SUMMARY REPORT

NATIONAL HIGH SCHOOL SPORTS-RELATED INJURY SURVEILLANCE STUDY

2017-2018 School Year

Compiled by:

R. Dawn Comstock, PhD

Lauren A. Pierpoint, MS

Alan Arakkal, BS

Jonathan H. Bihl, BS

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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.

For reprints/further information contact:
R. Dawn Comstock, PhD
Professor
Epidemiology, Colorado School of Public Health
Program for Injury Prevention, Education, and Research (PIPER) program

13001 E. 17th Place, Mailstop B119
Aurora, CO 80045
(303) 724-7881 phone
(303) 724-4489 fax
highschoolrio@ucdenver.edu

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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 7.9 million in 2016-17. While the health benefits of a physically active lifestyle including participating in sports are undeniable, high school athletes are at risk of sports-related injury because a certain endemic level of injury can be expected among participants of any physical activity. The challenge to injury epidemiologists is to reduce injury rates among high school athletes to the lowest possible level without discouraging adolescents from engaging in this important form of physical activity. This goal can best be accomplished by investigating the etiology of preventable injuries; by developing, implementing, and evaluating protective interventions using such science-based evidence; and by responsibly reporting epidemiologic findings while promoting a physically active lifestyle among adolescents.

1.2 Background and Significance

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

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

Since the 2005-06 school year, Dr. R. Dawn Comstock has conducted the National High School Sports-Related Injury Surveillance System to monitor injuries among US high school athletes participating in boys' football, boys' and girls' soccer, girls' volleyball, boys' and girls' basketball, boys' wrestling, boys' baseball, and girls' softball. This surveillance has been conducted using the time- and cost-efficient RIO™ (Reporting Information Online) surveillance system. Through the generous contributions of the Centers for Disease Control and Prevention (CDC) 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 2017-18 school year. Previous study years were funded by the Centers for Disease Control and Prevention (CDC), National Federation of State High School Associations (NFHS), the National Operating Committee on Standards for Athletic Equipment (NOCSAE), the Research Institute at Nationwide Children's Hospital, DonJoy Orthotics, EyeBlack, and The Ohio State University.

1.3 Specific Aims

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

A) To determine the incidence (number) of injuries among US high school boys' football, boys' and girls' soccer, girls' volleyball, boys' and girls' basketball, boys' wrestling, boys' baseball, and girls' softball athletes.

B) To calculate the rate of injuries per 1,000 athlete-competitions, per 1,000 athlete-practices, and per 1,000 athlete-exposures for US high school athletes in the 9 sports of interest.

C) To provide detailed information about the injuries sustained by US high school athletes including the type, site, severity, initial and subsequent treatment/care, outcome, etc.

D) To provide detailed information about the injury events including athlete demographics, position played, phase of play/activity, etc.

E) To identify potential risk or protective factors.

F) To compare injury rates and patterns from the 2005-06 through the 2017-18 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, dental injury, or exertional heat event 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 ≤ 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. Due to lower participation this year, strata were first filled with schools reporting for all 9 sports followed by schools reporting for 5 or more sports. Strata were then filled with schools reporting for any one of the 9 original sports in an attempt to have 100 schools reporting for each of the 9 original sports to ensure equal distribution of schools between the 8 strata. 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 47 weekly exposure reports: one for each week from July 25, 2017 through June 18, 2018. 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 9.4 and SPSS, version 24.0. Although fractures, concussions, and dental injuries resulting in <1 day time loss were collected, unless otherwise noted, analyses in this report excluded these injuries. With the exception of injury rates, data were weighted for all analyses to produce national estimates. For each sport in each stratum, weights account for the total number of US schools offering the sport and the average number of participating study schools reporting each week for that sport. For example,

following is the algorithm used to calculate football weights for the small (enrollment ≤ 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:

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

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

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

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

II. Overall Injury Epidemiology

Table 2.1 Injury Rates by Sport and Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Overall total	4,105	1,674,494	2.45	1,367,490
Competition	2,349	481,465	4.88	798,220
Practice	1,756	1,193,029	1.47	569,270
Boys' football total	1,761	406,379	4.33	463,626
Competition	1,050	74,308	14.13	281,790
Practice	711	332,071	2.14	181,836
Boys' soccer total	346	178,489	1.94	180,607
Competition	218	55,583	3.92	113,655
Practice	128	122,906	1.04	66,952
Girls' soccer total	432	153,235	2.82	242,602
Competition	275	47,133	5.83	152,993
Practice	157	106,102	1.48	89,609
Girls' volleyball total	247	160,117	1.54	67,163
Competition	122	55,944	2.18	33,075
Practice	125	104,173	1.20	34,088
Boys' basketball total	324	210,119	1.54	93,773
Competition	176	64,289	2.74	48,814
Practice	148	145,830	1.01	44,959
Girls' basketball total	332	154,149	2.15	90,554
Competition	199	48,258	4.12	53,834
Practice	133	105,891	1.26	36,720
Boys' wrestling total	351	132,408	2.65	103,058
Competition	153	35,553	4.30	48,770
Practice	198	96,855	2.04	54,288
Boys' baseball total	155	162,487	0.95	49,716
Competition	76	59,229	1.28	26,844
Practice	79	103,258	0.77	22,872

Girls' softball total	157	117,111	1.34	76,391
Competition	80	41,168	1.94	38,445
Practice	77	75,943	1.01	37,946

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

Table 2.2 Proportion of Injuries Resulting in Time Loss, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	≥1 days time loss	<1 day time loss	Time loss data missing	Total
Overall	93.9%	0.9%	5.2%	**100%**
Boys' football	93.6%	1.1%	5.3%	**100%**
Boys' soccer	95.8%	0.3%	3.9%	**100%**
Girls' soccer	94.9%	1.1%	4.0%	**100%**
Girls' volleyball	95.7%	0.0%	4.3%	**100%**
Boys' basketball	91.5%	0.8%	7.6%	**100%**
Girls' basketball	91.5%	1.1%	7.4%	**100%**
Boys' wrestling	93.6%	0.5%	5.9%	**100%**
Boys' baseball	95.1%	0.6%	4.3%	**100%**
Girls' softball	95.7%	2.4%	1.8%	**100%**

*By study definition, non-time loss injuries were fractures, concussions, dental injuries, and exertional heat events that resulted in <1 day time loss. Because they accounted for <1.0% 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, 2017-18 School Year*

	Male n= 740,814	**Female n= 354,480**
Year in School		
Freshman	22.0%	28.6%
Sophomore	22.7%	27.2%
Junior	27.4%	24.1%
Senior	27.9%	20.2%
Total†	**100.0%**	**100.0%**
Age (years)		
Minimum	13	12
Maximum	19	19
Mean (St. Dev.)	15.9 (1.3)	15.7 (1.3)
BMI		
Minimum	15.2	14.8
Maximum	52.3	43.0
Mean (St. Dev.)	24.5 (4.7)	22.4 (3.4)

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

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

Figure 2.1 Injury Diagnosis by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

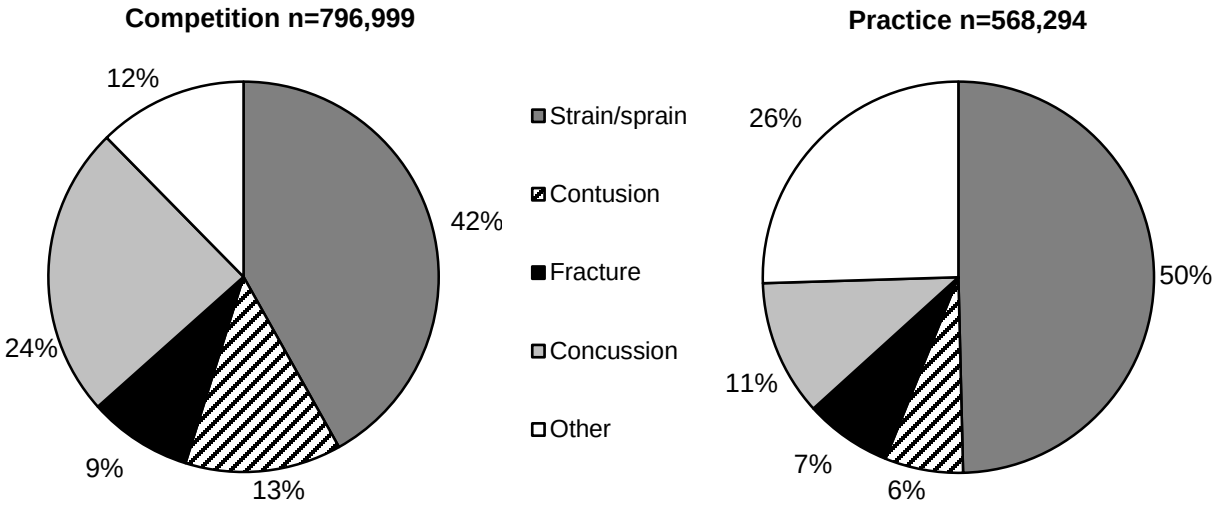


Table 2.4 Body Site of Injury by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	215,843	27.0%	77,553	13.6%	293,396	21.4%
Ankle	137,507	17.2%	105,454	18.5%	242,961	17.8%
Knee	109,736	13.7%	83,048	14.6%	192,784	14.1%
Hip/thigh/upper leg	64,581	8.1%	76,956	13.5%	141,537	10.4%
Hand/wrist	74,045	9.3%	51,040	9.0%	125,085	9.1%
Shoulder	44,551	5.6%	38,430	6.8%	82,981	6.1%
Lower leg	35,934	4.5%	28,206	5.0%	64,140	4.7%
Trunk	32,538	4.1%	37,820	6.6%	70,358	5.1%
Arm/elbow	31,122	3.9%	30,849	5.4%	61,971	4.5%
Foot	30,354	3.8%	22.659	4.0%	53.013	3.9%
Neck	9,039	1.2%	3,352	0.6%	12,391	0.9%
Other	12,969	1.6%	13,905	2.4%	26,874	2.0%
Total	**798,219**	**100.0%**	**569,272**	**100.0%**	**1,367,491**	**100.0%**

* 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, 2017-18 School Year*

	Male		Female		Total	
	n	% of Ankle Injuries	n	% of Ankle Injuries	n	% of Ankle Injuries
Ankle Ligament Injuries						
Anterior talofibular ligament	84,985	63.8%	74,617	74.9%	159,602	68.6%
Calcaneofibular ligament	35,420	26.6%	33,533	33.7%	68,953	29.6%
Anterior tibiofibular ligament	28,894	21.7%	16,827	16.9%	45,721	19.6%
Posterior talofibular ligament	11,906	8.9%	11,144	11.2%	23,050	9.9%
Deltoid ligament	11,370	8.5%	7,293	7.3%	18,663	8.0%
Posterior tibiofibular ligament	4,593	3.4%	4,791	4.8%	9,384	4.0%
Total Ankle Injuries	**133,192**		**99,562**		**232,754**	

*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, 2017-18 School Year*

	Male		Female		Total	
	n	% of Knee Injuries	n	% of Knee Injuries	n	% of Knee Injuries
Knee Ligament Injuries						
Medial collateral ligament	35,432	29.2%	11,545	16.9%	46,977	24.8%
Patella and/or patellar tendon	22,554	18.6%	20,871	30.5%	43,425	22.9%
Torn cartilage (meniscus)	22,150	18.3%	15,775	23.1%	37,925	20.0%
Anterior cruciate ligament	21,020	17.3%	14,263	20.9%	35,283	18.6%
Lateral collateral ligament	8,878	7.3%	5,328	7.8%	14,206	7.5%
Posterior cruciate ligament	2,188	1.8%	536	0.8%	2,724	1.4%
Total Knee Injuries	**121,312**		**68,339**		**189,651**	

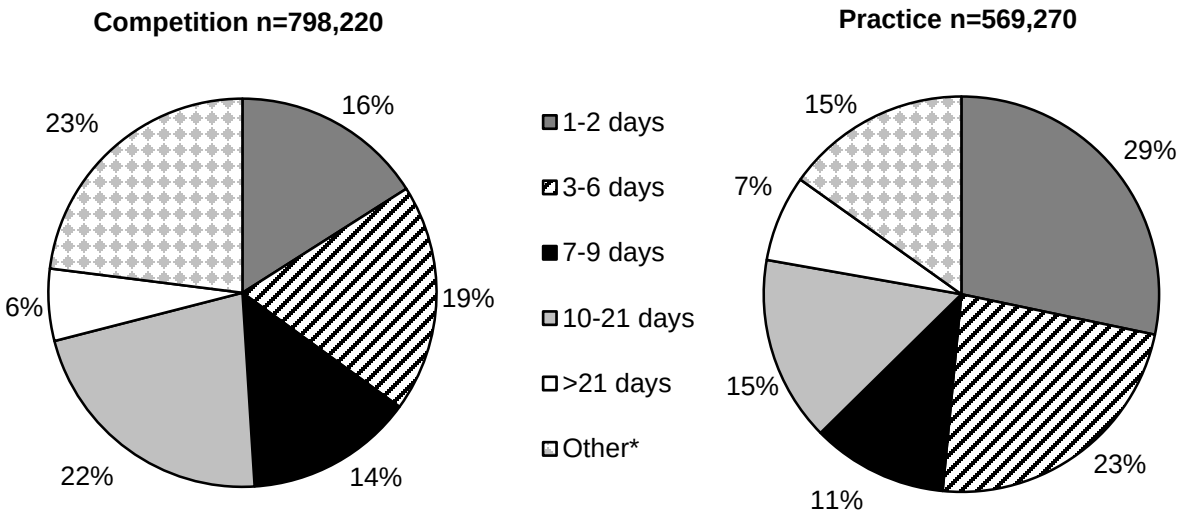
*Multiple ligament responses allowed per injury report. Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 2.7 Ten Most Common Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=797,000		Practice n=568,292		Overall n= 1,365,292	
	N	%	n	%	n	%
Diagnosis						
Head/face concussion	192,507	24.2%	63,416	11.2%	255,923	18.7%
Ankle strain/sprain	128,524	16.1%	95,012	16.7%	223,536	16.4%
Hip/thigh/upper leg strain/sprain	44,468	5.6%	66,326	11.7%	110,794	8.1%
Knee strain/sprain	63,395	8.0%	27,189	4.8%	90,584	6.6%
Knee other	25,722	3.2%	43,788	7.7%	69,510	5.1%
Hand/wrist strain/sprain	25,344	3.2%	22,132	3.9%	47,476	3.5%
Hand/wrist fracture	28,599	3.6%	18,343	3.2%	46,942	3.4%
Shoulder other	20,096	2.5%	19,647	3.5%	39,743	2.9%
Shoulder strain/sprain	20,597	2.6%	17,225	3.0%	37,822	2.8%
Trunk strain/sprain	13,455	1.7%	21,743	3.8%	35,198	2.6%

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

Figure 2.2 Time Loss by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	49,440	6.3%	28,181	5.0%	77,621	5.7%
Did not require surgery	741,012	93.7%	536,362	95.0%	1,277,374	94.3%
Total*	**790,452**	**100.0%**	**564,543**	**100.0%**	**1,354,995**	**100.0%**

* 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, 2017-18 School Year

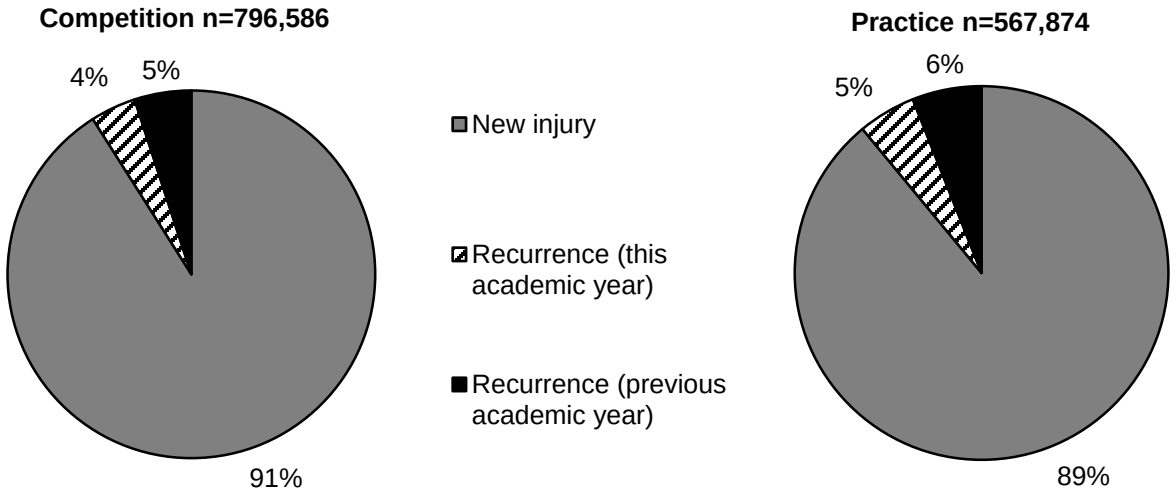


Table 2.9 Time during Season of Injury, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	273,198	20.0%
Regular season	1,034,060	75.7%
Post season	57,959	4.2%
Unknown	740	0.1%
Total	**1,365,957**	**100%**

* 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. Unknown was selected in 0.3% of injuries.

Table 2.10 Practice-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Practice		
First ½ hour	41,025	7.3%
Second ½ hour	74,061	13.1%
1-2 hours into practice	285,910	50.8%
>2 hours into practice	38,347	6.8%
Unknown	124,024	22.0%
Total	**563,366**	**100.0%**

* 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, 2017-18 School Year

	n	%
Injuries Evaluated by:*		
Certified athletic trainer	1,266,719	92.6%
General physician	229,860	16.8%
Orthopedic physician	225,073	16.5%
Physician's assistant	14,532	1.1%
Nurse practitioner	5,834	0.4%
Chiropractor	4,727	0.3%
Neurologist/neuropsychologist	4,128	0.3%
Dentist/oral surgeon	486	<0.1%
Other	40,385	3.0%
Total	**1,367,490**	
Injuries Assessed by:*		
Evaluation	1,317,925	96.4%
X-ray	449,564	32.9%
MRI	135,073	9.9%
CT-scan	28,714	2.1%
Blood work/lab test	6,170	0.5%
Other	9,689	0.7%
Total	**1,367,490**	

*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, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**1,761**	**406,379**	**4.33**	**463,626**
Competition	1,050	74,308	14.13	281,790
Practice	711	332,071	2.14	181,836

Table 3.2 Demographic Characteristics of Injured Football Athletes, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n=452,993**
Freshman	20.7%
Sophomore	23.5%
Junior	26.5%
Senior	29.2%
Total†	**100.0%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.9 (1.2)
BMI	
Minimum	15.6
Maximum	52.3
Mean (St. Dev.)	26.8 (5.9)

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

Figure 3.1 Diagnosis of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

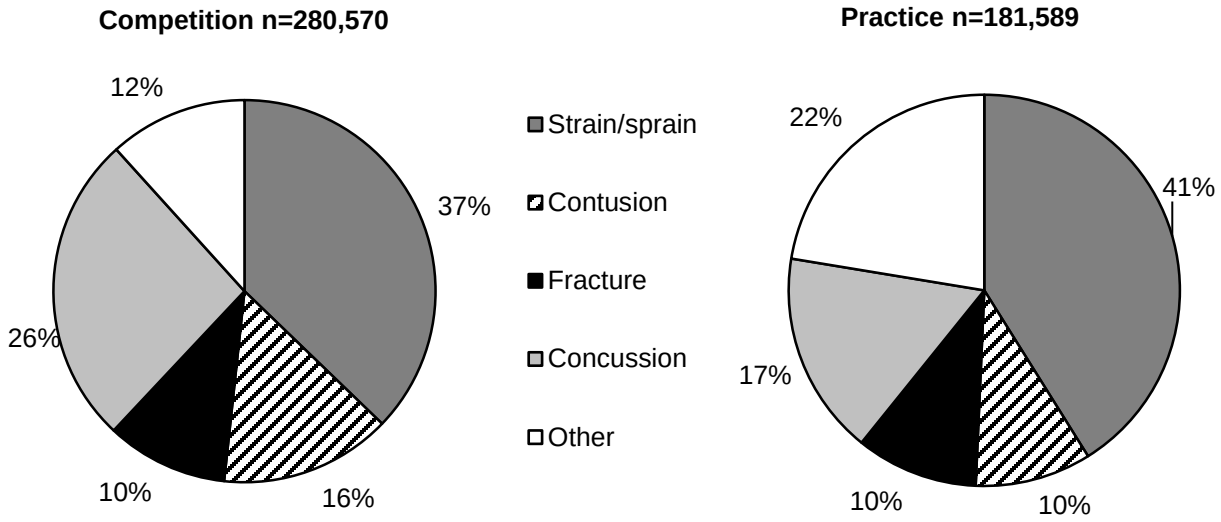


Table 3.3 Body Site of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	76,228	27.1%	31,803	17.5%	108,031	23.3%
Knee	39,261	13.9%	29,709	16.3%	68,970	14.9%
Ankle	37,224	13.2%	21,626	11.9%	58,850	12.7%
Hand/wrist	29,497	10.5%	21,944	12.1%	51,441	11.1%
Shoulder	26,539	9.4%	16,093	8.9%	42,632	9.2%
Hip/thigh/upper leg	18,427	6.5%	20,093	11.0%	38,520	8.3%
Trunk	12,393	4.4%	11,283	6.2%	23,676	5.1%
Lower leg	13,262	4.7%	7,450	4.1%	20,712	4.5%
Arm/elbow	9,972	3.5%	7,873	4.3%	17,845	3.8%
Foot	6,612	2.3%	7,240	4.0%	13,852	3.0%
Neck	4,128	1.5%	675	0.4%	4,803	1.0%
Other	8,248	2.9%	6,049	3.3%	14,297	3.1%
Total	**281,791**	**100.0%**	**181,838**	**100.0%**	**463,629**	**100.0%**

