CONVENIENCE SUMMARY REPORT

NATIONAL HIGH SCHOOL SPORTS-RELATED INJURY SURVEILLANCE STUDY

2009-2010 School Year

Compiled by:

R. Dawn Comstock, PhD

Christy L. Collins, MA

Natalie M. McIlvain, BS

Acknowledgements

We thank the certified athletic trainers (ATCs) for their hard work and dedication in providing us with complete and accurate data. Without their efforts, this study would not have been possible. We would like to thank the National Federation of State High School Associations (NFHS) for their support of this project. The content of this report was funded in part by the Centers for Disease Control and Prevention (CDC) grants #R49/CE000674-01 and #R49/CE001172-01. The content of this report is solely the responsibility of the authors and does not necessarily represent the official views of the CDC. We would also like to acknowledge the generous research funding contributions of the National Federation of State High School Associations (NFHS), National Operating Committee on Standards for Athletic Equipment (NOCSAE), and DonJoy Orthotics.

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
Center for Injury Research and Policy
The Research Institute at Nationwide Children's Hospital
700 Children's Drive
Columbus, OH 43205
(614) 722-2400
Dawn.Comstock@NationwideChildrens.org

List of Tables and Figures

Gender Differences within Sports

Figure

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 7.4 million in 2009-10. 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 2008-09 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, boys' and girls' volleyball, boys' and girls' basketball, boys' wrestling, boys' baseball, girls' softball, girls' field hockey, girls' gymnastics, boys' ice hockey, boys' and girls' lacrosse, boys' and girls' swimming, boys' and girls' track and cheerleading. This surveillance has been conducted using the time- and cost-efficient RIO^{TM} (Reporting Information Online) surveillance system. This study was funded by the Centers for Disease Control, the Research Institute at Nationwide Children's Hospital, The Ohio State University, the National Federation of State High School Associations (NFHS), National Operating Committee on Standards for Athletic Equipment (NOCSAE), and DonJoy Orthotics. Through these generous contributions, The National High School Sports-Related Injury Surveillance System was able to be continued during the 2009-10 school year.

1.3 Specific Aims

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

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

hockey boys' and girls' lacrosse, boys' and girls' swimming, boys' and girls' track and cheerleading 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 18 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.

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, practice, or performance and

B) Required medical attention by a team physician, certified athletic trainer, personal physician, or emergency department/urgent care facility and

C) Resulted in restriction of the high school athlete's participation for one or more days beyond the day of injury and

D) Any fracture, concussion, or dental injury regardless of whether or not it resulted in restriction of the student-athlete's participation.

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

C) Number of athlete-performances = the sum of the number of cheerleading athletes at each performance during the past week. For example, if 9 cheerleading athletes performed 3 times in one weekend, the number of athlete-performances would equal 27.

1.5 Sample Recruitment

The National Athletic Trainers' Association (NATA) membership list was used to identify eligible reporters - certified athletic trainers (ATC) who provide care for high school athletes and who have a valid e-mail address. Each eligible reporter received an e-mail introducing the study and inviting them to participate. A three stage sampling methodology was used to select study schools from all schools with ATCs who expressed an interest in participating as reporters.

1) All schools 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 report for each of the 9 sports included in the original National High School Sports-Related Injury Surveillance Study (boys' football, soccer, basketball, wrestling, and baseball and girls' soccer, volleyball, basketball, and softball). This subset of 100 study schools were the randomly selected, nationally representative sample.

2) All schools not selected in step 1 who offered any of the more rarely offered 9 sports included in the expansion of the National High School Sports-Related Injury Surveillance Study (girls' gymnastics, field hockey, and lacrosse and boys' ice hockey, volleyball and lacrosse) were selected for the convenience sample in an attempt to obtain as large a sample as possible reporting for these more rarely offered sports.
3) A random sample of all schools not selected in step 1 or step 2 who offered the remaining of the 9 sports of interest in the expansion of the National High School Sports-Related Injury Surveillance Study (boys' and girls' track & field, swimming & diving and cheerleading) were selected in an attempt to ensure at least 100 schools were reporting for each of the 20 sports of interest.

This three step sampling methodology resulted in a large, nationally disperse convenience sample of US high schools. Participating ATCs were offered a $300-$400 honorarium depending on the number of sports reported along with individualized injury reports following the study's conclusion.

As a result of the convenience sample methodology, different schools reported for the different sports of interest. See table below:

School Participation by Sport, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year.*

	# Schools in Random Sample	# Schools in Convenience Sample	# Schools Total
Original Sports			
Football	87	46	133
Boys' Soccer	87	60	147
Girls' Soccer	87	66	150
Girls' Volleyball	86	59	145
Boys' Basketball	94	63	157
Girls' Basketball	93	65	158
Wrestling	84	68	152
Baseball	91	60	151
Softball	93	60	153
New Sports			
Boys' Volleyball	11	16	27
Field Hockey	28	54	82
Gymnastics	11	35	46
Ice Hockey	17	35	52
Boys' Lacrosse	23	43	66
Girls' Lacrosse	25	42	67
Boys' Swimming and Diving	36	50	86
Girls' Swimming and Diving	36	53	89
Boys' Track and Field	64	79	143
Girls' Track and Field	63	81	144
Cheerleading	47	66	113
Total	**97**	**95**	**192**

*Numbers only include schools who actually reported data for the 2009-10 school year.

1.6 Data Collection

Each ATC that enrolled their school in National High School Sports-Related Injury Surveillance System received an email every Monday throughout the study period reminding them to enter their school's data into the surveillance system. Each participating ATC was asked to complete 45 weekly exposure reports: one for each week from July 27, 2009 through June 20, 2010. Exposure reports collected exposure information (number of athlete-competitions and athlete-practices) and the number of reportable injuries sustained by student athletes of each

sport that was currently in session at their school. For each reportable injury, the ATC was asked to complete an injury report. The injury report collected detailed information about the injured player (e.g., age, year in school, etc.), the injury (e.g. site, type, severity, etc.) and the injury event (e.g., position played, phase of play, etc.). This internet-based surveillance tool provided ATCs with the ability to view all their submitted data throughout the study and update reports as needed (e.g., need for surgery, days till resuming play, etc.).

1.7 Data Management

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

1.8 Data Analysis

Data were analyzed using SAS software, version 9.1 and SPSS, version 17.0. Although fractures, concussions, and dental injuries resulting in <1 day time loss were collected, unless otherwise noted, analyses in this report excluded these injuries.

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. 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

II. Overall Injury Epidemiology

Table 2.1 Injury Rates by Sport and Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

	# Injuries	# Exposures	Injury rate (per 1,000 AEs)
Overall total	**7,258**	**3,905,891**	**1.86**
Competition	**3,653**	**998,567**	**3.66**
Practice	**3,583**	**2,868,613**	**1.25**
Performance	**22**	**38,711**	**0.57**
Boys' football total	2,607	648,845	4.02
Competition	1,365	107,323	12.72
Practice	1,242	541,522	2.29
Boys' soccer total	466	260,693	1.79
Competition	284	79,235	3.58
Practice	182	181,458	1.00
Girls' soccer total	479	227,269	2.11
Competition	317	70,827	4.48
Practice	162	156,442	1.04
Boys' volleyball total	14	15,593	0.90
Competition	7	5,255	1.33
Practice	7	10,338	0.68
Girls' volleyball total	247	244,367	1.01
Competition	82	81,237	1.01
Practice	165	163,130	1.01
Boys' basketball total	464	301,946	1.54
Competition	251	89,153	2.82
Practice	213	212,793	1.00
Girls' basketball total	385	247,606	1.55
Competition	200	76,740	2.61
Practice	185	170,866	1.08
Boys' wrestling total	572	250,631	2.28
Competition	230	67,587	3.40
Practice	342	183,044	1.87
Boys' baseball total	223	238,676	0.93
Competition	126	83,503	1.51
Practice	97	155,173	0.63
Girls' softball total	204	178,106	1.15
Competition	101	60,131	1.68
Practice	103	117,975	0.87

Table 2.1 (Continued) Injury Rates by Sport and Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

	# Injuries	# Exposures	Injury rate (per 1,000 AEs)
Girls' Field Hockey total	217	120,712	1.80
Competition	102	37,691	2.71
Practice	115	83,021	1.39
Girls' Gymnastics total	58	24,354	2.38
Competition	17	4,388	3.87
Practice	41	19,966	2.05
Boys' Ice Hockey total	211	82,398	2.56
Competition	151	27,181	5.56
Practice	60	55,217	1.09
Boys' Lacrosse total	298	120,178	2.48
Competition	187	38,235	4.89
Practice	111	81,943	1.35
Girls' Lacrosse total	136	83,991	1.62
Competition	76	26,144	2.91
Practice	60	57,847	1.04
Boys' Swimming total	29	82,269	0.35
Competition	3	15,636	0.19
Practice	26	66,633	0.39
Girls' Swimming total	38	103,053	0.37
Competition	4	20,775	0.19
Practice	34	82,278	0.41
Boys' Track total	223	260,811	0.86
Competition	81	49,536	1.64
Practice	142	211,275	0.67
Girls' Track total	254	214,146	1.19
Competition	58	41,578	1.39
Practice	196	172,568	1.14
Cheerleading	133	200,247	0.66
Competition	11	16,412	0.67
Practice	100	145,124	0.69
Performance	22	38,711	0.57

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

Table 2.2 Proportion of Injuries Resulting in Time Loss, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

	≥1 days time loss	<1 day time loss	Total
Overall	**99.3%**	**0.7%**	**100%**
Boys' football	99.6%	0.4%	**100%**
Boys' soccer	98.70%	1.30%	**100%**
Girls' soccer	99.6%	0.4%	**100%**
Boys' volleyball	100.0%	0.0%	**100%**
Girls' volleyball	99.2%	0.8%	**100%**
Boys' basketball	99.1%	0.9%	**100%**
Girls' basketball	97.9%	2.1%	**100%**
Boys' wrestling	99.5%	0.5%	**100%**
Boys' baseball	98.7%	1.3%	**100%**
Girls' softball	100.0%	0.0%	**100%**
Girls' field hockey	98.6%	1.4%	**100%**
Girls' gymnastics	100.0%	0.0%	**100%**
Boys' ice hockey	98.6%	1.4%	**100%**
Boys' lacrosse	99.3%	0.7%	**100%**
Girls' lacrosse	99.3%	0.7%	**100%**
Boys' swimming	100.0%	0.0%	**100%**
Girls' swimming	100.0%	0.0%	**100%**
Boys' track	100.0%	0.0%	**100%**
Girls' track	100.0%	0.0%	**100%**
Cheerleading	99.2%	0.8%	**100%**

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

Table 2.3 Demographic Characteristics of Injured Athletes by Sex, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

	Male	Female
Year in School	**n=5,016**	**n=2,142**
Freshman	20.8%	24.4%
Sophomore	23.8%	26.1%
Junior	26.1%	25.8%
Senior	29.3%	23.8%
Total†	**100%**	**100%**
Age (years)		
Minimum	13	13
Maximum	19	19
Mean (St. Dev.)	16.1 (1.3)	15.8 (1.3)
BMI		
Minimum	8.12	10.5
Maximum	84.7	56.0
Mean (St. Dev.)	24.7 (4.6)	22.3 (3.8)

*All analyses in this report present un-weighted data.
†Throughout this report, totals and n's represent the total un-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, 2009-10 School Year

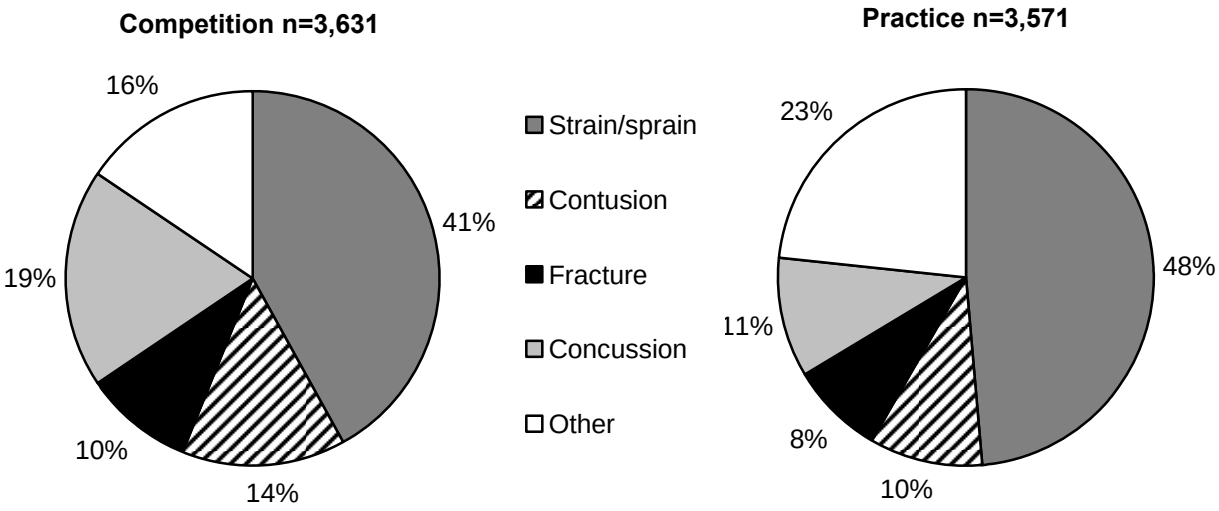


Table 2.4 Body Site of Injury by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall*	
	n	%	n	%	n	%
Body Site						
Head/face	798	21.9%	476	13.3%	1,278	17.6%
Ankle	595	16.3%	576	16.1%	1,174	16.2%
Knee	590	16.2%	477	13.3%	1,071	14.8%
Hip/thigh/upper leg	324	8.9%	449	12.5%	775	10.7%
Hand/wrist	320	8.8%	358	10.0%	680	9.4%
Shoulder	275	7.6%	296	8.3%	571	7.9%
Trunk	264	7.2%	267	7.5%	533	7.4%
Lower leg	148	4.1%	258	7.2%	408	5.6%
Arm/elbow	151	4.1%	125	3.5%	276	3.8%
Foot	102	2.8%	166	4.6%	268	3.7%
Neck	53	1.5%	71	2.0%	127	1.8%
Other	22	0.6%	62	1.7%	84	1.2%
Total	**3,642**	**100%**	**3,581**	**100%**	**7,245**	**100%**

*Overall includes cheerleading performance related injuries however performance injuries do not have a column due to them totaling less than 1.0% of all injuries

Table 2.5 Most Commonly Injured Ankle Structures, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Male		Female		Total	
	n	%	n	%	n	%
Ankle Ligament						
Anterior talofibular ligament	508	75.5%	403	81.4%	916	78.0%
Calcaneofibular ligament	194	28.8%	147	29.7%	342	29.1%
Anterior tibiofibular ligament	164	24.4%	82	16.6%	247	21.0%
Posterior talofibular ligament	81	12.0%	56	11.3%	138	11.8%
Deltoid ligament	56	8.3%	24	4.8%	81	6.9%
Posterior tibiofibular ligament	25	3.7%	6	1.2%	31	2.6%
Total	**673**	**100%**	**495**	**100%**	**1,174**	**100%**

*Multiple responses allowed per injury report.

Table 2.6 Most Commonly Injured Knee Structures, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Male		Female		Total	
	n	%	n	%	n	%
Knee Ligament						
Medial collateral ligament	243	32.9%	59	18.0%	302	28.2%
Patella/patellar tendon	138	18.7%	96	29.3%	235	21.9%
Anterior cruciate ligament	141	19.1%	81	24.7%	223	20.8%
Torn cartilage (meniscus)	143	19.4%	57	17.4%	201	18.8%
Lateral collateral ligament	41	5.6%	14	4.3%	55	5.1%
Posterior cruciate ligament	20	2.7%	4	1.2%	24	2.2%
Total	**738**	**100%**	**328**	**100%**	**1,071**	**100%**

*Multiple responses allowed per injury report.

Table 2.7 Ten Most Common Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=3,623		Practice n=3,569		Overall n=7,214	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	537	14.8%	517	14.5%	1,057	14.7%
Head/face concussion	675	18.6%	374	10.5%	1,053	14.6%
Hip/thigh/upper leg strain/sprain	213	5.9%	379	10.6%	594	8.2%
Knee strain/sprain	337	9.3%	201	5.6%	540	7.5%
Knee other	148	4.1%	203	5.7%	353	4.9%
Shoulder other	135	3.7%	140	3.9%	275	3.8%
Hand/wrist fracture	142	3.9%	124	3.5%	266	3.7%
Shoulder strain/sprain	112	3.1%	127	3.6%	239	3.3%
Trunk strain/sprain	77	2.1%	131	3.7%	210	2.9%
Hand/wrist strain/sprain	83	2.3%	117	3.3%	202	2.8%

Figure 2.2 Time Loss by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

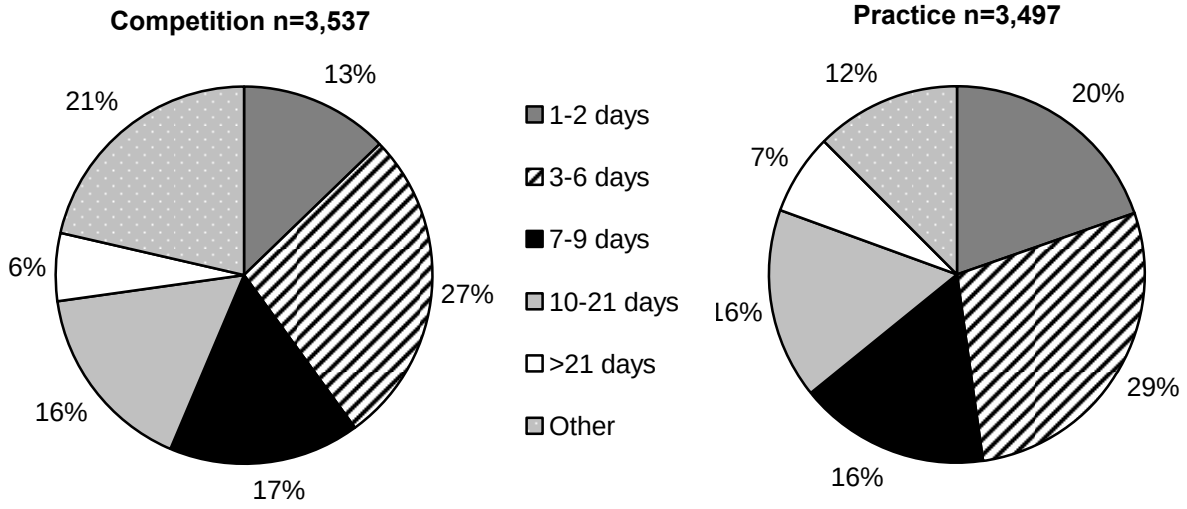


Table 2.8 Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	275	7.7%	187	5.3%	464	6.5%
Did not require surgery	3,311	92.3%	3,342	94.7%	6,673	93.5%
Total	**3,586**	**100%**	**3,529**	**100%**	**7,137**	**100%**

Figure 2.3 New and Recurring Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

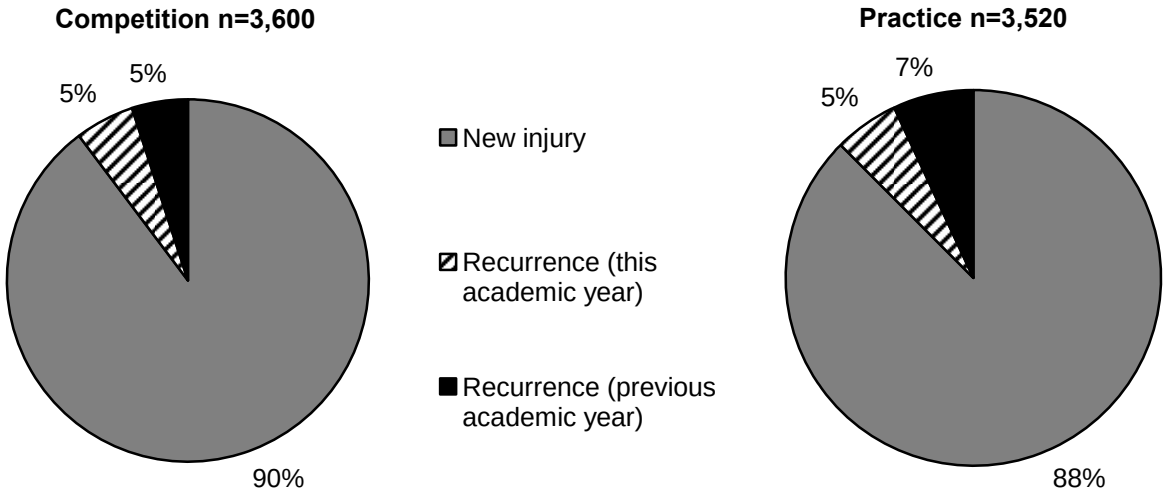


Table 2.9 Time during Season of Injury, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	1,659	22.9%
Regular season	5,376	74.3%
Post season	205	2.8%
Total	**7,240**	**100%**

Table 2.10 Competition-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	162	4.5%
Yes, according to the coach/athlete but was not ruled illegal/foul play	117	3.2%
No	3,185	87.9%
Unknown	161	4.4%
Total	**3,625**	**100%**

Table 2.11 Practice-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First ½ hour	420	12.0%
Second ½ hour	672	19.3%
1-2 hours into practice	2,000	57.3%
> 2 hours into practice	396	11.4%
Total	**3,488**	**100%**

Table 2.12 Methods for Injury Evaluation and Assessment, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
% of Injuries Evaluated by:*		
Certified athletic trainer	6,795	93.6%
General physician	2,608	35.9%
Orthopedic physician	1,906	26.3%
Chiropractor	83	1.1%
Physicians assistant	75	1.0%
Nurse practitioner	48	0.7%
Dentist/oral surgeon	20	0.3%
Other	320	4.4%
Total	**7,258**	**100%**
% of Injuries Assessed by:*		
Evaluation	6,950	95.8%
X-ray	2,613	36.0%
MRI	771	10.6%
CT-scan	297	4.1%
Surgery	64	0.9%
Blood work/lab test	63	0.9%
Other	95	1.3%
Total	**7,258**	**100%**

*Multiple responses allowed per injury report.

III. Boys' Football Injury Epidemiology

Table 3.1 Football Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**2,607**	**648,845**	**4.02**
Competition	1,365	107,323	12.72
Practice	1,242	541,522	2.29

Table 3.2 Demographic Characteristics of Injured Football Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=2,586**
Freshman	20.8%
Sophomore	23.6%
Junior	25.3%
Senior	30.4%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	16.0 (1.3)
BMI	
Minimum	8.1
Maximum	54.9
Mean (St. Dev.)	25.8 (4.8)

*All analyses in this report present un-weighted data
†Throughout this report, totals and n's represent the total un-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, 2009-10 School Year

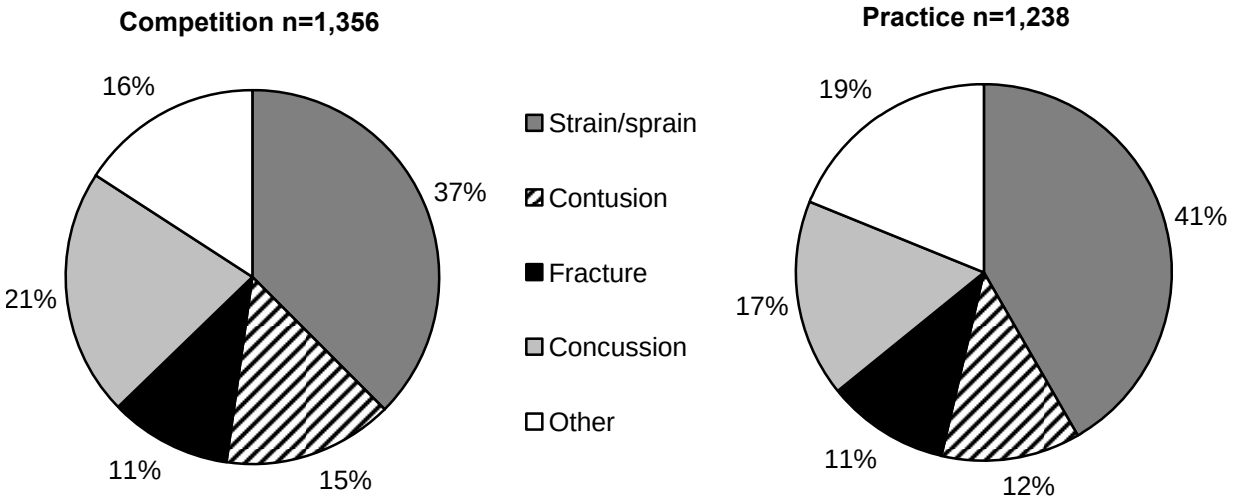


Table 3.3 Body Site of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	296	21.7%	219	17.6%	515	19.8%
Knee	244	17.9%	180	14.5%	424	16.3%
Hand/wrist	155	11.4%	158	12.7%	313	12.0%
Ankle	173	12.7%	138	11.1%	311	11.9%
Shoulder	143	10.5%	132	10.6%	275	10.6%
Hip/thigh/upper leg	80	5.9%	122	9.8%	202	7.8%
Trunk	102	7.5%	97	7.8%	199	7.6%
Lower leg	57	4.2%	53	4.3%	110	4.2%
Arm/elbow	53	3.9%	42	3.4%	95	3.6%
Foot	25	1.8%	42	3.4%	67	2.6%
Neck	25	1.8%	29	2.3%	54	2.1%
Other	9	0.7%	29	2.3%	38	1.5%
Total	**1,362**	**100%**	**1,241**	**100%**	**2,603**	**100%**

Table 3.4 Ten Most Common Football Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=1,354		Practice n=1,237		Total n=2,591	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	288	21.3%	209	16.9%	497	19.2%
Ankle strain/sprain	156	11.5%	121	9.8%	277	10.7%
Knee strain/sprain	161	11.9%	100	8.1%	261	10.1%
Shoulder other	72	5.3%	65	5.3%	137	5.3%
Hip/thigh/upper leg strain/sprain	33	2.4%	97	7.8%	130	5.0%
Hand/wrist fracture	65	4.8%	59	4.8%	124	4.8%
Shoulder strain/sprain	55	4.1%	51	4.1%	106	4.1%
Knee other	48	3.5%	53	4.3%	101	3.9%
Hand/wrist strain/sprain	39	2.9%	42	3.4%	81	3.1%
Trunk strain/sprain	26	1.9%	40	3.2%	66	2.5%
Trunk contusion	37	2.7%	28	2.3%	65	2.5%

Figure 3.2 Time Loss of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

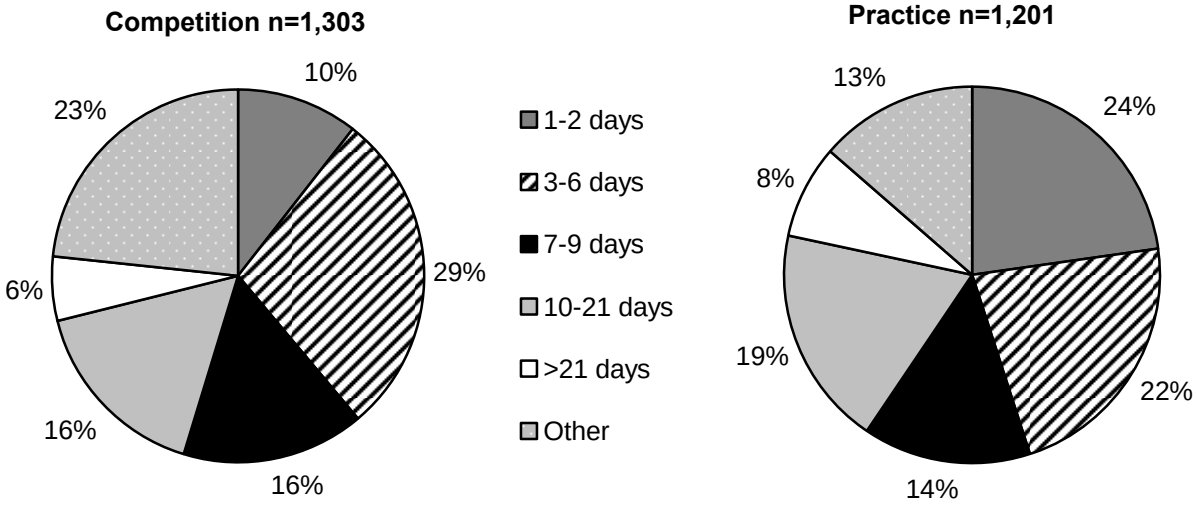


Table 3.5 Football Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	119	8.9%	74	6.1%	193	7.5%
Did not require surgery	1,220	91.1%	1,148	93.9%	2,368	92.5%
Total	**1,339**	**100%**	**1,222**	**100%**	**2,561**	**100%**

