/face concussion	4,002	10.6%	1,920	7.7%	5,922	9.5%
Hip/thigh/upper leg strain/sprain	4,033	10.7%	1,700	6.9%	5,733	9.2%
Hand/wrist fracture	3,379	9.0%	809	3.3%	4,188	6.7%
Shoulder other	835	2.2%	3,028	12.2%	3,863	6.2%
Shoulder strain/sprain	0	0.0%	3,749	15.1%	3,749	6.0%
Arm/elbow strain/sprain	2,273	6.0%	604	2.4%	2,877	4.6%
Hand/wrist other	2,424	6.4%	254	1.0%	2,678	4.3%
Knee strain/sprain	2,067	5.5%	391	1.6%	2,458	3.9%
Arm/elbow other	795	2.1%	1,261	5.1%	2,056	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 10.2 Time Loss of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**



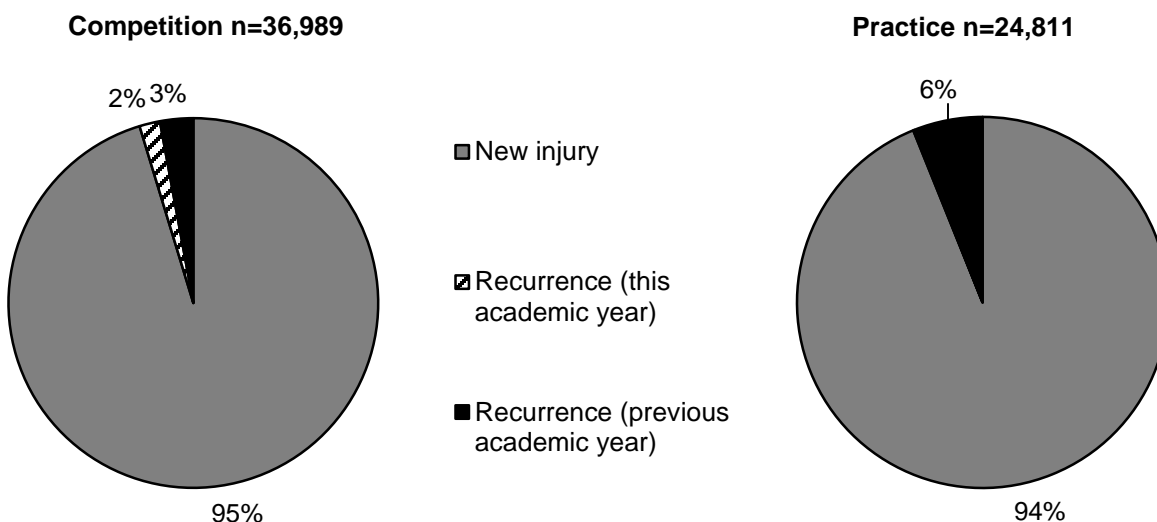
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 10.5 Baseball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	3,030	8.1%	719	3.0%	3,749	6.1%
Did not require surgery	34,308	91.9%	23,348	97.0%	57,656	93.9%
<b>Total</b>	<b>37,338</b>	<b>100%</b>	<b>24,067</b>	<b>100%</b>	<b>61,405</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, 2013-14 School Year**



**Table 10.6 Time during Season of Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	11,918	20.3%
Regular season	43,940	74.8%
Post season	2,916	5.0%
<b>Total</b>	<b>58,774</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.

**Table 10.7 Competition-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	2,320	6.9%
First inning	3,037	9.1%
Second inning	3,055	9.1%
Third inning	5,654	16.9%
Fourth inning	10,220	30.5%
Fifth inning	4,369	13.0%
Sixth inning	3,524	10.5%
Seventh inning	1,140	3.4%
Extra innings	188	0.6%
<b>Total</b>	<b>33,508</b>	<b>100%</b>
<b>Field Location</b>		
Home plate	11,308	33.0%
Second base	5,718	16.7%
First base	5,577	16.3%
Outfield	4,030	11.7%
Third base	3,452	10.1%
Pitcher's mound	2,127	6.2%
Foul territory	835	2.4%
Infield	482	1.4%
Other	785	2.3%
<b>Total</b>	<b>34,314</b>	<b>100%</b>

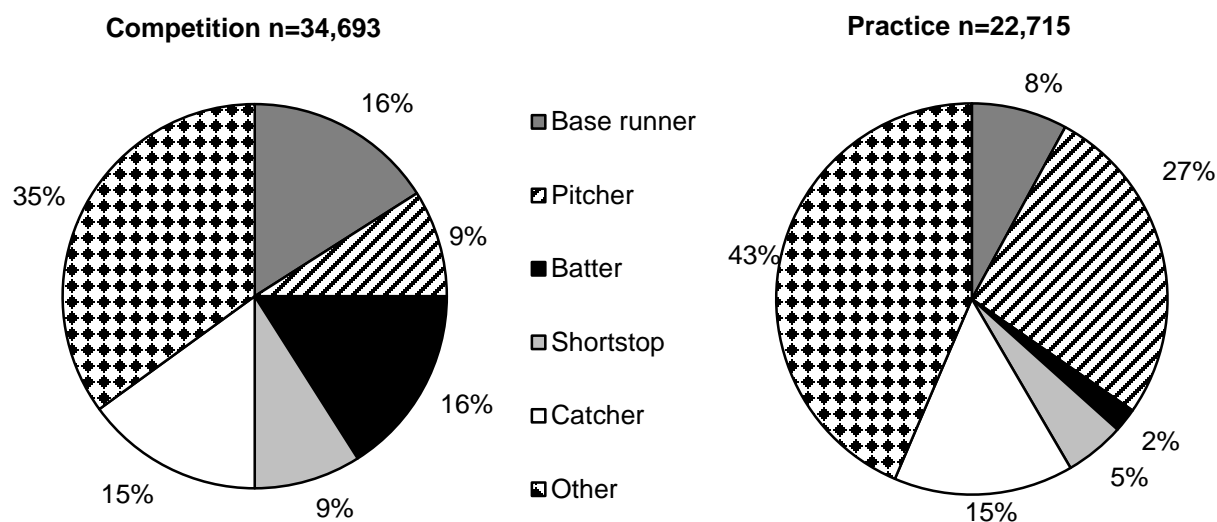
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 10.8 Practice-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	1,214	5.4%
Second 1/2 hour	5,513	24.6%
1-2 hours into practice	13,960	62.2%
>2 hours into practice	1,769	7.9%
<b>Total</b>	<b>22,456</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, 2013-14 School Year**