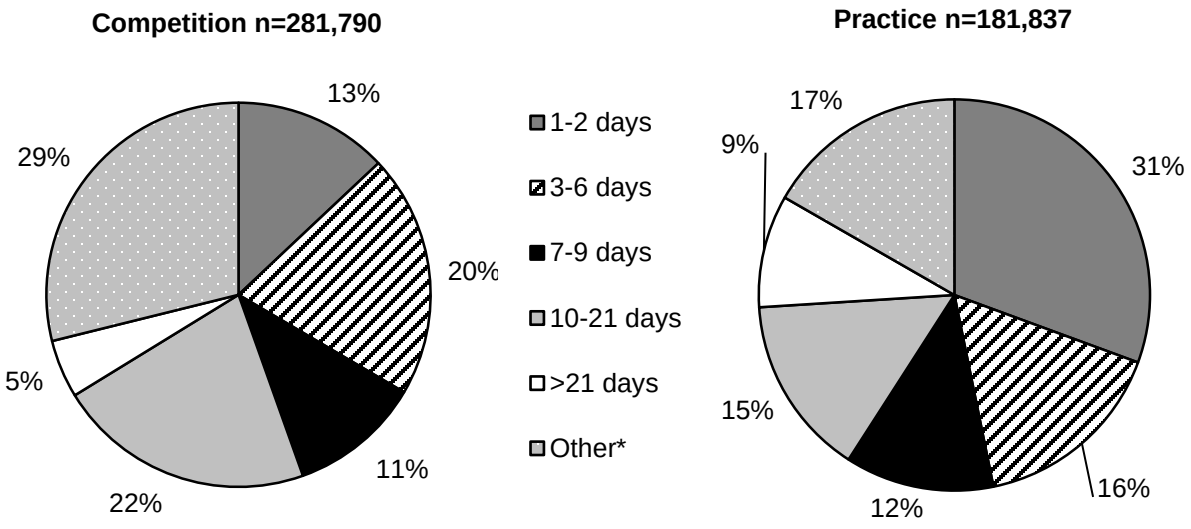
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 3.4 Ten Most Common Football Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=280,566		Practice n=181,589		Total n=462,155	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	73,673	26.3%	30,157	16.6%	103,830	22.5%
Ankle strain/sprain	34,494	12.3%	18,933	10.4%	53,427	11.6%
Knee strain/sprain	26,108	9.3%	12,005	6.6%	38,113	8.2%
Hip/thigh/upper leg strain/sprain	10,751	3.8%	15,411	8.5%	26,162	5.7%
Hand/wrist fracture	14,069	5.0%	8,932	4.9%	23,001	5.0%
Shoulder other	11,086	4.0%	9,740	5.4%	20,826	4.5%
Knee other	5,714	2.0%	12,382	6.8%	18,096	3.9%
Shoulder sprain/strain	12,404	4.4%	4,796	2.6%	17,200	3.7%
Hand/wrist strain/sprain	6,644	2.4%	8,988	4.9%	15,632	3.4%
Knee contusion	7,218	2.6%	4,552	2.5%	11,770	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 3.2 Time Loss of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	18,452	6.6%	10,536	5.8%	28,988	6.3%
Did not require surgery	259,662	93.4%	170,268	94.2%	429,930	93.7%
Total	**278,114**	**100.0%**	**180,804**	**100.0%**	**458,918**	**100.0%**

* 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, 2017-18 School Year

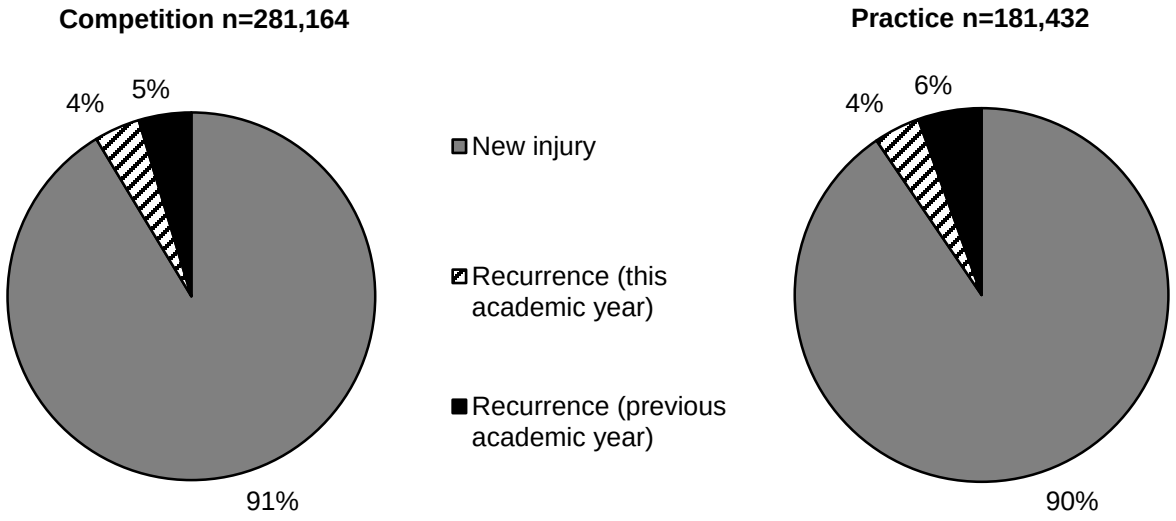


Table 3.6 Time during Season of Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	96,752	20.9%
Regular season	349,016	75.4%
Post season	17,203	3.7%
Unknown	118	0.03%
Total	**463,089**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Competition		
Pre-competition/warm-ups	2,809	1.1%
First quarter	29,191	11.5%
Second quarter	77,345	30.5%
Third quarter	82,758	32.6%
Fourth quarter	61,118	24.1%
Overtime	745	0.3%
Total	**253,965**	**100.0%**
Field Location		
Between the 20 yard lines	162,131	61.9%
Red zone (20 yard line to goal line)	40,908	15.6%
End zone	3,011	1.1%
Off the field	1,766	0.7%
Unknown	54,132	20.7%
Total	**261,948**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	13,422	7.5%
Second 1/2 hour	22,514	12.5%
1-2 hours into practice	93,321	51.9%
>2 hours into practice	18,481	10.3%
Unknown	32,073	17.8%
Total	**179,811**	**100.0%**

* 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, 2017-18 School Year

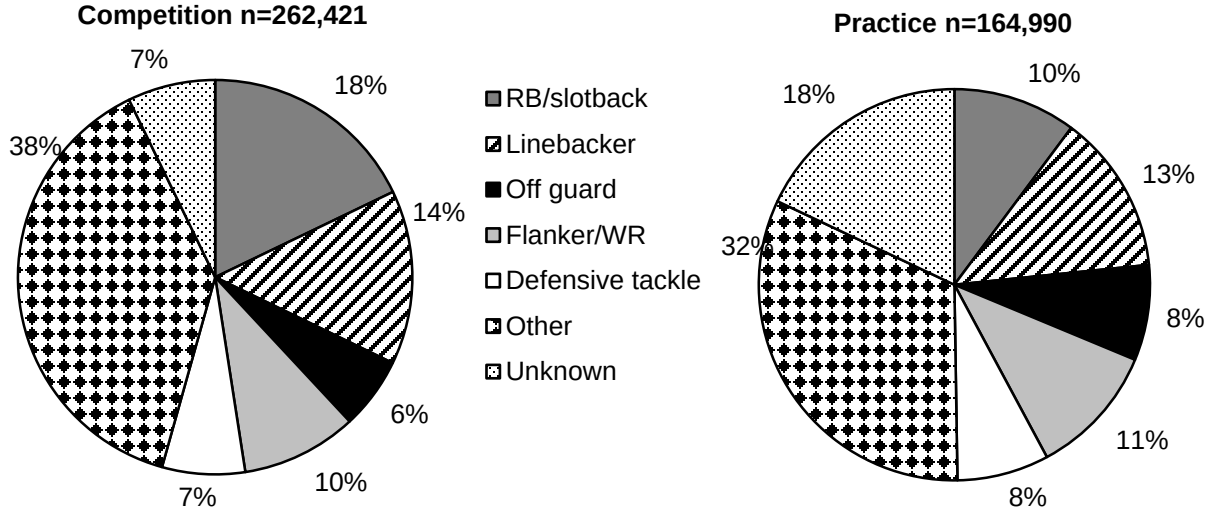


Table 3.9 Activities Leading to Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Being tackled	88,847	33.5%	27,038	16.2%	115,885	26.8%
Tackling	69,578	26.2%	27,574	16.5%	97,152	22.5%
Blocking	36,255	13.7%	26,139	15.7%	62,394	14.4%
Being blocked	18,218	6.9%	9,902	5.9%	28,120	6.5%
N/a (e.g., overuse, heat illness, conditioning, etc.)	1,853	0.7%	18,507	11.1%	20,360	4.7%
Stepped on/fell on/kicked	10,646	4.0%	8,774	5.3%	19,420	4.5%
Rotation around a planted foot/inversion	6,920	2.6%	6,320	3.8%	13,240	3.1%
Contact with blocking sled/dummy	0	0.0%	3,846	2.3%	3,846	0.9%
Uneven playing surface	988	0.4%	2,368	1.4%	3,356	0.8%
Contact with ball	1,006	0.4%	1,044	0.6%	2,050	0.5%
Other	6,714	2.5%	11,728	7.0%	18,442	4.3%
Unknown	24,260	9.1%	23,769	14.2%	48,029	11.1%
Total	**265,285**	**100.0%**	**167,009**	**100.0%**	**432,294**	**100.0%**

* 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 3.10 Activity Resulting in Football Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis									
	Strain/Sprain		Contusion		Fracture		Concussion		Other	
	n	%	n	%	n	%	n	%	n	%
Activity										
Being tackled	38,707	23.5%	21,669	40.5%	11,840	26.6%	30,952	31.4%	12,339	17.7%
Tackling	31,465	19.1%	10,261	19.2%	11,025	24.8%	27,535	28.0%	16,866	24.2%
Blocking	23,767	14.4%	7,387	13.8%	7,811	17.5%	13,686	13.9%	9,429	13.5%
Being blocked	9,333	5.7%	4,998	9.3%	1,434	3.2%	9,291	9.4%	3,065	4.4%
No contact (overuse/illness)	7,507	4.6%	527	1.0%	0	0.0%	379	0.4%	11,946	17.1%
Other	32,129	19.5%	5,392	10.1%	9,029	20.3%	3,901	4.0%	9,129	13.1%
Unknown	21,676	13.2%	3,335	6.2%	3,383	7.6%	12,687	12.9%	6,949	10.0%
Total	**164,584**	**100.0%**	**53,569**	**100.0%**	**44,522**	**100.0%**	**98,431**	**100.0%**	**69,723**	**100.0%**

IV. Boys' Soccer Injury Epidemiology

Table 4.1 Boys' Soccer Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**346**	**178,489**	**1.94**	**180,607**
Competition	218	55,583	3.92	113,655
Practice	128	122,906	1.04	66,952

Table 4.2 Demographic Characteristics of Injured Boys' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n= 171,077**
Freshman	21.8%
Sophomore	18.1%
Junior	32.5%
Senior	27.7%
Total†	**100.0%**
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.8 (1.3)
BMI	
Minimum	15.2
Maximum	32.1
Mean (St. Dev.)	22.3 (3.2)

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

Figure 4.1 Diagnosis of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

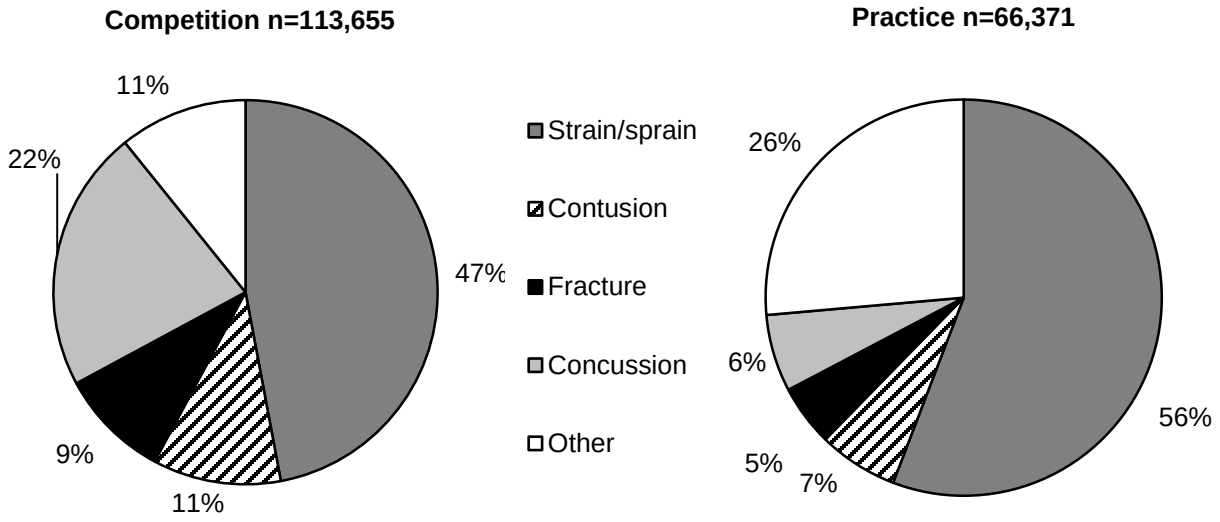


Table 4.3 Body Site of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Hip/thigh/upper leg	19,980	17.6%	18,752	28.0%	38,732	21.4%
Head/face	31,276	27.5%	5,233	7.8%	36,509	20.2%
Ankle	20,952	18.4%	12,001	17.9%	32,953	18.2%
Knee	14,199	12.5%	11,904	17.8%	26,103	14.5%
Lower leg	7,752	6.8%	4,765	7.1%	12,517	6.9%
Foot	5,826	5.1%	4,177	6.2%	10,003	5.5%
Hand/wrist	6,350	5.6%	1,261	1.9%	7,611	4.2%
Trunk	3,386	3.0%	3,999	6.0%	7,385	4.1%
Arm/elbow	1,348	1.2%	2,447	3.7%	3,795	2.1%
Shoulder	968	0.9%	1,287	1.9%	2,255	1.2%
Other	1,619	1.4%	1,127	1.7%	2,746	1.5%
Total	**113,656**	**100.0%**	**66,953**	**100.0%**	**180,609**	**100.0%**

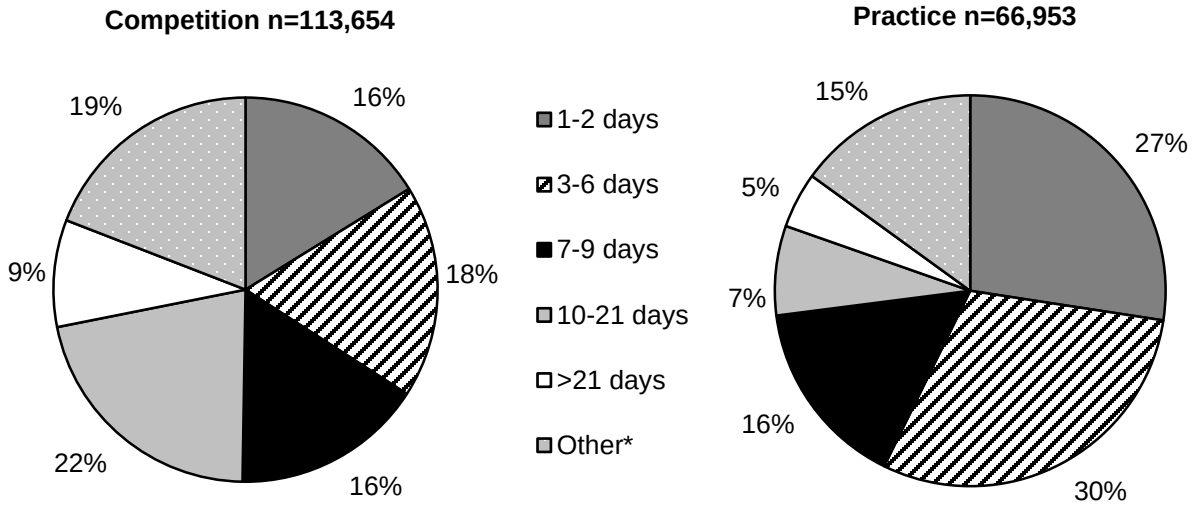
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 4.4 Ten Most Common Boys' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=113,655		Practice n=66,372		Total n=180,027	
	n	%	n	%	n	%
Diagnosis						
Hip/thigh/upper leg strain/sprain	15,528	13.7%	16,971	25.6%	32,499	18.1%
Ankle strain/sprain	19,705	17.3%	11,078	16.7%	30,783	17.1%
Head/face concussion	25,071	22.1%	4,193	6.3%	29,264	16.3%
Knee other	3,301	2.9%	6,953	10.5%	10,254	5.7%
Knee sprain/strain	8,727	7.7%	1,441	2.2%	10,168	5.6%
Knee contusion	1,950	1.7%	3,510	5.3%	5,460	3.0%
Hand/wrist fracture	4,488	3.9%	520	0.8%	5,008	2.8%
Lower leg other	1,382	1.2%	3,516	5.3%	4,898	2.7%
Trunk strain/sprain	2,166	1.9%	2,612	3.9%	4,778	2.7%
Lower leg strain/sprain	3,314	2.9%	1,188	1.8%	4,502	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, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	5,511	4.9%	1,083	1.7%	6,594	3.7%
Did not require surgery	106,918	95.1%	64,106	98.3%	171,024	96.3%
Total	**112,429**	**100.0%**	**65,189**	**100.0%**	**177,618**	**100.0%**

* 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, 2017-18 School Year

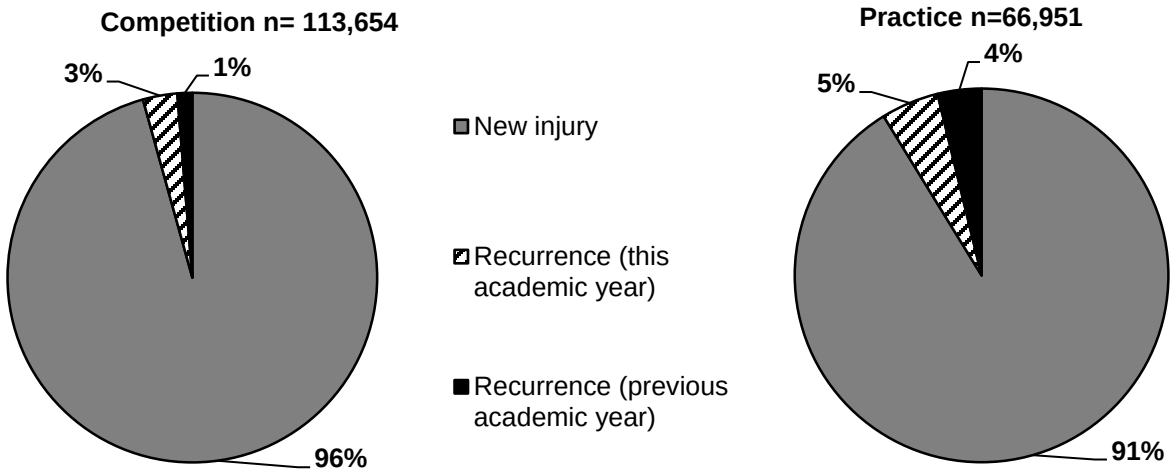


Table 4.6 Time during Season of Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	38,555	21.3%
Regular season	132,651	73.4%
Post season	9,043	5.0%
Unknown	358	0.2%
Total	**180,607**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Competition		
Pre-competition/warm-ups	2,550	2.5%
First half	21,490	20.9%
Second half	56,057	54.4%
Overtime	1,165	1.1%
Unknown	21,755	21.1%
Total	**103,018**	**100.0%**
Field Location		
Top of goal box extended to center line (defense)	19,209	19.0%
Top of goal box extended to center line (offense)	16,869	16.7%
Goal box (defense)	15,580	15.4%
Goal box (offense)	11,647	11.5%
Side of goal box (defense)	3,861	3.8%
Side of goal box (offense)	2,962	2.9%
Off the field	1,229	1.2%
Unknown	29,709	29.4%
Total	**101,067**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	3,906	5.9%
Second 1/2 hour	8,510	12.8%
1-2 hours into practice	35,955	54.3%
>2 hours into practice	1,943	2.9%
Unknown	15,935	24.1%
Total	**66,249**	**100.0%**

* 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, 2017-18 School Year

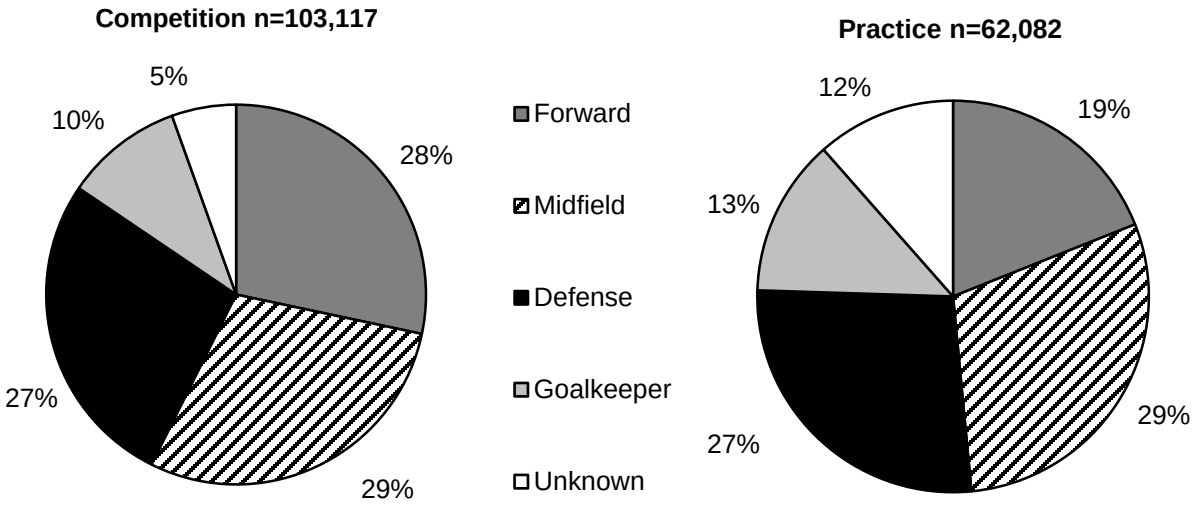


Table 4.9 Activities Leading to Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
General play	17,532	16.5%	23,124	37.2%	40,656	24.2%
Defending	20,196	19.0%	4,635	7.5%	24,831	14.8%
Chasing loose ball	12,181	11.5%	4,537	7.3%	16,718	9.9%
Goaltending	9,305	8.8%	6,401	10.3%	15,706	9.3%
Ball handling/dribbling	11,175	10.5%	4,145	6.7%	15,320	9.1%
Shooting (foot)	7,123	6.7%	3,116	5.0%	10,239	6.1%
Heading ball	6,268	5.9%	0	0.0%	6,268	3.7%
Conditioning	0	0.0%	5,113	8.2%	5,113	3.0%
Passing (foot)	4,798	4.5%	222	0.4%	5,020	3.0%
Receiving pass	3,597	3.4%	741	1.2%	4,338	2.6%
Blocking shot	2,831	2.7%	520	0.8%	3,351	2.0%
Attempting a slide tackle	1,083	1.0%	1,243	2.0%	2,326	1.4%
Receiving a slide tackle	1,951	1.8%	0	0.0%	1,951	1.2%
Other	61	0.1%	2,229	3.6%	2,290	1.4%
Unknown	8,010	7.5%	6,057	9.8%	14,067	8.4%
Total	**106,111**	**100.0%**	**62,083**	**100.0%**	**168,194**	**100.0%**