Figure 3.3 History of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

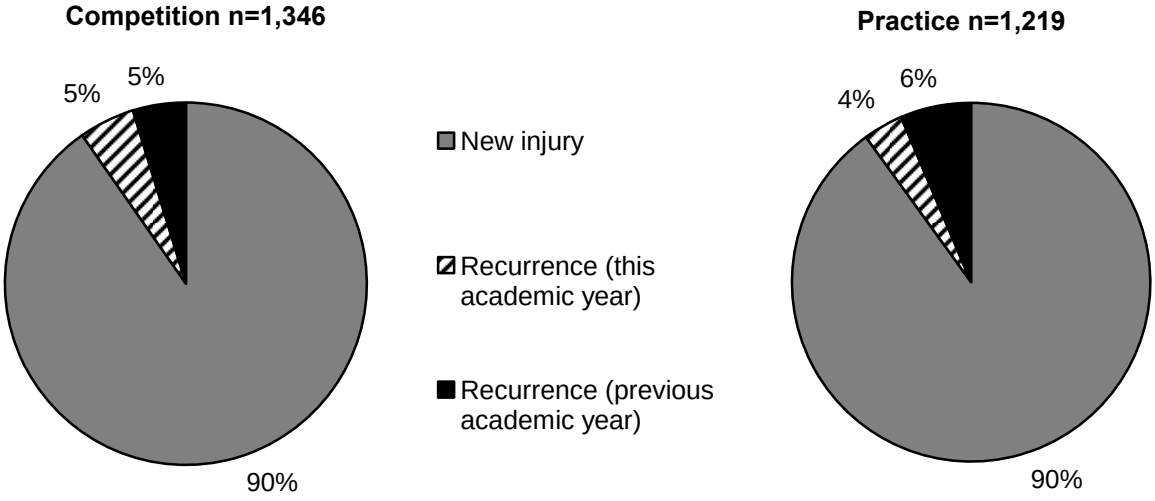


Table 3.6 Time during Season of Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	1,656	22.9%
Regular season	5,363	74.3%
Post season	201	2.8%
Total	**7,220**	**100%**

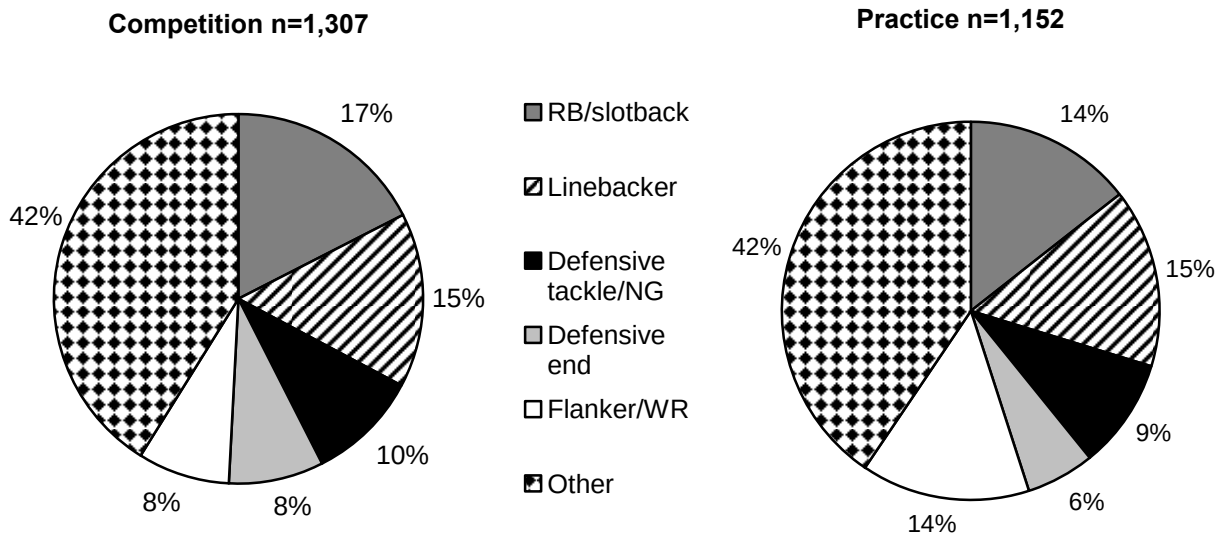
Table 3.7 Competition-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	20	1.5%
First quarter	170	12.9%
Second quarter	404	30.7%
Third quarter	403	30.6%
Fourth quarter	316	24.0%
Overtime	5	0.4%
Total	**1,318**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	10	0.7%
Yes, according to the coach/athlete but was not ruled illegal/foul play	35	2.6%
No	1,268	93.4%
Unknown	44	3.2%
Total	**1,357**	**100%**
Field Location		
Between the 20 yard lines	985	76.1%
Red zone (20 yard line to goal line)	271	20.9%
End zone	25	1.9%
Off the field	14	1.1%
Total	**1,295**	**100%**

Table 3.8 Practice-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	103	8.5%
Second 1/2 hour	178	14.6%
1-2 hours into practice	753	61.9%
>2 hours into practice	183	15.0%
Total	**1,217**	**100%**

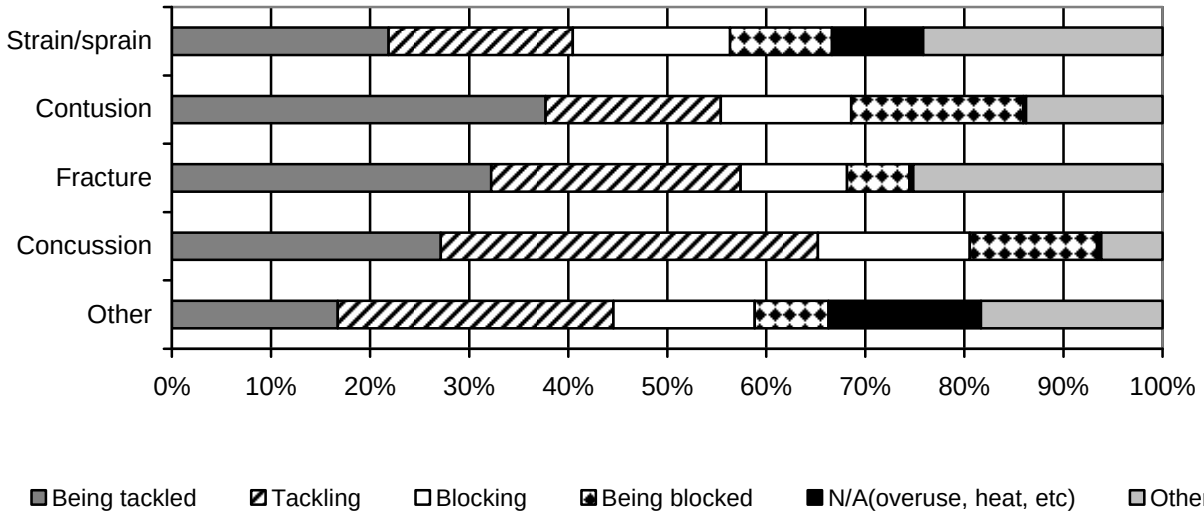
Figure 3.4 Player Position of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



.Table 3.9 Activities Leading to Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Being tackled	391	29.2%	250	20.7%	641	25.2%
Tackling	369	27.6%	254	21.1%	623	24.5%
Blocking	190	14.2%	181	15.0%	371	14.6%
Being blocked	165	12.3%	108	9.0%	273	10.7%
N/A (e.g., overuse, heat illness, conditioning)	24	1.8%	140	11.6%	164	6.4%
Stepped on/fell on/kicked	76	5.7%	50	4.1%	126	5.0%
Rotation around a planted foot/inversion	51	3.8%	0	0.0%	119	4.7%
Contact with ball	12	0.9%	21	1.7%	33	1.3%
Uneven playing surface	6	0.4%	24	2.0%	30	1.2%
Contact with blocking sled/dummy	0	0.0%	27	2.2%	27	1.1%
Contact with goal posts/yard marker/etc	1	0.1%	0	0.0%	1	0.0%
Other	52	3.9%	83	6.9%	135	5.3%
Total	**1,337**	**100%**	**1,206**	**100%**	**2,543**	**100%**

Figure 3.5 Activity Resulting in Football Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



IV. Boys' Soccer Injury Epidemiology

Table 4.1 Boys' Soccer Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**466**	**260,693**	**1.79**
Competition	284	79,235	3.58
Practice	182	181,458	1.00

Table 4.2 Demographic Characteristics of Injured Boys' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=457**
Freshman	23.6%
Sophomore	19.0%
Junior	26.7%
Senior	30.6%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	18
Mean (St. Dev.)	16.1 (1.3)
BMI	
Minimum	16.5
Maximum	37.2
Mean (St. Dev.)	22.7 (3.1)

*All analyses in this report present data un-weighted
†Throughout this report, totals and n's represent the total un-weighted numbers 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, 2009-10 School Year

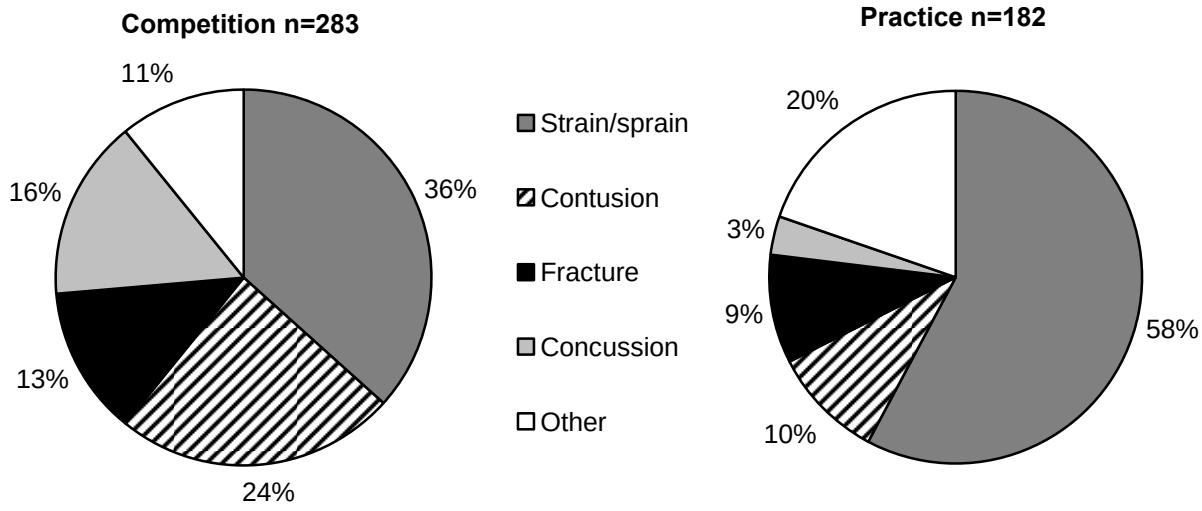


Table 4.3 Body Site of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Hip/thigh/upper leg	45	15.9%	44	24.2%	89	19.1%
Ankle	47	16.6%	34	18.7%	81	17.4%
Head/face	69	24.4%	10	5.5%	79	17.0%
Knee	38	13.4%	29	15.9%	67	14.4%
Lower leg	26	9.2%	15	8.2%	41	8.8%
Hand/wrist	14	4.9%	15	8.2%	29	6.2%
Foot	17	6.0%	12	6.6%	29	6.2%
Trunk	14	4.9%	13	7.1%	27	5.8%
Arm/elbow	7	2.5%	6	3.3%	13	2.8%
Shoulder	5	1.8%	2	1.1%	7	1.5%
Neck	1	0.4%	1	0.5%	2	0.4%
Other	0	0.0%	1	0.5%	1	0.2%
Total	**283**	**100%**	**182**	**100%**	**465**	**100%**

Table 4.4 Ten Most Common Boys' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=282		Practice n=182		Total n=464	
	n	%	n	%	n	%
Diagnosis						
Hip/thigh/upper leg strain/sprain	34	12.1%	39	21.4%	73	15.7%
Ankle strain/sprain	37	13.1%	31	17.0%	68	14.7%
Head/face concussion	44	15.6%	6	3.3%	50	10.8%
Knee strain/sprain	17	6.0%	11	6.0%	28	6.0%
Knee other	7	2.5%	13	7.1%	20	4.3%
Lower leg contusion	16	5.7%	3	1.6%	19	4.1%
Knee contusion	14	5.0%	5	2.7%	19	4.1%
Hand/wrist fracture	11	3.9%	6	3.3%	17	3.7%
Head/face other	14	5.0%	3	1.6%	17	3.7%
Foot contusion	9	3.2%	3	1.6%	12	2.6%
Lower leg strain/sprain	6	2.1%	6	3.3%	12	2.6%

Figure 4.2 Time Loss of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

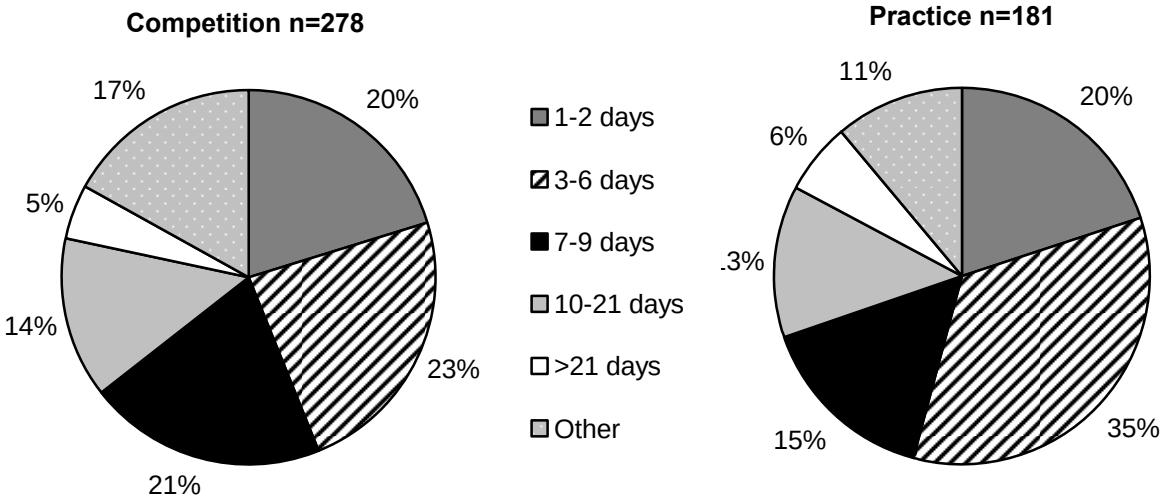


Table 4.5 Boys' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	20	7.1%	7	3.9%	27	5.9%
Did not require surgery	260	92.9%	172	96.1%	432	94.1%
Total	**280**	**100%**	**179**	**100%**	**459**	**100%**

Figure 4.3 History of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

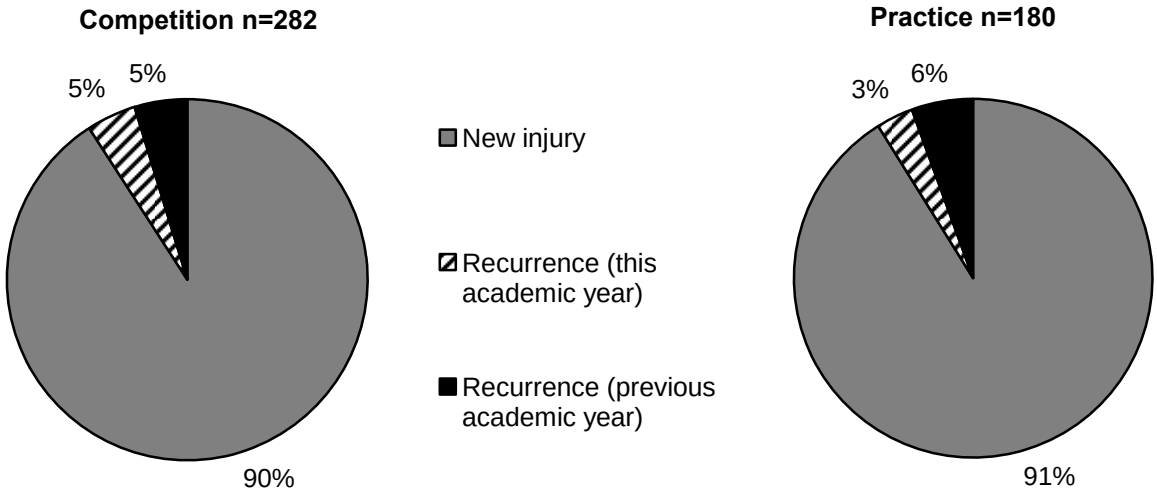


Table 4.6 Time during Season of Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	96	20.6%
Regular season	359	77.2%
Post season	10	2.2%
Total	**465**	**100%**

Table 4.7 Competition-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	4	1.4%
First half	109	38.9%
Second half	163	58.2%
Overtime	4	1.4%
Total	**280**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	20	7.1%
Yes, according to the coach/athlete but was not ruled illegal/foul play	14	4.9%
No	230	81.3%
Unknown	19	6.7%
Total	**283**	**100%**
Field Location		
Top of goal box extended to center line (offense)	103	37.7%
Top of goal box extended to center line (defense)	55	20.1%
Side of goal box (offense)	32	11.7%
Goal box (defense)	30	11.0%
Goal box (offense)	28	10.3%
Side of goal box (defense)	19	7.0%
Off the field	6	2.2%
Total	**273**	**100%**

Table 4.8 Practice-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	17	9.5%
Second 1/2 hour	48	26.8%
1-2 hours into practice	93	52.0%
>2 hours into practice	21	11.7%
Total	**179**	**100%**

Figure 4.4 Player Position of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

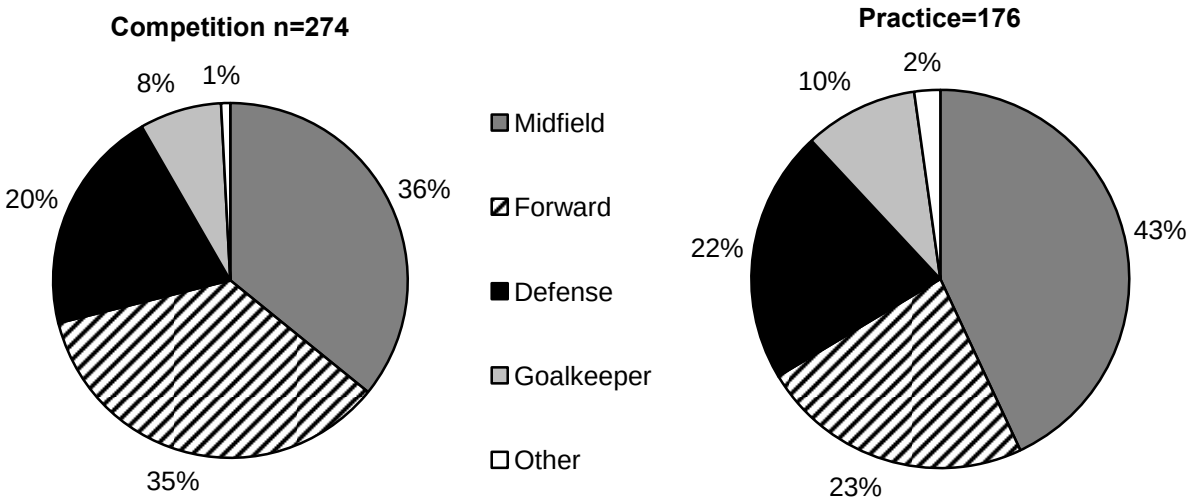
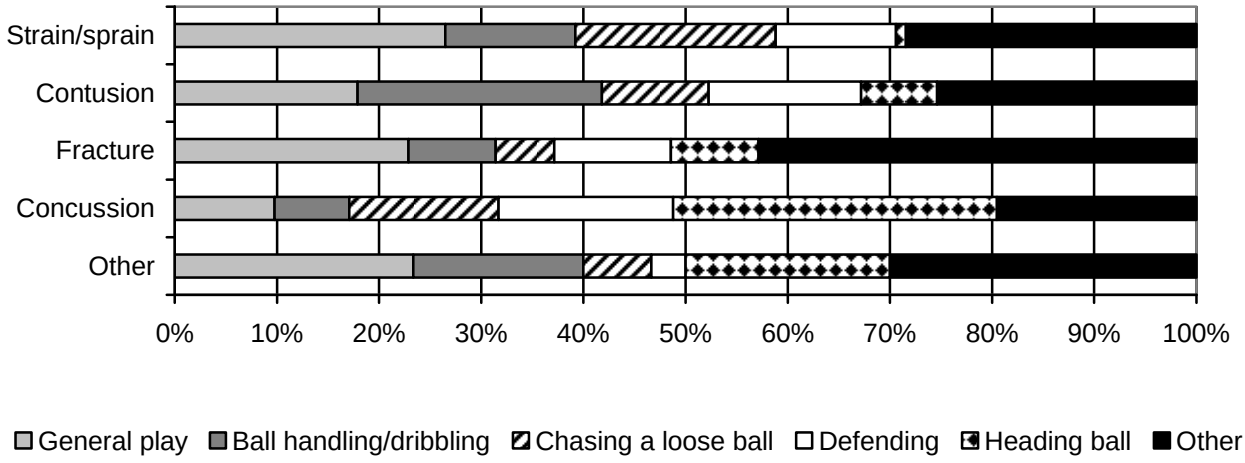


Table 4.9 Activities Leading to Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
General play	58	21.0%	51	28.5%	109	24.0%
Ball handling/dribbling	40	14.5%	13	7.3%	53	11.6%
Chasing loose ball	37	13.4%	15	8.4%	52	11.4%
Defending	34	12.3%	10	5.6%	44	9.7%
Heading ball	29	10.5%	7	3.9%	36	7.9%
Goaltending	16	5.8%	15	8.4%	31	6.8%
Passing (foot)	14	5.1%	13	7.3%	27	5.9%
Receiving pass	21	7.6%	5	2.8%	26	5.7%
Shooting (foot)	11	4.0%	11	6.1%	22	4.8%
Conditioning	0	0.0%	22	12.3%	22	4.8%
Blocking shot	5	1.8%	3	1.7%	8	1.8%
Attempting a slide tackle	1	0.4%	7	3.9%	8	1.8%
Receiving a slide tackle	7	2.5%	1	0.6%	8	1.8%
Other	3	1.1%	6	3.4%	9	2.0%
Total	**276**	**100%**	**179**	**100%**	**455**	**100%**

Figure 4.5 Activity Resulting in Boys' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



V. Girls' Soccer Injury Epidemiology

Table 5.1 Girls' Soccer Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**479**	**227,269**	**2.11**
Competition	317	70,827	4.48
Practice	162	156,442	1.04

Table 5.2 Demographic Characteristics of Injured Girls' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=471**
Freshman	24.6%
Sophomore	28.5%
Junior	24.6%
Senior	22.3%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.8 (1.2)
BMI	
Minimum	16.0
Maximum	40.4
Mean (St. Dev.)	22.0 (3.0)

*All analyses in this report present un-weighted data
†Throughout this report, totals and n's represent the total un-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, 2009-10 School Year

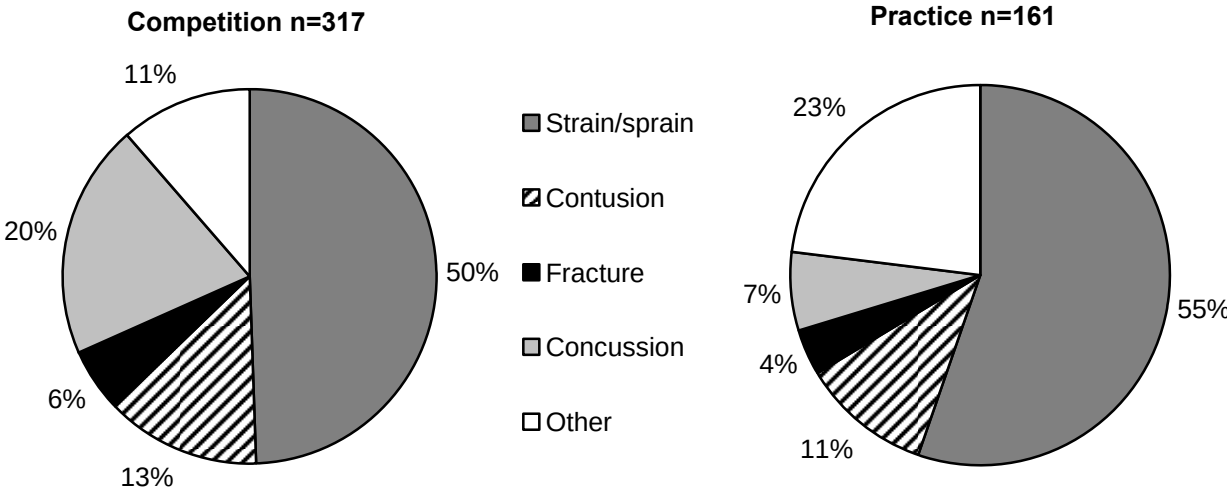


Table 5.3 Body Site of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	73	23.0%	38	23.5%	111	23.2%
Knee	84	26.5%	25	15.4%	109	22.8%
Head/face	73	23.0%	16	9.9%	89	18.6%
Hip/thigh/upper leg	21	6.6%	30	18.5%	51	10.6%
Lower leg	14	4.4%	24	14.8%	38	7.9%
Trunk	18	5.7%	9	5.6%	27	5.6%
Foot	12	3.8%	7	4.3%	19	4.0%
Hand/wrist	11	3.5%	7	4.3%	18	3.8%
Shoulder	4	1.3%	4	2.5%	8	1.7%
Arm/elbow	4	1.3%	1	0.6%	5	1.0%
Neck	3	0.9%	1	0.6%	4	0.8%
Total	**317**	**100%**	**162**	**100%**	**479**	**100%**

Table 5.4 Ten Most Common Girls' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=317		Practice n=161		Total n=478	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	68	21.5%	34	21.1%	102	21.3%
Head/face concussion	64	20.2%	11	6.8%	75	15.7%
Knee strain/sprain	48	15.1%	9	5.6%	57	11.9%
Hip/thigh/upper leg strain/sprain	13	4.1%	25	15.5%	38	7.9%
Knee other	22	6.9%	14	8.7%	36	7.5%
Knee contusion	13	4.1%	2	1.2%	15	3.1%
Lower leg other	0	0.0%	14	8.7%	14	2.9%
Trunk strain/sprain	7	2.2%	6	3.7%	13	2.7%
Lower leg strain/sprain	4	1.3%	7	4.3%	11	2.3%
Foot strain/sprain	7	2.2%	3	1.9%	10	2.1%