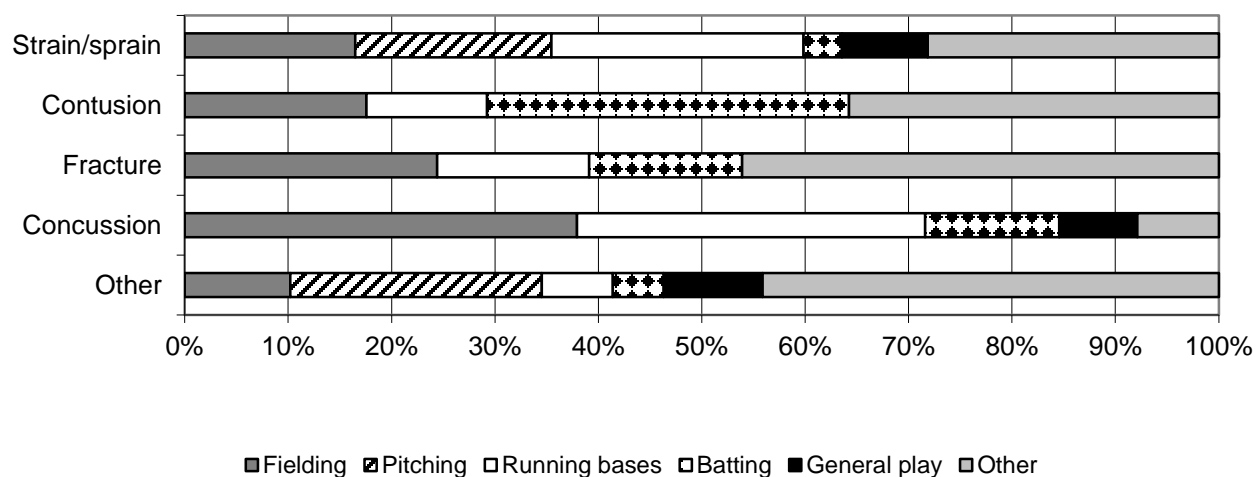


**Table 10.9 Activities Leading to Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Running bases	7,957	22.7%	2,614	11.2%	10,571	18.1%
Fielding a batted ball	3,917	11.2%	5,073	21.7%	8,990	15.4%
Pitching	2,598	7.4%	5,380	23.1%	7,978	13.7%
Batting	5,161	14.7%	764	3.3%	5,925	10.1%
Sliding	5,563	15.9%	92	0.4%	5,655	9.7%
Throwing (not pitching)	1,741	5.0%	3,270	14.0%	5,011	8.6%
General play	1,658	4.7%	2,066	8.9%	3,724	6.4%
Catching	2,504	7.1%	1,172	5.0%	3,676	6.3%
Conditioning	0	0.0%	1,833	7.9%	1,833	3.1%
Fielding a thrown ball	907	2.6%	671	2.9%	1,578	2.7%
Other	3,053	8.7%	391	1.7%	3,444	5.9%
<b>Total</b>	<b>35,059</b>	<b>100%</b>	<b>23,326</b>	<b>100%</b>	<b>58,385</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, 2013-14 School Year**



## **XI. Softball Injury Epidemiology**

**Table 11.1 Softball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**

	# Injuries	# Exposures	Injury rate (per 1,000 athlete- exposures)	Nationally Estimated # Injuries
<b>Total</b>	<b>132</b>	<b>133,736</b>	<b>0.99</b>	<b>53,649</b>
Competition	50	45,854	1.09	21,096
Practice	82	87,882	0.93	32,553

**Table 11.2 Demographic Characteristics of Injured Softball Athletes, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

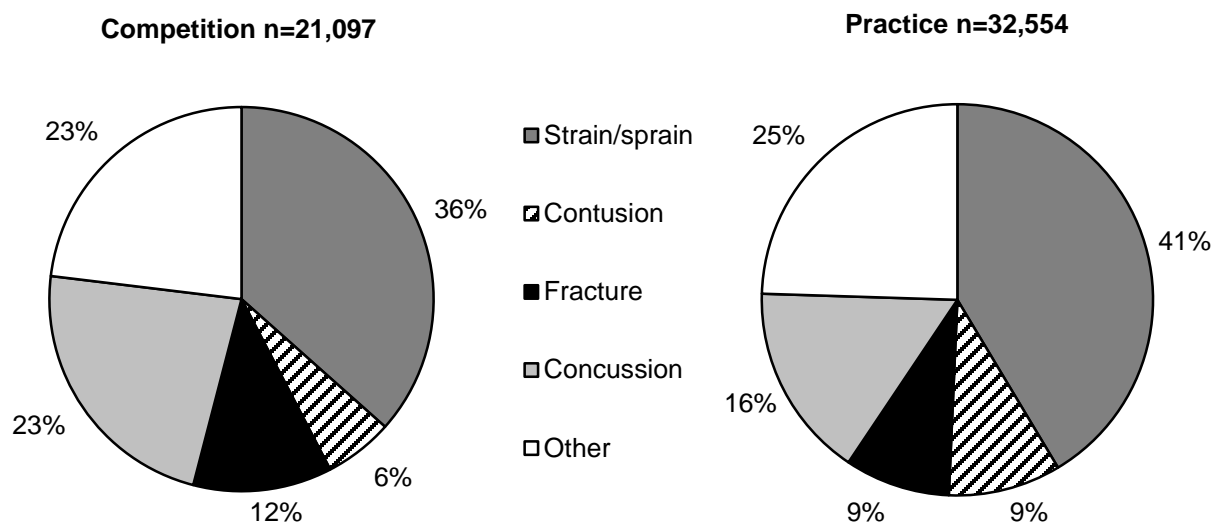
<b>Year in School</b>	<b>n=52,508</b>
Freshman	20.8%
Sophomore	30.9%
Junior	30.3%
Senior	18.0%
<b>Total<sup>†</sup></b>	<b>100%</b>
<b>Age (years)</b>	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.9 (1.2)
<b>BMI</b>	
Minimum	15.0
Maximum	42.7
Mean (St. Dev.)	23.5 (4.5)

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

<sup>†</sup>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, 2013-14 School Year**



**Table 11.3 Body Site of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Body Site</b>						
Head/face	7,344	34.8%	7,253	22.3%	14,597	27.2%
Ankle	3,242	15.4%	5,778	17.7%	9,020	16.8%
Knee	3,076	14.6%	2,866	8.8%	5,942	11.1%
Shoulder	819	3.9%	4,826	14.8%	5,645	10.5%
Hand/wrist	1,600	7.6%	3,989	12.3%	5,589	10.4%
Arm/elbow	153	0.7%	1,163	3.6%	1,316	2.5%
Lower leg	1,799	8.5%	1,300	4.0%	3,099	5.8%
Hip/thigh/upper leg	3,063	14.5%	2,732	8.4%	5,795	10.8%
Trunk	0	0.0%	2,263	7.0%	2,263	4.2%
Foot	0	0.0%	383	1.2%	383	0.7%
<b>Total</b>	<b>21,096</b>	<b>100%</b>	<b>32,553</b>	<b>100%</b>	<b>53,649</b>	<b>100%</b>