* 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 4.10 Activity Resulting in Boys' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis									
	Strain/Sprain		Contusion		Fracture		Concussion		Other	
	n	%	n	%	n	%	n	%	n	%
Activity										
General play	22,624	27.0%	1,443	9.5%	1,969	14.9%	3,622	13.2%	10,418	37.5%
Defending	13,154	15.7%	2,569	16.9%	3,338	25.2%	4,601	16.7%	1,168	4.2%
Chasing loose ball	10,244	12.2%	303	2.0%	61	0.5%	4,944	18.0%	1,165	4.2%
Goaltending	5,003	6.0%	2,246	14.8%	1,585	12.0%	4,699	17.1%	2,173	7.8%
Ball handling/dribbling	8,331	9.9%	1,950	12.8%	1,287	9.7%	1,585	5.8%	2,167	7.8%
Shooting (foot)	6,845	8.2%	823	5.4%	1,189	9.0%	0	0.0%	1,382	5.0%
Heading ball	0	0.0%	520	3.4%	2,110	15.9%	2,815	10.2%	823	3.0%
Conditioning	2,921	3.5%	1,065	7.0%	0	0.0%	0	0.0%	1,127	4.1%
passing (foot)	3,548	4.2%	303	2.0%	0	0.0%	283	1.0%	886	3.2%
Receiving pass	1,348	1.6%	222	1.5%	222	1.7%	1,724	6.3%	823	3.0%
Blocking shot	886	1.1%	0	0.0%	0	0.0%	1,083	3.9%	1,382	5.0%
Attempting a slide tackle	1,441	1.7%	886	5.8%	0	0.0%	0	0.0%	0	0.0%
Receiving a slide tackle	0	0.0%	1,065	7.0%	0	0.0%	886	3.2%	0	0.0%
Other	1,405	1.7%	0	0.0%	0	0.0%	520	1.9%	364	1.3%
Unknown	6,086	7.3%	1,781	11.7%	1,484	11.2%	777	2.8%	3,939	14.2%
Total	**83,836**	**100.0%**	**15,176**	**100.0%**	**13,245**	**100.0%**	**27,539**	**100.0%**	**27,817**	**100.0%**

V. Girls' Soccer Injury Epidemiology

Table 5.1 Girls' Soccer Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**432**	**153,235**	**2.82**	**242,602**
Competition	275	47,133	5.83	152,993
Practice	157	106,102	1.48	89,609

Table 5.2 Demographic Characteristics of Injured Girls' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n=232,528**
Freshman	31.3%
Sophomore	25.9%
Junior	23.3%
Senior	18.5%
Total†	**100.0%**
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.7 (1.2)
BMI	
Minimum	16.3
Maximum	40.7
Mean (St. Dev.)	22.7 (3.8)

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

Figure 5.1 Diagnosis of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

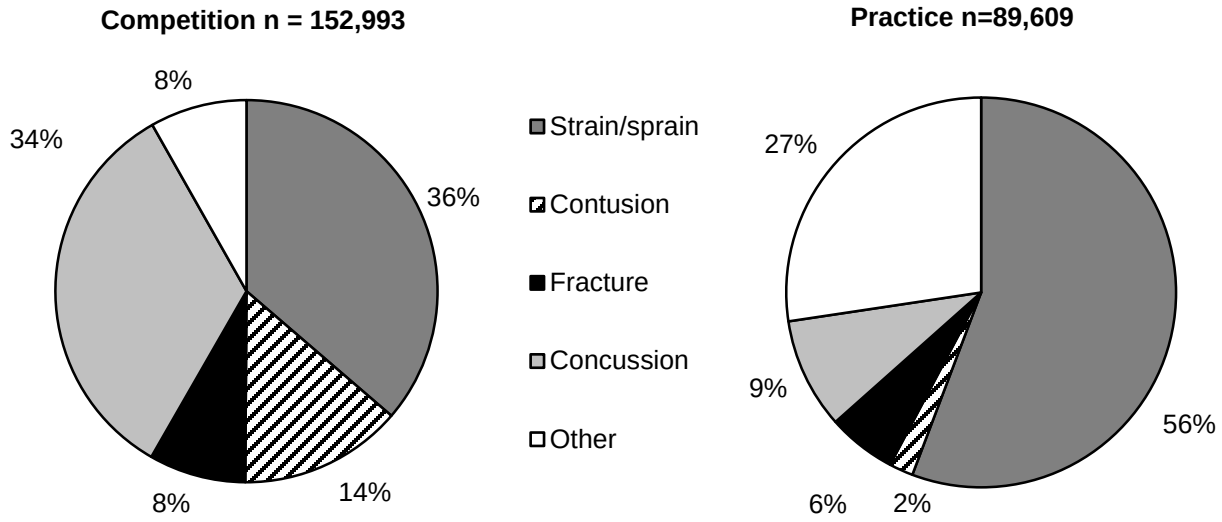


Table 5.3 Body Site of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	54,716	35.8%	8,755	9.8%	63,471	26.2%
Ankle	24,656	16.1%	19,824	22.1%	44,480	18.3%
Hip/thigh/upper leg	13,166	8.6%	22,644	25.3%	35,810	14.8%
Knee	22,821	14.9%	12,518	14.0%	35,339	14.6%
Lower leg	9,533	6.2%	10,248	11.4%	19,781	8.2%
Foot	12,878	8.4%	5,506	6.1%	18,384	7.6%
Hand/wrist	6,982	4.6%	3,652	4.1%	10,634	4.4%
Trunk	3,960	2.6%	3,449	3.8%	7,409	3.1%
Shoulder	764	0.5%	1,208	1.3%	1,972	0.8%
Arm/elbow	1,362	0.9%	0	0.0%	1,362	0.6%
Neck	1,249	0.8%	61	0.1%	1,310	0.5%
Other	906	0.6%	1,745	1.9%	2,651	1.1%
Total	**152,993**	**100.0%**	**89,610**	**100.0%**	**242,603**	**100.0%**

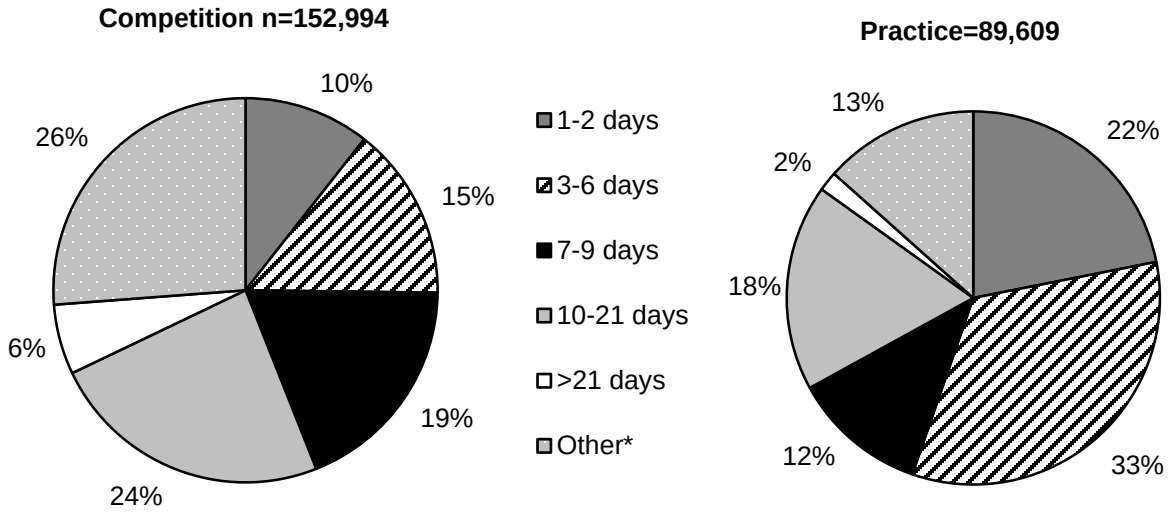
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 5.4 Ten Most Common Girls' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=152,994		Practice n=89,610		Total n=242,604	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	51,229	33.5%	8,218	9.2%	59,447	24.5%
Ankle strain/sprain	22,122	14.5%	16,695	18.6%	38,817	16.0%
Hip/thigh/upper leg strain/sprain	10,491	6.9%	21,528	24.0%	32,019	13.2%
Knee sprain/strain	12,579	8.2%	4,203	4.7%	16,782	6.9%
Knee other	6,036	3.9%	8,315	9.3%	14,351	5.9%
Foot contusion	8,213	5.4%	0	0.0%	8,213	3.4%
Lower leg other	537	0.4%	6,383	7.1%	6,920	2.9%
Lower leg strain/sprain	3,906	2.6%	1,505	1.7%	5,411	2.2%
Hand/wrist strain/sprain	2,897	1.9%	2,241	2.5%	5,138	2.1%
Hand/wrist fracture	3,548	2.3%	1,411	1.6%	4,959	2.0%

* 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, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	12,191	8.0%	2,401	2.7%	14,592	6.1%
Did not require surgery	139,871	92.0%	86,301	97.3%	226,172	93.9%
Total	**152,062**	**100.0%**	**88,702**	**100.0%**	**240,764**	**100.0%**

* 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, 2017-18 School Year

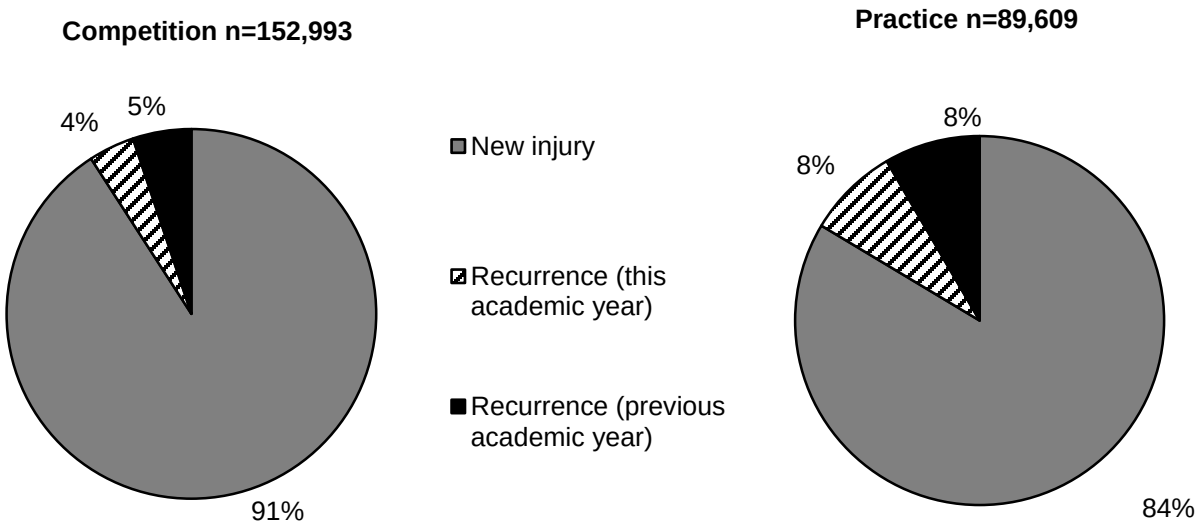


Table 5.6 Time during Season of Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	49,578	20.5%
Regular season	180,079	74.5%
Post season	12,016	5.0%
Total	**241,672**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Competition		
Pre-competition/warm-ups	2,266	1.5%
First half	29,525	19.8%
Second half	81,437	54.8%
Overtime	61	0.0%
Unknown	35,454	23.8%
Total	**148,742**	**100.0%**
Field Location		
Goal box (defense)	24,373	16.6%
Top of goal box extended to center line (offense)	23,404	15.9%
Top of goal box extended to center line (defense)	17,163	11.7%
Side of goal box (defense)	8,797	6.0%
Goal box (offense)	7,550	5.1%
Side of goal box (Defense	4,201	2.9%
Off the field	2,179	1.5%
Unknown	59,493	40.4%
Total	**147,159**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	9,701	10.8%
Second 1/2 hour	13,574	15.2%
1-2 hours into practice	34,559	38.6%
>2 hours into practice	2,841	3.2%
Unknown	28,813	32.2%
Total	**89,488**	**100.0%**

* 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, 2017-18 School Year

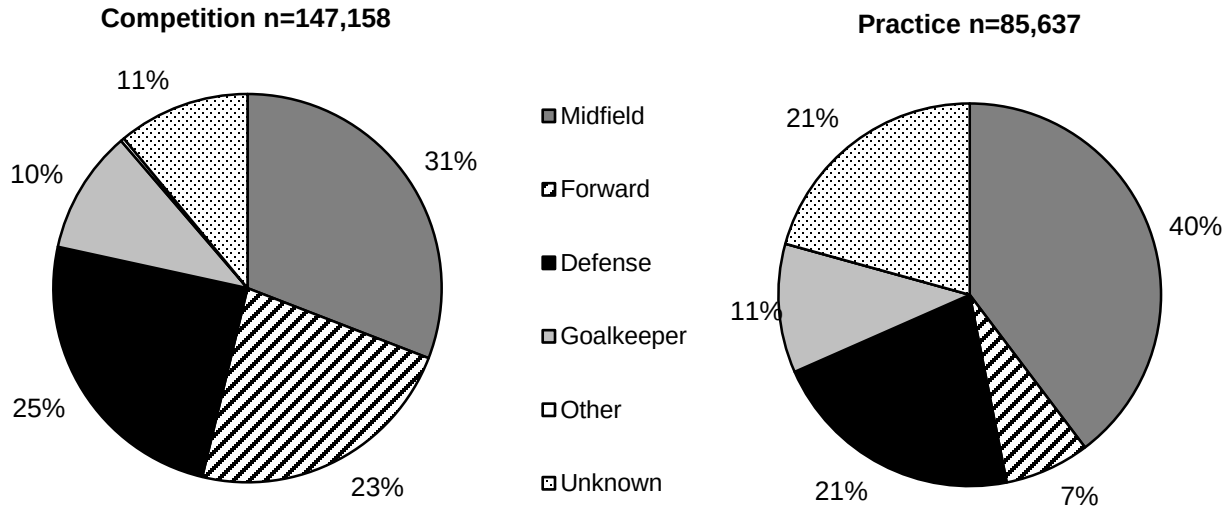


Table 5.9 Activities Leading to Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
General play	37,086	24.9%	32,652	38.1%	69,738	29.8%
Defending	26,729	18.0%	7,592	8.9%	34,321	14.6%
Goaltending	11,987	8.1%	5,753	6.7%	17,740	7.6%
Ball handling/dribbling	11,213	7.5%	6,326	7.4%	17,539	7.5%
Chasing loose ball	13,486	9.1%	2,976	3.5%	16,462	7.0%
Shooting (foot)	5,070	3.4%	4,778	5.6%	9,848	4.2%
Blocking shot	4,976	3.3%	4,428	5.2%	9,404	4.0%
Conditioning	369	0.2%	8,485	9.9%	8,854	3.8%
Heading ball	7,774	5.2%	0	0.0%	7,774	3.3%
Passing (foot)	4,865	3.3%	2,867	3.3%	7,732	3.3%
Receiving pass	2,865	1.9%	2,241	2.6%	5,106	2.2%
Attempting a slide tackle	1,428	1.0%	0	0.0%	1,428	0.6%
Receiving a slide tackle	1,249	0.8%	0	0.0%	1,249	0.5%
Other	972	0.7%	1,147	1.3%	2,119	0.9%
Unknown	18,675	12.6%	6,392	7.5%	25,067	10.7%
Total	**148,744**	**100.0%**	**85,637**	**100.0%**	**234,381**	**100.0%**

* 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 5.10 Activity Resulting in Girls' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis									
	Strain/Sprain		Contusion		Fracture		Concussion		Other	
	n	%	n	%	n	%	n	%	n	%
Activity										
General play	28,045	27.6%	2,928	13.3%	6,203	35.7%	12,800	22.0%	19,761	56.7%
Defending	13,132	12.9%	4,694	21.3%	1,188	6.8%	13,919	23.9%	1,387	4.0%
Goaltending	5,753	5.7%	2,756	12.5%	2,705	15.5%	4,483	7.7%	2,042	5.9%
Ball handling/dribbling	12,532	12.3%	2,087	9.5%	993	5.7%	756	1.3%	1,170	3.4%
Chasing loose ball	9,208	9.0%	1,386	6.3%	2,042	11.7%	2,102	3.6%	1,725	4.9%
Shooting (foot)	6,027	5.9%	1,386	6.3%	752	4.3%	0	0.0%	1,683	4.8%
Blocking shot	2,310	2.3%	930	4.2%	0	0.0%	5,234	9.0%	930	2.7%
Conditioning	7,802	7.7%	0	0.0%	0	0.0%	0	0.0%	1,053	3.0%
Heading ball	0	0.0%	0	0.0%	658	3.8%	6,125	10.5%	991	2.8%
Passing (foot)	3,346	3.3%	1,122	5.1%	739	4.2%	2,525	4.3%	0	0.0%
Receiving pass	1,362	1.3%	240	1.1%	1,188	6.8%	1,921	3.3%	395	1.1%
Attempting a slide tackle	1,188	1.2%	240	1.1%	0	0.0%	0	0.0%	0	0.0%
Receiving a slide tackle	1,249	1.2%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Other	1,147	1.1%	61	0.3%	0	0.0%	790	1.4%	121	0.3%
Unknown	8,660	8.5%	4,245	19.2%	930	5.3%	7,641	13.1%	3,591	10.3%
Total	**101,761**	**100.0%**	**22,075**	**100.0%**	**17,398**	**100.0%**	**58,296**	**100.0%**	**34,849**	**100.0%**

VI. Volleyball Injury Epidemiology

Table 6.1 Volleyball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**247**	**160,117**	**1.54**	**67,163**
Competition	122	55,944	2.18	33,075
Practice	125	104,173	1.20	34,088

Table 6.2 Demographic Characteristics of Injured Volleyball Athletes, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n=62,518**
Freshman	27.0%
Sophomore	27.3%
Junior	23.7%
Senior	22.0%
Total†	**100.0%**
Age (years)	
Minimum	12
Maximum	18
Mean (St. Dev.)	15.5 (1.3)
BMI	
Minimum	17.2
Maximum	40.2
Mean (St. Dev.)	22.4 (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 6.1 Diagnosis of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

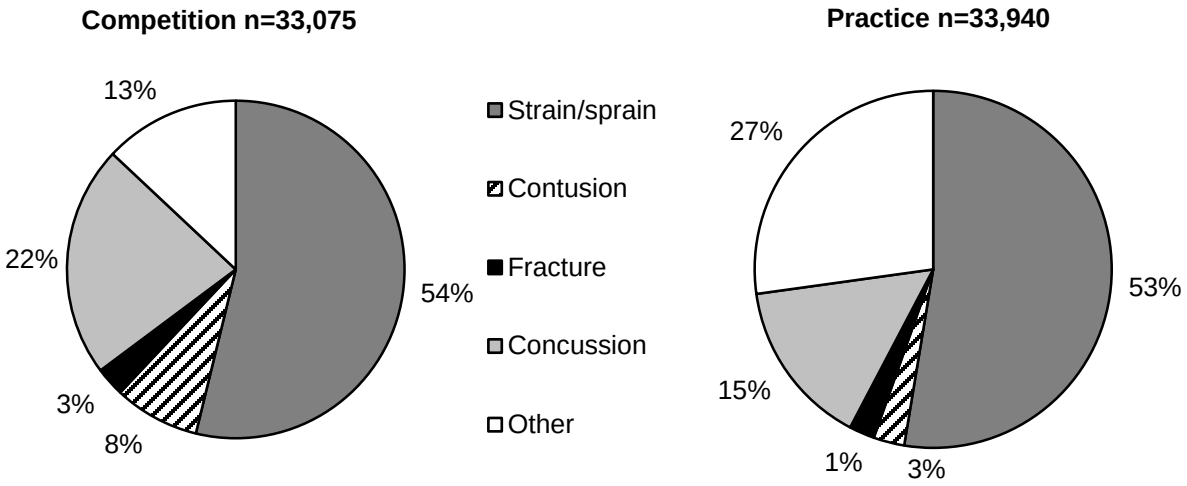


Table 6.3 Body Site of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	9,744	29.5%	10,022	29.4%	19,766	29.4%
Head/face	7,470	22.6%	5,854	17.2%	13,324	19.8%
Hand/wrist	5,036	15.2%	3,424	10.0%	8,460	12.6%
Knee	3,919	11.8%	4,413	12.9%	8,332	12.4%
Trunk	2,146	6.5%	3,660	10.7%	5,806	8.6%
Shoulder	1,247	3.8%	3,231	9.5%	4,478	6.7%
Hip/thigh/upper leg	1,583	4.8%	1,172	3.4%	2,755	4.1%
Lower leg	481	1.5%	933	2.7%	1,414	2.1%
Foot	713	2.2%	302	0.9%	1,015	1.5%
Arm/elbow	260	0.8%	387	1.1%	647	1.0%
Neck	0	0.0%	481	1.4%	481	0.7%
Other	478	1.4%	211	0.6%	689	1.0%
Total	**33,077**	**100.0%**	**34,090**	**100.0%**	**67,167**	**100.0%**

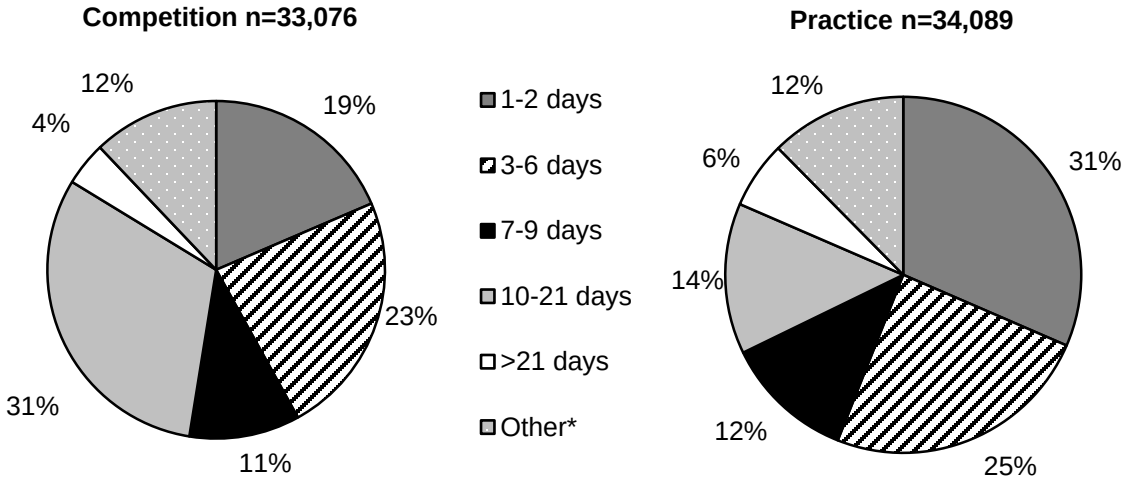
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 6.4 Ten Most Common Volleyball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=33,078		Practice n=33,940		Total n=67,018	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	9,456	28.6%	10,022	29.5%	19,478	29.1%
Head/face concussion	7,358	22.2%	5,134	15.1%	12,492	18.6%
Hand/wrist strain/sprain	3,410	10.3%	2,022	6.0%	5,432	8.1%
Knee other	1,460	4.4%	3,418	10.1%	4,878	7.3%
Knee strain/sprain	2,108	6.4%	996	2.9%	3,104	4.6%
Trunk strain/sprain	1,545	4.7%	1,358	4.0%	2,903	4.3%
Trunk other	601	1.8%	2,302	6.8%	2,903	4.3%
Shoulder other	1,247	3.8%	1,431	4.2%	2,678	4.0%
Shoulder strain/sprain	0	0.0%	1,799	5.3%	1,799	2.7%
Hand/wrist contusion	1,338	4.0%	239	0.7%	1,577	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 6.2 Time Loss of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	866	2.6%	1,137	3.4%	2,003	3.0%
Did not require surgery	32,209	97.4%	32,565	96.6%	64,774	97.0%
Total	**33,075**	**100.0%**	**33,702**	**100.0%**	**66,777**	**100.0%**