Figure 5.2 Time Loss of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

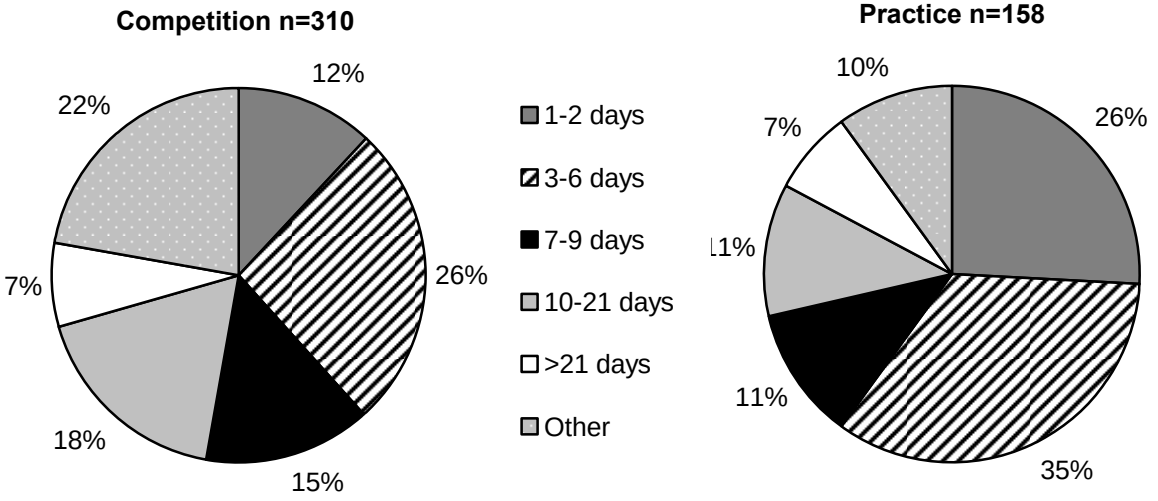


Table 5.5 Girls' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	28	9.1%	6	3.7%	34	7.2%
Did not require surgery	280	90.9%	155	96.3%	435	92.8%
Total	**308**	**100%**	**161**	**100%**	**469**	**100%**

Figure 5.3 History of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

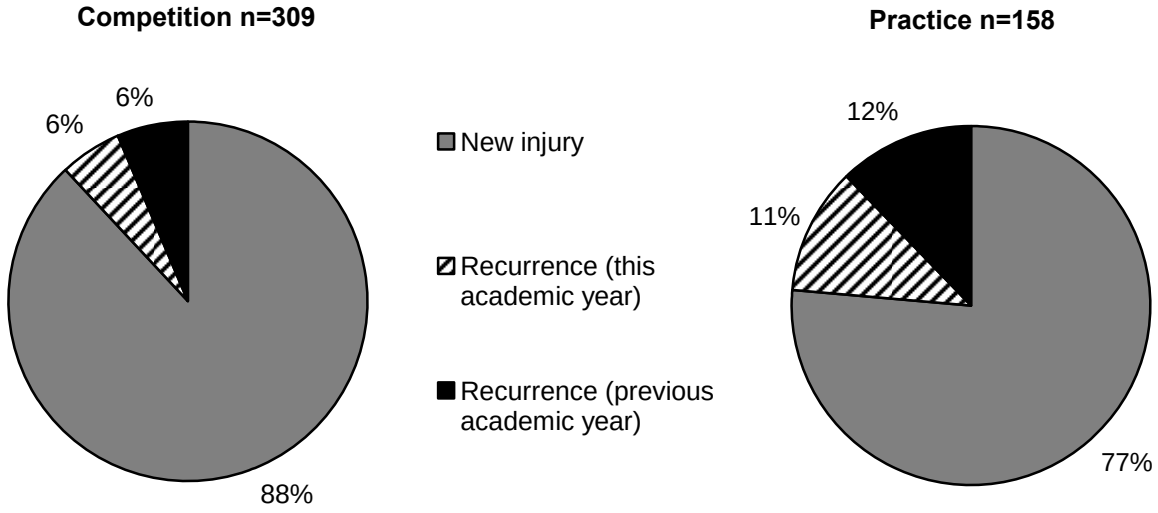


Table 5.6 Time during Season of Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	70	14.6%
Regular season	397	82.9%
Post season	12	2.5%
Total	**479**	**100%**

Table 5.7 Competition-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	2	0.7%
First half	108	35.8%
Second half	187	61.9%
Overtime	5	1.7%
Total	**302**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	21	6.7%
Yes, according to the coach/athlete but was not ruled illegal/foul play	25	8.0%
No	234	74.8%
Unknown	33	10.5%
Total	**313**	**100%**
Field Location		
Top of goal box extended to center line (offense)	89	30.8%
Top of goal box extended to center line (defense)	63	21.8%
Goal box (defense)	42	14.5%
Side of goal box (defense)	38	13.1%
Goal box (offense)	29	10.0%
Side of goal box (offense)	27	9.3%
Off the field	1	0.3%
Total	**289**	**100%**

Table 5.8 Practice-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	13	8.4%
Second 1/2 hour	36	23.2%
>2 hours into practice	99	63.9%
1-2 hours into practice	7	4.5%
Total	**155**	**100%**

Figure 5.4 Player Position of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

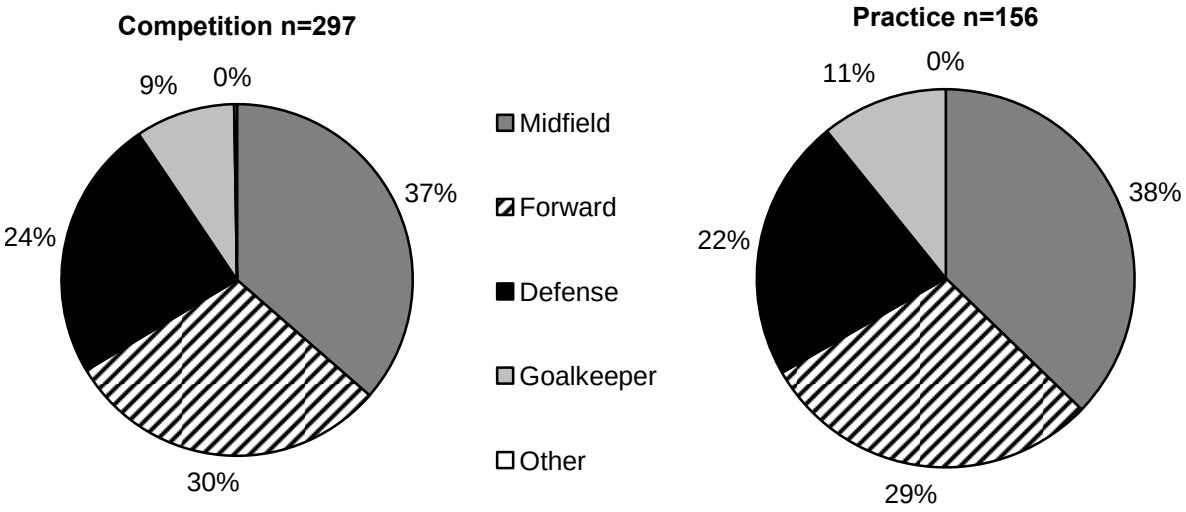
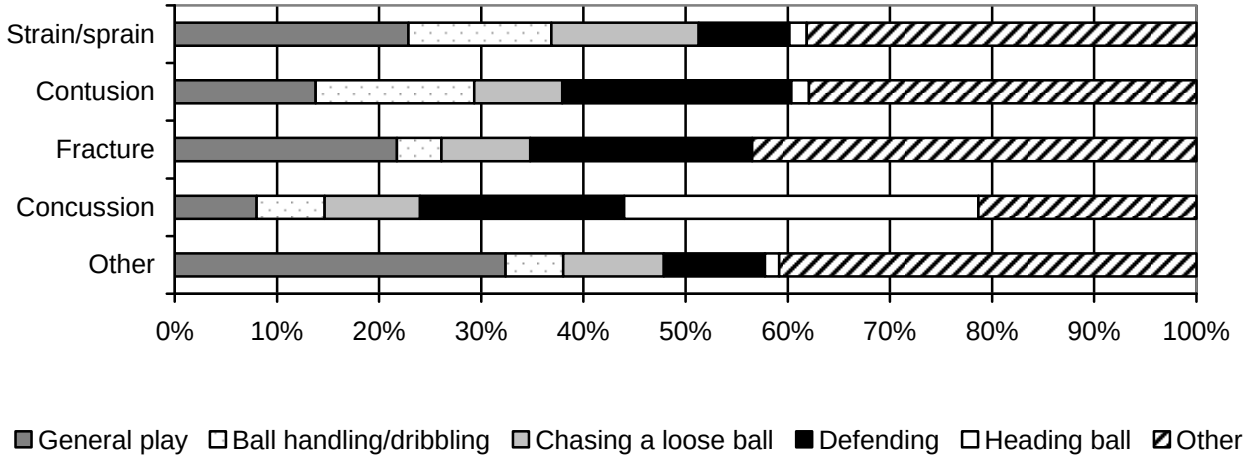


Table 5.9 Activities Leading to Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
General play	47	15.4%	49	30.8%	96	20.7%
Defending	52	17.0%	9	5.7%	61	13.1%
Chasing loose ball	41	13.4%	15	9.4%	56	12.1%
Ball handling/dribbling	37	12.1%	15	9.4%	52	11.2%
Goaltending	22	7.2%	15	9.4%	37	8.0%
Heading ball	28	9.2%	4	2.5%	32	6.9%
Conditioning	1	0.3%	29	18.2%	30	6.5%
Receiving pass	23	7.5%	5	3.1%	28	6.0%
Passing (foot)	23	7.5%	4	2.5%	27	5.8%
Shooting (foot)	18	5.9%	7	4.4%	25	5.4%
Blocking shot	7	2.3%	0	0.0%	7	1.5%
Attempting a slide tackle	4	1.3%	0	0.0%	4	0.9%
Receiving a slide tackle	2	0.7%	1	0.6%	3	0.6%
Other	0	0.0%	6	3.8%	6	1.3%
Total	**305**	**100%**	**159**	**100%**	**464**	**100%**

Figure 5.5 Activity Resulting in Girls' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



VI. Boys' Volleyball Injury Epidemiology

Table 6.1 Boys' Volleyball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**14**	**15,593**	**0.90**
Competition	7	5,255	1.33
Practice	7	10,338	0.68

Table 6.2 Demographic Characteristics of Injured Boys' Volleyball Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=14**
Freshman	14.3%
Sophomore	28.6%
Junior	21.4%
Senior	35.7%
Total†	**100%**
Age (years)	
Minimum	15
Maximum	17
Mean (St. Dev.)	16.3 (0.8)
BMI	
Minimum	21.7
Maximum	29.5
Mean (St. Dev.)	24.9 (2.5)

*All analyses in this report present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 Boys' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

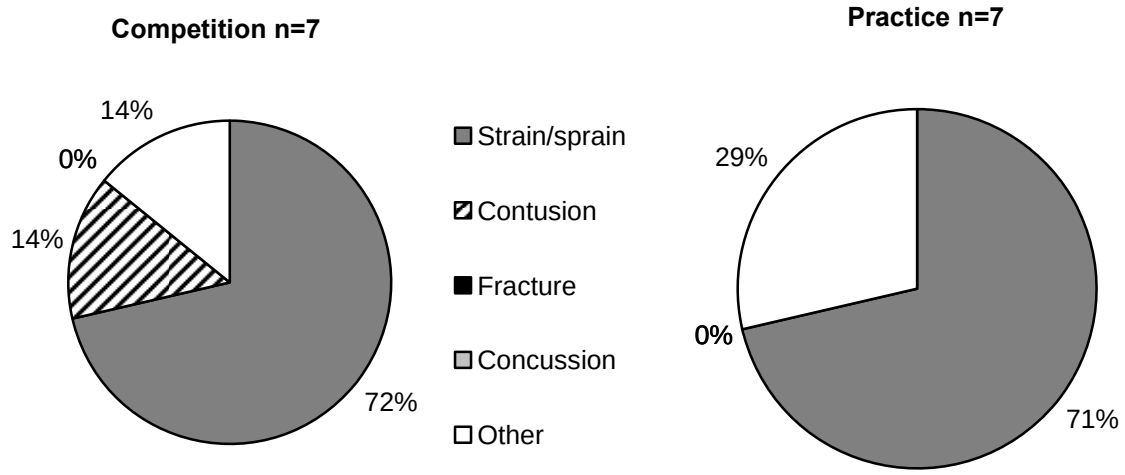


Table 6.3 Body Site of Boys' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	5	71.4%	4	57.1%	9	64.3%
Hand/wrist	0	0.0%	0	0.0%	0	0.0%
Knee	0	0.0%	0	0.0%	0	0.0%
Shoulder	0	0.0%	1	14.3%	1	7.1%
Hip/thigh/upper leg	0	0.0%	0	0.0%	0	0.0%
Head/face	0	0.0%	0	0.0%	0	0.0%
Trunk	0	0.0%	1	14.3%	1	7.1%
Lower leg	0	0.0%	1	14.3%	1	7.1%
Arm/elbow	0	0.0%	0	0.0%	0	0.0%
Foot	0	0.0%	0	0.0%	0	0.0%
Neck	0	0.0%	0	0.0%	0	0.0%
Other	2	28.6%	0	0.0%	2	14.3%
Total	**7**	**100%**	**7**	**100%**	**14**	**100%**

Table 6.4 Most Common Boys' Volleyball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=7		Practice n=7		Total n=14	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	5	71.4%	4	57.1%	9	64.3%
Shoulder other	0	0.0%	1	14.3%	1	7.1%
Trunk strain/sprain	0	0.0%	1	14.3%	1	7.1%
Lower leg Other	0	0.0%	1	14.3%	1	7.1%
Other	2	28.6%	0	0.0%	2	14.3%

Figure 6.2 Time Loss of Boys' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

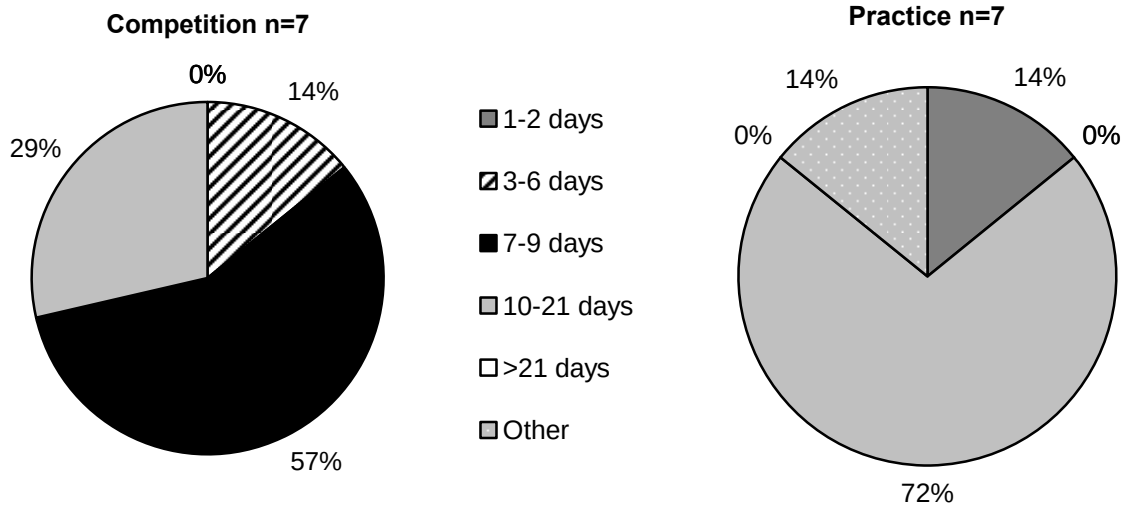


Table 6.5 Boys' Volleyball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	0	0.0%	0	0.0%	0	0.0%
Did not require surgery	7	100.0%	7	100.0%	14	100.0%
Total	**7**	**100%**	**7**	**100%**	**14**	**100%**

Figure 6.3 History of Boys' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

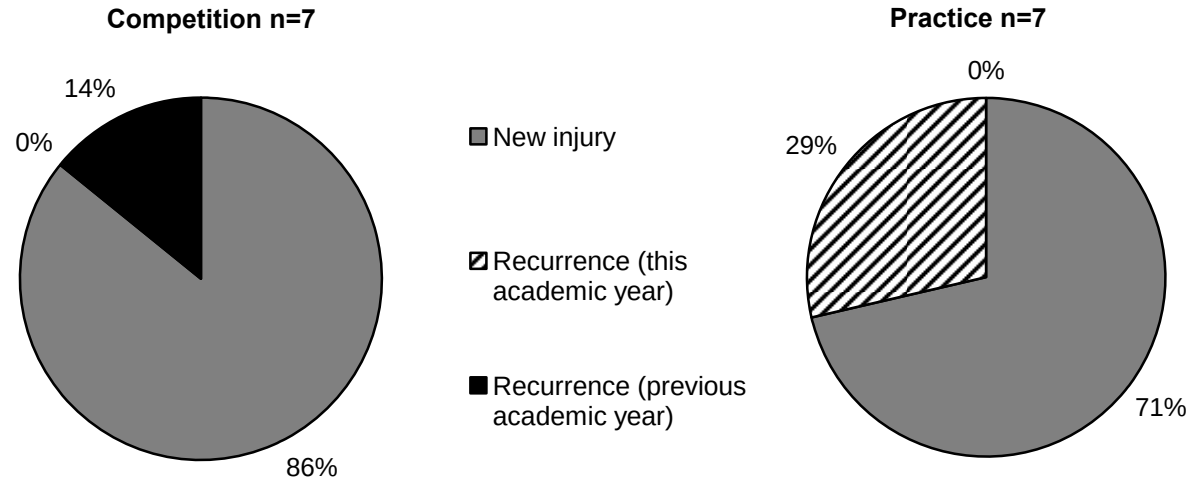


Table 6.6 Time during Season of Boys' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	0	0.0%
Regular season	12	85.7%
Post season	2	14.3%
Total	**14**	**100%**

Table 6.7 Competition-Related Variables for Boys' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	3	42.9%
First game	0	0.0%
Second game	2	28.6%
Third game	2	28.6%
Total	**7**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	0	0.0%
Yes, according to the coach/athlete but was not ruled illegal/foul play	0	0.0%
No	7	100.0%
Unknown	0	0.0%
Total	**7**	**100%**
Court Location		
Left front	3	42.9%
Right front	2	28.6%
Center front	1	14.3%
Outside the playable area	1	14.3%
Total	**7**	**100%**

Table 6.8 Practice-Related Variables for Boys' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	1	14.3%
Second 1/2 hour	2	28.6%
1-2 hours into practice	4	57.1%
>2 hours into practice	0	0.0%
Total	**7**	**100%**

Figure 6.4 Player Position of Boys' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

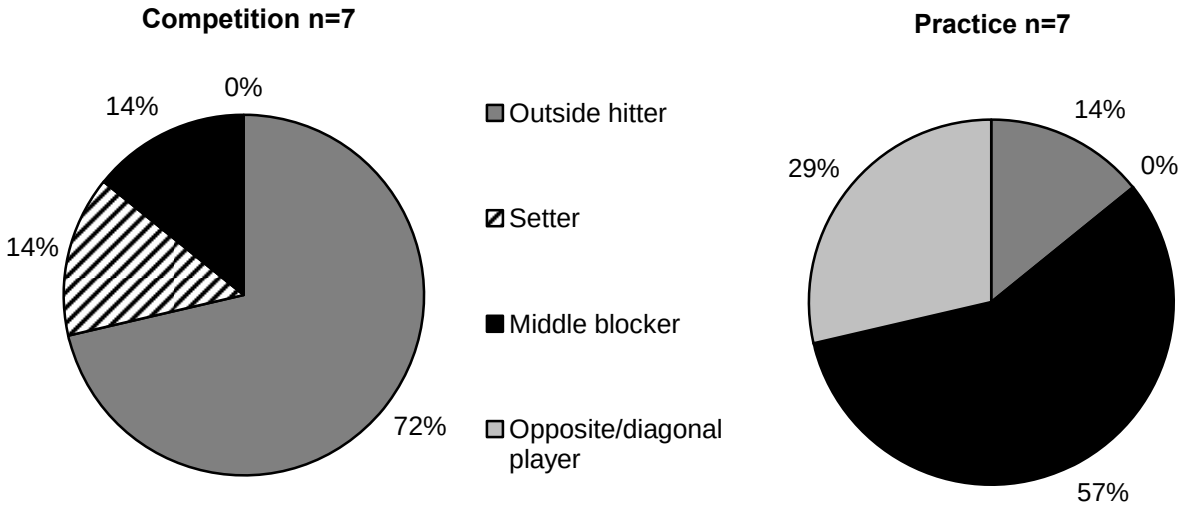
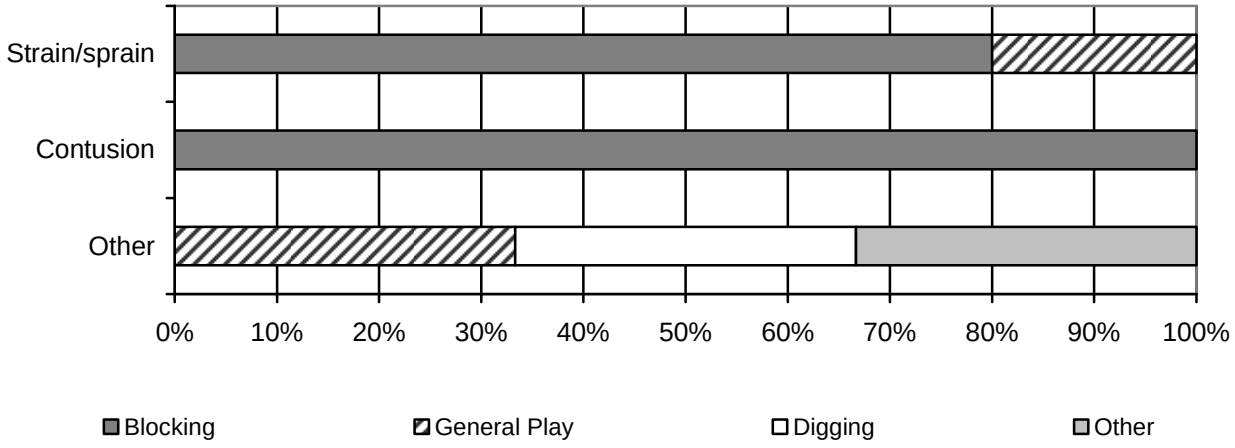


Table 6.9 Activities Leading to Boys' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	**%**	**n**	**%**	**n**	**%**
Activity						
Blocking	6	85.7%	3	42.9%	9	64.3%
General play	0	0.0%	3	42.9%	3	21.4%
Digging	0	0.0%	1	14.3%	1	7.1%
Other	1	14.3%	0	0.0%	1	7.1%
Total	**7**	**100%**	**7**	**100%**	**14**	**100%**

Figure 6.5 Activity Resulting in Boys' Volleyball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



VII. Girls' Volleyball Injury Epidemiology

Table 7.1 Girls' Volleyball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**247**	**244,367**	**1.01**
Competition	82	81,237	1.01
Practice	165	163,130	1.01

Table 7.2 Demographic Characteristics of Injured Girls' Volleyball Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=244**
Freshman	22.5%
Sophomore	25.0%
Junior	29.1%
Senior	23.4%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.8 (1.2)
BMI	
Minimum	15.6
Maximum	40.7
Mean (St. Dev.)	22.2 (3.6)

*All analyses in this report present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 Girls' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

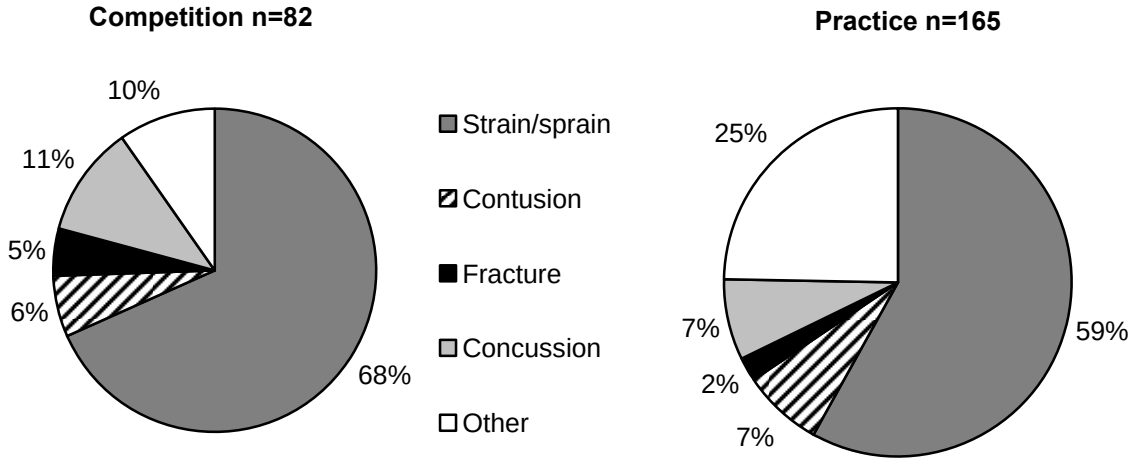


Table 7.3 Body Site of Girls' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	34	41.5%	55	33.3%	89	36.0%
Knee	17	20.7%	21	12.7%	38	15.4%
Head/face	10	12.2%	14	8.5%	24	9.7%
Hip/thigh/upper leg	7	8.5%	17	10.3%	24	9.7%
Hand/wrist	4	4.9%	18	10.9%	22	8.9%
Trunk	3	3.7%	10	6.1%	13	5.3%
Shoulder	2	2.4%	10	6.1%	12	4.9%
Foot	3	3.7%	7	4.2%	10	4.0%
Lower leg	1	1.2%	8	4.8%	9	3.6%
Arm/elbow	1	1.2%	2	1.2%	3	1.2%
Other	0	0.0%	3	1.8%	3	1.2%
Total	**82**	**100%**	**165**	**100%**	**247**	**100%**

Table 7.4 Ten Most Common Girls' Volleyball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=82		Practice n=165		Total n=247	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	33	40.2%	50	30.3%	83	33.6%
Head/face concussion	9	11.0%	12	7.3%	21	8.5%
Hip/thigh/upper leg strain/sprain	6	7.3%	15	9.1%	21	8.5%
Knee other	4	4.9%	13	7.9%	17	6.9%
Knee strain/sprain	10	12.2%	6	3.6%	16	6.5%
Hand/wrist strain/sprain	3	3.7%	11	6.7%	14	5.7%
Shoulder other	1	1.2%	6	3.6%	7	2.8%
Trunk strain/sprain	2	2.4%	5	3.0%	7	2.8%
Lower leg other	1	1.2%	5	3.0%	6	2.4%
Shoulder strain/sprain	1	1.2%	4	2.4%	5	2.0%
Knee contusion	3	3.7%	2	1.2%	5	2.0%

Figure 7.2 Time Loss of Girls' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

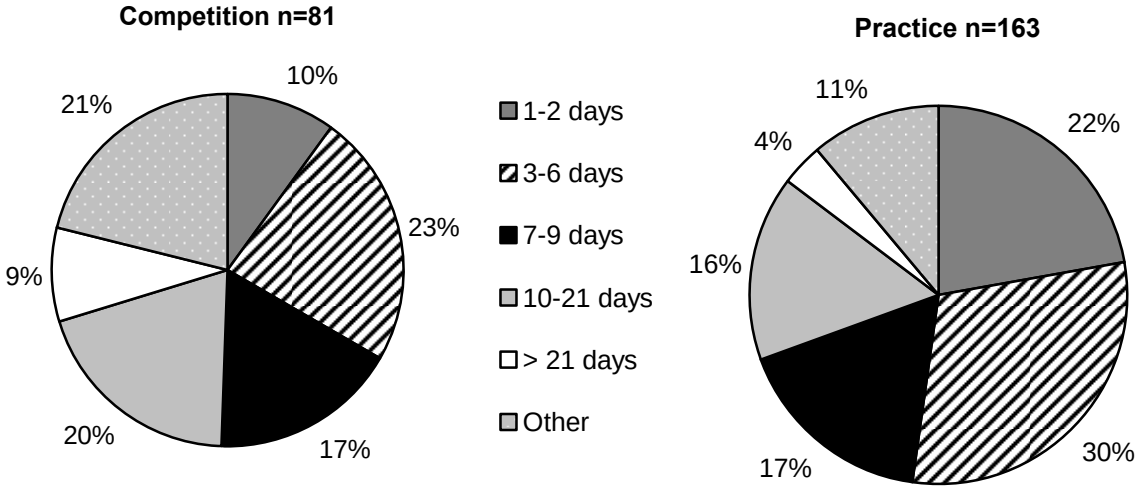


Table 7.5 Girls' Volleyball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	8	9.9%	6	3.7%	14	5.7%
Did not require surgery	73	90.1%	158	96.3%	231	94.3%
Total	**81**	**100%**	**164**	**100%**	**245**	**100%**

Figure 7.3 History of Girls' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