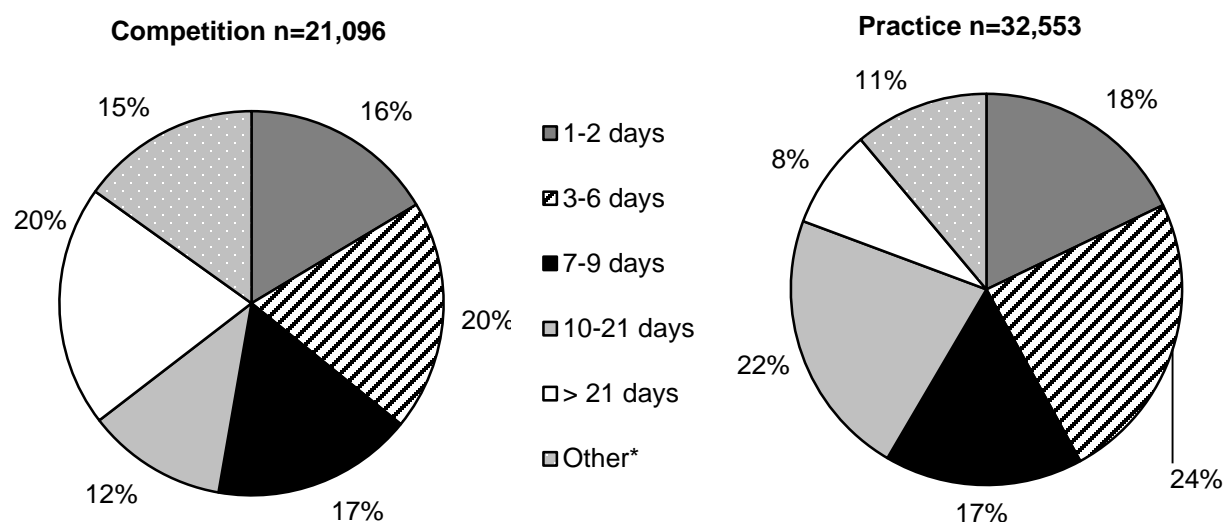
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 11.4 Ten Most Common Softball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Diagnosis	Competition n=21,095		Practice n=32,554		Total n=53,649	
	n	%	n	%	n	%
Head/face concussion	4,825	22.9%	5,233	16.1%	10,058	18.7%
Ankle strain/sprain	2,958	14.0%	4,992	15.3%	7,950	14.8%
Hip/thigh/upper leg strain/sprain	2,788	13.2%	1,438	4.4%	4,226	7.9%
Hand/wrist fracture	1,600	7.6%	1,852	5.7%	3,452	6.4%
Knee strain/sprain	1,696	8.0%	1,658	5.1%	3,354	6.3%
Shoulder other	536	2.5%	2,492	7.7%	3,028	5.6%
Shoulder strain/sprain	283	1.3%	2,334	7.2%	2,617	4.9%
Knee other	1,313	6.2%	1,208	3.7%	2,521	4.7%
Lower leg other	1,647	7.8%	764	2.3%	2,411	4.5%
Head/face other	1,371	6.2%	551	1.7%	1,922	3.6%

\* 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 11.2 Time Loss of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**



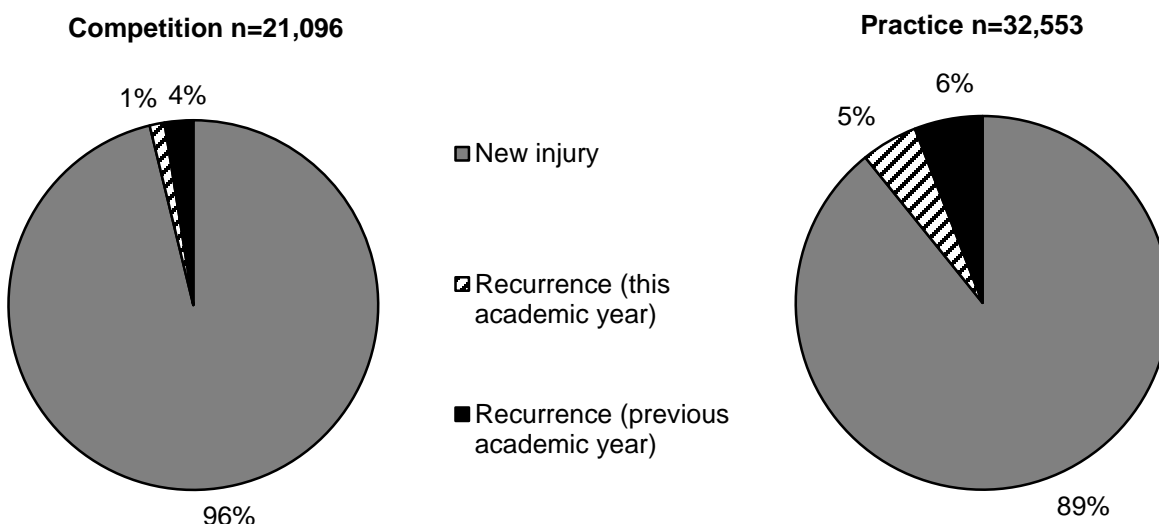
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 11.5 Softball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	Competition		Practice		Overall	
	n	%	n	%	n	%
<b>Need for surgery</b>						
Required surgery	3,253	15.4%	1,599	4.9%	4,852	9.1%
Did not require surgery	17,843	84.6%	30,887	95.1%	48,730	90.9%
<b>Total</b>	<b>21,096</b>	<b>100%</b>	<b>32,486</b>	<b>100%</b>	<b>53,582</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, 2013-14 School Year**



**Table 11.6 Time during Season of Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Season</b>		
Preseason	12,345	25.9%
Regular season	33,113	69.4%
Post season	2,261	4.7%
<b>Total</b>	<b>47,719</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, 2013-14 School Year\***

	n	%
<b>Time in Competition</b>		
Pre-competition/warm-ups	1,325	7.9%
First inning	633	3.8%
Second inning	1,086	6.5%
Third inning	5,611	33.3%
Fourth inning	3,427	20.4%
Fifth inning	3,429	20.4%
Sixth inning	878	5.2%
Seventh inning	153	0.9%
Extra innings	283	1.7%
<b>Total</b>	<b>16,826</b>	<b>100%</b>
<b>Field Location</b>		
Home plate	4,723	26.0%
Second base	3,020	16.7%
Outfield	2,813	15.5%
Third base	2,556	14.1%
Infield	2,334	12.9%
First base	1,315	7.3%
Foul territory	988	5.5%
Pitcher's mound	383	2.1%
<b>Total</b>	<b>18,131</b>	<b>100%</b>