* 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, 2017-18 School Year

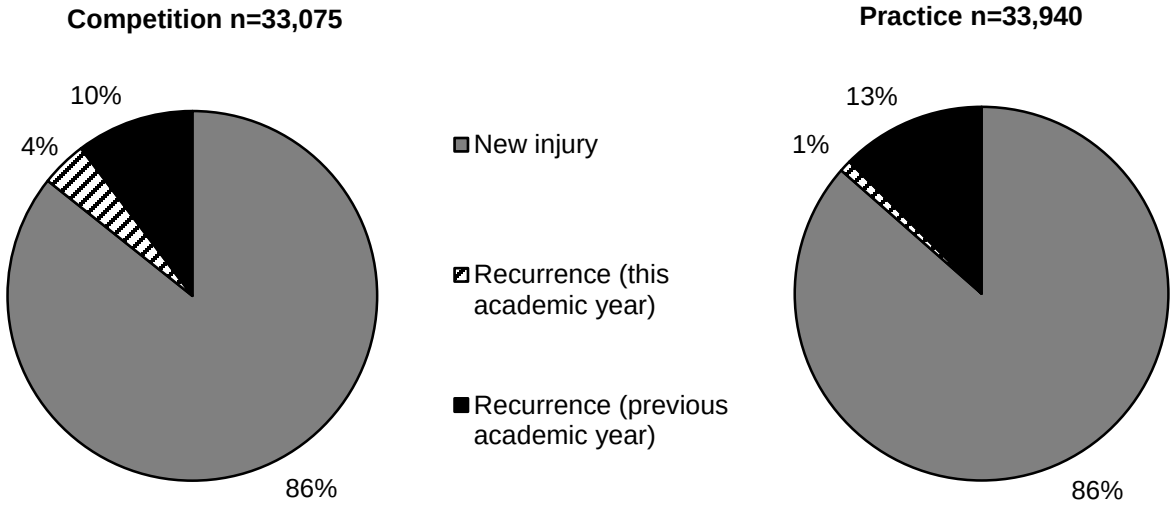


Table 6.6 Time during Season of Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	14,128	21.0%
Regular season	51,476	76.6%
Post season	1,412	2.1%
Unknown	148	0.2%
Total	**67,163**	**100.0%**

* 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, 2017-18 School Year*

Time in Competition	n	%
Pre-competition/warm-ups	3,907	12.6%
First set	749	2.4%
Second set	7,887	25.4%
Third set	6,612	21.3%
Fourth set	1,558	5.0%
Fifth set	724	2.3%
Unknown	9,560	30.8%
Total	**30,996**	**100.0%**

Court Location	n	%
Middle forward	4,953	16.9%
Right forward	3,229	11.0%
Left back	2,285	7.8%
Left forward	1,731	5.9%
Right back (server)	1,489	5.1%
At the net	1,293	4.4%
Outside court (opponents side)	938	3.2%
Outside the playable area	601	2.1%
Outside court (your side)	466	1.6%
Unknown	12,289	42.0%
Total	**29,273**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	702	2.1%
Second 1/2 hour	4,126	12.4%
1-2 hours into practice	15,811	47.4%
>2 hours into practice	4,589	13.8%
Unknown	8,142	24.4%
Total	**33,370**	**100.0%**

* 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, 2017-18 School Year

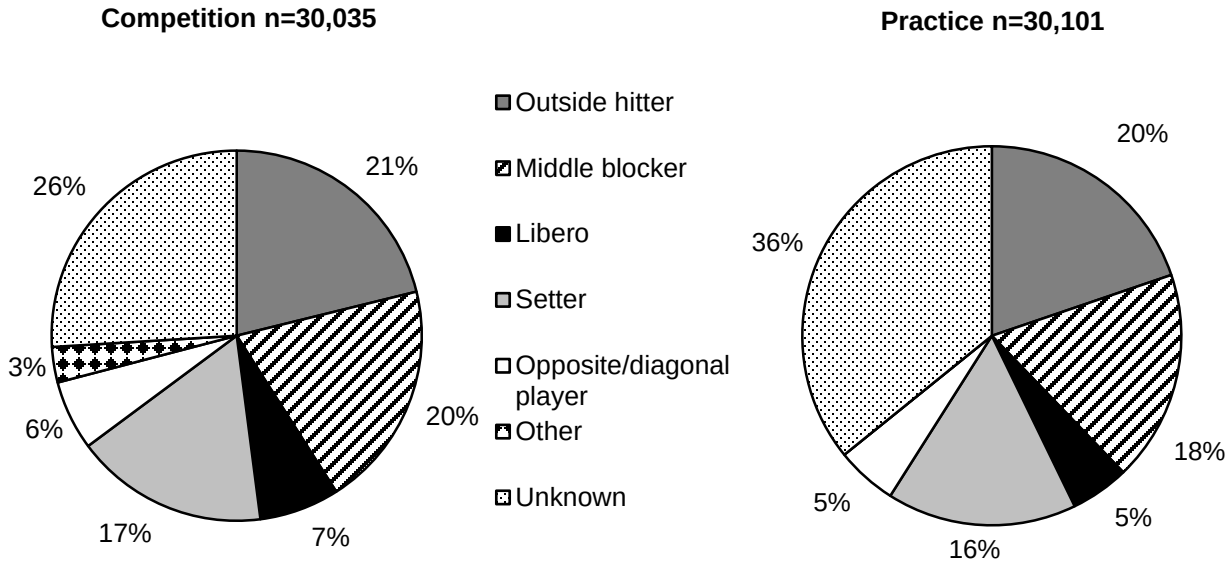


Table 6.9 Activities Leading to Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
General play	5,182	16.9%	8,015	26.0%	13,197	21.5%
Blocking	5,490	18.0%	5,237	17.0%	10,727	17.5%
Digging	7,356	24.1%	2,973	9.6%	10,329	16.8%
Spiking	2,285	7.5%	2,211	7.2%	4,496	7.3%
Passing	1,796	5.9%	1,267	4.1%	3,063	5.0%
Setting	1,056	3.5%	1,921	6.2%	2,977	4.8%
Serving	961	3.1%	1,696	5.5%	2,657	4.3%
Conditioning	0	0.0%	1,141	3.7%	1,141	1.9%
Other	1,592	5.2%	1,805	5.8%	3,397	5.5%
Unknown	4,861	15.9%	4,604	14.9%	9,465	15.4%
Total	**30,579**	**100.0%**	**30,870**	**100.0%**	**61,449**	**100.0%**

* 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 6.10 Activity Resulting in Volleyball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis									
	Strain/Sprain		Contusion		Fracture		Concussion		Other	
	n	%	n	%	n	%	n	%	n	%
Activity										
General play	5,819	18.1%	769	24.8%	0	0.0%	2,578	22.3%	4,031	31.5%
Spiking	2,321	7.2%	0	0.0%	288	17.0%	288	2.5%	1,600	12.5%
Digging	4,376	13.6%	1,717	55.4%	112	6.6%	3,181	27.6%	943	7.4%
Conditioning	239	0.7%	0	0.0%	0	0.0%	0	0.0%	902	7.0%
Serving	1,938	6.0%	0	0.0%	0	0.0%	0	0.0%	720	5.6%
Setting	1,566	4.9%	466	15.0%	0	0.0%	239	2.1%	705	5.5%
Blocking	9,830	30.5%	0	0.0%	362	21.4%	296	2.6%	239	1.9%
Passing	1,760	5.5%	0	0.0%	387	22.9%	769	6.7%	0	0.0%
Other	829	2.6%	0	0.0%	63	3.7%	2,358	20.4%	148	1.2%
Unknown	3,500	10.9%	148	4.8%	481	28.4%	1,827	15.8%	3,509	27.4%
Total	**32,178**	**100.0%**	**3,100**	**100.0%**	**1,693**	**100.0%**	**11,536**	**100.0%**	**12,797**	**100.0%**

VII. Boys' Basketball Injury Epidemiology

Table 7.1 Boys' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**324**	**210,119**	**1.54**	**93,773**
Competition	176	64,289	2.74	48,814
Practice	148	145,830	1.01	44,959

Table 7.2 Demographic Characteristics of Injured Boys' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n=91,301**
Freshman	20.0%
Sophomore	31.0%
Junior	25.3%
Senior	23.6%
Total†	**100.0%**
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	16.0 (1.3)
BMI	
Minimum	15.6
Maximum	37.9
Mean (St. Dev.)	22.8(3.8)

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

Figure 7.1 Diagnosis of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

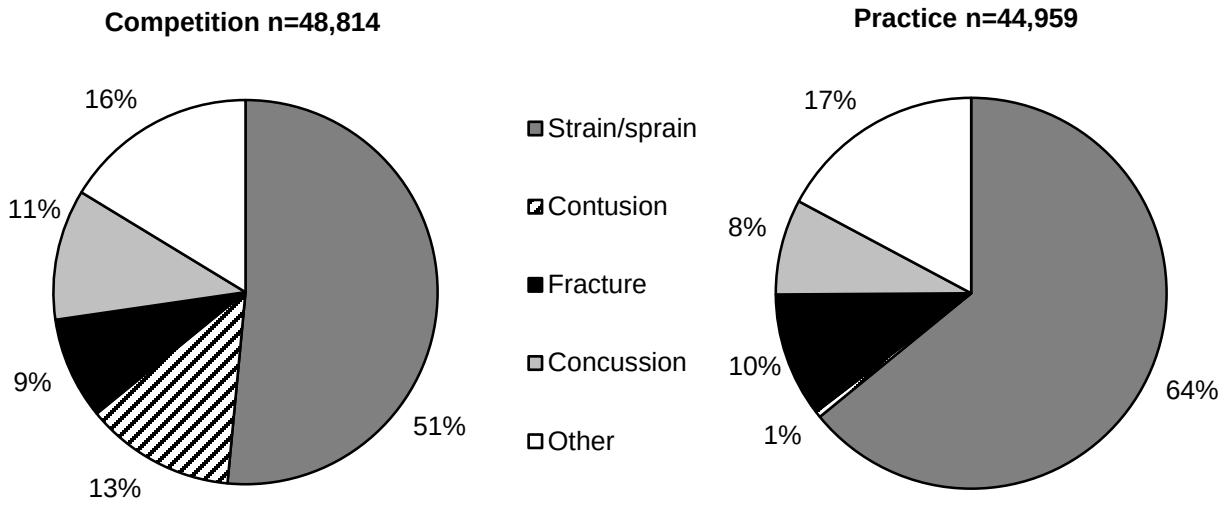


Table 7.3 Body Site of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	16,486	33.8%	16,617	37.0%	33,103	35.3%
Head/face	8,403	17.2%	4,559	10.1%	12,962	13.8%
Hand/wrist	6,542	13.4%	6,402	14.2%	12,944	13.8%
Knee	4,584	9.4%	5,679	12.6%	10,263	10.9%
Trunk	2,889	5.9%	3,461	7.7%	6,350	6.8%
Hip/thigh/upper leg	2,323	4.8%	2,629	5.8%	4,952	5.3%
Lower leg	2,196	4.5%	1,360	3.0%	3,556	3.8%
Foot	1,504	3.1%	1,500	3.3%	3,004	3.2%
Shoulder	1,091	2.2%	1,123	2.5%	2,214	2.4%
Arm/elbow	1,639	3.4%	114	0.3%	1,753	1.9%
Neck	890	1.8%	0	0.0%	890	0.9%
Other	266	0.5%	1,514	3.4%	1,780	1.9%
Total	**48,813**	**100.0%**	**44,958**	**100.0%**	**93,771**	**100.0%**

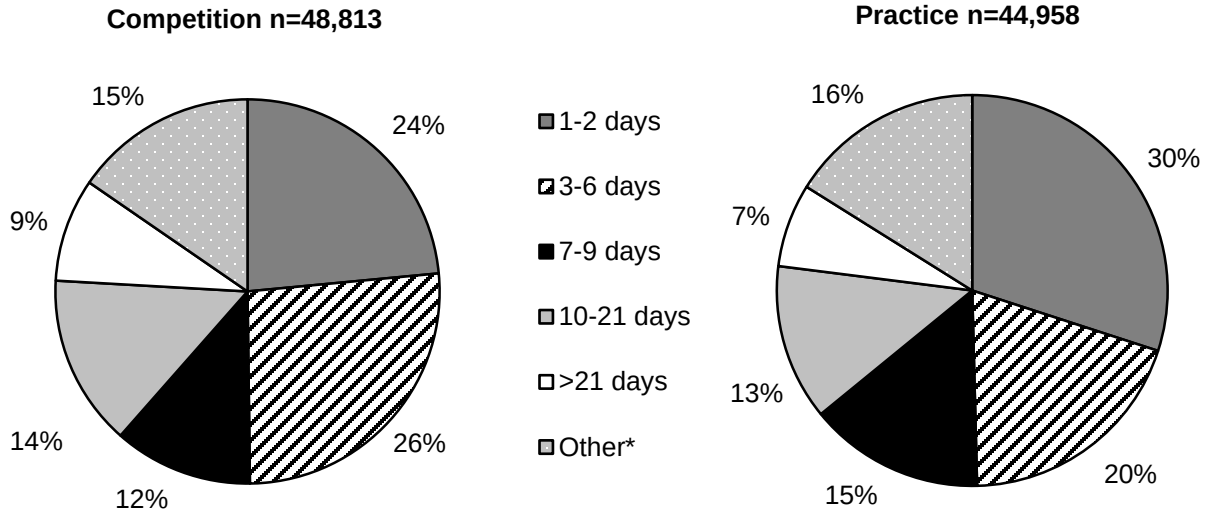
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 7.4 Ten Most Common Boys' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=48,814		Practice n=44,960		Total n=93,774	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	16,372	33.5%	15,966	35.5%	32,338	34.5%
Head/face concussion	5,378	11.0%	3,539	7.9%	8,917	9.5%
Hand/wrist strain/sprain	2,932	6.0%	2,861	6.4%	5,793	6.2%
Hand/wrist fracture	1,882	3.9%	2,946	6.6%	4,828	5.1%
Knee sprain/strain	1,332	2.7%	3,293	7.3%	4,625	4.9%
Knee other	2,019	4.1%	2,132	4.7%	4,151	4.4%
Trunk strain/sprain	1,044	2.1%	2,204	4.9%	3,248	3.5%
Trunk other	1,783	3.7%	1,004	2.2%	2,787	3.0%
Head/face other	1,409	2.9%	957	2.1%	2,366	2.5%
Hip/thigh/upper leg contusion	2,209	4.5%	114	0.3%	2,323	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 7.2 Time Loss of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	2,720	5.7%	2,771	6.3%	5,491	6.0%
Did not require surgery	45,206	94.3%	41,550	93.7%	86,756	94.0%
Total	**47,926**	**100.0%**	**44,321**	**100.0%**	**92,247**	**100.0%**

* 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, 2017-18 School Year

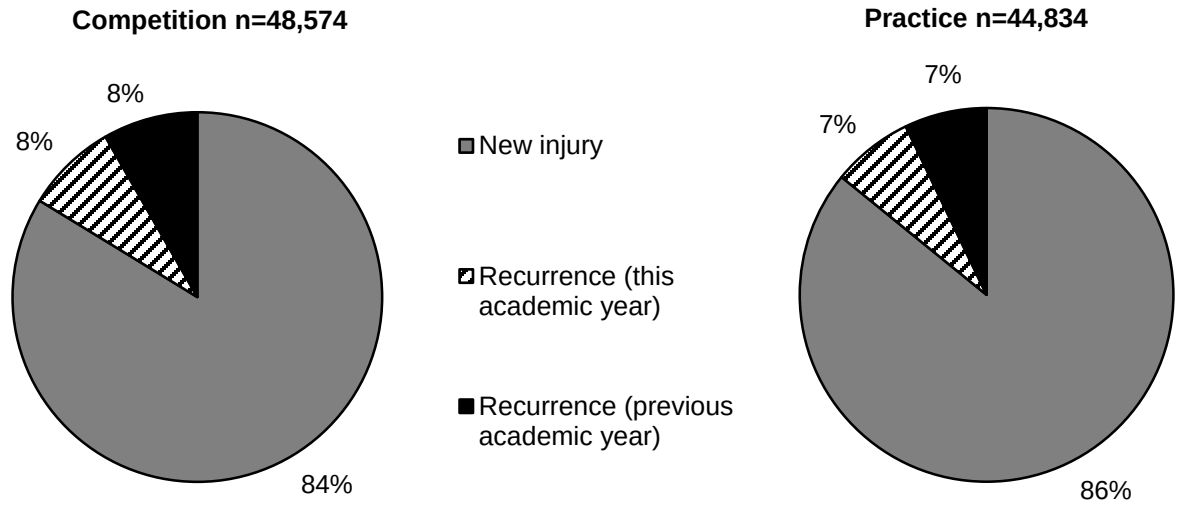


Table 7.6 Time during Season of Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	14,528	15.5%
Regular season	76,364	81.4%
Post season	2,881	3.1%
Total	**93,773**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Competition		
Pre-competition/warm-ups	1,238	2.6%
First quarter	3,856	8.2%
Second quarter	13,141	28.0%
Third quarter	12,494	26.6%
Fourth quarter	7,452	15.9%
Unknown	8,710	18.6%
Total	**46,891**	**100.0%**
Court Location		
Inside lane (defense)	10,205	21.8%
Inside lane (offense)	6,724	14.4%
Between 3 pt arc and lane (offense)	5,123	11.0%
Between 3 pt arc and lane (defense)	2,856	6.1%
Outside 3 point arc - defense	2,272	4.9%
Out of bounds	2,133	4.6%
Outside 3 point arc - offense	1,359	2.9%
Off the court	965	2.1%
Backcourt	894	1.9%
Unknown	14,246	30.5%
Total	**46,777**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	2,109	4.7%
Second 1/2 hour	7,555	16.9%
1-2 hours into practice	25,467	57.0%
>2 hours into practice	2,877	6.4%
Unknown	6,697	15.0%
Total	**44,705**	**100.0%**

* 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, 2017-18 School Year

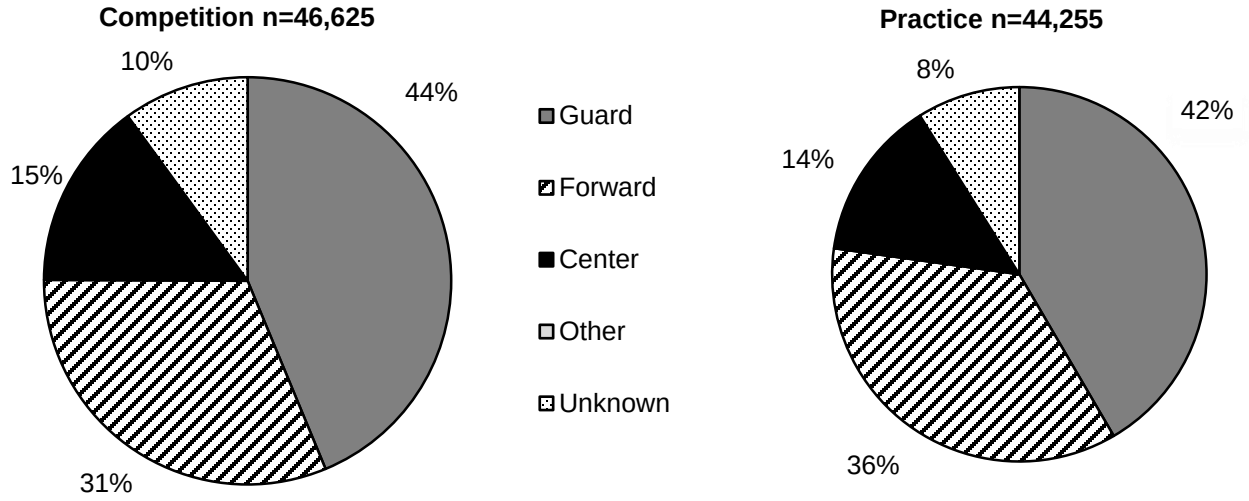


Table 7.9 Activities Leading to Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Rebounding	12,992	27.7%	11,978	27.4%	24,970	27.6%
General play	5,388	11.5%	13,459	30.8%	18,847	20.8%
Defending	7,764	16.6%	4,194	9.6%	11,958	13.2%
Shooting	4,587	9.8%	3,041	7.0%	7,628	8.4%
Chasing loose ball	5,536	11.8%	1,617	3.7%	7,153	7.9%
Ball handling/dribbling	2,137	4.6%	1,427	3.3%	3,564	3.9%
Receiving pass	776	1.7%	2,503	5.7%	3,279	3.6%
Passing	522	1.1%	522	1.2%	1,044	1.2%
Conditioning	0	0.0%	890	2.0%	890	1.0%
Screening	470	1.0%	0	0.0%	470	0.5%
Other	532	1.1%	372	0.9%	904	1.0%
Unknown	6,187	13.2%	3,731	8.5%	9,918	10.9%
Total	**46,891**	**100.0%**	**43,734**	**100.0%**	**90,625**	**100.0%**

* 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 7.10 Activity Resulting in Boys' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis									
	Strain/Sprain		Contusion		Fracture		Concussion		Other	
	n	%	n	%	n	%	n	%	n	%
Activity										
Rebounding	16,506	31.8%	1,599	25.0%	2,800	33.2%	1,257	14.6%	2,807	18.3%
General play	10,707	20.7%	522	8.2%	584	6.9%	1,857	21.6%	5,176	33.7%
Defending	6,190	11.9%	699	10.9%	716	8.5%	2,394	27.8%	1,960	12.8%
Shooting	5,164	10.0%	963	15.1%	626	7.4%	495	5.7%	380	2.5%
Chasing loose ball	3,935	7.6%	865	13.5%	470	5.6%	990	11.5%	893	5.8%
Ball handling/dribbling	1,849	3.6%	254	4.0%	254	3.0%	254	3.0%	953	6.2%
Receiving pass	776	1.5%	0	0.0%	1,970	23.3%	0	0.0%	533	3.5%
Passing	0	0.0%	522	8.2%	522	6.2%	0	0.0%	0	0.0%
Conditioning	254	0.5%	0	0.0%	114	1.4%	0	0.0%	522	3.4%
Screening	0	0.0%	0	0.0%	0	0.0%	470	5.5%	0	0.0%
Other	372	0.7%	0	0.0%	0	0.0%	266	3.1%	266	1.7%
Unknown	6,083	11.7%	965	15.1%	385	4.6%	626	7.3%	1,859	12.1%
Total	**51,836**	**100.0%**	**6,389**	**100.0%**	**8,441**	**100.0%**	**8,609**	**100.0%**	**15,349**	**100.0%**

VIII. Girls' Basketball Injury Epidemiology

Table 8.1 Girls' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**332**	**154,149**	**2.15**	**90,554**
Competition	199	48,258	4.12	53,834
Practice	133	105,891	1.26	36,720