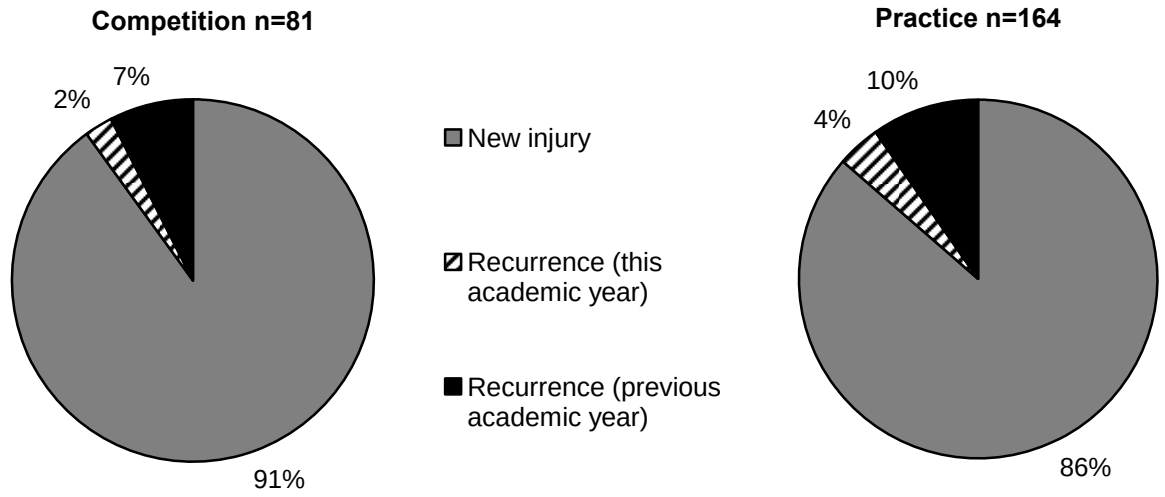


Table 7.6 Time during Season of Girls' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	73	29.9%
Regular season	160	65.6%
Post season	11	4.5%
Total	**244**	**100%**

Table 7.7 Competition-Related Variables for Girls' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	11	14.5%
First game	14	18.4%
Second game	35	46.1%
Third game	11	14.5%
Fourth game	4	5.3%
Fifth game	1	1.3%
Total	**76**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	4	4.9%
Yes, according to the coach/athlete but was not ruled illegal/foul play	1	1.2%
No	77	93.9%
Unknown		0.0%
Total	**82**	**100%**
Court Location		
Center front	21	28.4%
Right front	19	25.7%
Left front	17	23.0%
Left back	12	16.2%
Outside the playable area	3	4.1%
Outside court (your side)	1	1.4%
Outside court (opponents side)	1	1.4%
Total	**74**	**100%**

Table 7.8 Practice-Related Variables for Girls' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	25	15.5%
Second 1/2 hour	28	17.4%
1-2 hours into practice	97	60.2%
>2 hours into practice	11	6.8%
Total	**161**	**100%**

Figure 7.4 Player Position of Girls' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

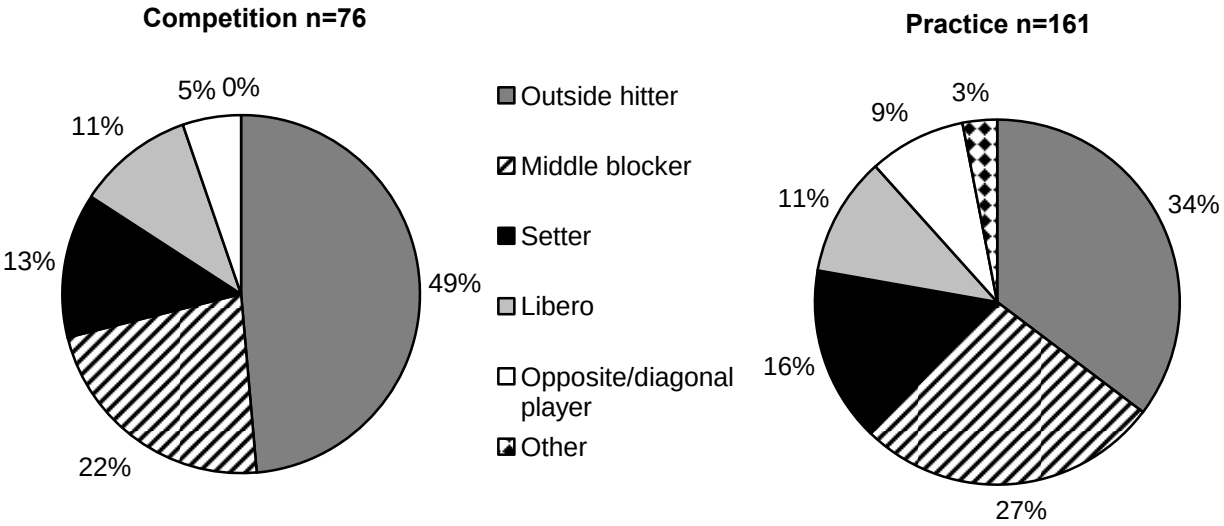
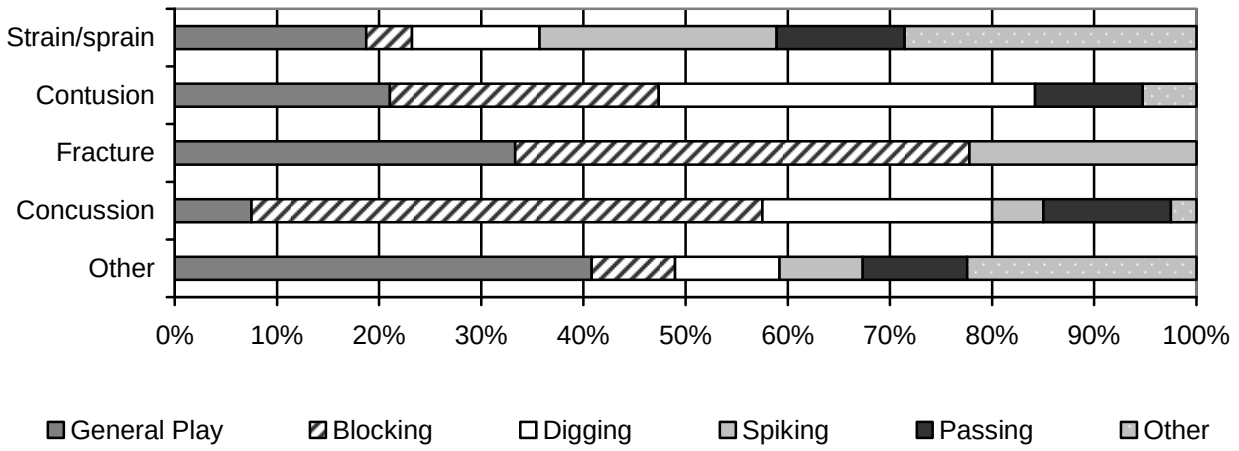


Table 7.9 Activities Leading to Girls' Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
General play	8	10.4%	43	26.2%	51	21.2%
Blocking	19	24.7%	31	18.9%	50	20.7%
Digging	13	16.9%	22	13.4%	35	14.5%
Spiking	19	24.7%	15	9.1%	34	14.1%
Passing	11	14.3%	15	9.1%	26	10.8%
Conditioning	0	0.0%	17	10.4%	17	7.1%
Setting	4	5.2%	8	4.9%	12	5.0%
Serving	0	0.0%	7	4.3%	7	2.9%
Other	3	3.9%	6	3.7%	9	3.7%
Total	**77**	**100%**	**164**	**100%**	**241**	**100%**

Figure 7.5 Activity Resulting in Girls' Volleyball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



VIII. Boys' Basketball Injury Epidemiology

Table 8.1 Boys' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**464**	**301,946**	**1.54**
Competition	251	89,153	2.82
Practice	213	212,793	1.00

Table 8.2 Demographic Characteristics of Injured Boys' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=458**
Freshman	20.7%
Sophomore	27.1%
Junior	23.6%
Senior	28.6%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	16.3 (1.3)
BMI	
Minimum	14.6
Maximum	84.7
Mean (St. Dev.)	23.3 (4.6)

*All analyses in this report present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

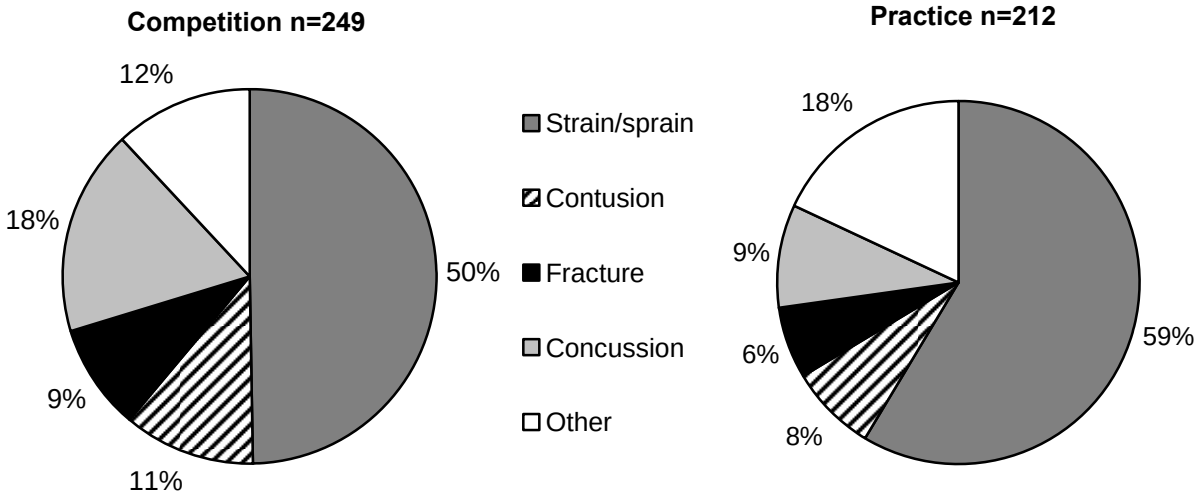


Table 8.3 Body Site of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	83	33.3%	76	35.7%	159	34.4%
Head/face	56	22.5%	36	16.9%	92	19.9%
Knee	31	12.4%	23	10.8%	54	11.7%
Hand/wrist	23	9.2%	16	7.5%	39	8.4%
Hip/thigh/upper leg	14	5.6%	14	6.6%	28	6.1%
Foot	10	4.0%	16	7.5%	26	5.6%
Trunk	14	5.6%	10	4.7%	24	5.2%
Shoulder	8	3.2%	7	3.3%	15	3.2%
Lower leg	4	1.6%	8	3.8%	12	2.6%
Arm/elbow	4	1.6%	3	1.4%	7	1.5%
Neck	0	0.0%	1	0.5%	1	0.2%
Other	2	0.8%	3	1.4%	5	1.1%
Total	**249**	**100%**	**213**	**100%**	**462**	**100%**

Table 8.4 Ten Most Common Boys' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=248		Practice n=212		Total n=460	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	79	31.9%	73	34.4%	152	33.0%
Head/face concussion	44	17.7%	20	9.4%	64	13.9%
Knee strain/sprain	15	6.0%	8	3.8%	23	5.0%
Hand/wrist strain/sprain	10	4.0%	8	3.8%	18	3.9%
Knee other	7	2.8%	10	4.7%	17	3.7%
Head/face other	5	2.0%	9	4.2%	14	3.0%
Hip/thigh/upper leg strain/sprain	5	2.0%	9	4.2%	14	3.0%
Hand/wrist fracture	9	3.6%	4	1.9%	13	2.8%
Hip/thigh/upper leg contusion	8	3.2%	5	2.4%	13	2.8%
Knee contusion	7	2.8%	5	2.4%	12	2.6%
Trunk strain/sprain	6	2.4%	6	2.8%	12	2.6%
Ankle strain/sprain	79	31.9%	73	34.4%	152	33.0%

Figure 8.2 Time Loss of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

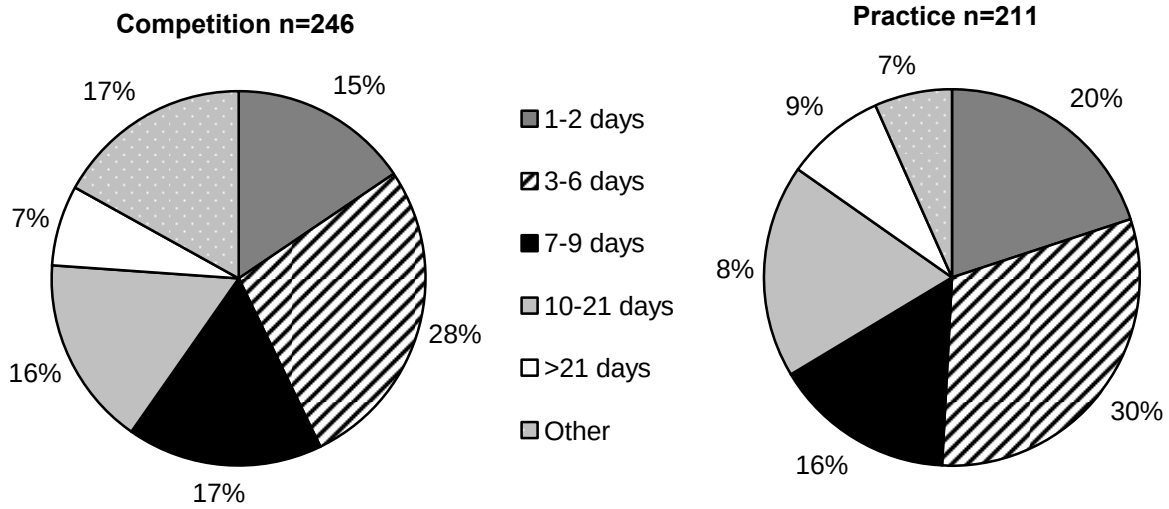


Table 8.5 Boys' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	19	7.8%	14	6.6%	33	7.2%
Did not require surgery	226	92.2%	197	93.4%	423	92.8%
Total	**245**	**100%**	**211**	**100%**	**456**	**100%**

Figure 8.3 History of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

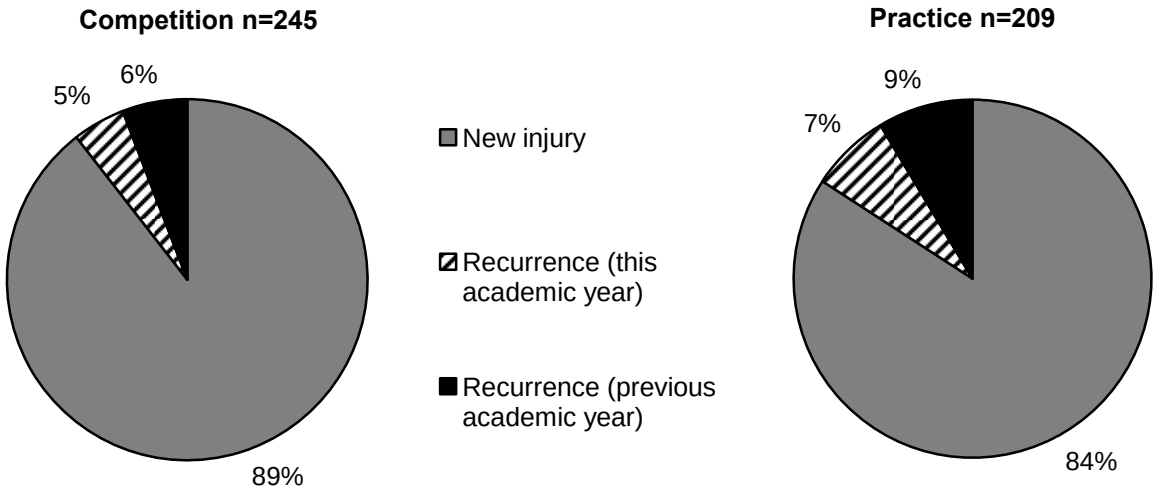


Table 8.6 Time during Season of Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	86	18.6%
Regular season	363	78.4%
Post season	14	3.0%
Total	**463**	**100%**

Table 8.7 Competition-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition-warm-ups	7	2.9%
First quarter	28	11.5%
Second quarter	80	32.8%
Third quarter	82	33.6%
Fourth quarter	47	19.3%
Overtime	0	0.0%
Total	**244**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	20	8.1%
Yes, according to the coach/athlete but was not ruled illegal/foul play	5	2.0%
No	216	87.4%
Unknown	6	2.4%
Total	**247**	**100%**
Court Location		
Inside lane (offense)	67	27.7%
Inside lane (defense)	66	27.3%
Between 3 pt arc and lane (offense)	32	13.2%
Between 3 pt arc and lane (defense)	21	8.7%
Outside 3 point arc (defense)	17	7.0%
Outside 3 point arc (offense)	13	5.4%
Backcourt	13	5.4%
Out of bounds	7	2.9%
Off the court	6	2.5%
Total	**242**	**100%**

Table 8.8 Practice-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	29	13.9%
Second 1/2 hour	43	20.7%
1-2 hours into practice	112	53.8%
>2 hours into practice	24	11.5%
Total	**208**	**100%**

Figure 8.4 Player Position of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

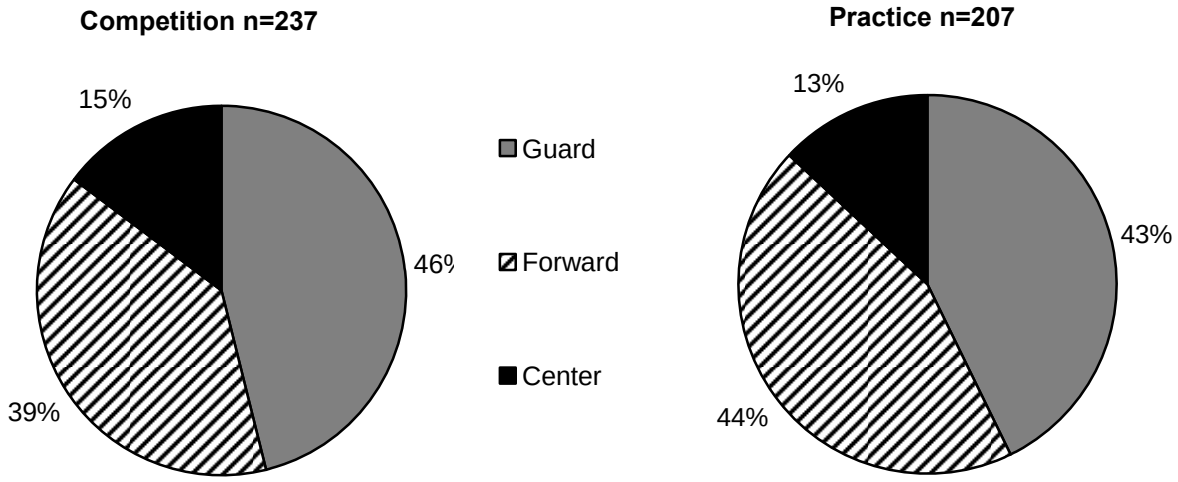
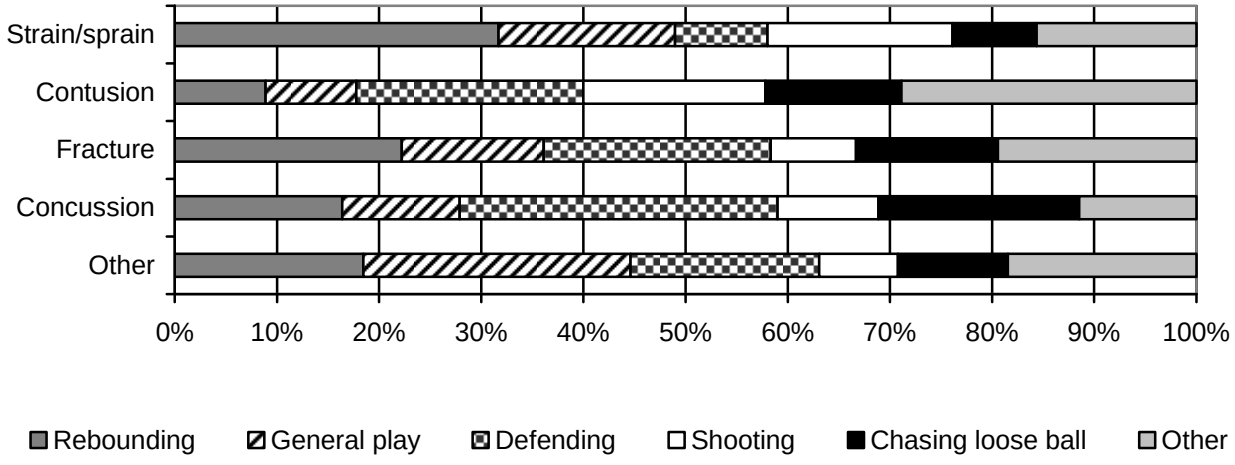


Table 8.9 Activities Leading to Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Rebounding	52	21.2%	59	28.4%	111	24.5%
General play	32	13.1%	44	21.2%	76	16.8%
Defending	50	20.4%	22	10.6%	72	15.9%
Shooting	48	19.6%	18	8.7%	66	14.6%
Chasing loose ball	32	13.1%	19	9.1%	51	11.3%
Ball handling/dribbling	13	5.3%	14	6.7%	27	6.0%
Receiving pass	7	2.9%	12	5.8%	19	4.2%
Conditioning	0	0.0%	9	4.3%	9	2.0%
Screening	3	1.2%	3	1.4%	6	1.3%
Passing	0	0.0%	1	0.5%	1	0.2%
Other	8	3.3%	7	3.4%	15	3.3%
Total	**245**	**100%**	**208**	**100%**	**453**	**100%**

Figure 8.5 Activity Resulting in Boys' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



IX. Girls' Basketball Injury Epidemiology

Table 9.1 Girls' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**385**	**247,606**	**1.55**
Competition	200	76,740	2.61
Practice	185	170,866	1.08

Table 9.2 Demographic Characteristics of Injured Girls' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=381**
Freshman	31.0%
Sophomore	23.9%
Junior	22.3%
Senior	22.8%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	15.7 (1.3)
BMI	
Minimum	15.8
Maximum	54.7
Mean (St. Dev.)	22.5 (3.8)

*All analyses in this report present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

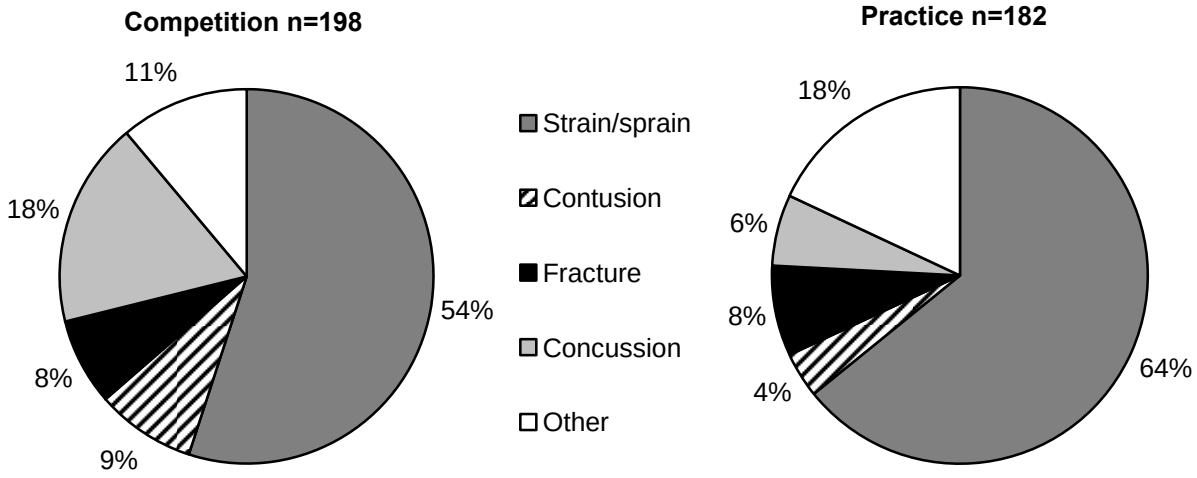


Table 9.3 Body Site of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	71	35.7%	73	39.5%	144	37.5%
Head/face	43	21.6%	18	9.7%	61	15.9%
Knee	31	15.6%	21	11.4%	52	13.5%
Hand/wrist	11	5.5%	20	10.8%	31	8.1%
Hip/thigh/upper leg	7	3.5%	14	7.6%	21	5.5%
Foot	9	4.5%	11	5.9%	20	5.2%
Trunk	12	6.0%	7	3.8%	19	4.9%
Shoulder	8	4.0%	5	2.7%	13	3.4%
Lower leg	1	0.5%	11	5.9%	12	3.1%
Arm/elbow	6	3.0%	1	0.5%	7	1.8%
Other	0	0.0%	4	2.2%	4	1.0%
Total	**199**	**100%**	**185**	**100%**	**384**	**100%**

Table 9.4 Ten Most Common Girls' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=197		Practice n=182		Total n=379	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	67	34.0%	70	38.5%	137	36.1%
Head/face concussion	35	17.8%	11	6.0%	46	12.1%
Knee other	10	5.1%	14	7.7%	24	6.3%
Knee strain/sprain	18	9.1%	5	2.7%	23	6.1%
Hip/thigh/upper leg strain/sprain	5	2.5%	13	7.1%	18	4.7%
Hand/wrist strain/sprain	5	2.5%	9	4.9%	14	3.7%
Hand/wrist fracture	6	3.0%	6	3.3%	12	3.2%
Foot strain/sprain	6	3.0%	4	2.2%	10	2.6%
Shoulder strain/sprain	3	1.5%	4	2.2%	7	1.8%
Trunk strain/sprain	3	1.5%	4	2.2%	7	1.8%

Figure 9.2 Time Loss of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

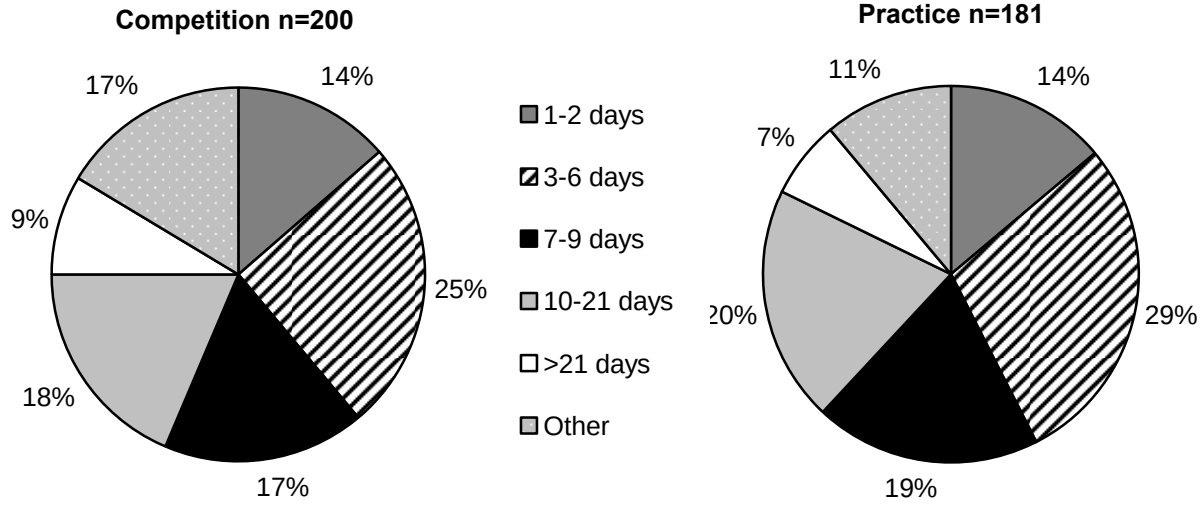


Table 9.5 Girls' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	14	7.1%	11	6.1%	25	6.6%
Did not require surgery	184	92.9%	168	93.9%	352	93.4%
Total	**198**	**100%**	**179**	**100%**	**377**	**100%**