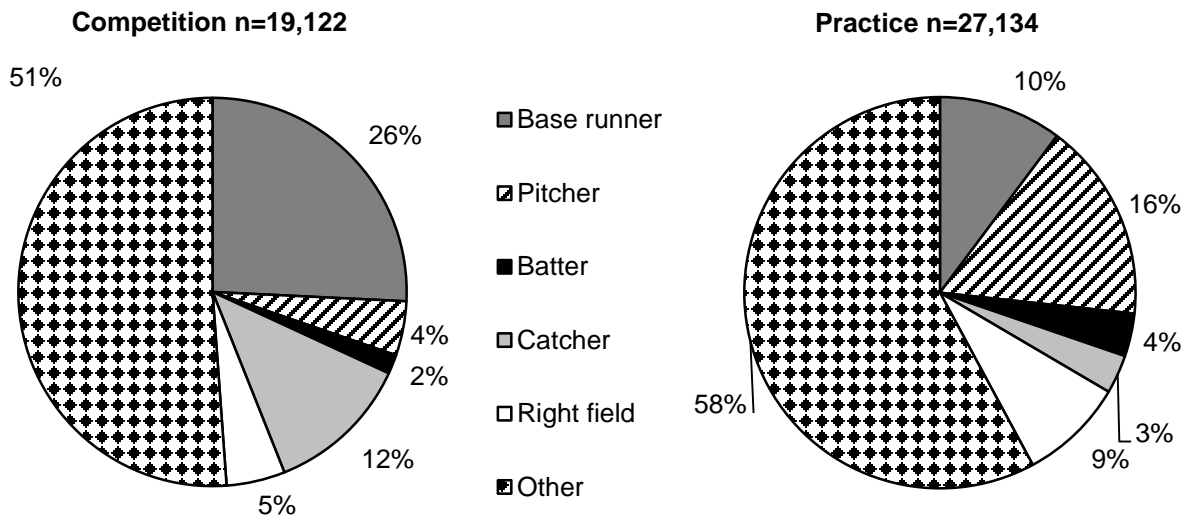
\* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

**Table 11.8 Practice-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

	n	%
<b>Time in Practice</b>		
First 1/2 hour	2,124	8.1%
Second 1/2 hour	8,191	31.4%
1-2 hours into practice	14,132	54.2%
>2 hours into practice	1,642	6.3%
<b>Total</b>	<b>26,089</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, 2013-14 School Year**

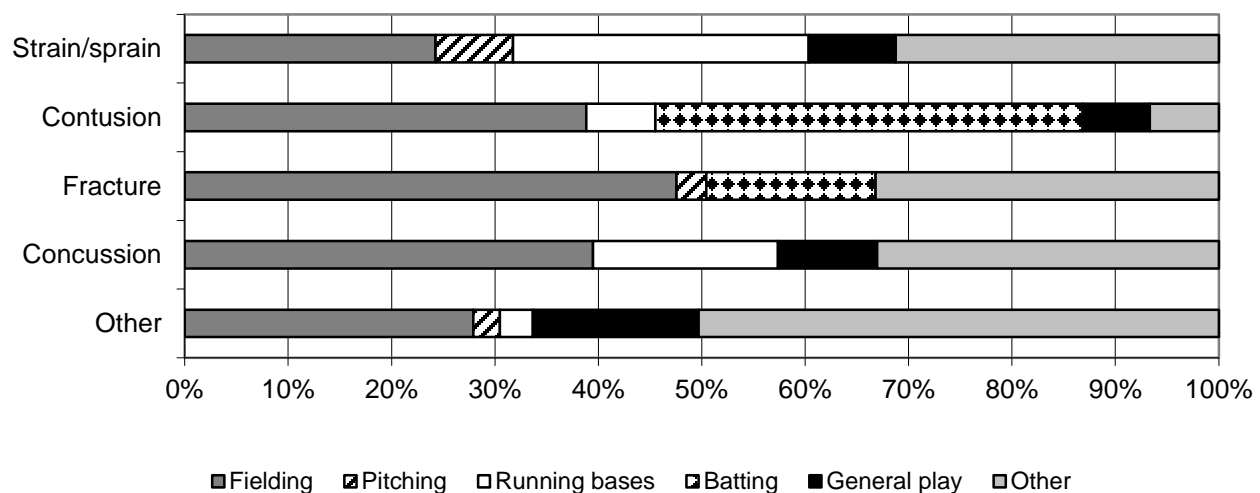


**Table 11.9 Activities Leading to Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year\***

Activity	Competition		Practice		Overall	
	n	%	n	%	n	%
Fielding a batted ball	4,659	24.4%	7,559	26.7%	12,218	25.8%
Running bases	3,497	18.3%	4,364	15.4%	7,861	16.6%
Sliding	4,857	25.4%	1,361	4.8%	6,218	13.1%
General Play	275	1.4%	3,961	14.0%	4,236	8.9%
Throwing (not pitching)	919	4.8%	2,283	8.1%	3,202	6.8%
Fielding a thrown ball	1,431	7.5%	1,544	5.5%	2,975	6.3%
Batting	689	3.6%	1,924	6.8%	2,613	5.5%
Conditioning	0	0.0%	2,119	7.5%	2,119	4.5%
Pitching	0	0.0%	1,811	6.4%	1,811	3.8%
Catching	963	5.0%	833	2.9%	1,796	3.8%
Other	1,830	9.6%	536	1.9%	2,366	5.0%
<b>Total</b>	<b>19,120</b>	<b>100%</b>	<b>28,295</b>	<b>100%</b>	<b>47,415</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, 2013-14 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, 2013-14 School Year**

	Boys' soccer	Girls' soccer*	RR (95% CI) <sup>†</sup>
<b>Total</b>	1.62	<b>2.47</b>	<b>1.53 (1.31, 1.78)</b>
Competition	3.40	<b>5.72</b>	<b>1.68 (1.40, 2.03)</b>
Practice	0.82	<b>1.04</b>	1.27 (0.97, 1.66)

\*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, 2013-14 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Body Site</b>			
Hip/thigh/upper leg	<b>20.8%</b>	10.5%	<b>1.98 (1.15, 3.42)</b>
Head/face	<b>27.2%</b>	26.5%	1.03 (0.74, 1.43)
Ankle	17.2%	<b>23.8%</b>	1.38 (0.92, 2.07)
Knee	12.0%	<b>17.7%</b>	1.47 (0.92, 2.36)
Hand/wrist	3.3%	<b>4.0%</b>	1.20 (0.43, 3.34)
Foot	<b>4.4%</b>	3.9%	1.12 (0.42, 2.98)
Lower leg	<b>9.1%</b>	5.9%	1.56 (0.71, 3.40)
Trunk	<b>2.1%</b>	2.0%	1.06 (0.32, 3.49)
Arm/elbow	0.4%	<b>0.6%</b>	1.56 (0.29, 8.33)
Shoulder	1.7%	<b>2.4%</b>	1.40 (0.35, 5.64)
Neck	<b>0.6%</b>	0.1%	5.16 (0.46, 57.44)
Other	1.2%	<b>2.7%</b>	2.23 (0.55, 9.03)
<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, 2013-14 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Diagnosis</b>			
Strain/sprain	43.1%	<b>48.4%</b>	1.12 (0.90, 1.40)
Contusion	<b>12.6%</b>	9.6%	1.32 (0.74, 2.35)
Fracture	5.5%	<b>6.2%</b>	1.12 (0.54, 2.34)
Concussion	24.3%	<b>24.5%</b>	1.01 (0.71, 1.43)
Other	<b>14.5%</b>	11.4%	<b>1.28 (0.75, 2.17)</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, 2013-14 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Diagnosis</b>			
Ankle strain/sprain	14.3%	<b>21.9%</b>	1.53 (0.98, 2.38)
Head/face concussion	24.3%	<b>24.5%</b>	1.01 (0.71, 1.43)
Hip/thigh/upper leg strain/sprain	<b>14.9%</b>	9.9%	1.51 (0.83, 2.72)
Knee strain/sprain	6.3%	<b>10.4%</b>	1.66 (0.84, 3.26)
Knee other	4.3%	<b>4.4%</b>	1.01 (0.42, 2.43)