Table 8.2 Demographic Characteristics of Injured Girls' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n=84,468**
Freshman	22.8%
Sophomore	26.1%
Junior	27.1%
Senior	24.0%
Total†	**100.0%**
Age (years)	
Minimum	12
Maximum	19
Mean (St. Dev.)	15.6 (1.3)
BMI	
Minimum	14.8
Maximum	43.0
Mean (St. Dev.)	22.8 (3.8)

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

Figure 8.1 Diagnosis of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

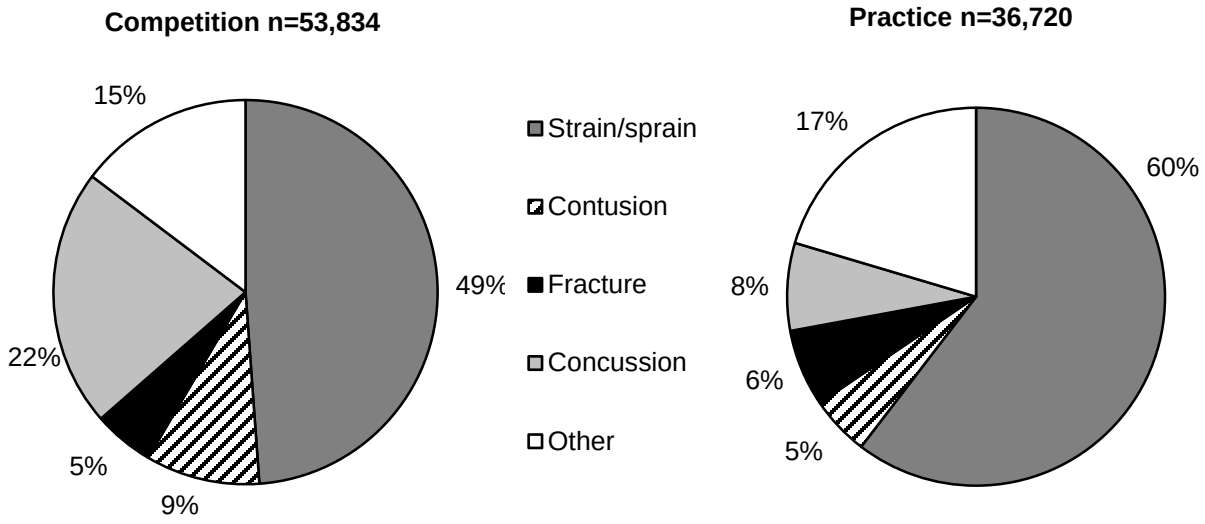


Table 8.3 Body Site of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	15,325	28.5%	14,173	38.6%	29,498	32.6%
Head/face	13,208	24.5%	3,884	10.6%	17,092	18.9%
Knee	8,848	16.4%	6,357	17.3%	15,205	16.8%
Hand/wrist	5,899	11.0%	3,320	9.0%	9,219	10.2%
Hip/thigh/upper leg	757	1.4%	4,105	11.2%	4,862	5.4%
Arm/elbow	2,913	5.4%	505	1.4%	3,418	3.8%
Shoulder	2,956	5.5%	414	1.1%	3,370	3.7%
Trunk	1,054	2.0%	1,795	4.9%	2,849	3.1%
Lower leg	398	0.7%	1,597	4.3%	1,995	2.2%
Foot	1,009	1.9%	440	1.2%	1,449	1.6%
Neck	757	1.4%	0	0.0%	757	0.8%
Other	709	1.3%	129	0.4%	838	0.9%
Total	**53,833**	**100.0%**	**36,719**	**100.0%**	**90,552**	**100.0%**

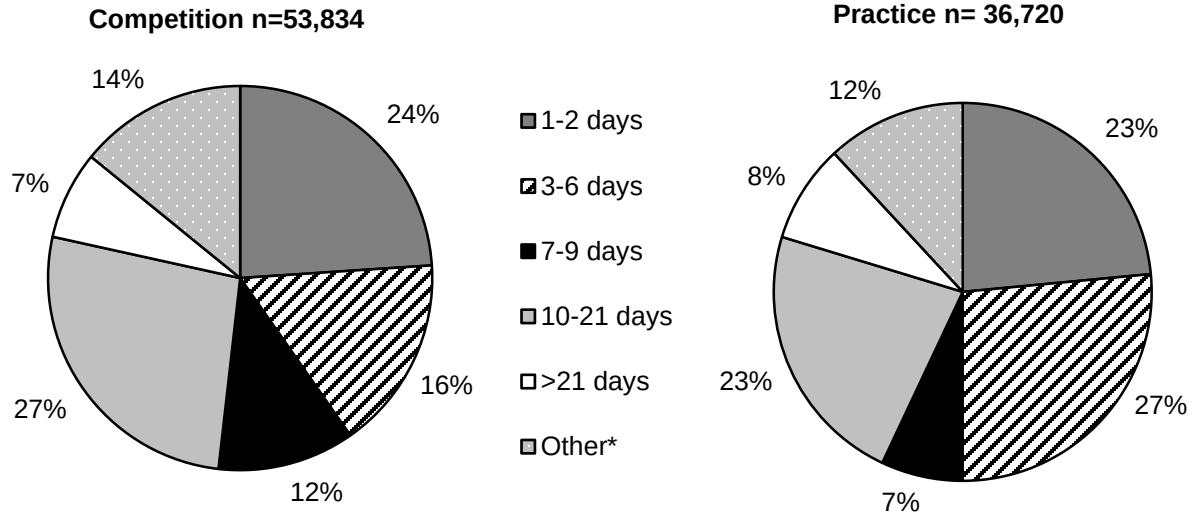
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 8.4 Ten Most Common Girls' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=53,835		Practice n=36,720		Total n=90,555	
	n	%	n	%	n	%
Diagnosis						
Ankle Strain/sprain	14,818	27.5%	12,393	33.8%	27,211	30.0%
Head/face concussion	11,190	20.8%	2,741	7.5%	13,931	15.4%
Knee strain/sprain	4,465	8.3%	3,105	8.5%	7,570	8.4%
Knee other	3,390	6.3%	2,776	7.6%	6,166	6.8%
Hand/wrist strain/sprain	3,497	6.5%	1,912	5.2%	5,409	6.0%
Hip/thigh/upper leg strain/sprain	123	0.2%	3,621	9.9%	3,744	4.1%
Hand/wrist fracture	1,432	2.7%	1,408	3.8%	2,840	3.1%
Shoulder other	1,689	3.1%	275	0.7%	1,964	2.2%
Head/face other	1,122	2.1%	764	2.1%	1,886	2.1%
Shoulder strain/sprain	1,267	2.4%	139	0.4%	1,406	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, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	2,621	4.9%	1,920	5.2%	4,541	5.0%
Did not require surgery	51.083	95.1%	34,800	94.8%	85,883	95.0%
Total	**53,704**	**100.0%**	**36,720**	**100.0%**	**90,424**	**100.0%**

* 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, 2017-18 School Year

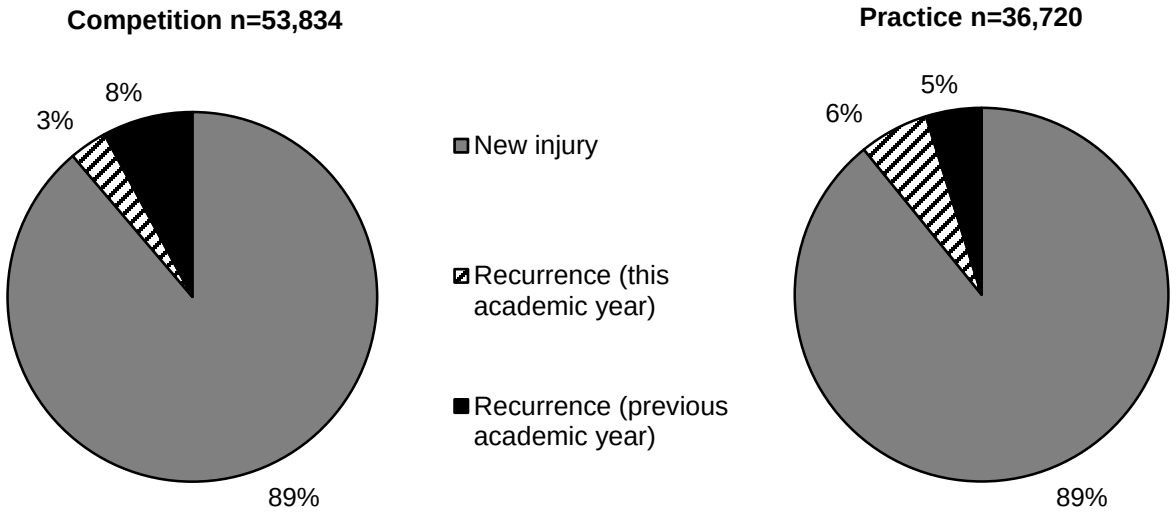


Table 8.6 Time during Season of Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	16,434	18.1%
Regular season	69,307	76.5%
Post season	4,812	5.3%
Total	**90,553**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Competition		
Pre-competition/warm-ups	1,663	3.3%
First quarter	3,806	7.6%
Second quarter	7,924	15.9%
Third quarter	13,826	27.8%
Fourth quarter	16,647	33.4%
Unknown	5,919	11.9%
Total	**49,786**	**100.0%**
Court Location		
Inside lane (defense)	10,010	20.1%
Inside lane (offense)	8,131	16.4%
Outside 3 point arc - defense	5,814	11.7%
Between 3 pt arc and lane (defense)	5,018	10.1%
Between 3 pt arc and lane (offense)	3,557	7.2%
Backcourt	3,071	6.2%
Outside 3 point arc - offense	2,019	4.1%
Out of bounds	259	0.5%
Off the court	191	0.4%
Unknown	11,654	23.4%
Total	**49,724**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	3,817	10.4%
Second 1/2 hour	5,200	14.2%
1-2 hours into practice	17,638	48.2%
>2 hours into practice	2,823	7.7%
Unknown	7,119	19.5%
Total	**36,597**	**100.0%**

* 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, 2017-18 School Year

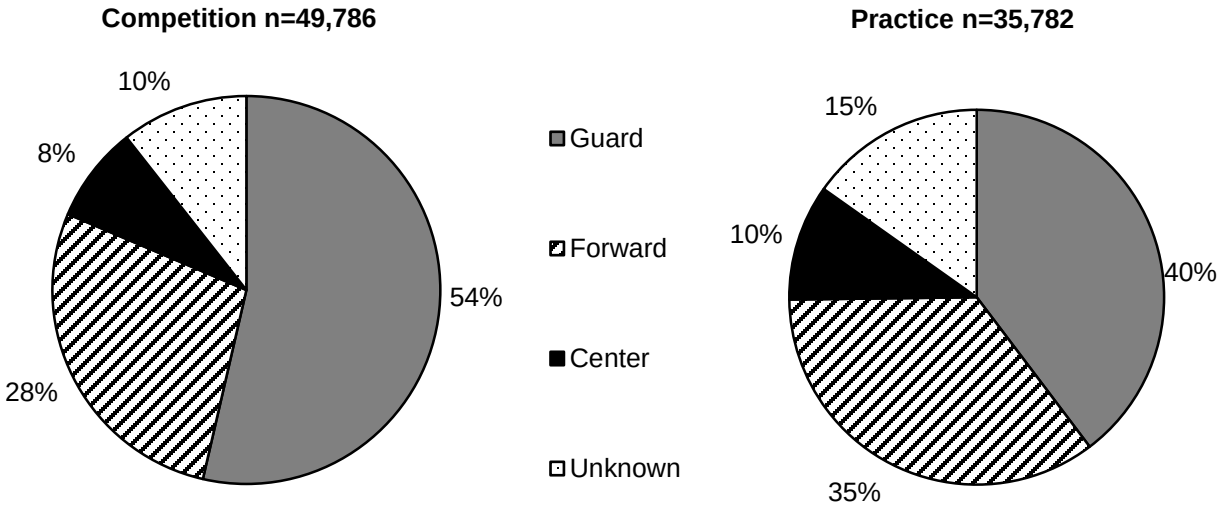


Table 8.9 Activities Leading to Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Rebounding	11,024	22.0%	5,468	15.3%	16,492	19.3%
Defending	11,095	22.2%	5,243	14.7%	16,338	19.1%
General play	4,412	8.8%	10,395	29.2%	14,807	17.3%
Chasing loose ball	9,445	18.9%	1,085	3.0%	10,530	12.3%
Shooting	3,763	7.5%	1,656	4.6%	5,419	6.3%
Ball handling/dribbling	1,456	2.9%	2,938	8.2%	4,394	5.1%
Receiving pass	1,569	3.1%	1,282	3.6%	2,851	3.3%
Conditioning	0	0.0%	1,783	5.0%	1,783	2.1%
Passing	1,122	2.2%	320	0.9%	1,442	1.7%
Other	61	0.1%	1,072	3.0%	1,133	1.3%
Unknown	6,052	12.1%	4,412	12.4%	10,464	12.2%
Total	**49,999**	**100.0%**	**35,654**	**100.0%**	**85,653**	**100.0%**

* 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 8.10 Activity Resulting in Girls' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis									
	Strain/Sprain		Contusion		Fracture		Concussion		Other	
	n	%	n	%	n	%	n	%	n	%
Activity										
Rebounding	10,106	22.3%	1,418	20.3%	1,369	27.2%	2,066	15.1%	1,533	10.5%
Defending	9,665	21.3%	1,667	23.9%	1,680	33.4%	2,561	18.7%	764	5.2%
General play	5,693	12.5%	903	12.9%	404	8.0%	2,469	18.1%	5,337	36.6%
Chasing loose ball	3,599	7.9%	1,263	18.1%	945	18.8%	2,730	20.0%	1,992	13.7%
Shooting	3,308	7.3%	485	6.9%	505	10.0%	379	2.8%	743	5.1%
Ball handling/dribbling	3,326	7.3%	0	0.0%	0	0.0%	414	3.0%	654	4.5%
Receiving pass	2,088	4.6%	0	0.0%	123	2.4%	201	1.5%	440	3.0%
Conditioning	1,277	2.8%	0	0.0%	0	0.0%	0	0.0%	505	3.5%
Passing	1,381	3.0%	0	0.0%	0	0.0%	61	0.4%	0	0.0%
Other	567	1.2%	0	0.0%	0	0.0%	61	0.4%	505	3.5%
Unknown	4,390	9.7%	1,245	17.8%	0	0.0%	2,729	20.0%	2,101	14.4%
Total	**45,400**	**100.0%**	**6,981**	**100.0%**	**5,026**	**100.0%**	**13,671**	**100.0%**	**14,574**	**100.0%**

IX. Wrestling Injury Epidemiology

Table 9.1 Wrestling Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**351**	**132,408**	**2.65**	**103,058**
Competition	153	35,553	4.30	48,770
Practice	198	96,855	2.04	54,288

Table 9.2 Demographic Characteristics of Injured Wrestlers, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n=97,382**
Freshman	27.6%
Sophomore	22.1%
Junior	27.8%
Senior	22.5%
Total†	**100.0%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.8 (1.3)
BMI	
Minimum	14.4
Maximum	49.6
Mean (St. Dev.)	24.0 (4.5)

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

Figure 9.1 Diagnosis of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

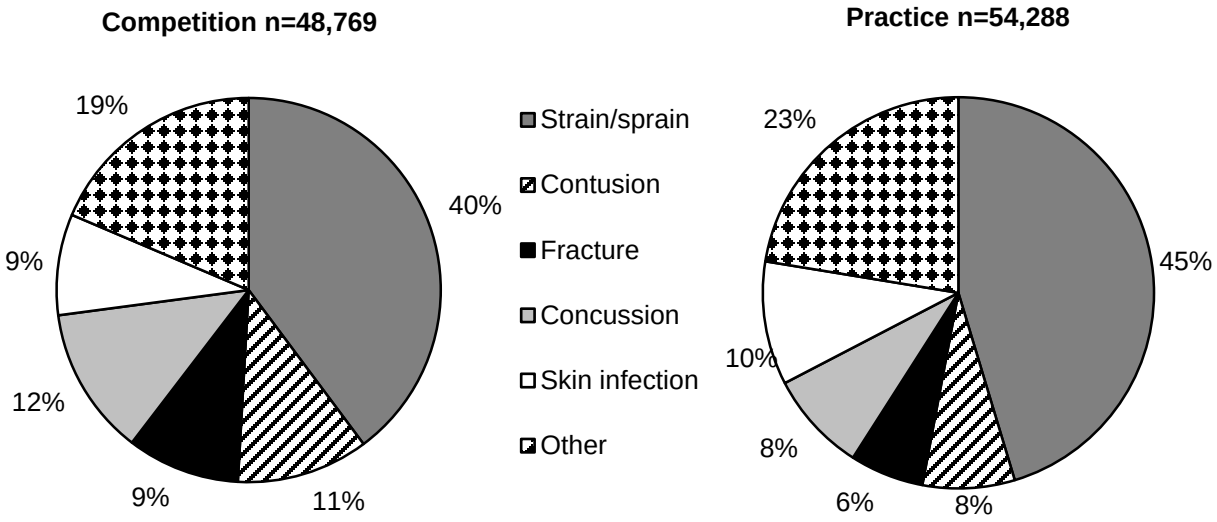


Table 9.3 Body Site of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	8,873	18.2%	10,036	18.5%	18,909	18.3%
Knee	9,368	19.2%	6,150	11.3%	15,518	15.1%
Arm/elbow	6,854	14.1%	7,389	13.6%	14,243	13.8%
Shoulder	5,779	11.8%	7,354	13.5%	13,133	12.7%
Trunk	3,971	8.1%	4,917	9.1%	8,888	8.6%
Ankle	4,011	8.2%	4,861	9.0%	8,872	8.6%
Hand/wrist	3,510	7.2%	3,903	7.2%	7,413	7.2%
Hip/thigh/upper leg	2,010	4.1%	3,842	7.1%	5,852	5.7%
Neck	2,015	4.1%	2,135	3.9%	4,150	4.0%
Other	444	0.9%	1,817	3.3%	2,261	2.2%
Lower leg	1,432	2.9%	696	1.3%	2,128	2.1%
Foot	503	1.0%	1,189	2.2%	1,692	1.6%
Total	**48,770**	**100.0%**	**54,289**	**100.0%**	**103,059**	**100.0%**

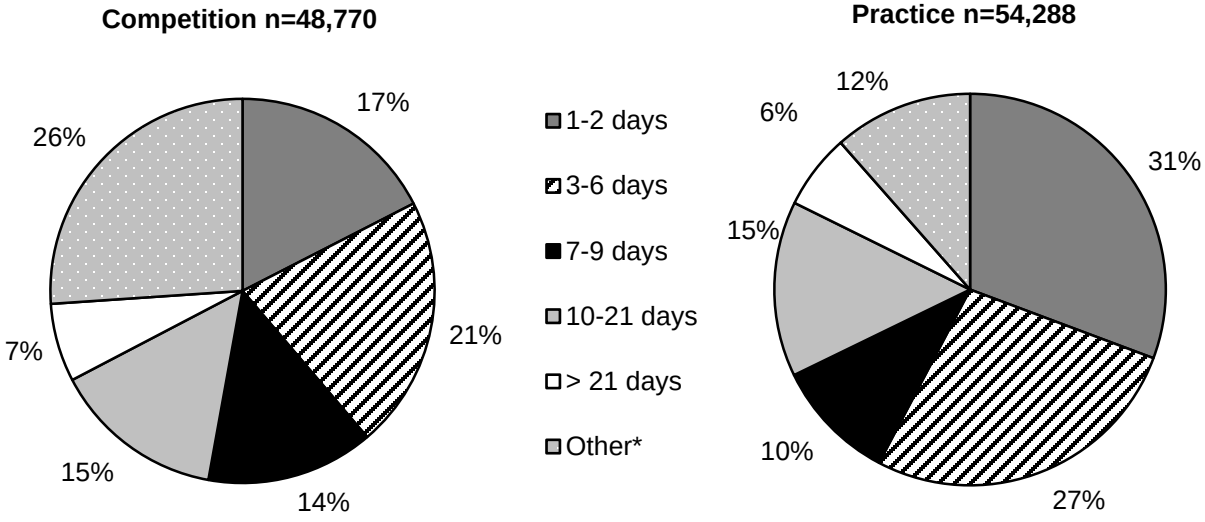
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 9.4 Ten Most Common Wrestling Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=48,774		Practice n=54,291		Total n=103,065	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	6,116	12.5%	4,506	8.3%	10,622	10.3%
Arm/elbow sprain/strain	3,617	7.4%	3,660	6.7%	7,277	7.1%
Shoulder sprain/strain	2,214	4.5%	4,797	8.8%	7,011	6.8%
Ankle sprain/strain	2,593	5.3%	4,146	7.6%	6,739	6.5%
Shoulder other	3,565	7.3%	2,557	4.7%	6,122	5.9%
Knee sprain/strain	4,398	9.0%	1,610	3.0%	6,008	5.8%
Knee other	2,370	4.9%	2,577	4.7%	4,947	4.8%
Trunk sprain/strain	1,664	3.4%	2,705	5.0%	4,369	4.2%
Knee contusion	2,277	4.7%	1,633	3.0%	3,910	3.8%
Hip/thigh/upper leg sprain/strain	681	1.4%	3,071	5.7%	3,752	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 9.2 Time Loss of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	4,543	9.3%	4,801	8.8%	9,344	9.1%
Did not require surgery	44,228	90.7%	49,486	91.2%	93,714	90.9%
Total	**48,771**	**100.0%**	**54,287**	**100.0%**	**103,058**	**100.0%**

* 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 injury

Figure 9.3 History of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

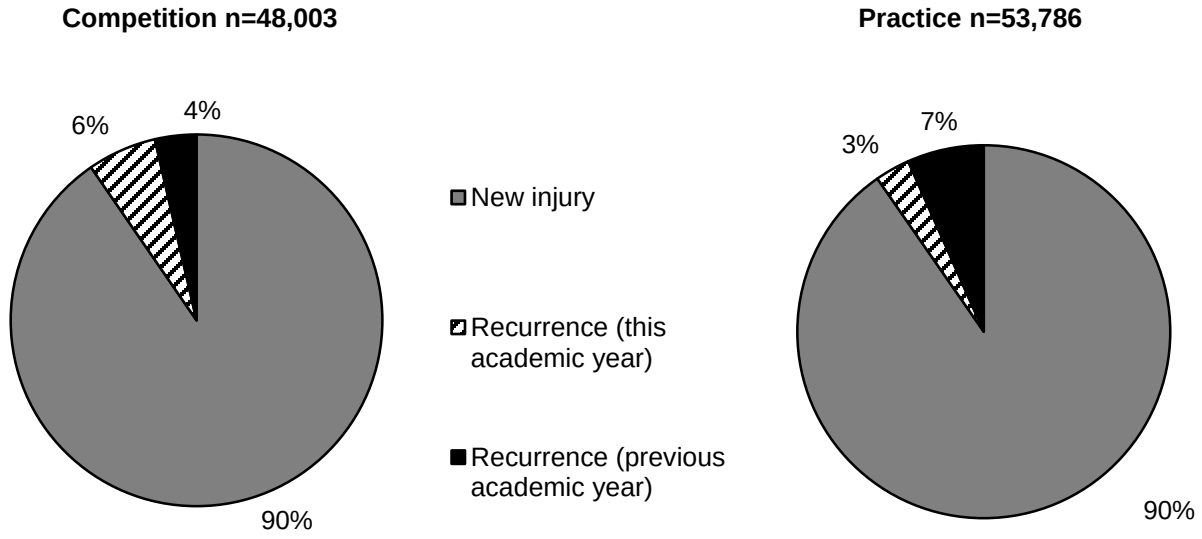


Table 9.6 Time during Season of Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	15,691	15.2%
Regular season	80,421	78.1%
Post season	6,763	6.6%
Unknown	117	0.1%
Total	**102,992**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Competition		
Pre-competition/warm-ups	0	0.0%
First period	4,221	8.9%
Second period	12,362	26.0%
Third period	3,904	8.2%
Unknown	27,066	56.9%
Total	**47,553**	**100.0%**
Mat Location		
Within 28 ft. circle	58,928	61.1%
Off the mat	2,934	3.0%
Out of bounds	345	0.4%
Unknown	34,269	35.5%
Total	**96,476**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	2,960	5.5%
Second 1/2 hour	6,164	11.5%
1-2 hours into practice	29,037	54.3%
>2 hours into practice	2,556	4.8%
Unknown	12,714	23.8%
Total	**53,430**	**100.0%**