Figure 9.3 History of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

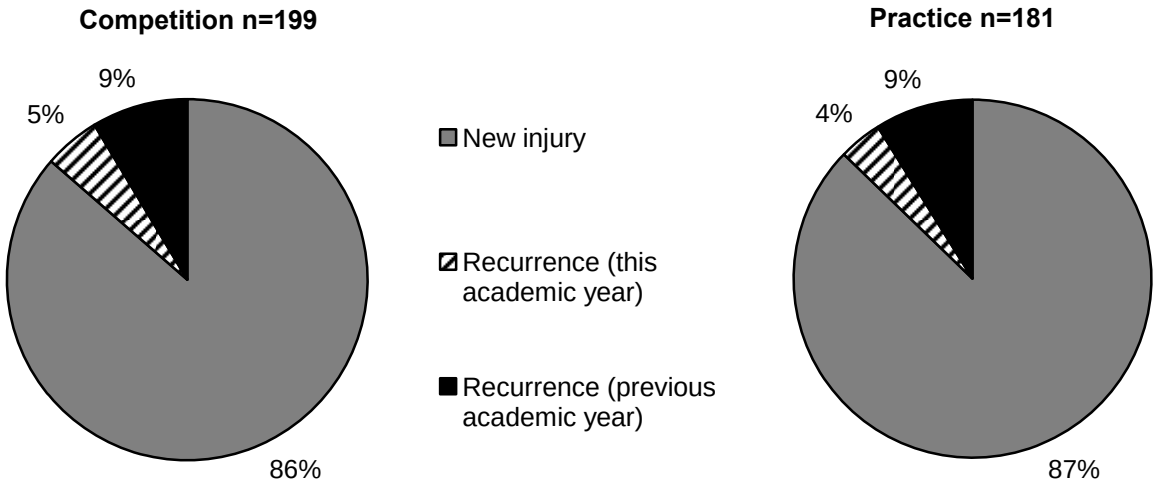


Table 9.6 Time during Season of Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	68	17.7%
Regular season	304	79.0%
Post season	13	3.4%
Total	**385**	**100%**

Table 9.7 Competition-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/Warm-ups	3	1.6
First quarter	20	10.4
Second quarter	62	32.1
Third quarter	71	36.8
Fourth quarter	37	19.2
Overtime	0	0.0%
Total	**193**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	17	8.6%
Yes, according to the coach/athlete but was not ruled illegal/foul play	4	2.0%
No	163	82.3%
Unknown	14	7.1%
Total	**198**	**100%**
Court Location		
Inside lane (defense)	51	27.6%
Inside lane (offense)	47	25.4%
Between 3 pt arc and lane (defense)	23	12.4%
Outside 3 point arc (defense)	17	9.2%
Outside 3 point arc (offense)	15	8.1%
Between 3 pt arc and lane (offense)	14	7.6%
Backcourt	12	6.5%
Out of bounds	3	1.6%
Off the court	3	1.6%
Total	**185**	**100%**

Table 9.8 Practice-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	21	11.9%
Second 1/2 hour	41	23.3%
1-2 hours into practice	103	58.5%
>2 hours into practice	11	6.3%
Total	**176**	**100%**

Figure 9.4 Player Position of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

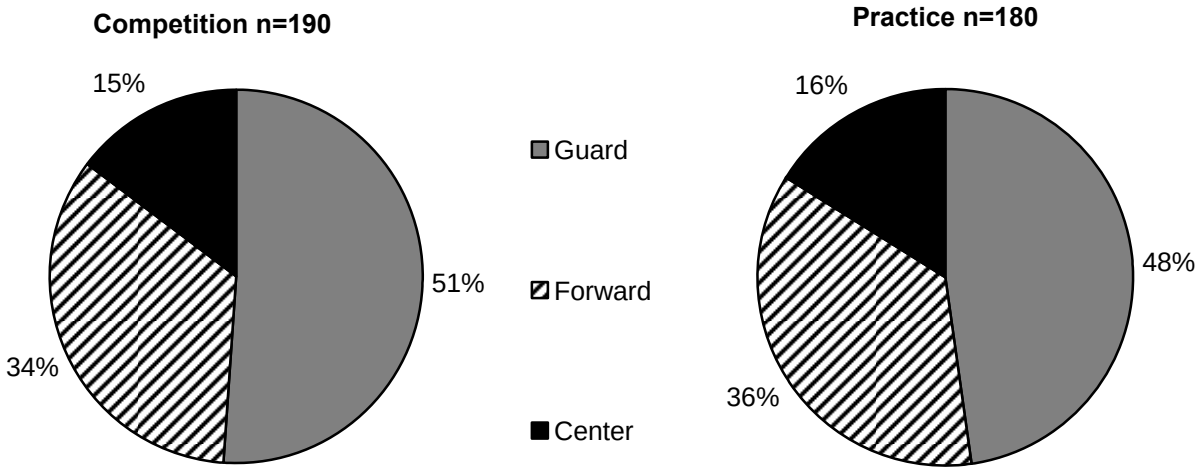
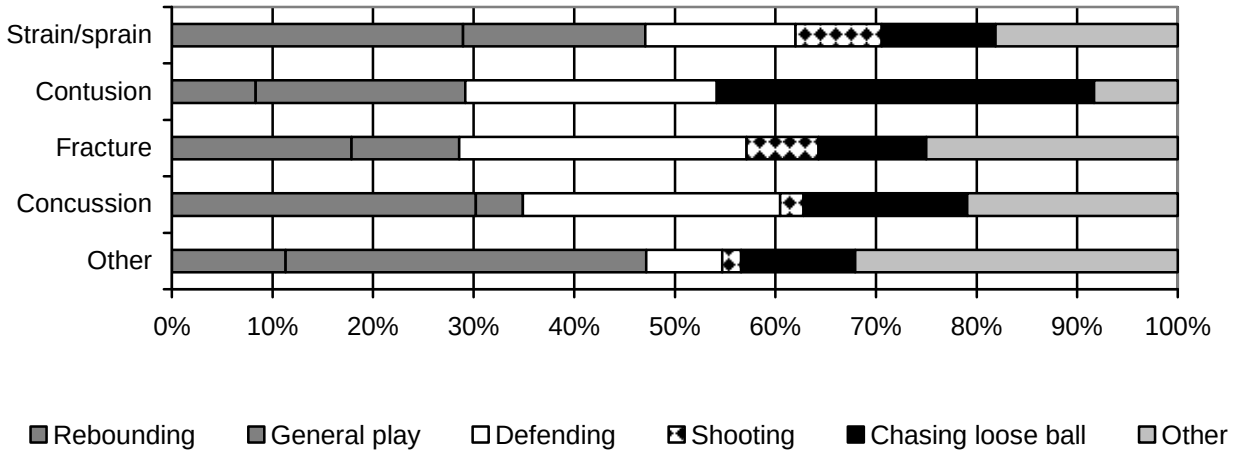


Table 9.9 Activities Leading to Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Rebounding	51	26.3%	39	21.7%	90	24.1%
General play	31	16.0%	39	21.7%	70	18.7%
Defending	42	21.6%	21	11.7%	63	16.8%
Chasing loose ball	35	18.0%	15	8.3%	50	13.4%
Shooting	11	5.7%	15	8.3%	26	7.0%
Receiving pass	6	3.1%	19	10.6%	25	6.7%
Ball handling/dribbling	13	6.7%	6	3.3%	19	5.1%
Conditioning	0	0.0%	16	8.9%	16	4.3%
Passing	2	1.0%	2	1.1%	4	1.1%
Screening	1	0.5%	1	0.6%	2	0.5%
Other	2	1.0%	7	3.9%	9	2.4%
Total	**194**	**100%**	**180**	**100%**	**374**	**100%**

Figure 9.5 Activity Resulting in Girls' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



X. Wrestling Injury Epidemiology

Table 10.1 Wrestling Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**572**	**250,631**	**2.28**
Competition	230	67,587	3.40
Practice	342	183,044	1.87

Table 10.2 Demographic Characteristics of Injured Wrestlers, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=553**
Freshman	23.9%
Sophomore	25.9%
Junior	26.8%
Senior	23.5%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.9 (1.3)
BMI	
Minimum	15.7
Maximum	41.8
Mean (St. Dev.)	23.6 (4.6)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

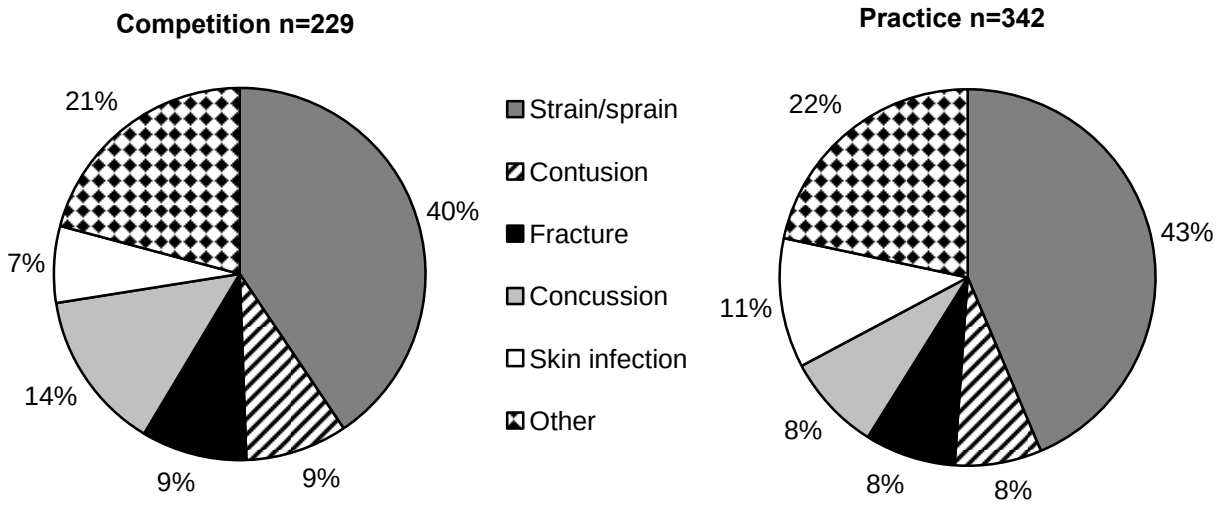


Table 10.3 Body Site of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	41	17.8%	51	14.9%	92	16.1%
Knee	37	16.1%	54	15.8%	91	15.9%
Shoulder	34	14.8%	40	11.7%	74	12.9%
Trunk	30	13.0%	38	11.1%	68	11.9%
Arm/elbow	32	13.9%	32	9.4%	64	11.2%
Hand/wrist	13	5.7%	38	11.1%	51	8.9%
Neck	17	7.4%	22	6.4%	39	6.8%
Ankle	9	3.9%	24	7.0%	33	5.8%
Hip/thigh/upper leg	4	1.7%	15	4.4%	19	3.3%
Lower leg	7	3.0%	12	3.5%	19	3.3%
Foot	3	1.3%	7	2.0%	10	1.7%
Other	3	1.3%	9	2.6%	12	2.1%
Total	**230**	**100%**	**342**	**100%**	**572**	**100%**

Table 10.4 Ten Most Common Wrestling Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=229		Practice n=342		Total n=571	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	30	13.1%	29	8.5%	59	10.3%
Shoulder strain/sprain	21	9.2%	24	7.0%	45	7.9%
Knee strain/sprain	17	7.4%	23	6.7%	40	7.0%
Knee other	13	5.7%	23	6.7%	36	6.3%
Neck strain/sprain	16	7.0%	18	5.3%	34	6.0%
Ankle strain/sprain	7	3.1%	22	6.4%	29	5.1%
Shoulder other	13	5.7%	12	3.5%	25	4.4%
Arm/elbow strain/sprain	11	4.8%	13	3.8%	24	4.2%
Trunk strain/sprain	9	3.9%	14	4.1%	23	4.0%
Head/face skin infection	8	3.5%	15	4.4%	23	4.0%
Hand/wrist strain/sprain	5	2.2%	18	5.3%	23	4.0%

Figure 10.2 Time Loss of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

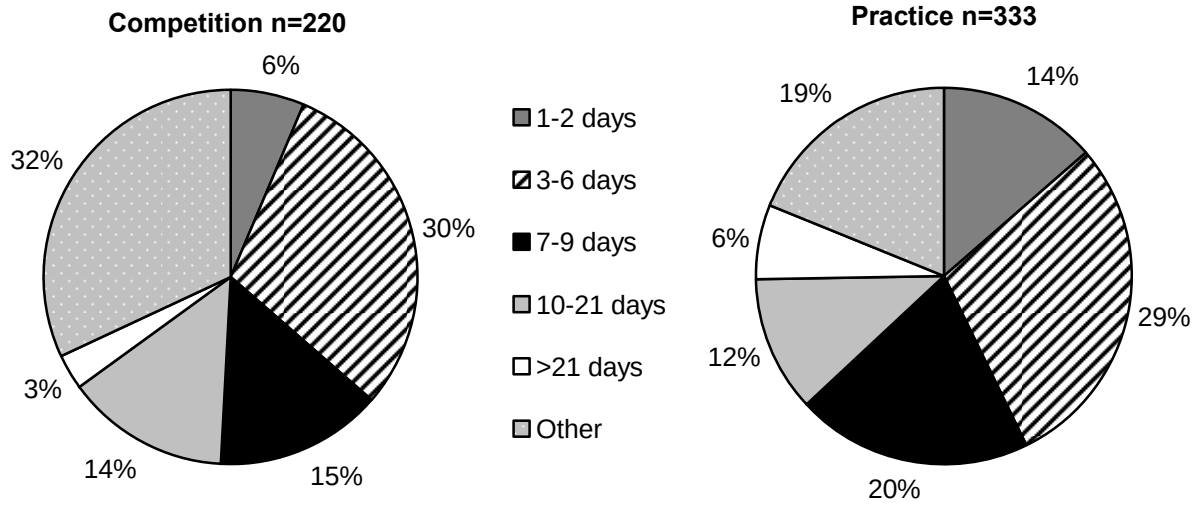


Table 10.5 Wrestling Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	21	9.4%	21	6.3%	42	7.5%
Did not require surgery	203	90.6%	314	93.7%	517	92.5
Total	**224**	**100%**	**335**	**100%**	**559**	**100%**

Figure 10.3 History of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

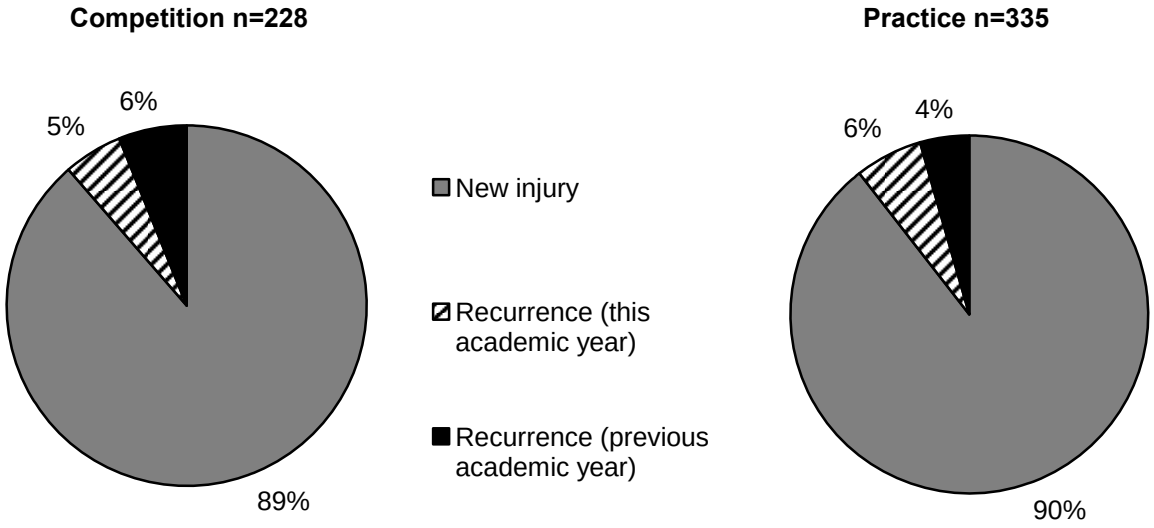


Table 10.6 Time during Season of Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	99	17.3%
Regular season	454	79.5%
Post season	18	3.2%
Total	**571**	**100%**

Table 10.7 Competition-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	8	3.8%
First period	40	19.0%
Second period	96	45.5%
Third period	66	31.3%
Overtime	1	0.5%
Total	**211**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play by a referee or disciplinary committee	10	4.4%
Yes, according to the coach/athlete but was not ruled illegal/foul play by a referee or disciplinary	8	3.5%
No	199	87.7%
Unknown	10	4.4%
Total	**227**	**100%**
Mat Location		
Within 28 ft. circle	202	93.1%
Out of bounds	13	6.0%
Off the mat	2	0.9%
Total	**217**	**100%**

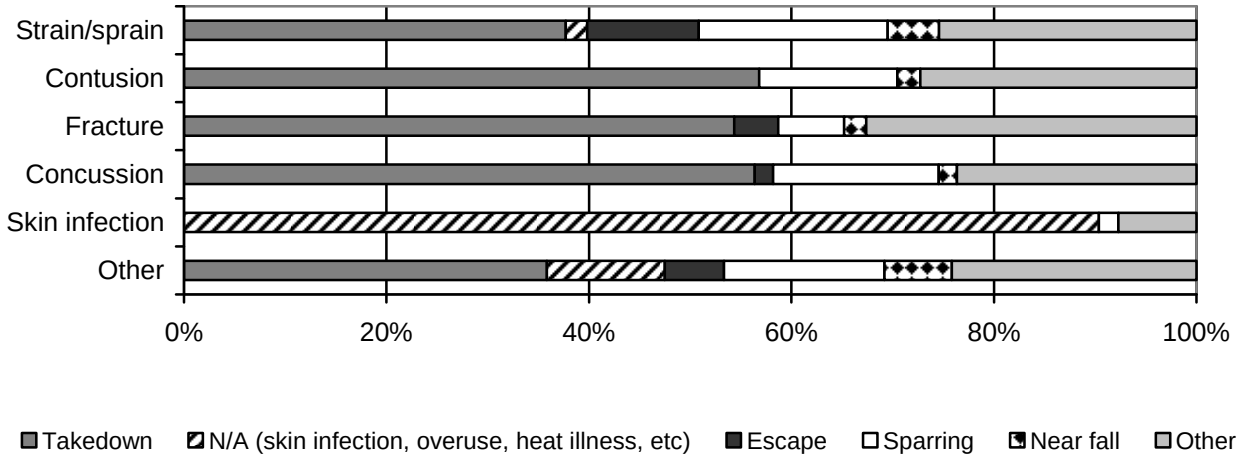
Table 10.8 Practice-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	43	13.1%
Second 1/2 hour	61	18.7%
1-2 hours into practice	185	56.6%
>2 hours into practice	38	11.6%
Total	**327**	**100%**

Table 10.9 Activities Leading to Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Takedown	100	45.2%	114	34.2%	214	38.6%
Sparring	23	10.4%	59	17.7%	82	14.8%
N/A (e.g., skin infection, overuse, heat illness, etc.)	13	5.9%	53	15.9%	66	11.9%
Escape	15	6.8%	21	6.3%	36	6.5%
Conditioning	2	0.9%	32	9.6%	34	6.1%
Riding	17	7.7%	8	2.4%	25	4.5%
Fall	7	3.2%	18	5.4%	25	4.5%
Near fall	16	7.2%	7	2.1%	23	4.2%
Reversal	14	6.3%	8	2.4%	22	4.0%
Other	14	6.3%	13	3.9%	27	4.9%
Total	**221**	**100%**	**333**	**100%**	**554**	**100%**

Figure 10.4 Activities Resulting in Wrestling Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XI. Baseball Injury Epidemiology

Table 11.1 Baseball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**223**	**238,676**	**0.93**
Competition	126	83,503	1.51
Practice	97	155,173	0.63

Table 11.2 Demographic Characteristics of Injured Baseball Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=222**
Freshman	16.2%
Sophomore	23.4%
Junior	29.7%
Senior	30.6%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	16.4 (1.2)
BMI	
Minimum	16.6
Maximum	37.6
Mean (St. Dev.)	23.8 (3.3)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

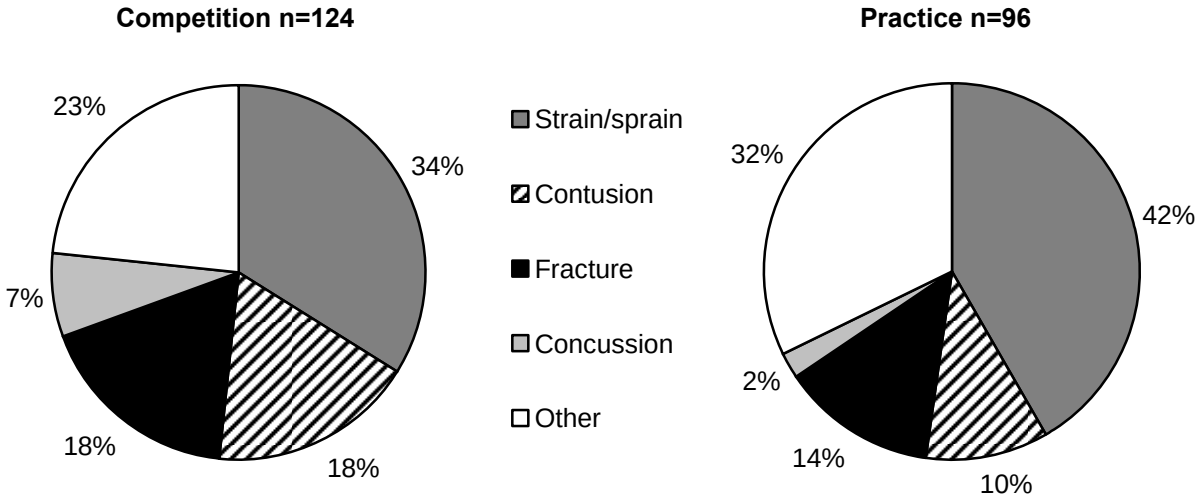


Table 11.3 Body Site of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Hand/wrist	22	17.6%	13	13.4%	35	15.8%
Shoulder	10	8.0%	25	25.8%	35	15.8%
Arm/elbow	20	16.0%	8	8.2%	28	12.6%
Head/face	20	16.0%	6	6.2%	26	11.7%
Ankle	14	11.2%	10	10.3%	24	10.8%
Hip/thigh/upper leg	12	9.6%	10	10.3%	22	9.9%
Knee	12	9.6%	7	7.2%	19	8.6%
Trunk	9	7.2%	9	9.3%	18	8.1%
Lower leg	5	4.0%	4	4.1%	9	4.1%
Foot	1	0.8%	4	4.1%	5	2.3%
Neck	0	0.0%	1	1.0%	1	0.5%
Total	**125**	**100%**	**97**	**100%**	**222**	**100%**

Table 11.4 Ten Most Common Baseball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=123		Practice n=96		Total n=219	
	n	%	n	%	n	%
Diagnosis						
Shoulder other	7	5.7%	16	16.7%	23	10.5%
Ankle strain/sprain	12	9.8%	7	7.3%	19	8.7%
Hand/wrist fracture	13	10.6%	6	6.3%	19	8.7%
Hip/thigh/upper leg strain/sprain	9	7.3%	8	8.3%	17	7.8%
Knee other	7	5.7%	5	5.2%	12	5.5%
Shoulder strain/sprain	3	2.4%	8	8.3%	11	5.0%
Head/face concussion	9	7.3%	2	2.1%	11	5.0%
Trunk strain/sprain	6	4.9%	5	5.2%	11	5.0%
Arm/elbow strain/sprain	5	4.1%	4	4.2%	9	4.1%
Head/face contusion	6	4.9%	1	1.0%	7	3.2%
Hand/wrist strain/sprain	3	2.4%	4	4.2%	7	3.2%
Arm/elbow other	5	4.1%	2	2.1%	7	3.2%

Figure 11.2 Time Loss of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

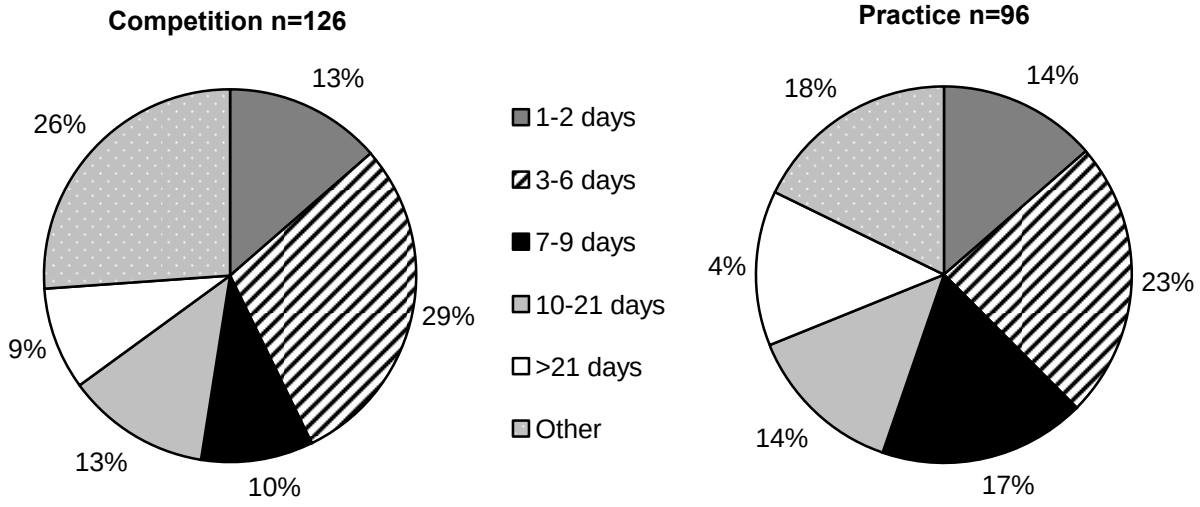


Table 11.5 Baseball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	6	4.8%	10	10.4%	16	7.2%
Did not require surgery	120	95.2%	86	89.6%	206	92.8%
Total	**126**	**100%**	**96**	**100%**	**222**	**100%**

Figure 11.3 History of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

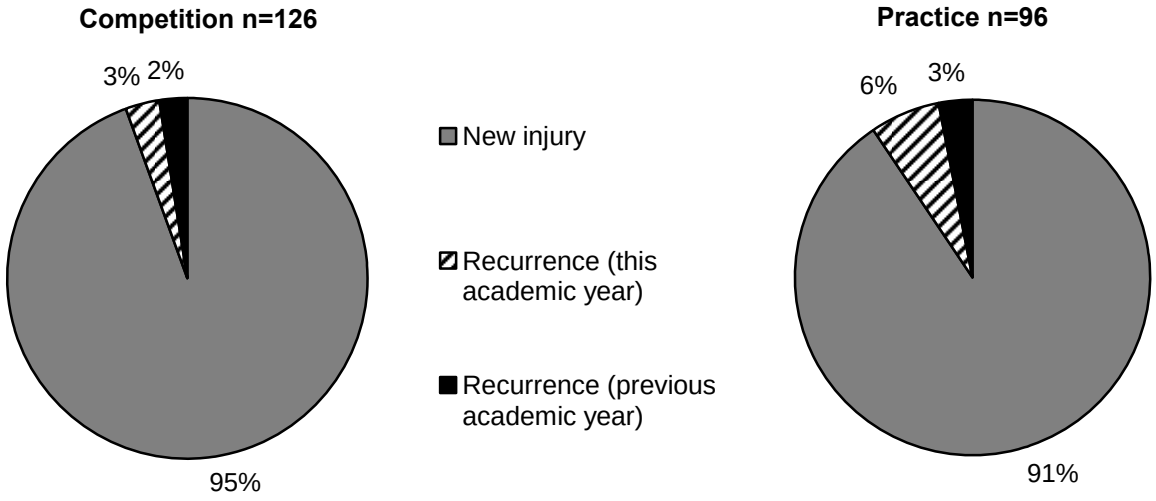


Table 11.6 Time during Season of Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	47	21.1%
Regular season	169	75.8%
Post season	7	3.1%
Total	**223**	**100%**