\*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, 2013-14 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Time Loss</b>			
1-2 days	<b>16.3%</b>	13.4%	1.21 (0.73, 2.01)
3-6 days	<b>24.2%</b>	19.5%	1.24 (0.84, 1.83)
7-9 days	16.5%	<b>17.8%</b>	1.08 (0.69, 1.68)
10-21 days	21.0%	<b>21.3%</b>	1.01 (0.70, 1.46)
22 days or more	5.2%	<b>8.8%</b>	1.68 (0.79, 3.56)
Other	16.7%	<b>19.1%</b>	1.14 (0.75, 1.74)
<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, 2013-14 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Soccer Mechanism</b>			
Contact with another player	<b>31.9%</b>	29.5%	1.08 (0.80, 1.46)
Stepped on/fell on/kicked	11.2%	<b>16.7%</b>	1.49 (0.85, 2.59)
Rotation around a planted foot/inversion	<b>11.8%</b>	10.7%	1.10 (0.63, 1.93)
Overuse, heat illness, conditioning, etc.	<b>16.6%</b>	9.0%	<b>1.84 (1.05, 3.22)</b>
Contact with ball	11.3%	<b>19.1%</b>	<b>1.69 (1.00, 2.86)</b>
Uneven playing surface	<b>6.2%</b>	4.5%	1.38 (0.53, 3.60)
Slide tackle	<b>6.4%</b>	4.6%	1.38 (0.59, 3.25)
Contact with goal	0.2%	<b>0.6%</b>	3.77 (0.33, 43.03)
Other	4.4%	<b>5.3%</b>	1.20 (0.53, 2.70)
<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, 2013-14 School Year**

	Boys' soccer	Girls' soccer	IPR (95% CI)
<b>Soccer Activity</b>			
General play	<b>29.5%</b>	28.5%	1.03 (0.74, 1.44)
Defending	14.6%	<b>16.2%</b>	1.11 (0.69, 1.77)
Chasing loose ball	8.9%	<b>11.2%</b>	1.26 (0.66, 2.43)
Ball handling/dribbling	<b>6.3%</b>	5.0%	1.27 (0.58, 2.75)
Goaltending	3.5%	<b>7.7%</b>	2.21 (0.96, 5.06)
Shooting (foot)	<b>5.5%</b>	3.0%	1.86 (0.79, 4.41)
Heading ball	<b>9.2%</b>	7.4%	1.25 (0.63, 2.49)
Passing (foot)	3.5%	<b>6.6%</b>	1.91 (0.72, 5.06)
Receiving pass	<b>6.3%</b>	3.7%	1.71 (0.65, 4.50)
Conditioning	<b>4.4%</b>	4.1%	1.09 (0.47, 2.52)
Other	<b>8.4%</b>	6.8%	1.24 (0.60, 2.53)
<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, 2013-14 School Year**

	Boys' basketball	Girls' basketball	RR (95% CI)*
<b>Total</b>	1.45	<b>1.88</b>	<b>1.30 (1.11, 1.51)</b>
Competition	2.40	<b>3.66</b>	<b>1.52 (1.24, 1.87)</b>
Practice	1.02	<b>1.08</b>	1.05 (0.83, 1.33)

**Table 12.9 Comparison of Body Sites of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**

	Boys' basketball	Girls' basketball	IPR (95% CI)
<b>Body Site</b>			
Ankle	<b>33.7%</b>	26.2%	1.29 (0.98, 1.69)
Knee	12.7%	<b>20.1%</b>	<b>1.58 (1.05, 2.39)</b>
Head/face	21.8%	<b>24.8%</b>	1.14 (0.83, 1.56)
Hip/thigh/upper leg	4.2%	<b>5.5%</b>	1.31 (0.62, 2.76)
Hand/wrist	<b>8.6%</b>	8.2%	1.05 (0.57, 1.92)
Shoulder	<b>2.8%</b>	2.5%	1.11 (0.38, 3.29)
Trunk	2.2%	<b>3.9%</b>	1.76 (0.64, 4.87)
Lower leg	3.0%	<b>5.6%</b>	1.86 (0.76, 4.53)
Arm/elbow	<b>5.1%</b>	0.8%	<b>6.43 (1.37, 30.16)</b>
Foot	<b>4.9%</b>	0.5%	<b>9.25 (2.32, 36.88)</b>
Neck	<b>0.4%</b>	0.3%	1.31 (0.08, 20.88)
Other	0.7%	<b>1.6%</b>	2.48 (0.49, 12.63)
<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, 2013-14 School Year**

	Boys' basketball	Girls' basketball	IPR (95% CI)
<b>Diagnosis</b>			
Strain/sprain	47.2%	<b>51.2%</b>	1.08 (0.91, 1.30)
Contusion	<b>5.5%</b>	4.6%	1.19 (0.58, 2.45)
Fracture	<b>10.3%</b>	4.5%	<b>2.27 (1.15, 4.48)</b>
Concussion	12.8%	<b>20.5%</b>	<b>1.60 (1.07, 2.40)</b>
Other	<b>24.2%</b>	19.2%	1.26 (0.89, 1.79)
<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, 2013-14 School Year**

	Boys' basketball	Girls' basketball	IPR (95% CI)
<b>Diagnosis</b>			
Ankle strain/sprain	<b>31.8%</b>	25.9%	1.23 (0.93, 1.62)
Head/face concussion	12.8%	<b>20.4%</b>	<b>1.59 (1.06, 2.38)</b>
Knee strain/sprain	3.7%	<b>9.7%</b>	<b>2.58 (1.29, 5.19)</b>
Knee other	6.6%	<b>8.6%</b>	1.30 (0.68, 2.49)

\*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, 2013-14 School Year**

	Boys' basketball	Girls' basketball	IPR (95% CI)
<b>Time Loss</b>			
1-2 days	18.0%	<b>18.9%</b>	1.05 (0.72, 1.53)
3-6 days	23.0%	<b>26.4%</b>	1.15 (0.84, 1.58)
7-9 days	14.3%	<b>14.5%</b>	1.02 (0.66, 1.56)
10-21 days	<b>18.1%</b>	15.9%	1.14 (0.48, 1.67)
22 days or more	<b>9.3%</b>	7.9%	1.18 (0.66, 2.12)
Other	<b>17.3%</b>	16.4%	1.05 (0.71, 1.57)
<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, 2013-14 School Year**