* 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Takedown	20,543	43.2%	16,233	32.0%	36,776	37.4%
Unknown	9,446	19.9%	7,616	15.0%	17,062	17.3%
Sparring	3,025	6.4%	10,001	19.7%	13,026	13.2%
n/a (e.g., skin infection, overuse, heat illness, etc.)	4,004	8.4%	5,414	10.7%	9,418	9.6%
Conditioning	0	0.0%	5,410	10.7%	5,410	5.5%
Reversal	1,485	3.1%	2,146	4.2%	3,631	3.7%
Fall	2,939	6.2%	249	0.5%	3,188	3.2%
Riding	1,520	3.2%	1,219	2.4%	2,739	2.8%
Escape	1,616	3.4%	782	1.5%	2,398	2.4%
Other	1,461	3.1%	899	1.8%	2,360	2.4%
Near fall	1,514	3.2%	827	1.6%	2,341	2.4%
Total	**47,553**	**100.0%**	**50,796**	**100.0%**	**98,349**	**100.0%**

* 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 9.10 Activities Resulting in Wrestling Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis											
	Strain/Sprain		Contusion		Fracture		Concussion		Skin Infection		Other	
	n	%	n	%	n	%	n	%	n	%	n	%
Activity												
Takedown	14,651	34.4%	5,157	55.9%	2,554	32.1%	6,837	68.7%	0	0.0%	7,578	36.2%
Unknown	11,552	27.1%	0	0.0%	503	6.3%	537	5.4%	0	0.0%	4,469	21.3%
Sparring	6,039	14.2%	1,788	19.4%	1,130	14.2%	1,391	14.0%	0	0.0%	2,677	12.8%
n/a	213	0.5%	0	0.0%	0	0.0%	0	0.0%	7,661	100.0%	1,544	7.4%
Conditioning	4,054	9.5%	510	5.5%	117	1.5%	237	2.4%	0	0.0%	491	2.3%
Reversal	1,691	4.0%	0	0.0%	1,047	13.1%	0	0.0%	0	0.0%	893	4.3%
Fall	1,224	2.9%	503	5.5%	635	8.0%	117	1.2%	0	0.0%	709	3.4%
Riding	1,105	2.6%	0	0.0%	1,013	12.7%	117	1.2%	0	0.0%	503	2.4%
Escape	833	2.0%	0	0.0%	132	1.7%	0	0.0%	0	0.0%	1,432	6.8%
Other	723	1.7%	620	6.7%	510	6.4%	507	5.1%	0	0.0%	0	0.0%
Near fall	503	1.2%	651	7.1%	324	4.1%	213	2.1%	0	0.0%	651	3.1%
Total	**42,588**	**100.0%**	**9,229**	**100.0%**	**7,965**	**100.0%**	**9,956**	**100.0%**	**7,661**	**100.0%**	**20,947**	**100.0%**

***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, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**155**	**162,487**	**0.95**	**49,716**
Competition	76	59,229	1.28	26,844
Practice	79	103,258	0.77	22,872

Table 10.2 Demographic Characteristics of Injured Baseball Athletes, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n=49,716**
Freshman	26.4%
Sophomore	18.8%
Junior	22.7%
Senior	32.2%
Total†	**100.0%**
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	16.3 (1.4)
BMI	
Minimum	16.9
Maximum	37.2
Mean (St. Dev.)	24.0 (4.1)

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

Figure 10.1 Diagnosis of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

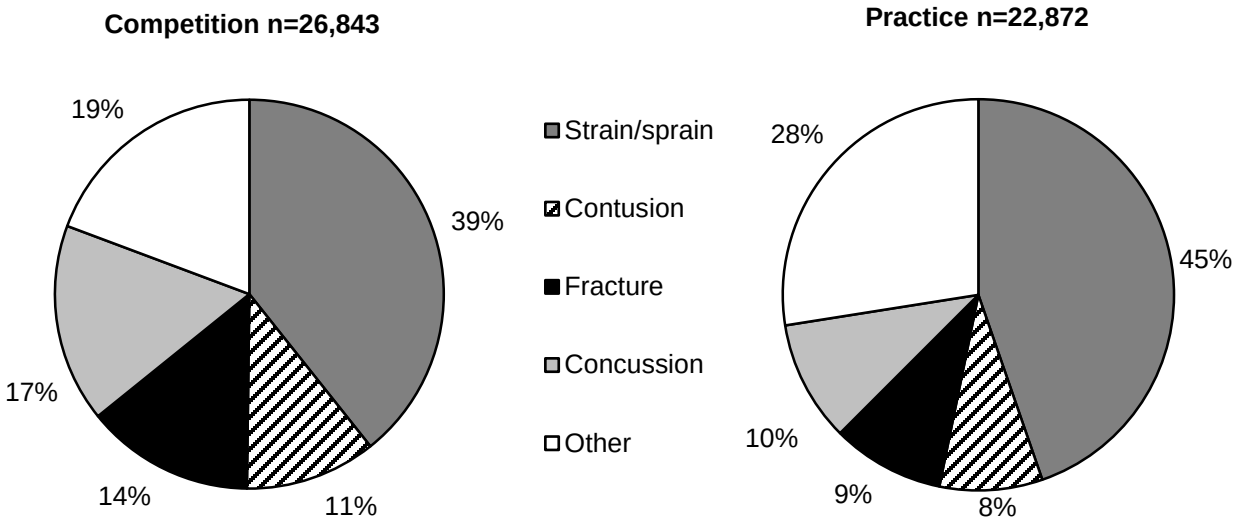


Table 10.3 Body Site of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	6,708	25.0%	3,743	16.4%	10,451	21.0%
Arm/elbow	4,671	17.4%	4,641	20.3%	9,312	18.7%
Hand/wrist	5,085	18.9%	2,196	9.6%	7,281	14.6%
Hip/thigh/upper leg	3,669	13.7%	2,573	11.2%	6,242	12.6%
Ankle	1,881	7.0%	2,918	12.8%	4,799	9.7%
Shoulder	1,665	6.2%	3,091	13.5%	4,756	9.6%
Knee	1,949	7.3%	991	4.3%	2,940	5.9%
Trunk	916	3.4%	1,301	5.7%	2,217	4.5%
Foot	0	0.0%	1,199	5.2%	1,199	2.4%
Other	299	1.1%	75	0.3%	374	0.8%
Lower leg	0	0.0%	144	0.6%	144	0.3%
Total	**26,843**	**100.0%**	**22,872**	**100.0%**	**49,715**	**100.0%**

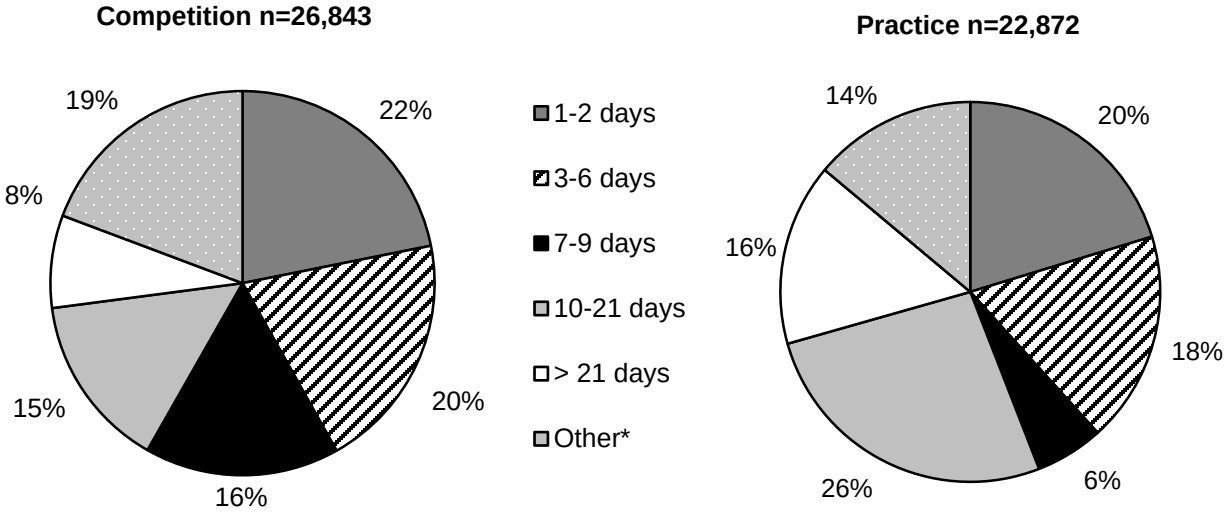
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 10.4 Ten Most Common Baseball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=26,843		Practice n=22,872		Total n=49,715	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	4,427	16.5%	2,295	10.0%	6,722	13.5%
Hip/thigh/upper leg strain/sprain	3,370	12.6%	2,130	9.3%	5,500	11.1%
Ankle strain/sprain	1,737	6.5%	2,510	11.0%	4,247	8.5%
Arm/elbow strain/sprain	843	3.1%	2,190	9.6%	3,033	6.1%
Hand/wrist strain/sprain	2,388	8.9%	617	2.7%	3,005	6.0%
Shoulder strain/sprain	1,147	4.3%	1,848	8.1%	2,995	6.0%
Arm/elbow other	1,484	5.5%	1,444	6.3%	2,928	5.9%
Hand/wrist fracture	1,734	6.5%	1,015	4.4%	2,749	5.5%
Knee other	882	3.3%	916	4.0%	1,798	3.6%
Shoulder other	518	1.9%	1,243	5.4%	1,761	3.5%

* 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 10.2 Time Loss of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	2,075	7.8%	2,154	9.4%	4,229	8.6%
Did not require surgery	24,504	92.2%	20,718	90.6%	45,222	91.4%
Total	**26,579**	**100.0%**	**22,872**	**100.0%**	**49,451**	**100.0%**

* 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, 2017-18 School Year

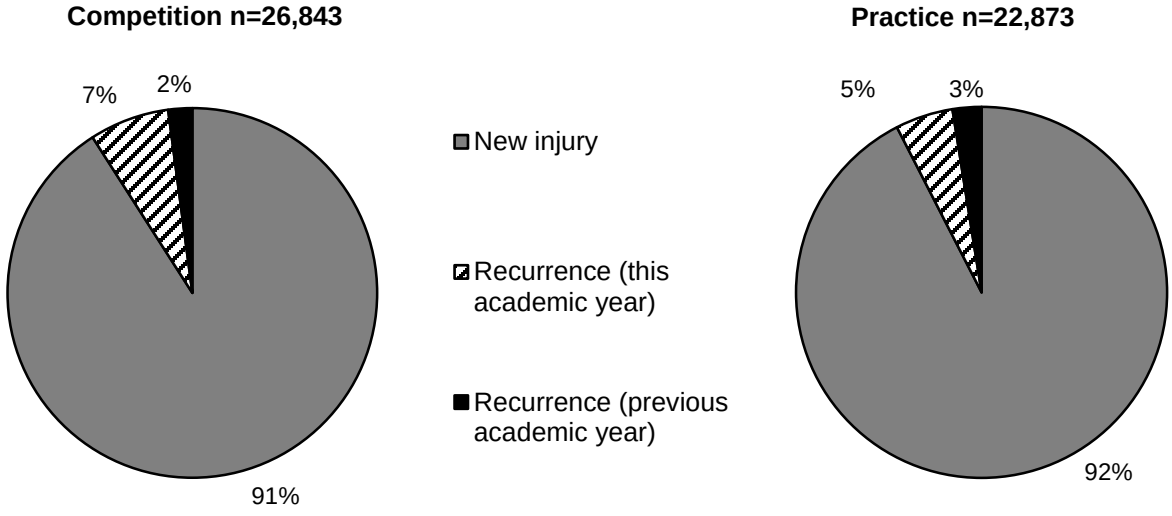


Table 10.6 Time during Season of Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	12,034	24.2%
Regular season	35,593	71.6%
Post season	2,088	4.2%
Total	**49,716**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Competition		
Pre-competition/warm-ups	1,682	6.7%
First inning	1,172	4.7%
Second inning	820	3.3%
Third inning	2,063	8.2%
Fourth inning	5,590	22.3%
Fifth inning	1,237	4.9%
Sixth inning	1,938	7.7%
Seventh inning	2,165	8.7%
Unknown	8,354	33.4%
Total	**25,022**	**100.0%**
Field Location		
Home plate	5,726	22.9%
First base	2,288	9.1%
Second base	4,296	17.2%
Third base	3,667	14.7%
Infield	1,394	5.6%
Pitcher's mound	1,824	7.3%
Outfield	3,610	14.4%
Foul territory	581	2.3%
Other	564	2.3%
Unknown	1,073	4.3%
Total	**25,022**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	1,894	8.3%
Second 1/2 hour	3,438	15.1%
1-2 hours into practice	11,009	48.5%
>2 hours into practice	617	2.7%
Unknown	5,764	25.4%
Total	**22,722**	**100.0%**

* 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, 2017-18 School Year

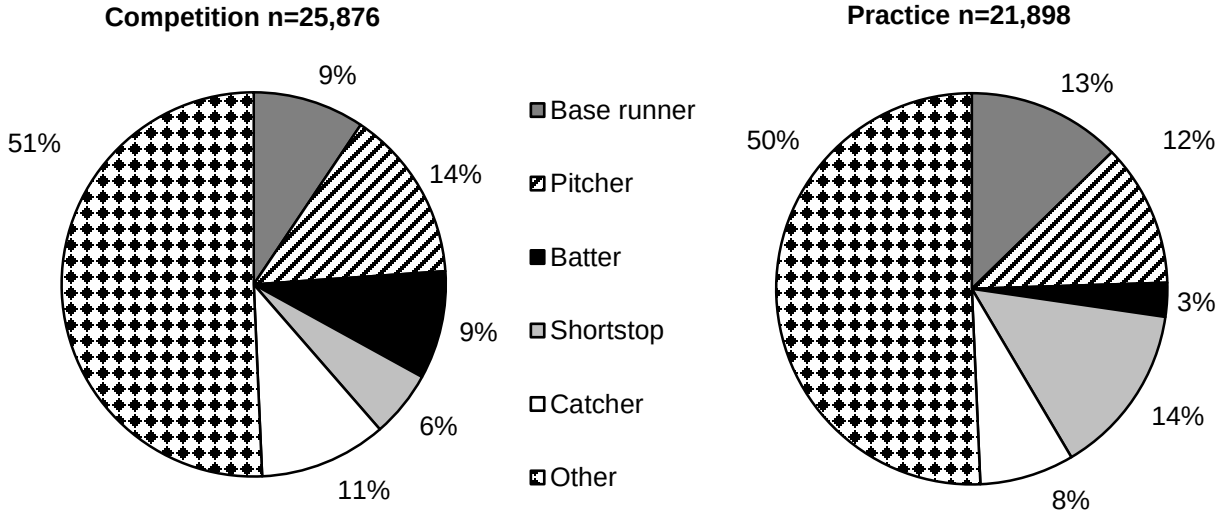


Table 10.9 Activities Leading to Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Fielding a batted ball	5,763	22.3%	3,756	17.2%	9,519	19.9%
Throwing (not pitching)	2,672	10.3%	4,920	22.5%	7,592	15.9%
Running bases	3,365	13.0%	2,518	11.5%	5,883	12.3%
Batting	2,960	11.4%	2,126	9.7%	5,086	10.6%
Sliding	3,409	13.2%	851	3.9%	4,260	8.9%
Pitching	1,824	7.0%	1,865	8.5%	3,689	7.7%
Fielding a thrown ball	1,880	7.3%	1,759	8.0%	3,639	7.6%
Catching	2,691	10.4%	934	4.3%	3,625	7.6%
General play	299	1.2%	1,233	5.6%	1,532	3.2%
Conditioning	299	1.2%	1,170	5.3%	1,469	3.1%
Other	714	2.8%	615	2.8%	1,329	2.8%
Unknown	0	0.0%	151	0.7%	151	0.3%
Total	**25,876**	**100.0%**	**21,898**	**100.0%**	**47,774**	**100.0%**

* 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 10.10 Activity Resulting in Baseball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis									
	Strain/Sprain		Contusion		Fracture		Concussion		Other	
	n	%	n	%	n	%	n	%	n	%
Activity										
Fielding	2,697	13.6%	1,942	39.8%	1,956	35.0%	4,969	73.9%	1,595	14.8%
Throwing (not pitching)	5,133	25.9%	0	0.0%	854	15.3%	0	0.0%	1,605	14.9%
Running bases	3,631	18.3%	0	0.0%	288	5.2%	0	0.0%	1,965	18.2%
Batting	2,001	10.1%	1,437	29.5%	564	10.1%	934	13.9%	150	1.4%
Sliding	2,043	10.3%	0	0.0%	759	13.6%	0	0.0%	1,459	13.5%
Pitching	1,257	6.3%	299	6.1%	316	5.7%	0	0.0%	1,817	16.9%
Catching	1,233	6.2%	1,199	24.6%	854	15.3%	265	3.9%	75	0.7%
General play	316	1.6%	0	0.0%	0	0.0%	0	0.0%	1,215	11.3%
Conditioning	615	3.1%	0	0.0%	0	0.0%	555	8.3%	299	2.8%
Other	732	3.7%	0	0.0%	0	0.0%	0	0.0%	598	5.5%
Unknown	151	0.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Total	**19,809**	**100.0%**	**4,877**	**100.0%**	**5,591**	**100.0%**	**6,723**	**100.0%**	**10,778**	**100.0%**

XI. Softball Injury Epidemiology

Table 11.1 Softball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)	Nationally Estimated # Injuries
Total	**157**	**117,111**	**1.34**	**76,391**
Competition	80	41,168	1.94	38,445
Practice	77	75,943	1.01	37,946

Table 11.2 Demographic Characteristics of Injured Softball Athletes, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

Year in School	**n=73,508**
Freshman	28.6%
Sophomore	34.0%
Junior	19.1%
Senior	18.3%
Total†	**100.0%**
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.8 (1.2)
BMI	
Minimum	15.9
Maximum	33.7
Mean (St. Dev.)	23.0 (3.8)

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

Figure 11.1 Diagnosis of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

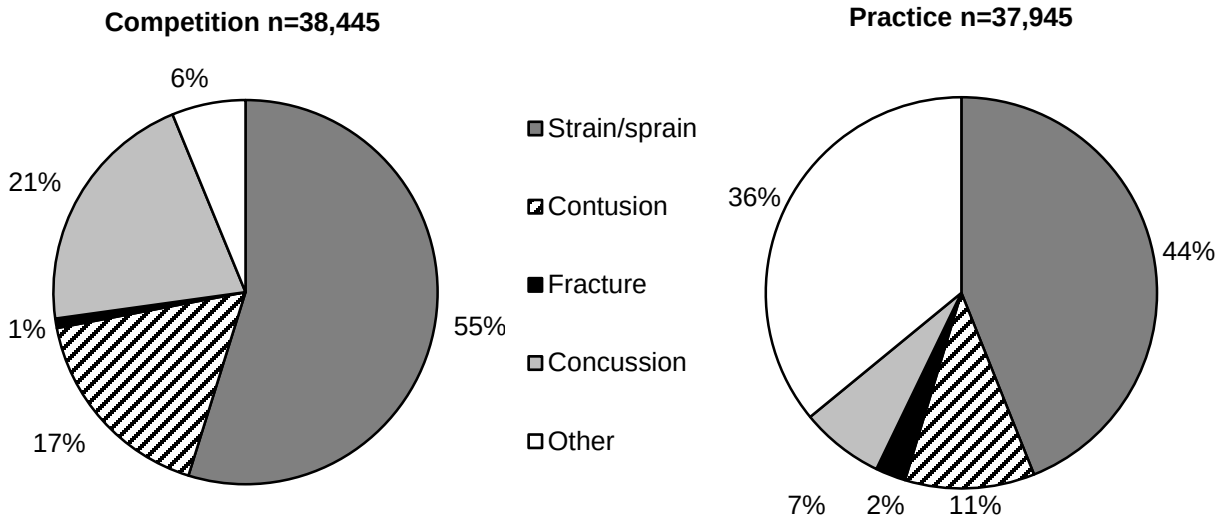


Table 11.3 Body Site of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	8,960	23.3%	3,687	9.7%	12,647	16.6%
Ankle	7,228	18.8%	3,412	9.0%	10,640	13.9%
Knee	4,785	12.4%	5,328	14.0%	10,113	13.2%
Hand/wrist	5,145	13.4%	4,937	13.0%	10,082	13.2%
Hip/thigh/upper leg	2,103	5.5%	7,492	19.7%	9,595	12.6%
Shoulder	3,543	9.2%	4,629	12.2%	8,172	10.7%
Lower leg	1,824	4.7%	3,955	10.4%	5,779	7.6%
Trunk	2,666	6.9%	1,147	3.0%	3,813	5.0%
Arm/elbow	1,310	3.4%	1,106	2.9%	2,416	3.2%
Neck	881	2.3%	1,014	2.7%	1,895	2.5%
Other	0	0.0%	1,239	3.3%	1,239	1.6%
Total	**38,445**	**100.0%**	**37,946**	**100.0%**	**76,391**	**100.0%**

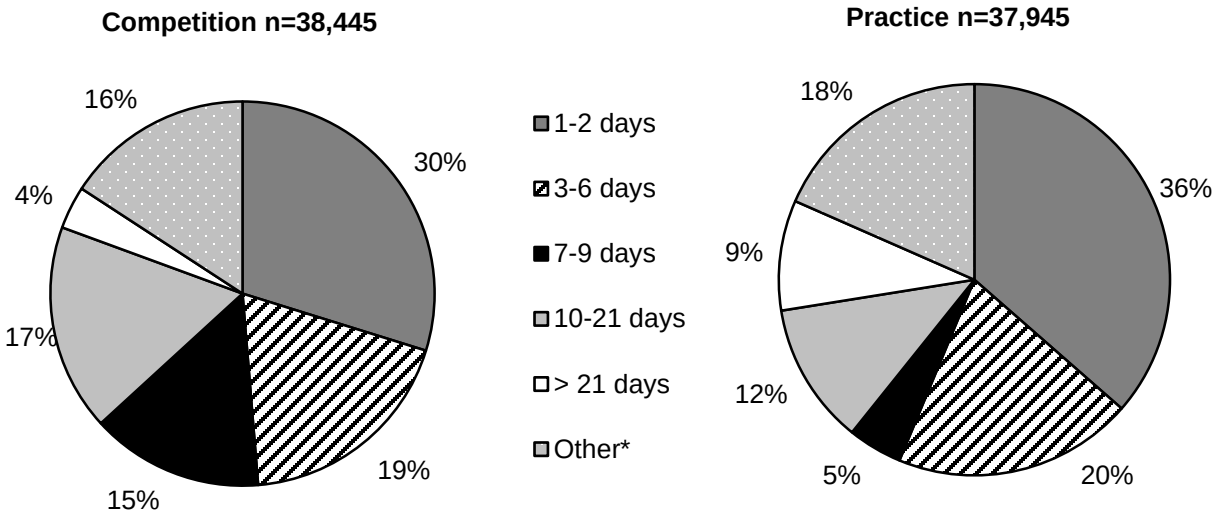
* Totals and n's are not always equal due to slight rounding of the weighted number of injuries and missing responses. Due to a low level of non-response, these totals are always similar but are not always equal to the total number of injuries.