Table 11.7 Competition-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	6	4.9%
First inning	9	7.4%
Second inning	13	10.7%
Third inning	24	19.7%
Fourth inning	23	18.9%
Fifth inning	24	19.7%
Sixth inning	13	10.7%
Seventh inning	7	5.7%
Extra innings	3	2.5%
Total	**122**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	3	2.4%
Yes, according to the coach/athlete but was not ruled illegal/foul play	2	1.6%
No	118	95.2%
Unknown	1	0.8%
Total	**124**	**100%**
Field Location		
Home plate	32	25.8%
First base	19	15.3%
Second base	24	19.4%
Third base	5	4.0%
Infield	8	6.5%
Pitcher's mound	20	16.1%
Outfield	12	9.7%
Other	4	3.2%
Total	**124**	**100%**

Table 11.8 Practice-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	14	14.6%
Second 1/2 hour	17	17.7%
1-2 hours into practice	52	54.2%
>2 hours into practice	13	13.5%
Total	**96**	**100%**

Figure 11.4 Player Position of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

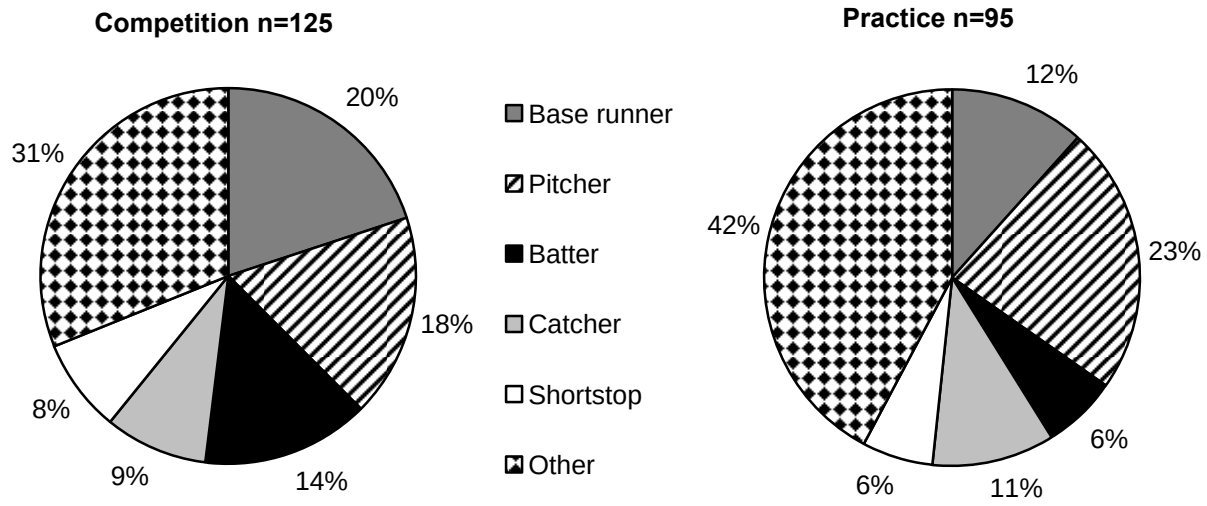
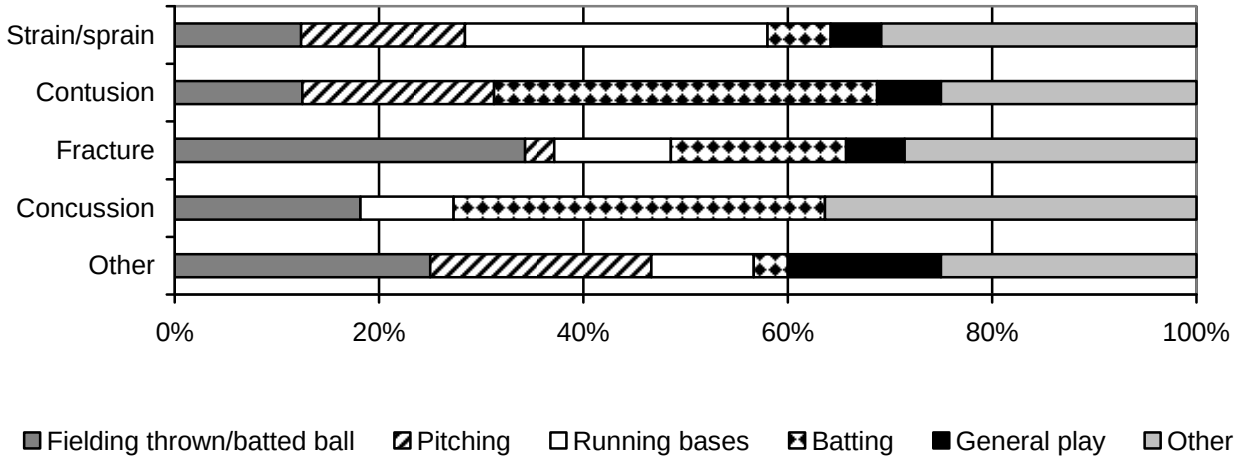


Table 11.9 Activities Leading to Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Pitching	19	15.1%	16	16.7%	35	15.8%
Running bases	22	17.5%	13	13.5%	35	15.8%
Fielding a batted ball	17	13.5%	15	15.6%	32	14.4%
Batting	23	18.3%	6	6.3%	29	13.1%
Sliding	16	12.7%	4	4.2%	20	9.0%
Throwing (not pitching)	6	4.8%	11	11.5%	17	7.7%
General play	1	0.8%	16	16.7%	17	7.7%
Catching	8	6.3%	5	5.2%	13	5.9%
Fielding a thrown ball	10	7.9%	1	1.0%	11	5.0%
Conditioning	0	0.0%	5	5.2%	5	2.3%
Other	4	3.2%	4	4.2%	8	3.6%
Total	**126**	**100%**	**96**	**100%**	**222**	**100%**

Figure 11.5 Activity Resulting in Baseball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XII. Softball Injury Epidemiology

Table 12.1 Softball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**204**	**178,106**	**1.15**
Competition	101	60,131	1.68
Practice	103	117,975	0.87

Table 12.2 Demographic Characteristics of Injured Softball Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=201**
Freshman	30.3%
Sophomore	22.9%
Junior	26.4%
Senior	20.4%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	19
Mean (St. Dev.)	15.9 (1.3)
BMI	
Minimum	15.8
Maximum	39.2
Mean (St. Dev.)	23.2 (4.5)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 12.1 Diagnosis of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

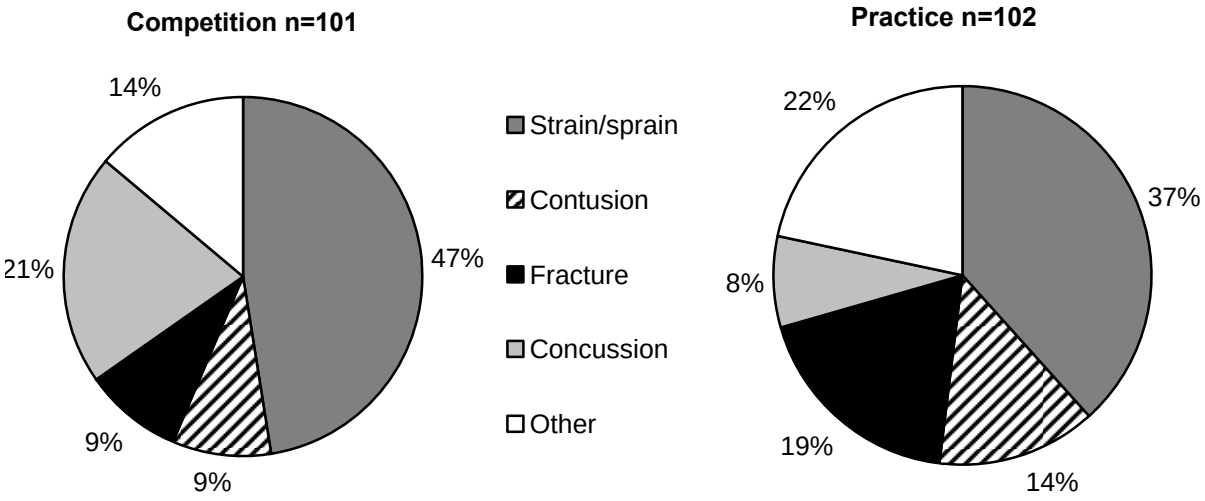


Table 12.3 Body Site of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Hand/wrist	18	17.8%	24	23.3%	42	20.6%
Head/face	23	22.8%	17	16.5%	40	19.6%
Ankle	17	16.8%	11	10.7%	28	13.7%
Hip/thigh/upper leg	13	12.9%	7	6.8%	20	9.8%
Shoulder	7	6.9%	12	11.7%	19	9.3%
Knee	11	10.9%	5	4.9%	16	7.8%
Trunk	4	4.0%	7	6.8%	11	5.4%
Arm/elbow	3	3.0%	8	7.8%	11	5.4%
Lower leg	4	4.0%	5	4.9%	9	4.4%
Foot	1	1.0%	5	4.9%	6	2.9%
Neck	0	0.0%	2	1.9%	2	1.0%
Total	**101**	**100%**	**103**	**100%**	**204**	**100%**

Table 12.4 Ten Most Common Softball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=101		Practice n=102		Total n=203	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	21	20.8%	8	7.8%	29	14.3%
Ankle strain/sprain	15	14.9%	8	7.8%	23	11.3%
Hand/wrist fracture	7	6.9%	13	12.7%	20	9.9%
Hip/thigh/upper leg strain/sprain	11	10.9%	5	4.9%	16	7.9%
Shoulder strain/sprain	4	4.0%	6	5.9%	10	4.9%
Knee strain/sprain	7	6.9%	2	2.0%	9	4.4%
Hand/wrist contusion	4	4.0%	5	4.9%	9	4.4%
Hand/wrist strain/sprain	4	4.0%	4	3.9%	8	3.9%
Shoulder other	3	3.0%	5	4.9%	8	3.9%
Trunk strain/sprain	3	3.0%	4	3.9%	7	3.4%

Figure 12.2 Time Loss of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

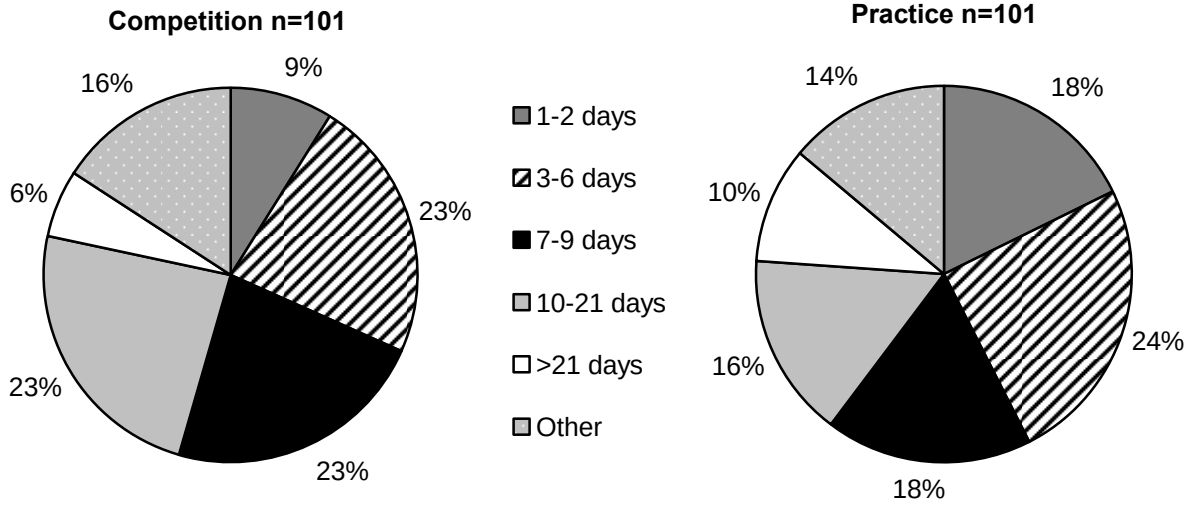


Table 12.5 Softball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	5	5.0%	5	5.0%	10	5.0%
Did not require surgery	96	95.0%	96	95.0%	192	95.0%
Total	**101**	**100%**	**101**	**100%**	**202**	**100%**

Figure 12.3 History of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

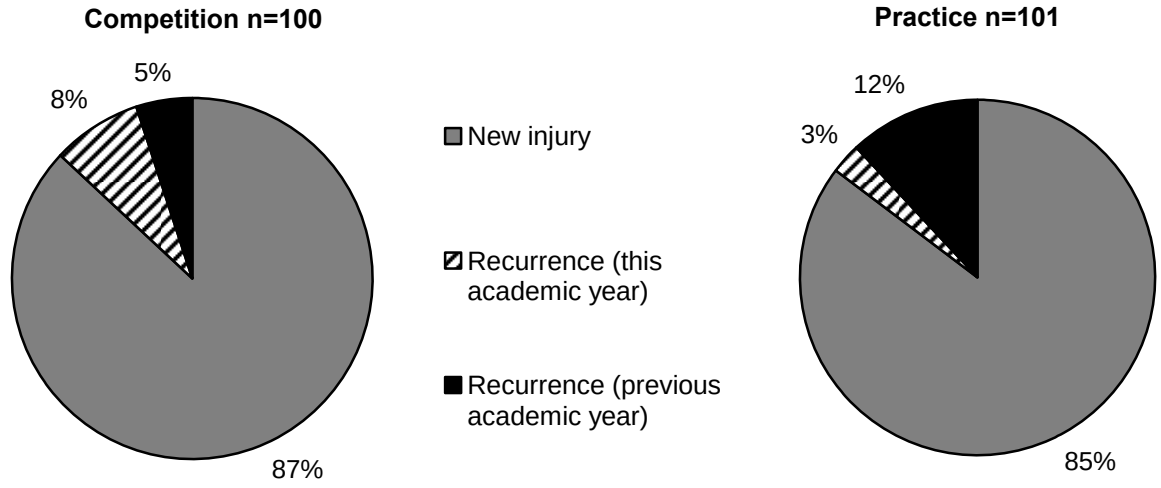


Table 12.6 Time during Season of Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	45	22.2%
Regular season	156	76.8%
Post season	2	1.0%
Total	**203**	**100%**

Table 12.7 Competition-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	10	10.5%
First inning	5	5.3%
Second inning	14	14.7%
Third inning	11	11.6%
Fourth inning	16	16.8%
Fifth inning	16	16.8%
Sixth inning	13	13.7%
Seventh inning	8	8.4%
Extra innings	2	2.1%
Total	**95**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	0	0.0%
Yes, according to the coach/athlete but was not ruled illegal/foul play	1	1.0%
No	98	98.0%
Unknown	1	1.0%
Total	**100**	**100%**
Field Location		
Home plate	20	20.2%
Second base	18	18.2%
Outfield	17	17.2%
Pitcher's mound	16	16.2%
First base	11	11.1%
Third base	9	9.1%
Infield	4	4.0%
Foul territory	2	2.0%
Other	2	2.0%
Total	**99**	**100%**

Table 12.8 Practice-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	13	13.3%
Second 1/2 hour	24	24.5%
1-2 hours into practice	53	54.1%
>2 hours into practice	8	8.2%
Total	**98**	**100%**

Figure 12.4 Player Position of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

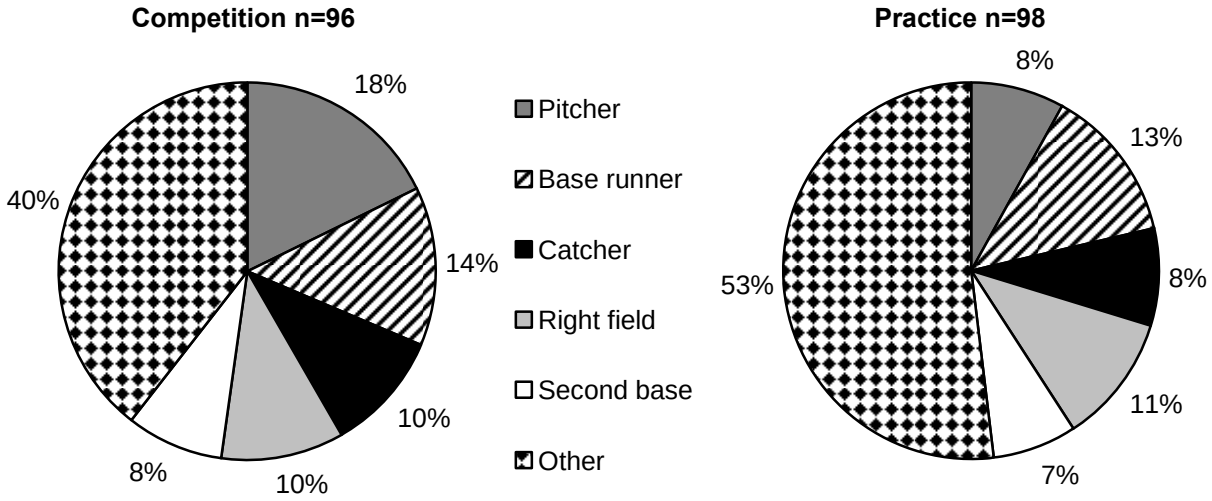
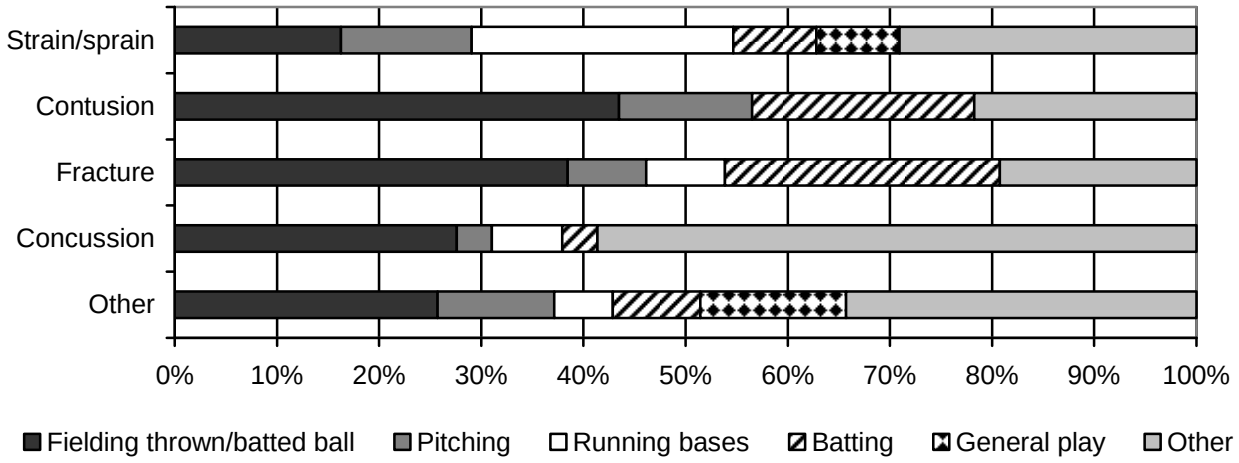


Table 12.9 Activities Leading to Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Fielding a batted ball	23	22.8%	13	13.1%	36	18.0%
Running bases	19	18.8%	9	9.1%	28	14.0%
Batting	8	7.9%	15	15.2%	23	11.5%
Pitching	16	15.8%	5	5.1%	21	10.5%
Throwing (not pitching)	4	4.0%	15	15.2%	19	9.5%
Fielding a thrown ball	7	6.9%	9	9.1%	16	8.0%
Sliding	10	9.9%	5	5.1%	15	7.5%
Catching	7	6.9%	7	7.1%	14	7.0%
General play	2	2.0%	10	10.1%	12	6.0%
Conditioning	0	0.0%	5	5.1%	5	2.5%
Other	5	5.0%	6	6.1%	11	5.5%
Total	**101**	**100%**	**99**	**100%**	**200**	**100%**

Figure 12.5 Activity Resulting in Softball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XIII. Girls' Field Hockey Injury Epidemiology

Table 13.1 Girls' Field Hockey Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**217**	**120,712**	**1.80**
Competition	102	37,691	2.71
Practice	115	83,021	1.39

Table 13.2 Demographic Characteristics of Injured Girls' Field Hockey Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=212**
Freshman	13.7%
Sophomore	27.8%
Junior	34.0%
Senior	24.5%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.8 (1.2)
BMI	
Minimum	17.2
Maximum	56.0
Mean (St. Dev.)	22.5 (4.3)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 13.1 Diagnosis of Girls' Field Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

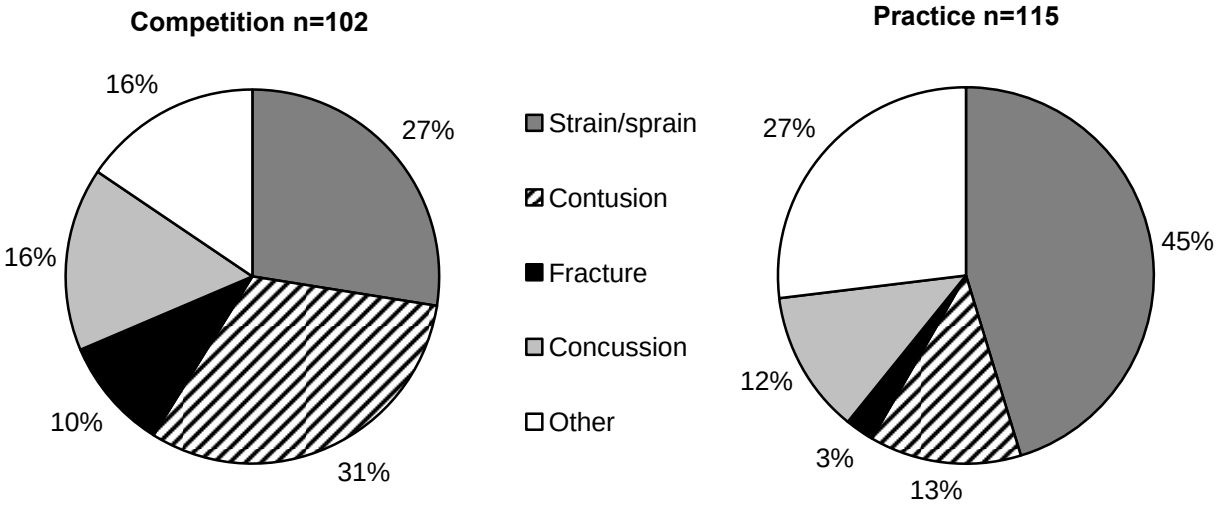


Table 13.3 Body Site of Girls' Field Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	31	30.4%	21	18.3%	52	24.0%
Hip/thigh/upper leg	8	7.8%	26	22.6%	34	15.7%
Knee	18	17.6%	14	12.2%	32	14.7%
Ankle	11	10.8%	15	13.0%	26	12.0%
Hand/wrist	15	14.7%	7	6.1%	22	10.1%
Trunk	6	5.9%	10	8.7%	16	7.4%
Lower leg	5	4.9%	10	8.7%	15	6.9%
Foot	4	3.9%	5	4.3%	9	4.1%
Arm/elbow	3	2.9%	1	0.9%	4	1.8%
Shoulder	1	1.0%	1	0.9%	2	0.9%
Other	0	0.0%	5	4.3%	5	2.3%
Total	**102**	**100%**	**115**	**100%**	**217**	**100%**

Table 13.4 Ten Most Common Girls' Field Hockey Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=102		Practice n=115		Total n=217	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	15	14.7%	14	12.2%	29	13.4%
Hip/thigh/upper leg strain/sprain	6	5.9%	23	20.0%	29	13.4%
Ankle strain/sprain	9	8.8%	14	12.2%	23	10.6%
Knee other	5	4.9%	9	7.8%	14	6.5%
Head/face other	8	7.8%	3	2.6%	11	5.1%
Hand/wrist contusion	8	7.8%	2	1.7%	10	4.6%
Hand/wrist fracture	5	4.9%	3	2.6%	8	3.7%
Head/face contusion	4	3.9%	4	3.5%	8	3.7%
Knee strain/sprain	5	4.9%	3	2.6%	8	3.7%
Trunk strain/sprain	3	2.9%	4	3.5%	7	3.2%
Lower leg strain/sprain	2	2.0%	5	4.3%	7	3.2%

Figure 13.2 Time Loss of Girls' Field Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

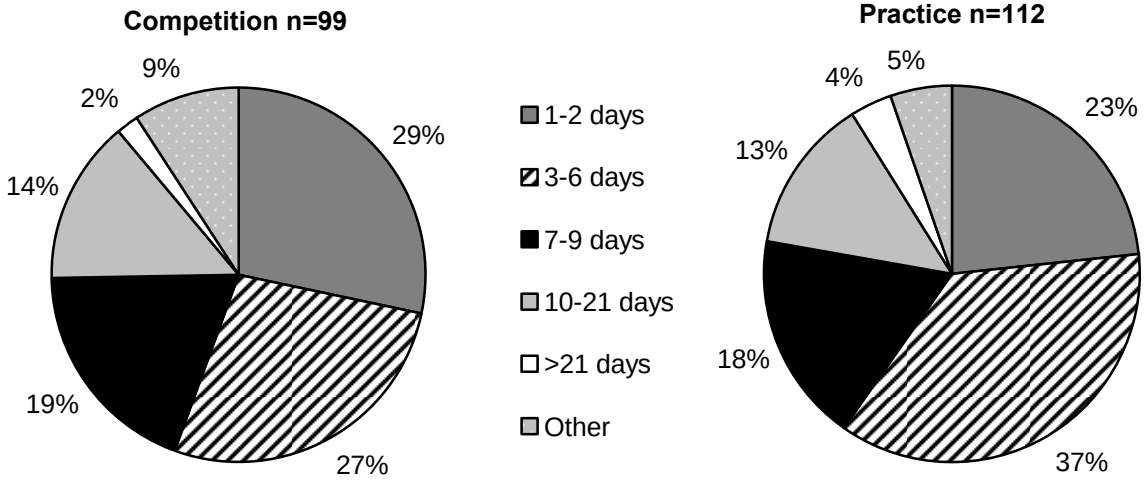


Table 13.5 Girls' Field Hockey Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	5	5.0%	4	3.5%	9	4.2%
Did not require surgery	95	95.0%	109	96.5%	204	95.8%
Total	**100**	**100%**	**113**	**100%**	**213**	**100%**

Figure 13.3 History of Girls' Field Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

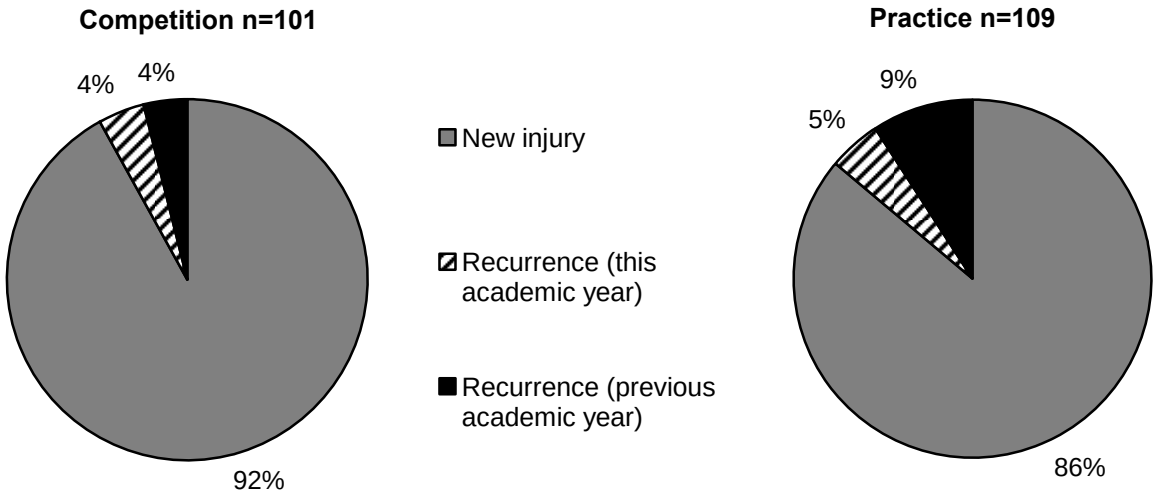


Table 13.6 Time during Season of Girls' Field Hockey Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	56	25.8%
Regular season	157	72.4%
Post season	4	1.8%
Total	**217**	**100%**