	Boys' basketball	Girls' basketball	IPR (95% CI)
<b>Basketball Mechanism</b>			
Collision with another player	<b>32.8%</b>	25.7%	1.28 (0.95, 1.71)
Jumping/landing	<b>26.8%</b>	21.7%	1.23 (0.88, 1.73)
Overuse, heat illness, conditioning, etc.	6.3%	<b>14.2%</b>	<b>2.23 (1.24, 4.03)</b>
Rotation around a planted foot/inversion	12.7%	<b>16.0%</b>	1.26 (0.80, 2.00)
Stepped on/fell on/kicked	<b>9.1%</b>	9.1%	1.01 (0.57, 1.80)
Contact with ball	<b>4.9%</b>	3.0%	1.60 (0.65, 3.97)
Other	7.5%	<b>10.2%</b>	1.36 (0.75, 2.47)
<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, 2013-14 School Year**

	Boys' basketball	Girls' basketball	IPR (95% CI)
<b>Basketball Activity</b>			
Rebounding	<b>31.2%</b>	22.0%	<b>1.42 (1.03, 1.95)</b>
General play	22.5%	<b>27.3%</b>	1.21 (0.86, 1.70)
Defending	9.9%	<b>14.0%</b>	1.41 (0.85, 2.36)
Chasing loose ball	7.0%	<b>11.3%</b>	1.61 (0.89, 2.93)
Shooting	<b>12.8%</b>	7.4%	1.73 (0.94, 3.17)
Conditioning	2.1%	<b>3.7%</b>	1.74 (0.62, 4.90)
Ball handling/dribbling	6.6%	<b>7.7%</b>	1.16 (0.60, 2.25)
Receiving pass	<b>5.4%</b>	3.1%	1.76 (0.72, 4.32)
Other	2.4%	<b>3.6%</b>	1.49 (0.50, 4.46)
<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, 2013-14 School Year**

	Baseball	Softball	RR (95% CI)
<b>Total</b>	<b>1.01</b>	0.99	1.02 (0.82, 1.27)
Competition	<b>1.68</b>	1.09	<b>1.54 (1.11, 2.16)</b>
Practice	0.63	<b>0.93</b>	<b>1.48 (1.08, 2.02)</b>

**Table 12.16 Comparison of Body Sites of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2013-14 School Year**

	Baseball	Softball	IPR (95% CI)
<b>Body Site</b>			
Ankle	12.9%	<b>16.8%</b>	1.30 (0.66, 2.57)
Knee	9.0%	<b>11.1%</b>	1.23 (0.53, 2.81)
Head/face	17.7%	<b>27.2%</b>	1.54 (0.93, 2.55)
Hip/thigh/upper leg	<b>11.3%</b>	10.8%	1.08 (0.46, 2.38)
Hand/wrist	<b>16.7%</b>	10.4%	1.60 (0.78, 3.27)
Shoulder	<b>12.8%</b>	10.5%	1.22 (0.55, 2.70)
Trunk	2.8%	<b>4.2%</b>	1.52 (0.42, 5.47)
Lower leg	5.2%	<b>5.8%</b>	1.11 (0.38, 3.27)
Arm/elbow	<b>9.1%</b>	2.5%	3.70 (0.81, 16.86)
Foot	<b>1.3%</b>	0.7%	1.77 (0.15, 21.55)
Neck	<b>1.2%</b>	0.0%	-
<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, 2013-14 School Year**

	Baseball	Softball	IPR (95% CI)
<b>Diagnosis</b>			
Strain/sprain	<b>42.6%</b>	39.6%	1.08 (0.77, 1.51)
Contusion	<b>11.3%</b>	7.9%	1.44 (0.65, 3.15)
Fracture	<b>12.9%</b>	9.8%	1.31 (0.64, 2.69)
Concussion	9.5%	<b>18.7%</b>	1.98 (0.99, 3.96)
Other	23.7%	<b>24.0%</b>	1.01 (0.62, 1.65)
<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, 2013-14 School Year**

	Baseball	Softball	IPR (95% CI)
<b>Diagnosis</b>			
Ankle strain/sprain	12.3%	<b>14.8%</b>	1.21 (0.58, 2.50)
Hand/wrist fracture	<b>6.7%</b>	6.4%	1.04 (0.37, 2.91)
Head/face concussion	9.5%	<b>18.7%</b>	1.98 (0.99, 3.96)
Hip/thigh/upper leg strain/sprain	<b>9.2%</b>	7.9%	1.17 (0.44, 3.09)
Knee strain/sprain	3.9%	<b>6.3%</b>	1.59 (0.48, 5.24)

\*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, 2013-14 School Year**

	Baseball	Softball	IPR (95% CI)
<b>Time Loss</b>			
1-2 days	<b>19.7%</b>	17.3%	1.14 (0.63, 2.04)
3-6 days	18.9%	<b>22.3%</b>	1.18 (0.69, 2.00)
7-9 days	<b>17.7%</b>	16.6%	1.06 (0.59, 1.93)
10-21 days	<b>24.1%</b>	18.1%	1.33 (0.76, 2.33)
22 days or more	5.0%	<b>13.0%</b>	2.62 (0.96, 7.20)
Other	<b>14.7%</b>	12.7%	1.16 (0.60, 2.25)
<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, 2013-14 School Year**

	Baseball	Softball	IPR (95% CI)
<b>Baseball/Softball Mechanism</b>			
Overuse, heat illness, conditioning, etc.	10.1%	<b>18.2%</b>	1.80 (0.90, 3.61)
Contact with another player	10.2%	<b>15.5%</b>	1.51 (0.73, 3.13)
Contact with bases	10.1%	<b>11.7%</b>	1.15 (0.49, 2.69)
Throwing - not pitching	<b>8.6%</b>	6.8%	1.27 (0.48, 3.36)
Throwing - pitching	<b>11.1%</b>	0.9%	<b>11.69 (2.00, 68.25)</b>
Contact with thrown ball (non-pitch)	3.5%	<b>11.1%</b>	<b>3.18 (1.17, 8.66)</b>
Rotation around a planted foot/inversion	<b>11.4%</b>	8.3%	1.37 (0.59, 3.22)
Hit by batted ball	9.3%	<b>9.3%</b>	1.00 (0.42, 2.40)
Hit by pitch	<b>8.8%</b>	5.5%	1.60 (0.55, 4.67)
Other	16.2%	<b>16.6%</b>	1.02 (0.55, 1.90)
<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, 2013-14 School Year**

	Baseball	Softball	IPR (95% CI)
<b>Baseball/Softball Activity</b>			
Fielding a batted ball	15.4%	<b>25.8%</b>	1.67 (0.95, 2.94)
Fielding a thrown ball	2.7%	<b>6.3%</b>	2.32 (0.80, 6.74)
Running bases	<b>18.1%</b>	16.6%	1.09 (0.58, 2.05)
Pitching	<b>13.7%</b>	3.8%	<b>3.58 (1.05, 12.22)</b>
Batting	<b>10.1%</b>	5.5%	1.84 (0.65, 5.23)
Sliding	9.7%	<b>13.1%</b>	1.35 (0.60, 3.07)
Throwing (not pitching)	<b>8.6%</b>	6.8%	1.27 (0.48, 3.36)
General play	6.4%	<b>8.9%</b>	1.40 (0.55, 3.58)
Conditioning	3.1%	<b>4.5%</b>	1.42 (0.37, 5.48)
Catching	<b>6.3%</b>	3.8%	1.66 (0.43, 6.40)
Other	<b>5.9%</b>	5.0%	1.18 (0.35, 4.01)
<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, 2005/06-2013/14 School Years**