Table 11.4 Ten Most Common Softball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition n=38,446		Practice n=37,947		Total n=76,393	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	8,065	21.0%	2,633	6.9%	10,698	14.0%
Ankle strain/sprain	7,228	18.8%	3,271	8.6%	10,499	13.7%
Arm/elbow strain/sprain	1,620	4.2%	4,206	11.1%	5,826	7.6%
Shoulder strain/sprain	2,732	7.1%	2,441	6.4%	5,173	6.8%
Hand/wrist contusion	2,616	6.8%	2,284	6.0%	4,900	6.4%
Knee other	226	0.6%	3,990	10.5%	4,216	5.5%
Hand/wrist strain/sprain	1,719	4.5%	2,081	5.5%	3,800	5.0%
Trunk strain/sprain	943	2.5%	2,843	7.5%	3,786	5.0%
Hip/thigh/upper leg strain/sprain	2,592	6.7%	1,147	3.0%	3,742	4.9%
Knee strain/sprain	3,228	8.4%	460	1.2%	3,688	4.8%

* 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, 2017-18 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, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	460	1.2%	1,379	3.6%	1,839	2.4%
Did not require surgery	37,333	98.8%	36,568	96.4%	73,901	97.6%
Total	**37,793**	**100.0%**	**37,947**	**100.0%**	**75,740**	**100.0%**

* 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, 2017-18 School Year

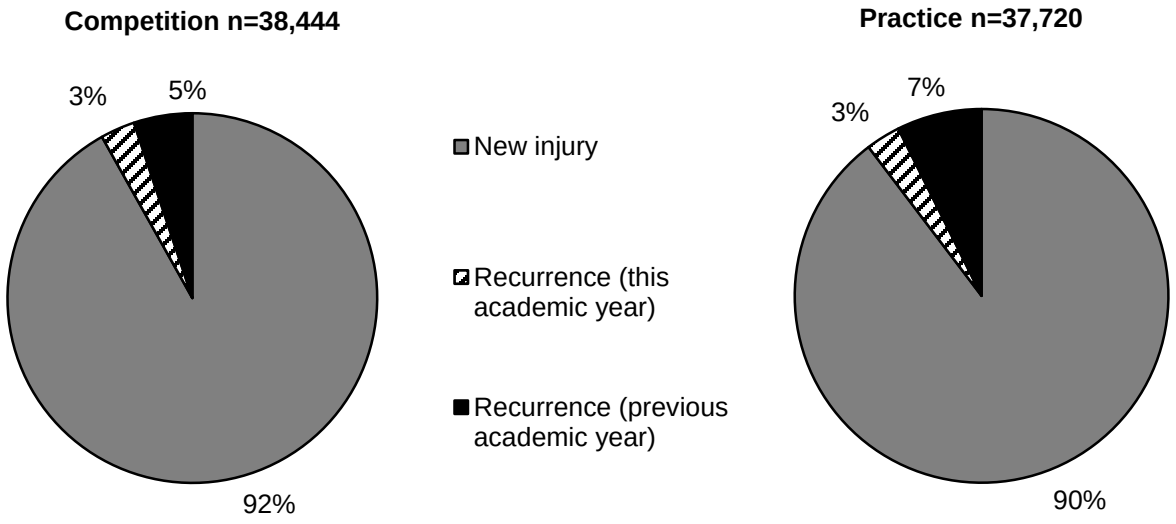


Table 11.6 Time during Season of Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	n	%
Time in Season		
Preseason	15,497	20.3%
Regular season	59,153	77.4%
Post season	1,741	2.3%
Total	**76,391**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Competition		
Pre-competition/warm-ups	4,146	11.3%
First inning	1,363	3.7%
Second inning	2,192	5.9%
Third inning	3,995	10.8%
Fourth inning	2,816	7.6%
Fifth inning	1,922	5.2%
Sixth inning	3,334	9.0%
Seventh inning	2,431	6.6%
Unknown	14,648	39.8%
Total	**36,847**	**100.0%**
Field Location		
Home plate	9,786	26.6%
Second base	4,834	13.1%
Third base	4,402	11.9%
Pitcher's mound	4,166	11.3%
Infield	3,352	9.1%
Outfield	1,922	5.2%
Foul territory	1,373	3.7%
First base	1,223	3.3%
Other	966	2.6%
Unknown	4,823	13.1%
Total	**36,847**	**100.0%**

* 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, 2017-18 School Year*

	n	%
Time in Practice		
First 1/2 hour	2,516	6.8%
Second 1/2 hour	2,980	8.1%
1-2 hours into practice	23,112	62.5%
>2 hours into practice	1,620	4.4%
Unknown	6,767	18.3%
Total	**36,995**	**100.0%**

* 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, 2017-18 School Year

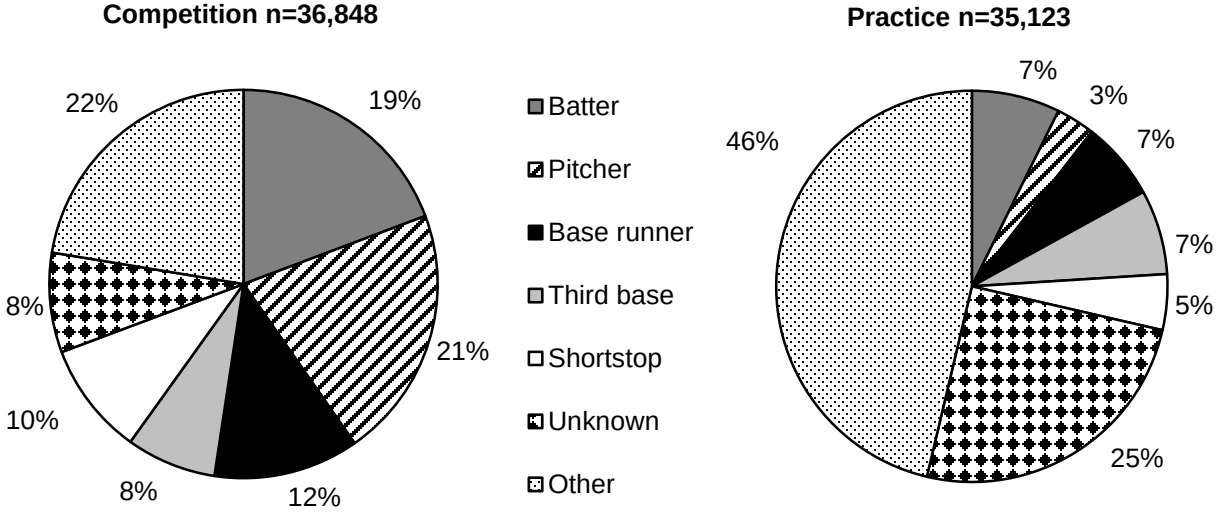


Table 11.9 Activities Leading to Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year*

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Fielding a batted ball	9,457	25.7%	3,547	9.8%	13,004	17.8%
Running bases	6,209	16.9%	4,754	13.1%	10,963	15.0%
Throwing (not pitching)	1,731	4.7%	7,450	20.6%	9,181	12.6%
Batting	4,889	13.3%	3,844	10.6%	8,733	11.9%
Catching	3,454	9.4%	3,691	10.2%	7,145	9.8%
General play	940	2.6%	4,712	13.0%	5,652	7.7%
Pitching	4,166	11.3%	881	2.4%	5,047	6.9%
Sliding	3,489	9.5%	601	1.7%	4,090	5.6%
Fielding a thrown ball	141	0.4%	2,396	6.6%	2,537	3.5%
Other	908	2.5%	908	2.5%	1,816	2.5%
Unknown	1,462	4.0%	3,466	9.6%	4,928	6.7%
Total	**36,846**	**100.0%**	**36,250**	**100.0%**	**73,096**	**100.0%**

* 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 11.10 Activity Resulting in Softball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Diagnosis									
	Strain/Sprain		Contusion		Fracture		Concussion		Other	
	n	%	n	%	n	%	n	%	n	%
Activity										
Fielding	5,770	16.2%	4,511	42.3%	572	45.0%	2,864	28.6%	1,824	11.7%
Running bases	8,702	24.4%	2,120	19.9%	141	11.1%	0	0.0%	0	0.0%
Throwing (not pitching)	5,499	15.4%	810	7.6%	0	0.0%	705	7.0%	2,167	13.9%
Batting	3,675	10.3%	2,338	21.9%	0	0.0%	1,258	12.6%	1,462	9.4%
Catching	3,352	9.4%	71	0.7%	244	19.2%	2,424	24.2%	1,054	6.8%
General play	1,572	4.4%	0	0.0%	244	19.2%	470	4.7%	3,365	21.6%
Pitching	4,096	11.5%	810	7.6%	0	0.0%	71	0.7%	71	0.5%
Sliding	2,683	7.5%	0	0.0%	71	5.6%	651	6.5%	686	4.4%
Other	257	0.7%	0	0.0%	0	0.0%	908	9.1%	651	4.2%
Unknown	0	0.0%	0	0.0%	0	0.0%	651	6.5%	4,277	27.5%
Total	**35,606**	**100.0%**	**10,660**	**100.0%**	**1,272**	**100.0%**	**10,002**	**100.0%**	**15,557**	**100.0%**

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, 2017-18 School Year

	Boys' soccer	Girls' soccer*	RR (95% CI)†
Total	1.94	**2.82**	**1.45 (1.27-1.67)**
Competition	3.92	**5.83**	**1.49 (1.25-1.79)**
Practice	1.04	**1.48**	**1.42 (1.12-1.79)**

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

Table 12.2 Comparison of Body Sites of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Body Site			
Hip/thigh/upper leg	**21.4%**	14.8%	**1.45 (1.01-2.09)**
Head/face	20.2%	**26.2%**	1.29 (0.95-1.77)
Ankle	18.2%	**18.3%**	1.01 (0.71-1.43)
Knee	14.5%	**14.6%**	1.01 (0.67-1.51)
Hand/wrist	4.2%	**4.4%**	1.04 (0.47-2.33)
Foot	5.5%	**7.6%**	1.37 (0.71-2.63)
Lower leg	6.9%	**8.2%**	1.18 (0.65-2.13)
Trunk	**4.1%**	3.1%	1.34 (0.55-3.27)
Arm/elbow	**2.1%**	0.6%	3.74 (0.79-17.85)
Shoulder	**1.2%**	0.8%	1.54 (0.37-6.46)
Neck	0.0%	**0.5%**	--
Other	**1.5%**	1.1%	1.39 (0.38-5.16)
Total	**100.0%**	**100.0%**	--

Table 12.3 Comparison of Diagnoses of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Diagnosis			
Strain/sprain	**50.3%**	43.5%	1.16 (0.97-1.38)
Contusion	9.2%	**9.4%**	1.02 (0.61-1.69)
Fracture	**7.7%**	7.3%	1.06 (0.57-1.95)
Concussion	16.3%	**24.5%**	**1.51 (1.06-2.14)**
Other	**16.6%**	15.3%	1.08 (0.74-1.59)
Total	**100.0%**	**100.0%**	--

Table 12.4 Most Common Boys' and Girls' Soccer Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Diagnosis			
Ankle strain/sprain	**17.0%**	16.0%	1.06 (0.74-1.54)
Head/face concussion	16.2%	**24.5%**	**1.51 (1.06-2.15)**
Hip/thigh/upper leg strain/sprain	**18.0%**	13.2%	1.36 (0.92-2.03)
Knee strain/sprain	5.6%	**6.9%**	1.23 (0.65-2.33)
Knee other	5.7%	**5.9%**	1.04 (0.53-2.04)

*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, 2017-18 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Time Loss			
1-2 days	**20.3%**	14.8%	1.38 (0.95-1.99)
3-6 days	**22.3%**	21.5%	1.04 (0.76-1.42)
7-9 days	16.0%	**16.2%**	1.01 (0.68-1.50)
10-21 days	16.4%	**21.7%**	1.33 (0.93-1.89)
22 days or more	**7.3%**	4.3%	1.69 (0.83-3.45)
Other	17.6%	**21.5%**	1.22 (0.87-1.70)
Total	**100.0%**	**100.0%**	---

Table 12.6 Comparison of Mechanisms of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Soccer Mechanism			
Contact with another player	**22.9%**	18.4%	1.25 (0.89-1.75)
Stepped on/fell on/kicked	11.8%	**14.1%**	1.19 (0.75-1.92)
Rotation around a planted foot/inversion	**13.5%**	12.0%	1.12 (0.72-1.75)
Overuse, heat illness, conditioning, etc.	13.8%	**16.4%**	1.19 (0.78-1.82)
Contact with ball	10.8%	**17.9%**	**1.67 (1.07-2.60)**
Uneven playing surface	**2.9%**	2.0%	1.44 (0.44-4.66)
Slide tackle	**5.3%**	1.7%	**3.05 (1.18-7.92)**
Contact with goal	0.1%	**0.2%**	1.47 (0.11-20.00)
Other	**12.9%**	10.4%	1.25 (0.77-2.02)
Unknown	6.0%	**6.9%**	1.15 (0.58-2.27)
Total	**100.0%**	**100.0%**	---

Table 12.7 Comparison of Activities of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Soccer Activity			
General play	24.2%	**29.8%**	1.23 (0.92-1.64)
Defending	**14.8%**	14.6%	1.01 (0.66-1.54)
Chasing loose ball	**9.9%**	7.0%	1.42 (0.80-2.50)
Ball handling/dribbling	**9.1%**	7.5%	1.22 (0.69-2.13)
Goaltending	**9.3%**	7.6%	1.23 (0.69-2.22)
Shooting (foot)	**6.1%**	4.2%	1.45 (0.69-3.03)
Heading ball	**3.7%**	3.3%	1.12 (0.47-2.70)
Passing (foot)	3.0%	**3.3%**	1.12 (0.44-2.80)
Receiving pass	**2.6%**	2.2%	1.18 (0.39-3.57)
Conditioning	3.0%	**3.8%**	1.23 (0.43-3.57)
Other	5.9%	**6.1%**	1.03 (0.50-2.10)
Unknown	8.4%	**10.7%**	1.28 (0.75-2.17)
Total	**100.0%**	**100.0%**	---

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, 2017-18 School Year

	Boys' basketball	Girls' basketball	RR (95% CI)*
Total	1.54	**2.15**	**1.39 (1.20-1.64)**
Competition	2.74	**4.12**	**1.52 (1.23-1.85)**
Practice	1.01	**1.26**	1.23 (0.98-1.56)

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

Table 12.9 Comparison of Body Sites of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Body Site			
Ankle	**35.3%**	32.6%	1.08 (0.85-1.39)
Knee	10.9%	**16.8%**	1.53 (0.97-2.42)
Head/face	13.8%	**18.9%**	1.37 (0.93-2.01)
Hip/thigh/upper leg	5.3%	**5.4%**	1.02 (0.49-2.12)
Hand/wrist	**13.8%**	10.2%	1.36 (0.82-2.25)
Shoulder	2.4%	**3.7%**	1.56 (0.56-4.55)
Trunk	**6.8%**	3.1%	2.17 (0.88-5.26)
Lower leg	**3.8%**	2.2%	1.72 (0.66-4.51)
Arm/elbow	1.9%	**3.8%**	2.02 (0.62-6.59)
Foot	**3.2%**	1.6%	2.00 (0.63-6.33)
Neck	**0.9%**	0.8%	1.14 (0.17-7.54)
Other	**1.9%**	0.9%	2.05 (0.51-8.22)
Total	**100.0%**	**100.0%**	---

Table 12.10 Comparison of Diagnoses of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Diagnosis			
Strain/sprain	**57.5%**	53.5%	1.08 (0.92-1.26)
Contusion	6.8%	**7.8%**	1.14 (0.61-2.13)
Fracture	**9.4%**	5.7%	1.65 (0.86-3.17)
Concussion	9.5%	**16.0%**	**1.68 (1.06-2.66)**
Other	16.7%	**17.0%**	1.02 (0.68-1.52)
Total	**100.0%**	**100.0%**	---

Table 12.11 Most Common Boys' and Girls' Basketball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Diagnosis			
Ankle strain/sprain	**34.5%**	30.0%	1.15 (0.89-1.48)
Head/face concussion	9.5%	**15.4%**	**1.62 (1.02-2.58)**
Knee strain/sprain	4.9%	**8.4%**	1.70 (0.84-3.41)
Knee other	4.4%	**6.8%**	1.54 (0.73-3.23)
Hand/wrist fracture	**5.1%**	3.1%	1.64 (0.65-4.13)
Hip/thigh/upper leg strain/sprain	2.2%	**4.1%**	1.85 (0.65-5.23)

*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, 2017-18 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Time Loss			
1-2 days	**26.7%**	23.8%	1.12 (0.82-1.54)
3-6 days	**23.1%**	20.5%	1.13 (0.81-1.57)
7-9 days	**13.0%**	9.7%	1.35 (0.83-2.19)
10-21 days	13.7%	**25.1%**	**1.82 (1.27-2.63)**
22 days or more	7.8%	7.8%	1.01 (0.54-1.85)
Other	**15.7%**	13.2%	1.19 (0.79-1.79)
Total	**100.0%**	**100.0%**	---

Table 12.13 Comparison of Mechanisms of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Basketball Mechanism			
Collision with another player	22.4%	**31.8%**	**1.42 (1.05-1.91)**
Jumping/landing	**24.5%**	17.8%	1.38 (0.96-1.96)
Overuse, heat illness, conditioning, etc.	8.2%	**9.6%**	1.17 (0.64-2.13)
Rotation around a planted foot/inversion	9.3%	**13.1%**	1.42 (0.86-2.34)
Stepped on/fell on/kicked	**14.4%**	12.2%	1.18 (0.73-1.91)
Contact with ball	4.3%	**5.6%**	1.29 (0.58-2.90)
Other	**11.4%**	7.0%	1.64 (0.94-2.88)
Unknown	**5.4%**	2.9%	1.85 (0.71-4.76)
Total	**100.0%**	**100.0%**	---

Table 12.14 Comparison of Activities of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Basketball Activity			
Rebounding	**27.6%**	19.3%	**1.43 (1.02-2.02)**
General play	**20.8%**	17.3%	1.20 (0.83-1.75)
Defending	13.2%	**19.1%**	1.45 (0.94-2.21)
Chasing loose ball	7.9%	**12.3%**	1.56 (0.90-2.69)
Shooting	**8.4%**	6.3%	1.33 (0.70-2.53)
Conditioning	1.0%	**2.1%**	2.12 (0.43-10.45)
Ball handling/dribbling	3.9%	**5.1%**	1.30 (0.60-2.82)
Receiving pass	**3.6%**	3.3%	1.09 (0.42-2.83)
Other	2.7%	**3.0%**	1.12 (0.38-3.33)
Unknown	10.9%	**12.2%**	1.12 (0.68-1.84)
Total	**100.0%**	**100.0%**	---

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, 2017-18 School Year

	Baseball	Softball	RR (95% CI)
Total	0.95	**1.34**	**1.41 (1.12-1.75)**
Competition	1.28	**1.94**	**1.52 (1.11-2.08)**
Practice	0.77	**1.01**	1.33 (0.97-1.82)

Table 12.16 Comparison of Body Sites of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Baseball	Softball	IPR (95% CI)
Body Site			
Ankle	9.7%	**13.9%**	1.44 (0.75-2.80)
Knee	5.9%	**13.2%**	2.24 (0.91-5.52)
Head/face	**21.0%**	16.6%	1.27 (0.75-2.13)
Hip/thigh/upper leg	**12.6%**	5.0%	**2.52 (1.05-6.05)**
Hand/wrist	**14.6%**	13.2%	1.11 (0.58-2.13)
Shoulder	9.6%	**10.7%**	1.12 (0.53-2.38)
Trunk	4.5%	**7.6%**	1.70 (0.64-4.50)
Lower leg	0.3%	**2.5%**	8.58 (0.80-91.53)
Arm/elbow	**18.7%**	12.6%	1.49 (0.79-2.82)
Foot	2.4%	**3.2%**	1.31 (0.26-6.54)
Other	0.8%	**1.6%**	2.17 (0.22-20.0)
Total	**100.0%**	**100.0%**	---

Table 12.17 Comparison of Diagnoses of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Baseball	Softball	IPR (95% CI)
Diagnosis			
Strain/sprain	41.8%	**49.4%**	1.18 (0.89-1.56)
Contusion	9.8%	**14.0%**	1.42 (0.67-3.00)
Fracture	**11.8%**	1.7%	**7.14 (2.81-17.86)**
Concussion	13.5%	**14.0%**	1.04 (0.55-1.97)
Other	**23.0%**	21.0%	1.10 (0.68-1.78)
Total	**100.0%**	**100.0%**	---

Table 12.18 Most Common Baseball and Softball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Baseball	Softball	IPR (95% CI)
Diagnosis			
Ankle strain/sprain	8.5%	**13.7%**	1.61 (0.80-3.22)
Hand/wrist fracture	**5.5%**	0.7%	**7.38 (1.75-31.12)**
Head/face concussion	13.5%	**14.0%**	1.04 (0.55-1.97)
Hip/thigh/upper leg strain/sprain	**11.1%**	4.9%	2.26 (0.91-5.63)
Knee strain/sprain	1.1%	**4.8%**	4.57 (0.99-21.21)
Shoulder strain/sprain	6.0%	**6.8%**	1.12 (0.41-3.03)

*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, 2017-18 School Year

	Baseball	Softball	IPR (95% CI)
Time Loss			
1-2 days	21.1%	**33.1%**	**1.57 (1.01-2.43)**
3-6 days	19.1%	**19.4%**	1.01 (0.59-1.72)
7-9 days	**11.5%**	9.5%	1.20 (0.59-2.50)
10-21 days	**20.1%**	14.5%	1.39 (0.80-2.40)
22 days or more	**11.3%**	6.4%	1.79 (0.83-3.85)
Other	16.8%	**17.1%**	1.02 (0.58-1.78)
Total	**100.0%**	**100.0%**	---