Table 13.7 Competition-Related Variables for Girls' Field Hockey Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	7	7.0%
First half	42	42.0%
Second half	48	48.0%
Overtime	3	3.0%
Total	**100**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	11	10.8%
Yes, according to the coach/athlete but was not ruled illegal/foul play	2	2.0%
No	82	80.4%
Unknown	7	6.9%
Total	**102**	**100%**
Field Location		
Between 25-yard line and center line	33	33.7%
Within 25-yard line	27	27.6%
Goal area/circle	18	18.4%
Within 16-yard arc	14	14.3%
Sideline	5	5.1%
Other	1	1.0%
Total	**98**	**100%**

Table 13.8 Practice-Related Variables for Girls' Field Hockey Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	18	15.7%
Second 1/2 hour	31	27.0%
1-2 hours into practice	63	54.8%
>2 hours into practice	3	2.6%
Total	**115**	**100%**

Figure 13.4 Player Position of Girls' Field Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

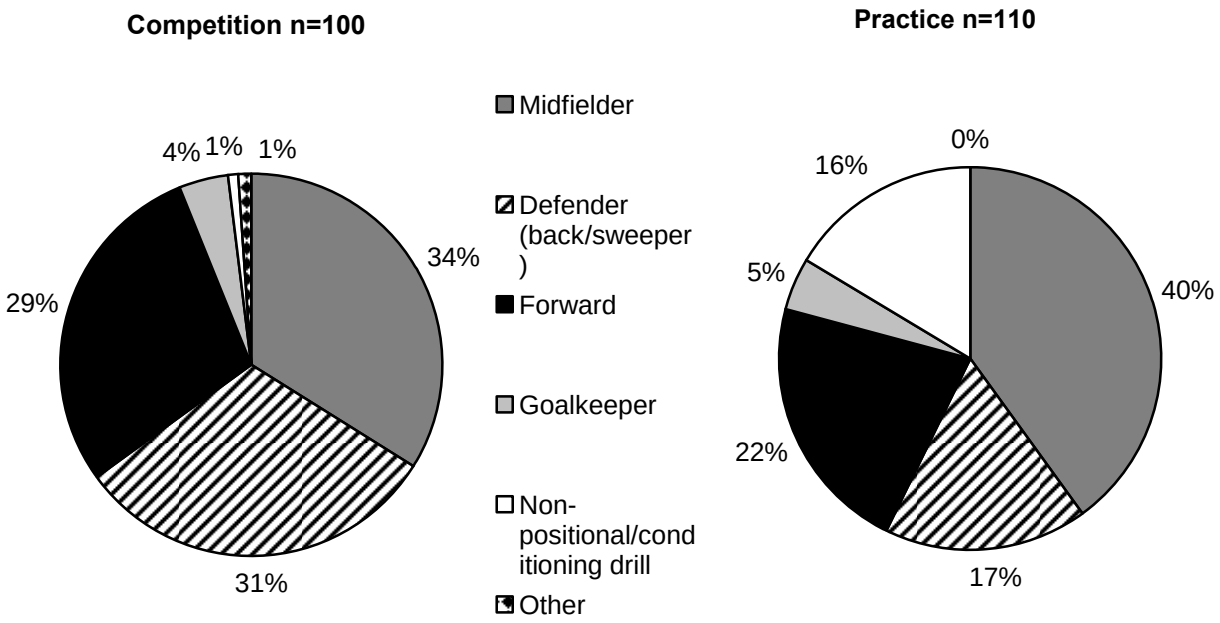
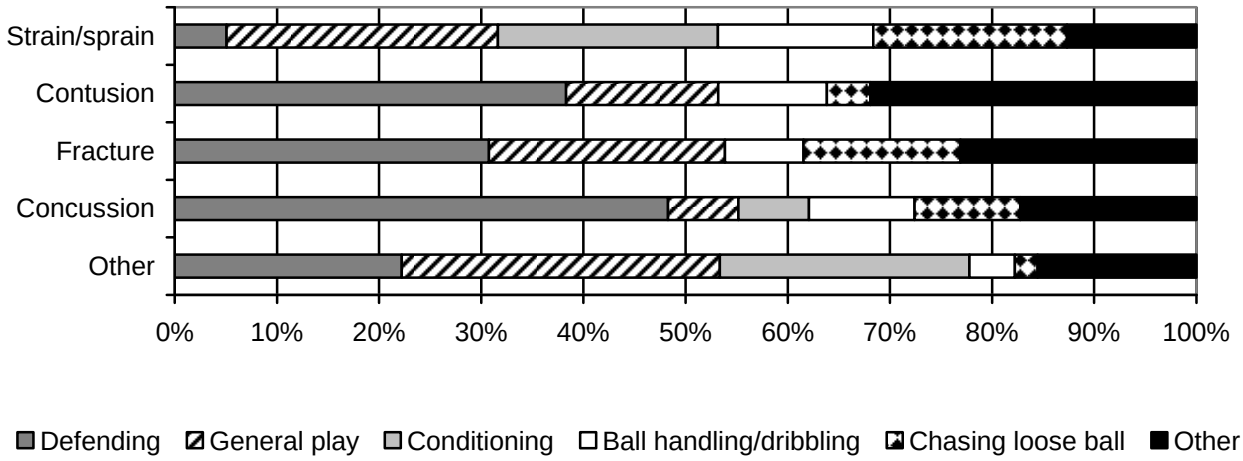


Table 13.9 Activities Leading to Girls' Field Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Defending	34	34.0%	16	14.2%	50	23.5%
General play	17	17.0%	30	26.5%	47	22.1%
Conditioning	0	0.0%	30	26.5%	30	14.1%
Ball handling/dribbling	12	12.0%	11	9.7%	23	10.8%
Chasing a loose ball	13	13.0%	10	8.8%	23	10.8%
Receiving pass	8	8.0%	3	2.7%	11	5.2%
Passing	7	7.0%	3	2.7%	10	4.7%
Blocking shot	5	5.0%	2	1.8%	7	3.3%
Goaltending	3	3.0%	3	2.7%	6	2.8%
Shooting	1	1.0%	4	3.5%	5	2.3%
Other	0	0.0%	1	0.9%	1	0.5%
Total	**100**	**100%**	**113**	**100%**	**213**	**100%**

Figure 13.5 Activity Resulting in Girls' Field Hockey Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XIV. Girls' Gymnastics Injury Epidemiology

Table 14.1 Girls' Gymnastics Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**58**	**24,354**	**2.38**
Competition	17	4,388	3.87
Practice	41	19,966	2.05

Table 14.2 Demographic Characteristics of Injured Girls' Gymnastics Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=57**
Freshman	26.3%
Sophomore	31.6%
Junior	8.8%
Senior	33.3%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	19
Mean (St. Dev.)	15.8 (1.5)
BMI	
Minimum	18.0
Maximum	37.7
Mean (St. Dev.)	23.0 (4.1)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 14.1 Diagnosis of Girls' Gymnastics Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

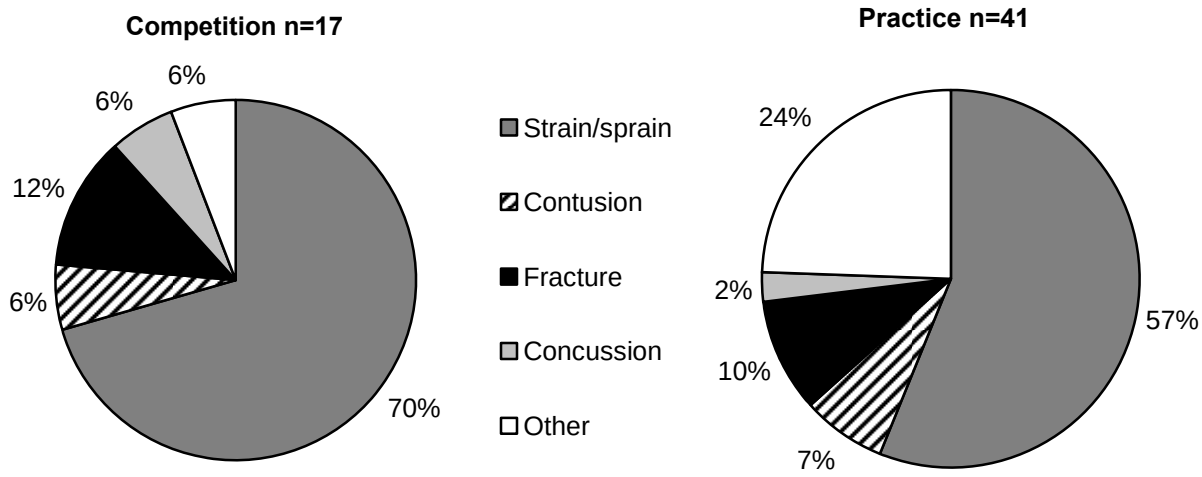


Table 14.3 Body Site of Girls' Gymnastics Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	5	29.4%	9	22.0%	14	24.1%
Knee	4	23.5%	8	19.5%	12	20.7%
Trunk	3	17.6%	5	12.2%	8	13.8%
Arm/elbow	1	5.9%	4	9.8%	5	8.6%
Hip/thigh/upper leg	1	5.9%	3	7.3%	4	6.9%
Hand/wrist	0	0.0%	4	9.8%	4	6.9%
Foot	1	5.9%	3	7.3%	4	6.9%
Head/face	1	5.9%	1	2.4%	2	3.4%
Shoulder	0	0.0%	2	4.9%	2	3.4%
Lower leg	0	0.0%	2	4.9%	2	3.4%
Neck	1	5.9%	0	0.0%	1	1.7%
Total	**17**	**100%**	**41**	**100%**	**58**	**100%**

Table 14.4 Nine Most Common Girls' Gymnastics Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=17		Practice n=41		Total n=58	
	n	%	n	%	n	%
Diagnosis						
Ankle strain/sprain	5	29.4%	8	19.5%	13	22.4%
Knee strain/sprain	4	23.5%	4	9.8%	8	13.8%
Knee other	0	0.0%	4	9.8%	4	6.9%
Trunk strain/sprain	1	5.9%	3	7.3%	4	6.9%
Trunk contusion	1	5.9%	2	4.9%	3	5.2%
Hip/thigh/upper leg strain/sprain	1	5.9%	2	4.9%	3	5.2%
Foot strain/sprain	0	0.0%	3	7.3%	3	5.2%
Arm/elbow strain/sprain	0	0.0%	2	4.9%	2	3.4%
Head/face concussion	1	5.9%	1	2.4%	2	3.4%
Hand/wrist fracture	0	0.0%	2	4.9%	2	3.4%
Shoulder other	0	0.0%	2	4.9%	2	3.4%
Arm/elbow fracture	1	5.9%	1	2.4%	2	3.4%

Figure 14.2 Time Loss of Girls' Gymnastics Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

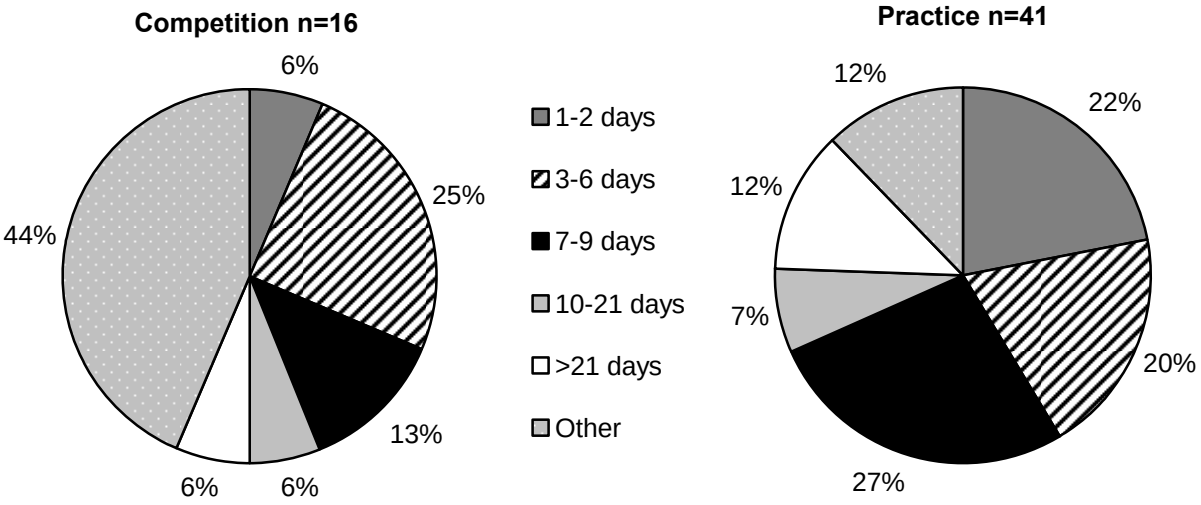


Table 14.5 Girls' Gymnastics Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	0	0.0%	2	4.9%	2	3.4%
Did not require surgery	17	100.0%	39	95.1%	56	96.6%
Total	**17**	**100%**	**41**	**100%**	**58**	**100%**

Figure 14.3 History of Girls' Gymnastics Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

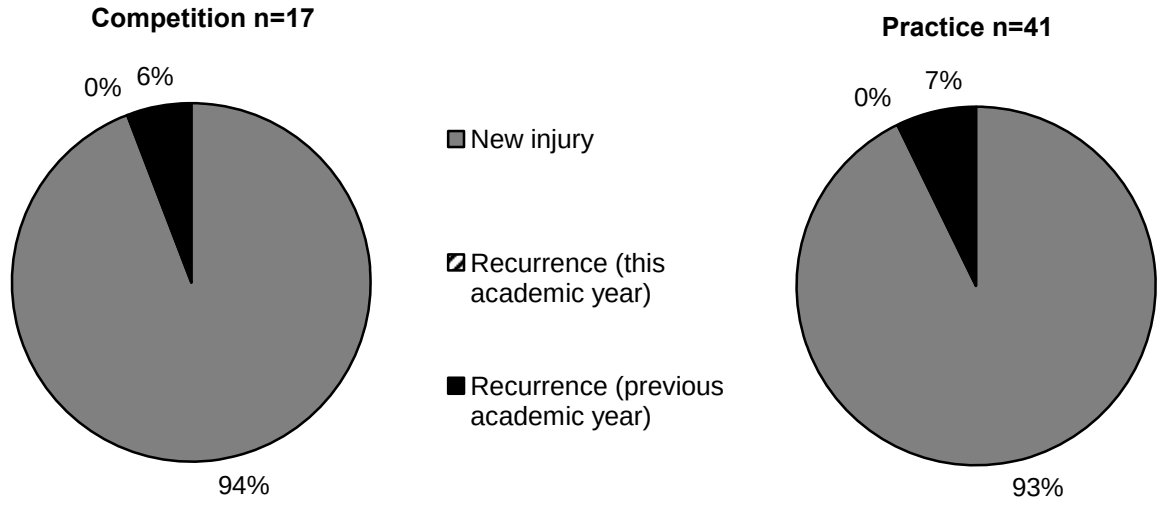


Table 14.6 Time during Season of Girls' Gymnastics Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	11	19.0%
Regular season	42	72.4%
Post season	5	8.6%
Total	**58**	**100%**

Table 14.7 Competition-Related Variables for Girls' Gymnastics Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Gymnast event/apparatus		
Floor exercise	5	29.4%
Vault	5	29.4%
Balance beam	3	17.6%
Warm-up/stretching/conditioning	2	11.8%
Uneven parallel bars	2	11.8%
Total	**17**	**100%**

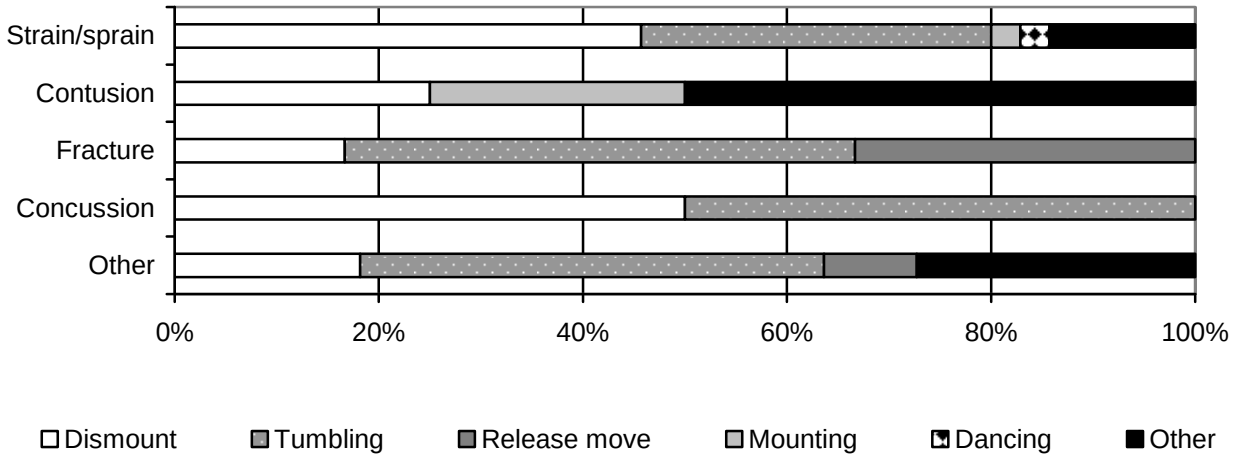
Table 14.8 Practice-Related Variables for Girls' Gymnastics Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	2	4.9%
Second 1/2 hour	3	7.3%
1-2 hours into practice	29	70.7%
>2 hours into practice	7	17.1%
Total	**41**	**100%**

Table 14.9 Activities Leading to Girls' Gymnastics Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Dismount	8	47.1%	13	31.7%	21	36.2%
Tumbling	6	35.3%	15	36.6%	21	36.2%
Release move	0	0.0%	3	7.3%	3	5.2%
Mounting	1	5.9%	1	2.4%	2	3.4%
Dancing	0	0.0%	1	2.4%	1	1.7%
Other	2	11.8%	8	19.5%	10	17.2%
Total	**17**	**100%**	**41**	**100%**	**58**	**100%**

Figure 14.4 Activity Resulting in Girls' Gymnastics Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XV. Boys' Ice Hockey Injury Epidemiology

Table 15.1Boys' Ice Hockey Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**211**	**82,398**	**2.56**
Competition	151	27,181	5.56
Practice	60	55,217	1.09

Table 15.2 Demographic Characteristics of Injured Boys' Ice Hockey Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=205**
Freshman	10.7%
Sophomore	26.3%
Junior	28.8%
Senior	34.1%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	19
Mean (St. Dev.)	16.5 (1.2)
BMI	
Minimum	18.3
Maximum	37.1
Mean (St. Dev.)	24.2 (3.4)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 15.1 Diagnosis of Boys' Ice Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

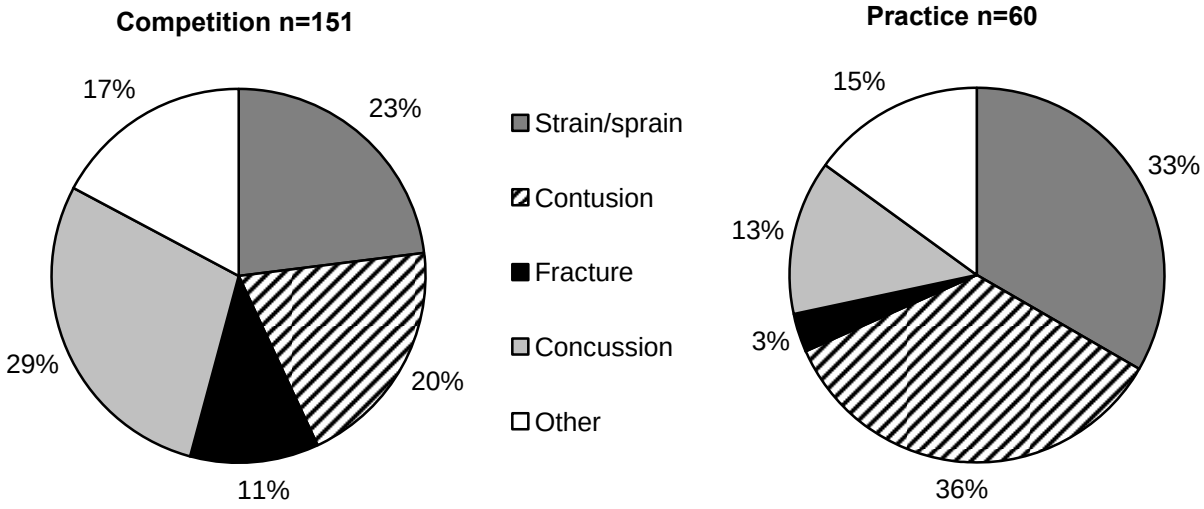


Table 15.3 Body Site of Boys' Ice Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	46	30.5%	9	15.0%	55	26.1%
Shoulder	25	16.6%	7	11.7%	32	15.2%
Trunk	25	16.6%	6	10.0%	31	14.7%
Knee	13	8.6%	14	23.3%	27	12.8%
Hip/thigh/upper leg	16	10.6%	7	11.7%	23	10.9%
Hand/wrist	9	6.0%	6	10.0%	15	7.1%
Arm/elbow	8	5.3%	3	5.0%	11	5.2%
Ankle	4	2.6%	3	5.0%	7	3.3%
Lower leg	2	1.3%	1	1.7%	3	1.4%
Neck	2	1.3%	1	1.7%	3	1.4%
Foot	0	0.0%	2	3.3%	2	0.9%
Other	1	0.7%	1	1.7%	2	0.9%
Total	**151**	**100%**	**60**	**100%**	**211**	**100%**

Table 15.4 Ten Most Common Boys' Ice Hockey Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=151		Practice n=60		Total n=211	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	43	28.5%	8	13.3%	51	24.2%
Shoulder other	13	8.6%	2	3.3%	15	7.1%
Hip/thigh/upper leg strain/sprain	7	4.6%	6	10.0%	13	6.2%
Shoulder strain/sprain	9	6.0%	4	6.7%	13	6.2%
Knee contusion	4	2.6%	9	15.0%	13	6.2%
Trunk strain/sprain	6	4.0%	5	8.3%	11	5.2%
Hip/thigh/upper leg contusion	9	6.0%	1	1.7%	10	4.7%
Knee strain/sprain	7	4.6%	3	5.0%	10	4.7%
Trunk contusion	8	5.3%	1	1.7%	9	4.3%
Hand/wrist fracture	4	2.6%	2	3.3%	6	2.8%
Hand/wrist contusion	3	2.0%	3	5.0%	6	2.8%
Trunk other	6	4.0%	0	0.0%	6	2.8%

Figure 15.2 Time Loss of Boys' Ice Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

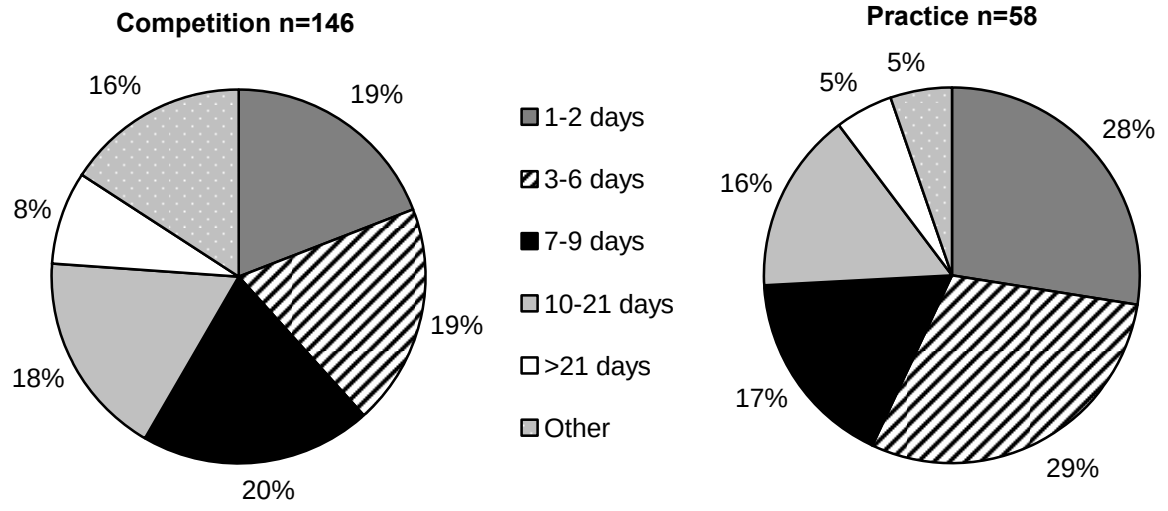


Table 15.5 Boys' Ice Hockey Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	6	4.1%	3	5.2%	9	4.4%
Did not require surgery	141	95.9%	55	94.8%	196	95.6%
Total	**147**	**100%**	**58**	**100%**	**205**	**100%**

Figure 15.3 History of Boys' Ice Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

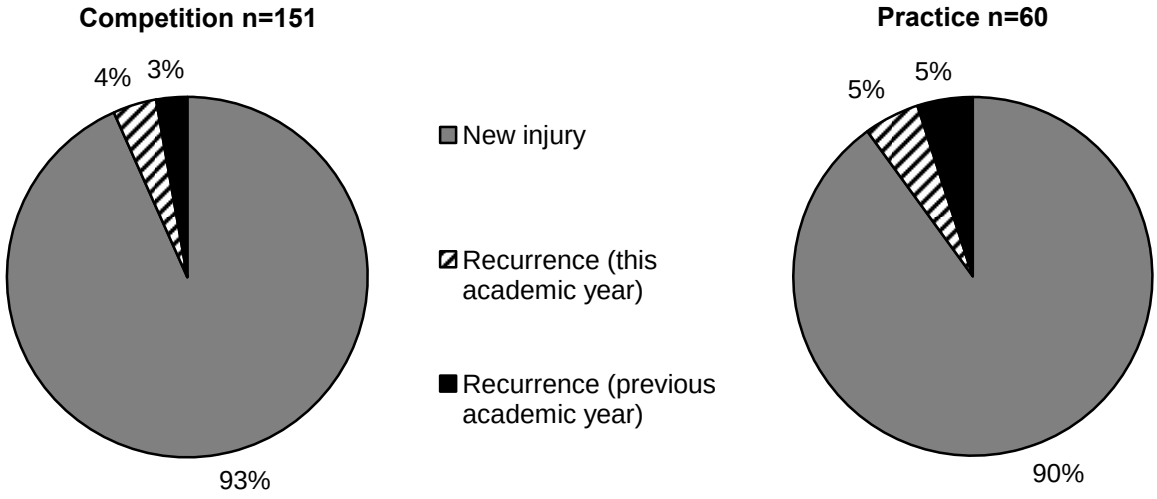


Table 15.6 Time during Season of Boys' Ice Hockey Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	16	7.6%
Regular season	194	91.9%
Post season	1	0.5%
Total	**211**	**100%**

Table 15.7 Competition-Related Variables for Boys' Ice Hockey Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Warm-ups	1	0.7%
First period	33	22.6%
Second period	61	41.8%
Third period	49	33.6%
Overtime	2	1.4%
Total	**146**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	11	7.4%
Yes, according to the coach/athlete but was not ruled illegal/foul play	7	4.7%
No	124	83.2%
Unknown	7	4.7%
Total	**149**	**100%**
Rink Location		
Between goal line and blue line	57	39.3%
Neutral zone	31	21.4%
Corner	29	20.0%
Behind goal	14	9.7%
Goal area	10	6.9%
Bench	2	1.4%
Face-off circle	1	0.7%
Other	1	0.7%
Total	**145**	**100%**

Table 15.8 Practice-Related Variables for Boys' Ice Hockey Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	6	10.3%
Second 1/2 hour	15	25.9%
1-2 hours into practice	31	53.4%
>2 hours into practice	6	10.3%
Total	**58**	**100%**

Figure 15.4 Player Position of Boys' Ice Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