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	p-value for trend*
<b>Overall total</b>	2.51	2.59	2.31	2.01	2.10	1.97	2.17	2.16	2.18	0.068
<b>Competition</b>	4.63	4.88	4.45	4.05	4.19	4.10	4.26	4.31	4.22	0.071
<b>Practice</b>	1.69	1.75	1.52	1.26	1.32	1.16	1.40	1.34	1.39	0.058
Boys' football total	4.36	4.45	4.18	3.50	3.81	3.50	3.78	3.87	3.74	0.052
Competition	12.09	13.50	12.80	11.26	12.95	12.30	12.41	12.53	11.38	0.357
Practice	2.54	2.68	2.47	1.92	2.06	1.74	2.16	2.08	2.15	0.074
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>1.62</b>	<b>0.008</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>3.40</b>	<b>0.015</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>0.82</b>	<b>0.006</b>
Girls' soccer total	2.36	2.51	2.35	2.07	2.00	1.93	2.42	2.29	2.47	0.904
Competition	5.21	5.43	5.15	4.59	4.67	4.13	5.68	5.54	5.72	0.522
Practice	1.10	1.31	1.16	1.00	0.85	0.93	1.09	0.92	1.04	0.145
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>0.99</b>	<b>0.011</b>
Competition	1.92	1.40	1.43	0.90	1.00	1.18	1.27	1.08	1.15	0.078
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>0.91</b>	<b>0.004</b>
Boys' basketball total	1.89	1.75	1.39	1.35	1.45	1.34	1.40	1.47	1.45	0.075
Competition	2.98	2.87	2.23	2.32	2.72	2.30	2.60	2.44	2.40	0.176
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>1.02</b>	<b>0.049</b>
Girls' basketball total	2.01	2.09	1.61	1.54	1.58	1.73	1.57	1.83	1.88	0.487
Competition	3.60	3.60	3.30	3.13	2.84	3.59	3.03	3.13	3.66	0.627
Practice	1.37	1.44	0.90	0.87	1.02	0.92	0.98	1.24	1.08	0.376
Boys' wrestling total	2.50	2.51	2.27	2.17	1.98	2.01	2.50	2.33	2.48	0.861
Competition	3.93	3.80	3.70	3.35	3.09	3.32	3.56	3.54	3.95	0.686
Practice	2.04	2.06	1.76	1.75	1.56	1.55	2.10	1.88	1.95	0.813
Boys' baseball total	1.19	1.25	0.93	0.78	0.82	0.81	0.83	0.88	1.01	0.141
Competition	1.77	2.01	1.37	1.32	1.27	1.49	1.14	1.30	1.68	0.224
Practice	0.87	0.82	0.68	0.48	0.57	0.46	0.65	0.66	0.63	0.164
Girls' softball total	1.13	1.11	1.29	1.04	1.12	0.94	1.46	1.15	0.99	0.882
Competition	1.78	1.96	1.86	1.62	1.66	1.45	2.04	1.96	1.09	0.299
Practice	0.79	0.65	0.98	0.72	0.85	0.69	1.16	0.73	0.93	0.412

\*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, 2005/06-2013/14 School Years**

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
<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>1,427,315</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>790,966</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>	<b>636,349</b>
Boys' football total	516,150	574,367	616,665	527,321	581,414	483,016	559,064	616,209	624,470
Competition	280,919	292,316	311,780	288,637	322,801	296,199	287,710	344,097	324,354
Practice	235,231	282,051	304,885	238,684	258,614	186,817	271,354	272,112	300,116
Boys' soccer total	218,760	171,874	159,351	149,229	153,485	138,974	172,070	149,049	149,278
Competition	119,703	93,295	99,785	87,082	83,985	81,238	97,540	89,429	90,683
Practice	99,058	78,579	59,566	62,147	69,500	57,736	74,530	59,620	58,595
Girls' soccer total	185,770	230,769	215,850	192,108	181,159	180,254	222,679	190,382	227,172
Competition	122,803	149,231	146,102	123,312	129,754	124,674	145,469	141,339	167,975
Practice	62,967	81,538	69,748	68,796	51,405	55,580	77,210	49,043	59,197
Girls' volleyball total	81,813	80,493	72,261	56,609	67,760	50,711	52,662	44,064	45,144
Competition	32,677	27,423	26,539	19,764	21,728	21,416	24,439	19,150	16,430
Practice	49,136	53,069	45,722	36,845	46,032	29,295	28,223	24,914	28,714

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**Table 13.2 Nationally Estimated Number of Injuries by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2013/14 School Years (continued)**

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Boys' basketball total	100,058	96,670	82,612	79,230	85,063	79,762	75,872	85,819	84,455
Competition	44,826	46,109	36,766	40,152	46,787	41,252	41,978	44,095	42,504
Practice	55,232	50,561	45,846	39,078	38,276	38,510	33,894	41,724	41,951
Girls' basketball total	103,566	102,831	73,283	64,933	78,709	83,033	67,280	83,107	89,451
Competition	53,812	53,703	45,236	38,277	44,026	53,931	37,213	45,645	50,864
Practice	49,753	49,128	28,047	26,656	34,684	29,102	30,067	37,462	38,587
Boys' wrestling total	105,542	101,139	91,625	88,996	80,390	80,569	107,992	85,485	91,203
Competition	36,259	38,750	40,698	39,029	37,742	36,536	40,235	35,016	39,378
Practice	69,283	62,389	50,927	49,967	42,647	44,033	67,757	50,469	51,825
Boys' baseball total	67,560	60,296	44,760	39,869	64,053	46,796	43,590	49,747	62,493
Competition	33,639	33,494	22,803	25,584	36,502	29,789	20,818	24,807	37,682
Practice	33,922	26,802	21,957	14,285	27,551	17,008	22,772	24,940	24,811
Girls' softball total	63,313	54,411	63,316	49,831	67,862	52,700	91,053	58,124	53,649
Competition	34,696	32,191	33,325	28,688	30,767	26,607	45,091	35,477	21,096
Practice	28,618	22,220	29,991	21,143	37,096	26,093	45,962	22,647	32,553