Table 12.20 Comparison of Mechanisms of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Baseball	Softball	IPR (95% CI)
Baseball/Softball Mechanism			
Overuse, heat illness, conditioning, etc.	8.6%	**16.2%**	1.89 (0.91-3.91)
Contact with another player	**17.0%**	7.8%	**2.19 (1.03-4.65)**
Contact with bases	8.8%	**10.2%**	1.16 (0.52-2.59)
Throwing - not pitching	**15.2%**	8.8%	1.72 (0.81-3.67)
Throwing - pitching	**7.1%**	3.5%	2.04 (0.62-6.74)
Contact with thrown ball (non-pitch)	6.9%	**11.4%**	1.65 (0.69-3.93)
Rotation around a planted foot/inversion	3.7%	**8.4%**	2.26 (0.76-6.73)
Hit by batted ball	5.4%	**7.4%**	1.39 (0.51-3.74)
Hit by pitch	**6.3%**	3.5%	1.82 (0.51-6.25)
Other	**19.9%**	17.1%	1.17 (0.68-2.01)
Unknown	1.2%	**5.8%**	4.96 (0.60-41.00)
Total	**100.0%**	**100.0%**	---

Table 12.21 Comparison of Activities of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2017-18 School Year

	Baseball	Softball	IPR (95% CI)
Baseball/Softball Activity			
Fielding a batted ball	**19.9%**	17.8%	1.12 (0.65-1.96)
Fielding a thrown ball	**7.6%**	3.5%	2.17 (0.64-7.69)
Running bases	12.3%	**15.0%**	1.22 (0.63-2.38)
Pitching	**7.7%**	6.9%	1.12 (0.43-2.91)
Batting	10.6%	**11.9%**	1.12 (0.53-2.38)
Sliding	**8.9%**	5.6%	1.59 (0.62-4.09)
Throwing (not pitching)	**15.9%**	12.6%	1.27 (0.65-2.44)
General play	3.2%	**7.7%**	2.38 (0.72-8.33)
Conditioning	**3.1%**	0.0%	--
Catching	7.6%	**9.8%**	1.29 (0.54-3.07)
Other	**2.8%**	2.5%	1.12 (0.28-4.55)
Unknown	0.3%	**6.7%**	**21.38 (2.62-174.2)**
Total	**100.0%**	**100.0%**	---

XIII. Trends over Time

Table 13.1 Injury Rates by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2017/18 School Years (continued on next page)

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	p-value for trend*
Overall total	2.51	2.59	2.31	2.01	2.10	1.97	2.17	2.16	2.18	2.13	2.32	2.09	2.45	0.44
Competition	4.63	4.88	4.45	4.05	4.19	4.10	4.26	4.31	4.22	4.40	4.74	4.28	4.88	0.81
Practice	1.69	1.75	1.52	1.26	1.32	1.16	1.40	1.34	1.39	1.28	1.39	1.22	1.47	0.08
Boys' football total	4.36	4.45	4.18	3.50	3.81	3.50	3.78	3.87	3.74	3.73	4.08	3.56	4.33	0.38
Competition	12.09	13.50	12.80	11.26	12.95	12.30	12.41	12.53	11.38	11.97	12.68	11.55	14.13	0.92
Practice	2.54	2.68	2.47	1.92	2.06	1.74	2.16	2.08	2.15	2.06	2.18	1.89	2.14	0.06
Boys' soccer total	2.43	2.27	1.75	1.62	1.75	1.56	1.64	1.52	1.62	1.60	1.87	1.47	1.94	0.08
Competition	4.22	4.31	3.63	3.43	3.39	3.08	3.47	3.28	3.40	3.43	3.95	3.25	3.92	0.30
Practice	**1.58**	**1.45**	**0.96**	**0.87**	**1.04**	**0.90**	**0.90**	**0.78**	**0.82**	**0.78**	**0.91**	**0.67**	**1.04**	**0.01**
Girls' soccer total	2.36	2.51	2.35	2.07	2.00	1.93	2.42	2.29	2.47	2.64	2.59	2.46	2.82	0.06
Competition	**5.21**	**5.43**	**5.15**	**4.59**	**4.67**	**4.13**	**5.68**	**5.54**	**5.72**	**6.11**	**5.93**	**5.91**	**5.83**	**0.02**
Practice	1.10	1.31	1.16	1.00	0.85	0.93	1.09	0.92	1.04	1.09	1.09	0.85	1.48	0.89
Girls' volleyball total	1.64	1.37	1.22	0.89	0.99	0.96	1.00	0.89	0.99	1.11	1.19	1.13	1.54	0.70
Competition	1.92	1.40	1.43	0.90	1.00	1.18	1.27	1.08	1.15	1.39	1.52	1.67	2.18	0.34
Practice	1.48	1.36	1.12	0.88	0.99	0.85	0.85	0.78	0.91	0.97	1.02	0.86	1.20	0.12
Boys' basketball total	1.89	1.75	1.39	1.35	1.45	1.34	1.40	1.47	1.45	1.08	1.48	1.54	1.54	0.20
Competition	2.98	2.87	2.23	2.32	2.72	2.30	2.60	2.44	2.40	1.98	2.84	2.65	2.74	0.70
Practice	**1.46**	**1.28**	**1.04**	**0.95**	**0.92**	**0.91**	**0.91**	**1.04**	**1.02**	**0.68**	**0.90**	**1.04**	**1.01**	**0.05**

*Statistically significant tests for trend are bolded

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Table 13.1 Injury Rates by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2017/18 School Years

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	p-value for trend*
Girls' basketball total	2.01	2.09	1.61	1.54	1.58	1.73	1.57	1.83	1.88	1.65	2.14	1.87	2.15	0.36
Competition	3.6	3.6	3.3	3.13	2.84	3.59	3.03	3.13	3.66	3.27	4.17	3.63	4.12	0.13
Practice	1.37	1.44	0.9	0.87	1.02	0.92	0.98	1.24	1.08	0.94	1.24	1.03	1.26	0.80
Boys' wrestling total	2.50	2.51	2.27	2.17	1.98	2.01	2.50	2.33	2.48	2.12	2.23	2.02	2.65	0.87
Competition	3.93	3.80	3.70	3.35	3.09	3.32	3.56	3.54	3.95	3.76	3.43	3.77	4.30	0.36
Practice	2.04	2.06	1.76	1.75	1.56	1.55	2.10	1.88	1.95	1.61	1.83	1.40	2.04	0.47
Boys' baseball total	1.19	1.25	0.93	0.78	0.82	0.81	0.83	0.88	1.01	0.94	0.84	0.74	0.95	0.10
Competition	1.77	2.01	1.37	1.32	1.27	1.49	1.14	1.30	1.68	1.67	1.35	1.23	1.28	0.13
Practice	0.87	0.82	0.68	0.48	0.57	0.46	0.65	0.66	0.63	0.55	0.56	0.44	0.77	0.19
Girls' softball total	1.13	1.11	1.29	1.04	1.12	0.94	1.46	1.15	0.99	1.00	1.30	1.34	1.34	0.32
Competition	1.78	1.96	1.86	1.62	1.66	1.45	2.04	1.96	1.09	1.67	2.10	1.55	1.94	0.88
Practice	0.79	0.65	0.98	0.72	0.85	0.69	1.16	0.73	0.93	0.65	0.87	1.21	1.01	0.15

*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, 2005/06-2017/18 School Years (continued on next page)

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Overall total	**1,442,533**	**1,472,849**	**1,419,723**	**1,248,126**	**1,359,897**	**1,195,815**	**1,392,262**	**1,361,986**
Competition	**759,334**	**766,512**	**763,034**	**690,525**	**754,091**	**711,642**	**740,493**	**779,055**
Practice	**683,199**	**706,337**	**656,689**	**557,601**	**605,805**	**484,173**	**651,769**	**582,931**
Boys' football total	516,150	574,367	616,665	527,321	581,414	483,016	559,064	616,209
Competition	280,919	292,316	311,780	288,637	322,801	296,199	287,710	344,097
Practice	235,231	282,051	304,885	238,684	258,614	186,817	271,354	272,112
Boys' soccer total	218,760	171,874	159,351	149,229	153,485	138,974	172,070	149,049
Competition	119,703	93,295	99,785	87,082	83,985	81,238	97,540	89,429
Practice	99,058	78,579	59,566	62,147	69,500	57,736	74,530	59,620
Girls' soccer total	185,770	230,769	215,850	192,108	181,159	180,254	222,679	190,382
Competition	122,803	149,231	146,102	123,312	129,754	124,674	145,469	141,339
Practice	62,967	81,538	69,748	68,796	51,405	55,580	77,210	49,043
Girls' volleyball total	81,813	80,493	72,261	56,609	67,760	50,711	52,662	44,064
Competition	32,677	27,423	26,539	19,764	21,728	21,416	24,439	19,150
Practice	49,136	53,069	45,722	36,845	46,032	29,295	28,223	24,914
Boys' basketball total	100,058	96,670	82,612	79,230	85,063	79,762	75,872	85,819
Competition	44,826	46,109	36,766	40,152	46,787	41,252	41,978	44,095
Practice	55,232	50,561	45,846	39,078	38,276	38,510	33,894	41,724
Girls' basketball total	103,566	102,831	73,283	64,933	78,709	83,033	67,280	83,107
Competition	53,812	53,703	45,236	38,277	44,026	53,931	37,213	45,645
Practice	49,753	49,128	28,047	26,656	34,684	29,102	30,067	37,462
Boys' wrestling total	105,542	101,139	91,625	88,996	80,390	80,569	107,992	85,485
Competition	36,259	38,750	40,698	39,029	37,742	36536	40,235	35,016
Practice	69,283	62,389	50,927	49,967	42,647	44,033	67,757	50,469
Boys' baseball total	67,560	60,296	44,760	39,869	64,053	46,796	43,590	49,747
Competition	33,639	33,494	22,803	25,584	36,502	29,789	20,818	24,807
Practice	33,922	26,802	21,957	14,285	27,551	17,008	22,772	24,940
Girls' softball total	63,313	54,411	63,316	49,831	67,862	52,700	91,053	58,124
Competition	34,696	32,191	33,325	28,688	30,767	26,607	45,091	35,477
Practice	28,618	22,220	29,991	21,143	37,096	26,093	45,962	22,647

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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, 2005/06-2017/18 School Years

	2013-14	2014-15	2015-16	2016-17	2017-18
Overall total	**1,427,315**	**1,196,479**	**1,393,566**	**1,160,321**	**1,367,490**
Competition	**790,966**	**708,150**	**801,156**	**699,410**	**798,220**
Practice	**636,349**	**488,329**	**592,410**	**460,911**	**569,270**
Boys' football total	624,470	529,483	568,789	444,281	463,626
Competition	324,354	286,421	316,308	252,462	281,790
Practice	300,116	243,062	252,481	191,819	181,836
Boys' soccer total	149,278	133,919	174,811	145,215	180,607
Competition	90,683	89,091	111,720	98,031	113,655
Practice	58,595	44,828	63,091	47,184	66,952
Girls' soccer total	227,172	217,546	209,027	190,436	242,602
Competition	167,975	158,078	142,722	146,696	152,993
Practice	59,197	59,468	66,305	43,740	89,609
Girls' volleyball total	45,144	46,807	58,127	46,601	67,163
Competition	16,430	19,373	25,300	23,886	33,075
Practice	28,714	27,434	32,827	22,715	34,088
Boys' basketball total	84,455	55,980	81,240	88,927	93,773
Competition	42,504	32,534	45,596	46,251	48,814
Practice	41,951	23,446	35,644	42,676	44,959
Girls' basketball total	89,451	64,491	99,598	70,700	90,554
Competition	50,864	38,803	56,786	44,660	53,834
Practice	38,587	25,688	42,812	26,040	36,720
Boys' wrestling total	91,203	60,253	91,642	67,834	103,058
Competition	39,378	32,728	38,430	34,405	48,770
Practice	51,825	27,525	53,212	33,429	54,288
Boys' baseball total	62,493	44,208	44,760	36,395	49,716
Competition	37,682	27,129	25,581	21,458	26,844
Practice	24,811	17,079	19,179	14,937	22,872
Girls' softball total	53,649	43,792	65,572	69,932	76,391
Competition	21,096	23,993	38,713	31,561	38,445
Practice	32,553	19,799	26,859	38,371	37,946

Table 13.3 Body Site of Injury by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2017/18 School Years* (continued on next page)

	2005-06 n=1,442,048	2006-07 n=1,464,926	2007-08 n=1,411,621	2008-09 n=1,248,126	2009-10 n=1,359,897	2010-11 n=1,194,319	2011-12 n=1,391,577
Body Site							
Ankle	22.7%	19.8%	18.5%	16.4%	17.5%	17.7%	16.1%
Knee	14.2%	16.6%	14.6%	14.8%	15.7%	14.2%	13.4%
Head/face	12.3%	12.4%	12.4%	15.3%	17.2%	23.3%	25.1%
Hip/thigh/upper leg	10.8%	10.5%	10.2%	10.3%	9.2%	8.3%	9.8%
Shoulder	7.9%	8.0%	10.1%	9.3%	8.4%	7.0%	6.6%
Hand/wrist	8.0%	7.5%	9.1%	8.5%	10.3%	8.9%	8.5%
Trunk	6.2%	6.7%	6.5%	6.6%	5.8%	4.7%	4.9%
Lower leg	4.6%	5.2%	5.7%	5.8%	4.7%	5.0%	4.5%
Arm/elbow	4.1%	3.9%	4.6%	4.1%	4.0%	3.1%	4.0%
Foot	4.0%	4.0%	4.2%	5.0%	4.1%	4.0%	3.4%
Neck	2.2%	1.9%	1.8%	1.9%	1.9%	1.8%	1.7%
Other	3.2%	3.6%	2.4%	2.1%	1.2%	2.1%	2.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

*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.

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Table 13.3 Body Site of Injury by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2017/18 School Years*

	2012-13 n=1,361,584	2013-14 n=1,427,315	2014-15 n=1,196,398	2015-16 n=1,393,565	2016-17 n = 1,160,321	2017-18 n=1,367,491
Body Site						
Ankle	15.5%	16.9%	15.1%	16.6%	17.8%	17.8%
Knee	14.8%	14.4%	13.7%	14.9%	13.4%	14.1%
Head/face	25.7%	25.3%	27.4%	27.3%	27.2%	21.4%
Hip/thigh/upper leg	9.5%	8.7%	9.0%	8.0%	9.0%	10.4%
Shoulder	6.5%	8.5%	7.2%	6.8%	6.4%	6.1%
Hand/wrist	7.4%	7.8%	7.4%	7.8%	7.7%	9.1%
Trunk	5.2%	4.1%	4.3%	4.0%	4.3%	5.1%
Lower leg	3.9%	4.9%	4.0%	4.3%	4.4%	4.7%
Arm/elbow	3.5%	3.1%	3.7%	3.4%	3.7%	4.5%
Foot	3.2%	2.8%	3.9%	3.6%	2.5%	3.9%
Neck	2.3%	1.2%	1.9%	1.3%	1.4%	0.9%
Other	2.5%	2.4%	2.5%	2.1%	2.3%	2.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

*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, 2005/06-2017/18 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
Diagnosis						
Strain/sprain	52.0%	48.2%	48.3%	45.7%	44.7%	43.2%
Contusion	12.2%	13.7%	12.4%	11.5%	14.0%	9.6%
Fracture	9.8%	8.9%	10.2%	10.9%	9.9%	10.2%
Concussion	9.1%	8.4%	9.2%	11.8%	14.0%	20.0%
Other	16.8%	20.9%	19.9%	20.2%	17.5%	17.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
	2011-12 n=1,392,262	**2012-13 n=1,360,701**	**2013-14 n=1,427,315**	**2014-15 n=1,194,932**	**2015-16 n=1,391,729**	**2016-17 n=1,157,001**
Diagnosis						
Strain/sprain	42.2%	42.3%	41.7%	39.8%	40.4%	40.2%
Contusion	10.8%	10.6%	9.4%	9.3%	9.2%	9.6%
Fracture	7.7%	7.8%	7.6%	9.4%	8.6%	8.5%
Concussion	22.2%	23.1%	21.9%	24.6%	24.6%	24.8%
Other	17.1%	16.2%	19.4%	16.9%	17.1%	16.9%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
	2017-18 n=1,365,293					
Diagnosis						
Strain/sprain	45.1%					
Contusion	10.3%					
Fracture	8.0%					
Concussion	18.8%					
Other	17.8%					
Total	**100.0%**					

Table 13.5 Most Common Injury Diagnoses by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2017/18 School Years (continued on next page)

	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
Diagnosis						
Ankle strain/sprain	20.6%	17.8%	17.3%	15.0%	16.0%	16.3%
Head/face concussion	9.0%	8.4%	9.2%	11.7%	13.9%	20.0%
Knee strain/sprain	7.6%	8.8%	7.8%	7.9%	8.0%	7.7%
Hip/thigh/upper leg strain/sprain	7.9%	7.7%	7.3%	7.7%	6.5%	6.4%
Knee other	4.3%	4.9%	4.7%	4.5%	5.2%	4.8%
Shoulder other	3.1%	3.7%	4.1%	4.0%	3.3%	3.7%
Hand/wrist fracture	3.2%	3.3%	4.0%	4.0%	4.2%	4.0%
Shoulder strain/sprain	3.4%	2.9%	3.4%	3.7%	3.3%	2.2%
Trunk strain/sprain	2.8%	2.7%	3.2%	2.8%	2.5%	2.4%
Hand/wrist strain/sprain	3.1%	2.5%	3.8%	2.9%	2.8%	2.8%
	2011-12 n=1,388,873	**2012-13 n=1,360,303**	**2013-14 n=1,426,018**	**2014-15 n=1,194,848**	**2015-16 n=1,391,729**	**2016-17 n=1,157,003**
Diagnosis						
Ankle strain/sprain	14.7%	14.5%	15.6%	14.2%	15.7%	16.5%
Head/face concussion	22.2%	23.1%	21.9%	24.5%	24.6%	24.8%
Knee strain/sprain	7.6%	8.2%	7.8%	7.3%	8.1%	6.9%
Hip/thigh/upper leg strain/sprain	6.9%	6.7%	6.6%	6.9%	5.7%	6.4%
Knee other	3.9%	4.1%	4.7%	4.5%	5.2%	4.9%
Shoulder other	3.1%	3.4%	4.6%	4.0%	3.3%	3.4%
Hand/wrist fracture	3.7%	3.2%	3.3%	3.5%	3.6%	3.5%
Shoulder strain/sprain	2.9%	2.6%	3.3%	2.6%	2.9%	2.7%
Trunk strain/sprain	1.9%	2.3%	1.7%	1.9%	1.5%	1.9%
Hand/wrist strain/sprain	3.0%	2.5%	2.8%	1.9%	2.5%	2.0%

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Table 13.5 Most Common Injury Diagnoses by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2017/18 School Years

	2017-18 n=1,365,292
Diagnosis	
Ankle strain/sprain	16.4%
Head/face concussion	18.7%
Knee strain/sprain	6.6%
Hip/thigh/upper leg strain/sprain	8.1%
Knee other	5.1%
Shoulder other	2.9%
Hand/wrist fracture	3.5%
Shoulder strain/sprain	2.8%
Trunk strain/sprain	2.6%
Hand/wrist strain/sprain	3.5%

Table 13.6 Time Loss of Injuries by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2017/18 School Years

	2005-06 n=1,378,145	2006-07 n=1,423,183	2007-08 n=1,355,981	2008-09 n= 1,248,126	2009-10 n= 1,359,897	2010-11 n=1,195,815
Time Loss						
1-2 days	22.5%	26.6%	22.8%	13.7%	14.7%	12.8%
3-6 days	30.0%	28.5%	28.8%	28.5%	27.3%	25.2%
7-9 days	15.3%	14.7%	15.8%	17.7%	16.1%	16.7%
10-21 days	14.9%	14.1%	16.7%	19.7%	16.9%	19.2%
≥22 days or other	17.2%	16.1%	15.9%	20.3%	25.0%	26.1%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

	2011-12 n=1,392,262	2012-13 n=1,361,986	2013-14 n=1,427,312	2014-15 n=1,196,479	2015-16 n=1,393,565	2016-17 n=1,160,321
Time Loss						
1-2 days	15.9%	12.6%	14.9%	11.0%	16.3%	12.6%
3-6 days	23.3%	23.6%	21.8%	22.0%	21.9%	22.0%
7-9 days	16.1%	16.3%	16.7%	15.6%	12.9%	16.1%
10-21 days	19.6%	21.3%	21.1%	22.1%	21.1%	21.6%
≥22 days or other	25.0%	26.2%	25.5%	29.3%	27.8%	27.8%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

	2017-18 n=1,367,490
Time Loss	
1-2 days	21.1%
3-6 days	20.9%
7-9 days	12.8%
10-21 days	`18.8%
≥22 days or other	26.4%
Total	**100%**

Table 13.7 Injuries Requiring Surgery by Year, High School Sports-Related Injury Surveillance Study, US, 2005/06-2017/18 School Years

	2005-06 n=1,429,072	2006-07 n=1,428,960	2007-08 n=1,380,872	2008-09 n= 1,248,126	2009-10 n= 1,359,897	2010-11 n=1,169,423
Required surgery	5.3%	6.4%	6.1%	6.7%	8.0%	8.2%
Did not require surgery	94.7%	93.6%	93.9%	93.3%	92.0%	91.8%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
	2011-12 n=1,392,262	**2012-13 n=1,337,403**	**2013-14 n=1,407,594**	**2014-15 n=1,186,938**	**2015-16 n=1,380,731**	**2016-17 n=1,147,090**
Required surgery	6.7%	7.3%	7.6%	7.3%	6.1%	7.1%
Did not require surgery	93.3%	92.7%	92.4%	92.7%	93.9%	92.9%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**
	2017-18 n=1,354,995					
Required surgery	5.7%					
Did not require surgery	94.3%					
Total	**100%**					

XIV. Reporter Demographics & Compliance

During the 2017-18 school year, 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, 104 enrolled ATs reported an average of 40 study weeks. The majority of ATs (95.2%) reported all the weeks during which they were enrolled, with only 1 ATs (1.0%) missing over 10 weeks. Internal validity checks during the 2016-17 academic year yielded 90.9% sensitivity, 98.4% specificity, a positive predictive value of 95.2%, and a negative predictive value of 96.9%. Internal validity checks are completed every other year, so the next will occur using data from the 2018-19 academic year.

Prior to the start of the 2017-18 High School RIO™ study, participating ATs were asked to complete a short demographics survey. Over three-quarters (84.6%) of participating high schools were public schools, with the remainder being private. All ATs except for 2 provided services to athletes of their high school on 5 or more days each week. Over 63% of ATs participating during the 2017-18 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 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 58 ATs (27.9%). Average reporting time burdens were 31 minutes for the weekly exposure report and 11 minutes for the injury report form. Using a 5 point Likert scale, RIO™ was overwhelmingly reported to be either very easy (47.4%) or somewhat easy (43.9%) to use (5 and 4 on the Likert scale, respectively), with ATs being either very satisfied (56.9%) or somewhat satisfied (34.5%) 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 2018-19 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.