**Table 13.3 Body Site of Injury by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2013/14 School Years\***

	<b>2005-06</b> <b>n=1,442,048</b>	<b>2006-07</b> <b>n=1,464,926</b>	<b>2007-08</b> <b>n=1,411,621</b>	<b>2008-09</b> <b>n=1,248,126</b>	<b>2009-10</b> <b>n=1,359,897</b>	<b>2010-11</b> <b>n=1,194,319</b>	<b>2011-12</b> <b>n=1,391,577</b>	<b>2012-13</b> <b>n=1,361,584</b>	<b>2013-14</b> <b>n=1,427,315</b>
<b>Body Site</b>									
Ankle	22.7%	19.8%	18.5%	16.4%	17.5%	17.7%	16.1%	15.5%	16.9%
Knee	14.2%	16.6%	14.6%	14.8%	15.7%	14.2%	13.4%	14.8%	14.4%
Head/face	12.3%	12.4%	12.4%	15.3%	17.2%	23.3%	25.1%	25.7%	25.3%
Hip/thigh/upper leg	10.8%	10.5%	10.2%	10.3%	9.2%	8.3%	9.8%	9.5%	8.7%
Shoulder	7.9%	8.0%	10.1%	9.3%	8.4%	7.0%	6.6%	6.5%	8.5%
Hand/wrist	8.0%	7.5%	9.1%	8.5%	10.3%	8.9%	8.5%	7.4%	7.8%
Trunk	6.2%	6.7%	6.5%	6.6%	5.8%	4.7%	4.9%	5.2%	4.1%
Lower leg	4.6%	5.2%	5.7%	5.8%	4.7%	5.0%	4.5%	3.9%	4.9%
Arm/elbow	4.1%	3.9%	4.6%	4.1%	4.0%	3.1%	4.0%	3.5%	3.1%
Foot	4.0%	4.0%	4.2%	5.0%	4.1%	4.0%	3.4%	3.2%	2.8%
Neck	2.2%	1.9%	1.8%	1.9%	1.9%	1.8%	1.7%	2.3%	1.2%
Other	3.2%	3.6%	2.4%	2.1%	1.2%	2.1%	2.0%	2.5%	2.4%
<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>	<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, 2005/06-2013/14 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	2013-14 n=1,427,315
<b>Diagnosis</b>									
Strain/sprain	52.0%	48.2%	48.3%	45.7%	44.7%	43.2%	42.2%	42.3%	41.7%
Contusion	12.2%	13.7%	12.4%	11.5%	14.0%	9.6%	10.8%	10.6%	9.4%
Fracture	9.8%	8.9%	10.2%	10.9%	9.9%	10.2%	7.7%	7.8%	7.6%
Concussion	9.1%	8.4%	9.2%	11.8%	14.0%	20.0%	22.2%	23.1%	21.9%
Other	16.8%	20.9%	19.9%	20.2%	17.5%	17.0%	17.1%	16.2%	19.4%
<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>	<b>100%</b>

**Table 13.5 Most Common Injury Diagnoses by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2013/14 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	2013-14 n=1,426,018
<b>Diagnosis</b>									
Ankle strain/sprain	20.6%	17.8%	17.3%	15.0%	16.0%	16.3%	14.7%	14.5%	15.6%
Head/face concussion	9.0%	8.4%	9.2%	11.7%	13.9%	20.0%	22.2%	23.1%	21.9%
Knee strain/sprain	7.6%	8.8%	7.8%	7.9%	8.0%	7.7%	7.6%	8.2%	7.8%
Hip/thigh/upper leg strain/sprain	7.9%	7.7%	7.3%	7.7%	6.5%	6.4%	6.9%	6.7%	6.6%
Knee other	4.3%	4.9%	4.7%	4.5%	5.2%	4.8%	3.9%	4.1%	4.7%
Shoulder other	3.1%	3.7%	4.1%	4.0%	3.3%	3.7%	3.1%	3.4%	4.6%
Hand/wrist fracture	3.2%	3.3%	4.0%	4.0%	4.2%	4.0%	3.7%	3.2%	3.3%
Shoulder strain/sprain	3.4%	2.9%	3.4%	3.7%	3.3%	2.2%	2.9%	2.6%	3.3%
Trunk strain/sprain	2.8%	2.7%	3.2%	2.8%	2.5%	2.4%	1.9%	2.3%	1.7%
Hand/wrist strain/sprain	3.1%	2.5%	3.8%	2.9%	2.8%	2.8%	3.0%	2.5%	2.8%

**Table 13.6 Time Loss of Injuries by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2013/14 School Years**

	<b>2005-06</b> <b>n=1,378,145</b>	<b>2006-07</b> <b>n=1,423,183</b>	<b>2007-08</b> <b>n=1,355,981</b>	<b>2008-09</b> <b>n= 1,248,126</b>	<b>2009-10</b> <b>n= 1,359,897</b>	<b>2010-11</b> <b>n=1,195,815</b>	<b>2011-12</b> <b>n=1,392,262</b>	<b>2012-13</b> <b>n=1,361,986</b>	<b>2013-14</b> <b>n=1,427,312</b>
<b>Time Loss</b>									
1-2 days	22.5%	26.6%	22.8%	13.7%	14.7%	12.8%	15.9%	12.6%	14.9%
3-6 days	30.0%	28.5%	28.8%	28.5%	27.3%	25.2%	23.3%	23.6%	21.8%
7-9 days	15.3%	14.7%	15.8%	17.7%	16.1%	16.7%	16.1%	16.3%	16.7%
10-21 days	14.9%	14.1%	16.7%	19.7%	16.9%	19.2%	19.6%	21.3%	21.1%
≥22 days	17.2%	16.1%	15.9%	20.3%	25.0%	26.1%	25.0%	26.2%	25.5%
<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>	<b>100%</b>

**Table 13.7 Injuries Requiring Surgery by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2013/14 School Years**

	<b>2005-06</b> <b>n=1,429,072</b>	<b>2006-07</b> <b>n=1,428,960</b>	<b>2007-08</b> <b>n=1,380,872</b>	<b>2008-09</b> <b>n= 1,248,126</b>	<b>2009-10</b> <b>n= 1,359,897</b>	<b>2010-11</b> <b>n=1,169,423</b>	<b>2011-12</b> <b>n=1,392,262</b>	<b>2012-13</b> <b>n=1,337,403</b>	<b>2013-14</b> <b>n=1,407,594</b>
<b>Need for surgery</b>									
Required surgery	5.3%	6.4%	6.1%	6.7%	8.0%	8.2%	6.7%	7.3%	7.6%
Did not require surgery	94.7%	93.6%	93.9%	93.3%	92.0%	91.8%	93.3%	92.7%	92.4%
<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>	<b>100%</b>

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



During the 2013-14 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, 99 enrolled ATs reported an average of 43 study weeks. The majority of ATs (90.0%) reported all the weeks during which they were enrolled, with only 1 AT (1.0%) 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 2013-14 High School RIO™ study, participating ATs were asked to complete a short demographics survey. Over three-quarters (83.8%) 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 90% (90.9%) of ATs participating during the 2013-14 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=260) 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 122 ATs (46.9%). Average reporting time burdens were 21 minutes for the weekly exposure report and 10 minutes for the injury report form. Using a 5 point Likert scale, RIO™ was overwhelmingly reported to be either very easy (56.6%) or somewhat easy (36.1%) to use (5 and 4 on the Likert scale, respectively), with ATs being either very satisfied (62.3%) or somewhat satisfied (32.8%) 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 2014-15 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.