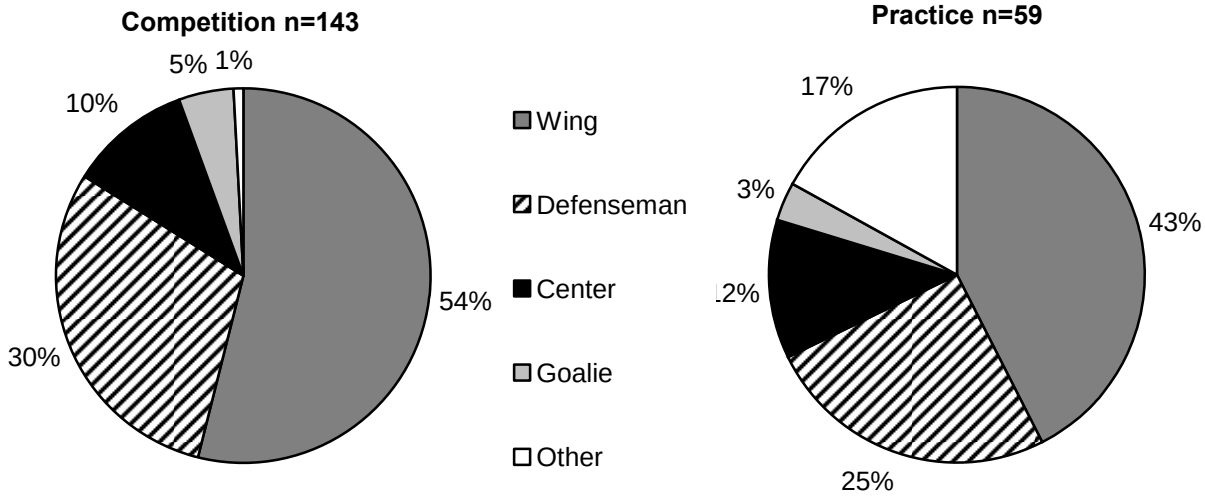
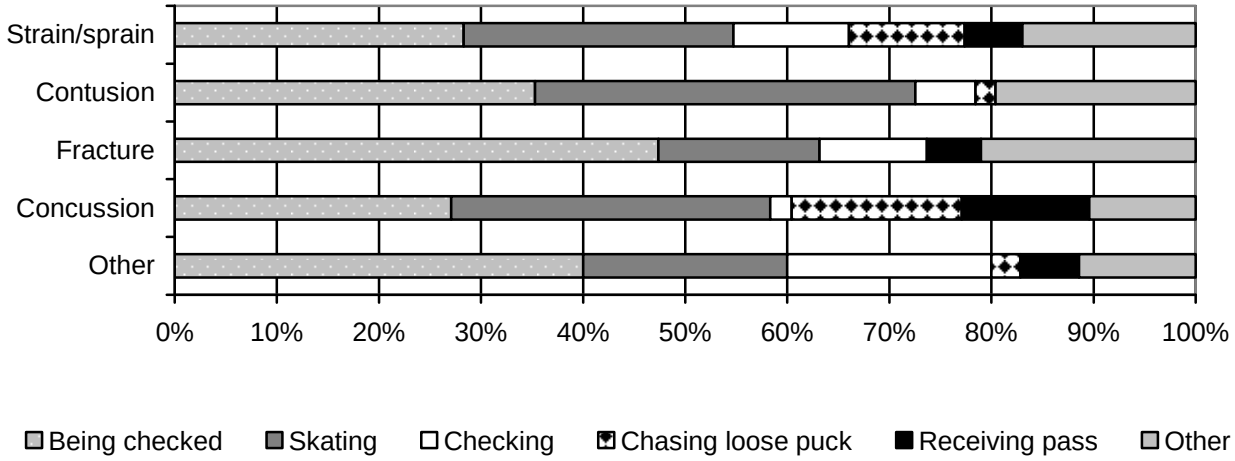


Table 15.9 Activities Leading to Boys' Ice Hockey Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Being checked	57	38.8%	12	20.3%	69	33.5%
Skating	41	27.9%	17	28.8%	58	28.2%
Checking	14	9.5%	5	8.5%	19	9.2%
Chasing loose puck	9	6.1%	7	11.9%	16	7.8%
Receiving pass	7	4.8%	5	8.5%	12	5.8%
Goaltending	7	4.8%	2	3.4%	9	4.4%
Passing	6	4.1%	1	1.7%	7	3.4%
Shooting	1	0.7%	1	1.7%	2	1.0%
Other	5	3.4%	9	15.3%	14	6.8%
Total	**147**	**100%**	**59**	**100%**	**206**	**100%**

Figure 15.5 Activity Resulting in Boys' Ice Hockey Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XVI. Boys' Lacrosse Injury Epidemiology

Table 16.1 Boys' Lacrosse Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**298**	**120,178**	2.48
Competition	187	38,235	4.89
Practice	111	81,943	1.35

Table 16.2 Demographic Characteristics of Injured Boys' Lacrosse Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=290**
Freshman	20.0%
Sophomore	23.4%
Junior	25.9%
Senior	30.7%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	16.4 (1.4)
BMI	
Minimum	17.7
Maximum	44.9
Mean (St. Dev.)	25.0 (3.9)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 16.1 Diagnosis of Boys' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

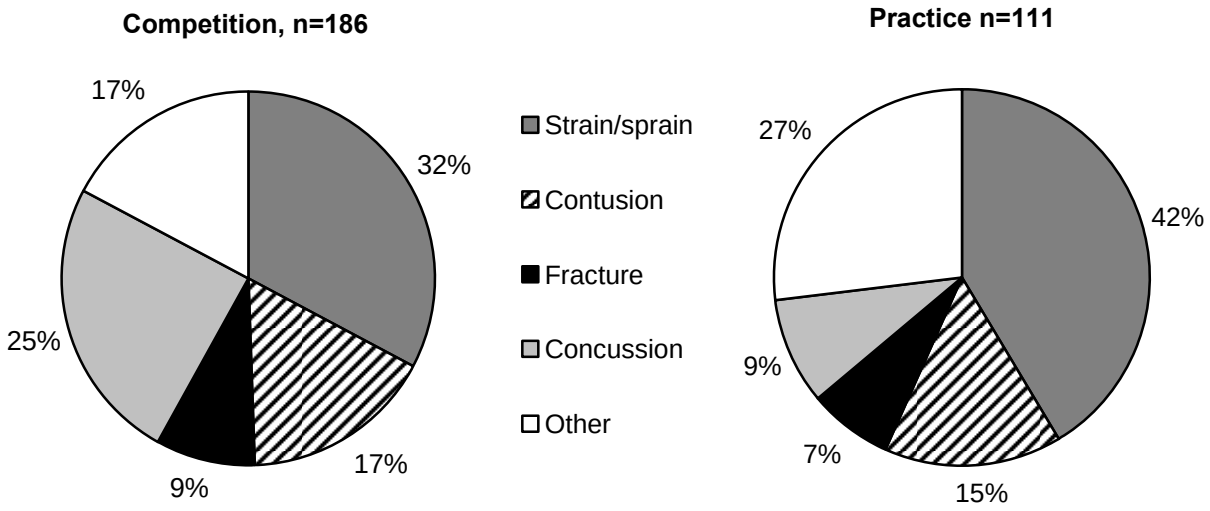


Table 16.3 Body Site of Boys' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Head/face	58	31.2%	12	10.8%	70	23.6%
Ankle	16	8.6%	17	15.3%	33	11.1%
Knee	15	8.1%	17	15.3%	32	10.8%
Hip/thigh/upper leg	20	10.8%	12	10.8%	32	10.8%
Trunk	20	10.8%	12	10.8%	32	10.8%
Shoulder	19	10.2%	5	4.5%	24	8.1%
Hand/wrist	14	7.5%	8	7.2%	22	7.4%
Lower leg	7	3.8%	15	13.5%	22	7.4%
Foot	5	2.7%	6	5.4%	11	3.7%
Arm/elbow	5	2.7%	3	2.7%	8	2.7%
Neck	4	2.2%	1	0.9%	5	1.7%
Other	3	1.6%	3	2.7%	6	2.0%
Total	**186**	**100%**	**111**	**100%**	**297**	**100%**

Table 16.4 Ten Most Common Boys' Lacrosse Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=185		Practice n=111		Total n=296	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	45	24.3%	10	9.0%	55	18.6%
Ankle strain/sprain	15	8.1%	15	13.5%	30	10.1%
Hip/thigh/upper leg strain/sprain	14	7.6%	9	8.1%	23	7.8%
Knee strain/sprain	11	5.9%	8	7.2%	19	6.4%
Trunk contusion	9	4.9%	2	1.8%	11	3.7%
Head/face other	9	4.9%	1	0.9%	10	3.4%
Trunk other	5	2.7%	5	4.5%	10	3.4%
Hand/wrist fracture	6	3.2%	3	2.7%	9	3.0%
Shoulder sprain/strain	7	3.8%	2	1.8%	9	3.0%
Shoulder other	6	3.2%	3	2.7%	9	3.0%
Lower leg other	2	1.1%	7	6.3%	9	3.0%

Figure 16.2 Time Loss of Boys' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

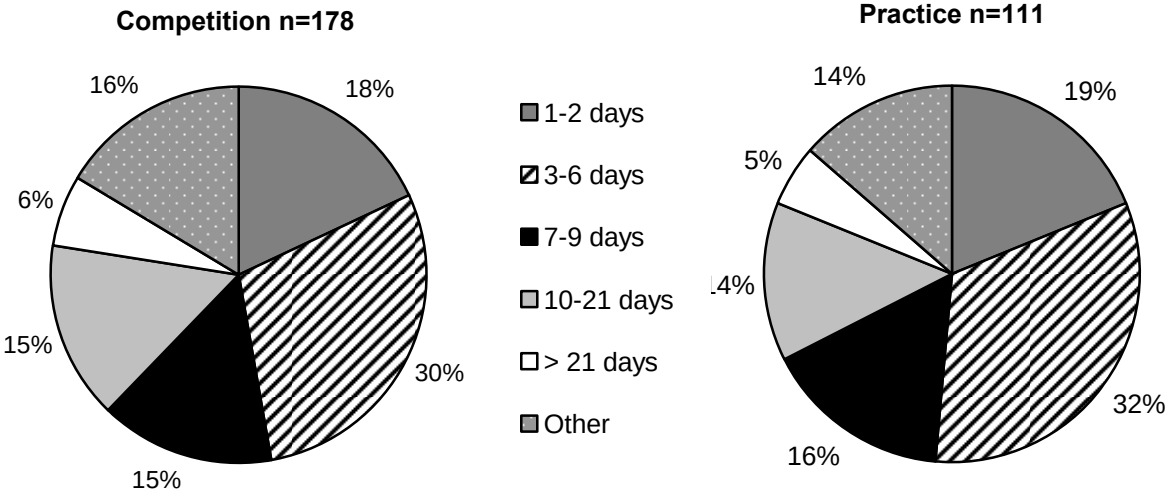


Table 16.5 Boys' Lacrosse Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	12	6.5%	6	5.4%	18	6.1%
Did not require surgery	172	93.5%	105	94.6%	277	93.9%
Total	**184**	**100%**	**111**	**100%**	**295**	**100%**

Figure 16.3 History of Boys' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

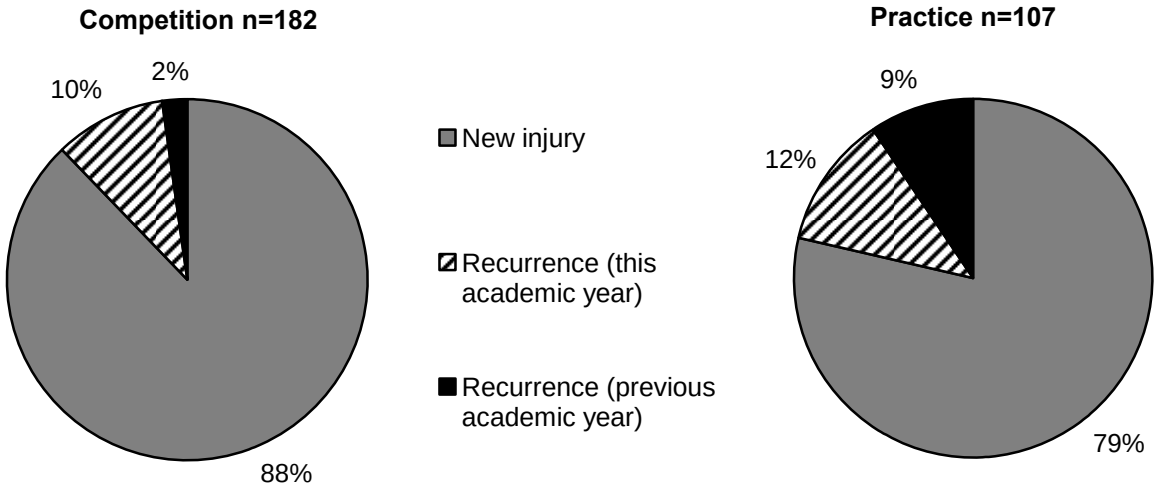


Table 16.6 Time during Season of Boys' Lacrosse Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	46	41.4%
Regular season	65	58.6%
Post season	0	0.0%
Total	**111**	**100%**

Table 16.7 Competition-Related Variables for Boys' Lacrosse Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-competition/warm-ups	2	1.2%
First quarter	17	9.8%
Second quarter	55	31.8%
Third quarter	67	38.7%
Fourth quarter	31	17.9%
Overtime	1	0.6%
Total	**173**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	21	11.3%
Yes, according to the coach/athlete but was not ruled illegal/foul play	11	5.9%
No	138	74.2%
Unknown	16	8.6%
Total	**186**	**100%**
Field Location		
Midfield	64	37.6%
Defensive area	43	25.3%
Goal area	30	17.6%
Wing area	28	16.5%
Sideline	5	2.9%
Total	**170**	**100%**

Table 16.8 Practice-Related Variables for Boys' Lacrosse Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First ½ hour	13	12.4%
Second ½ hour	12	11.4%
1-2 hours into practice	65	61.9%
> 2 hours into practice	15	14.3%
Total	**105**	**100%**

Figure 16.4 Player Position of Boys' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

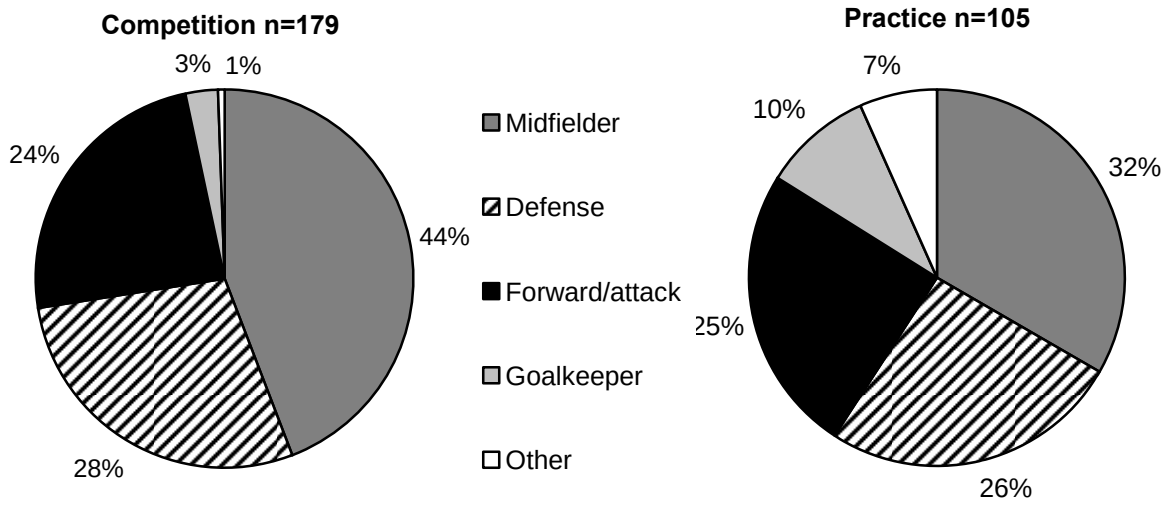
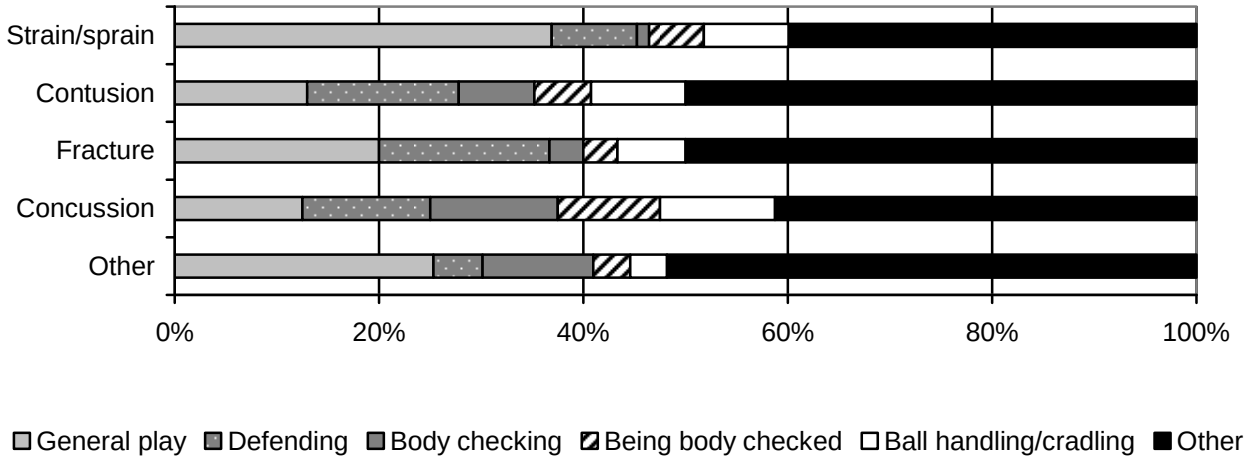


Table 16.9 Activities Leading to Boys' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
General play	33	18.5%	33	30.8%	66	23.2%
Defending	18	10.1%	10	9.3%	28	9.8%
Body checking	19	10.7%	6	5.6%	25	8.8%
Being body checked	18	10.1%	5	4.7%	23	8.1%
Ball handling/cradling	18	10.1%	5	4.7%	23	8.1%
Chasing loose ball	14	7.9%	5	4.7%	19	6.7%
Receiving pass	17	9.6%	1	0.9%	18	6.3%
Being crosse/stick checked	10	5.6%	6	5.6%	16	5.6%
Crosse/stick checking	9	5.1%	2	1.9%	11	3.9%
Goaltending	4	2.2%	7	6.5%	11	3.9%
Conditioning	1	0.6%	10	9.3%	11	3.9%
Shooting	3	1.7%	5	4.7%	8	2.8%
Passing	5	2.8%	3	2.8%	8	2.8%
Other	9	5.1%	9	8.4%	18	6.3%
Total	**178**	**100%**	**107**	**100%**	**285**	**100%**

Figure 16.5 Activity Resulting in Boys' Lacrosse Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XVII. Girls' Lacrosse Injury Epidemiology

Table 17.1 Girls' Lacrosse Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**136**	**83,991**	**1.62**
Competition	76	26,144	2.91
Practice	60	57,847	1.04

Table 17.2 Demographic Characteristics of Injured Girls' Lacrosse Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=132**
Freshman	21.2%
Sophomore	19.7%
Junior	37.9%
Senior	21.2%
Total	**100%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	16.1 (1.4)
BMI	
Minimum	16.6
Maximum	37.1
Mean (St. Dev.)	22.7 (4.0)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 17.1 Diagnosis of Girls' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

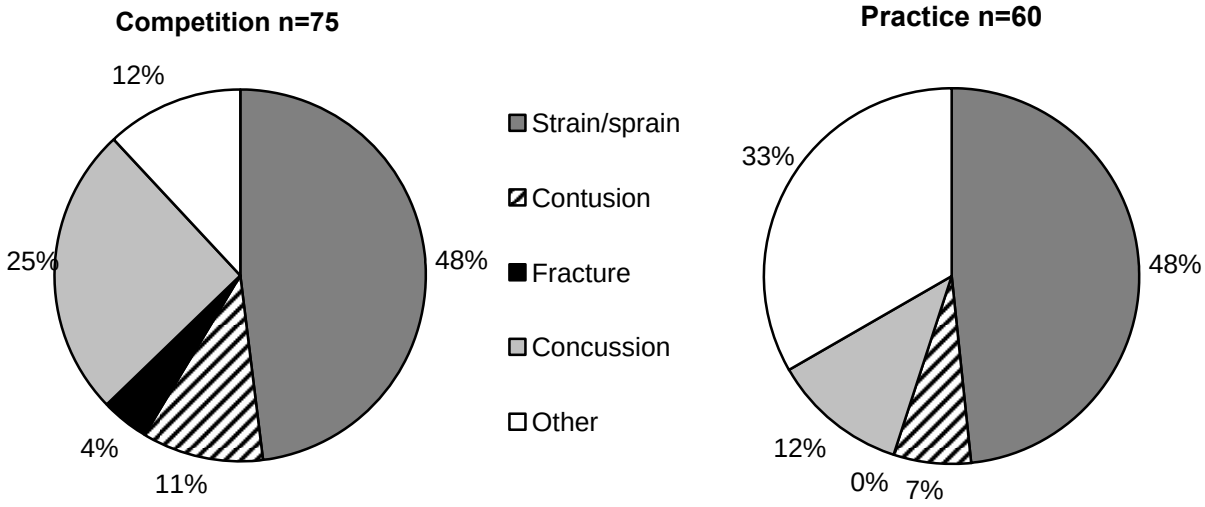


Table 17.3 Body Site of Girls' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Ankle	19	25.0%	11	18.6%	30	22.2%
Head/face	22	28.9%	8	13.6%	30	22.2%
Knee	13	17.1%	11	18.6%	24	17.8%
Hip/thigh/upper leg	7	9.2%	9	15.3%	16	11.9%
Lower leg	4	5.3%	8	13.6%	12	8.9%
Hand/wrist	7	9.2%	2	3.4%	9	6.7%
Foot	1	1.3%	6	10.2%	7	5.2%
Trunk	1	1.3%	4	6.8%	5	3.7%
Shoulder	1	1.3%	0	0.0%	1	0.7%
Other	1	1.3%	0	0.0%	1	0.7%
Total	**76**	**100%**	**59**	**100%**	**135**	**100%**

Table 17.4 Nine Most Common Girls' Lacrosse Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=75		Practice n=59		Total n=134	
	n	%	n	%	n	%
Diagnosis						
Head/face concussion	19	25.3%	7	11.9%	26	19.4%
Ankle strain/sprain	17	22.7%	9	15.3%	26	19.4%
Hip/thigh/upper leg strain/sprain	5	6.7%	9	15.3%	14	10.4%
Knee other	2	2.7%	9	15.3%	11	8.2%
Knee strain/sprain	10	13.3%	1	1.7%	11	8.2%
Lower leg other	0	0.0%	7	11.9%	7	5.2%
Lower leg strain/sprain	3	4.0%	1	1.7%	4	3.0%
Hand/wrist fracture	3	4.0%	1	1.7%	4	3.0%
Trunk strain/sprain	0	0.0%	4	6.8%	4	3.0%
Foot stain/sprain	0	0.0%	4	6.8%	4	3.0%

Figure 17.2 Time Loss of Girls' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

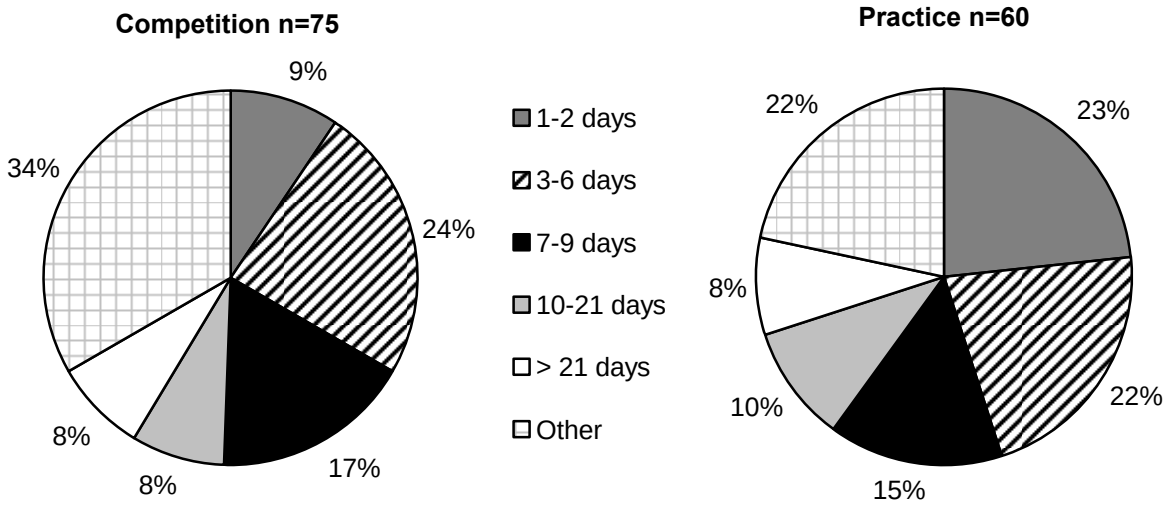


Table 17.5 Girls' Lacrosse Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	7	9.2%	6	10.0%	13	9.6%
Did not require surgery	69	90.8%	54	90.0%	123	90.4%
Total	**76**	**100%**	**60**	**100%**	**136**	**100%**

Figure 17.3 History of Girls' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

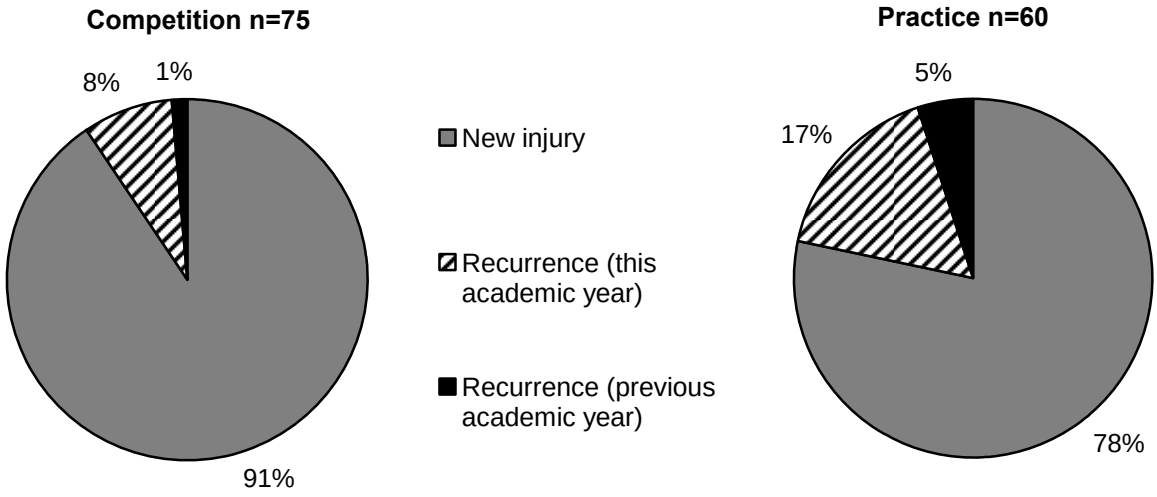


Table 17.6 Time during Season of Girls' Lacrosse Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	4	5.3%
Regular season	68	89.5%
Post season	4	5.3%
Total	**76**	**100%**

Table 17.7 Competition-Related Variables for Girls' Lacrosse Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Competition		
Pre-Competition-Warm-ups	3	4.3%
First half	31	44.9%
Second half	35	50.7%
Overtime	-	0.0%
Total	**69**	**100%**
Injury Related to Foul Play		
Yes, and the action was ruled illegal/foul play	14	18.4%
Yes, according to the coach/athlete but was not ruled illegal/foul play	2	2.6%
No	57	75.0%
Unknown	3	3.9%
Total	**76**	**100%**
Field Location		
Midfield (between restraining lines)	30	44.1%
Critical scoring area (including the fan and arc)	24	35.3%
Goal circle	10	14.7%
Sideline	2	2.9%
Center circle	1	1.5%
Endline	1	1.5%
Total	**68**	**100%**

Table 17.8 Practice-Related Variables for Girls' Lacrosse Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	11	19.0%
Second 1/2 hour	16	27.6%
1-2 hours into practice	22	37.9%
>2 hours into practice	9	15.5%
Total	**58**	**100%**

Figure 17.4 Player Position of Girls' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

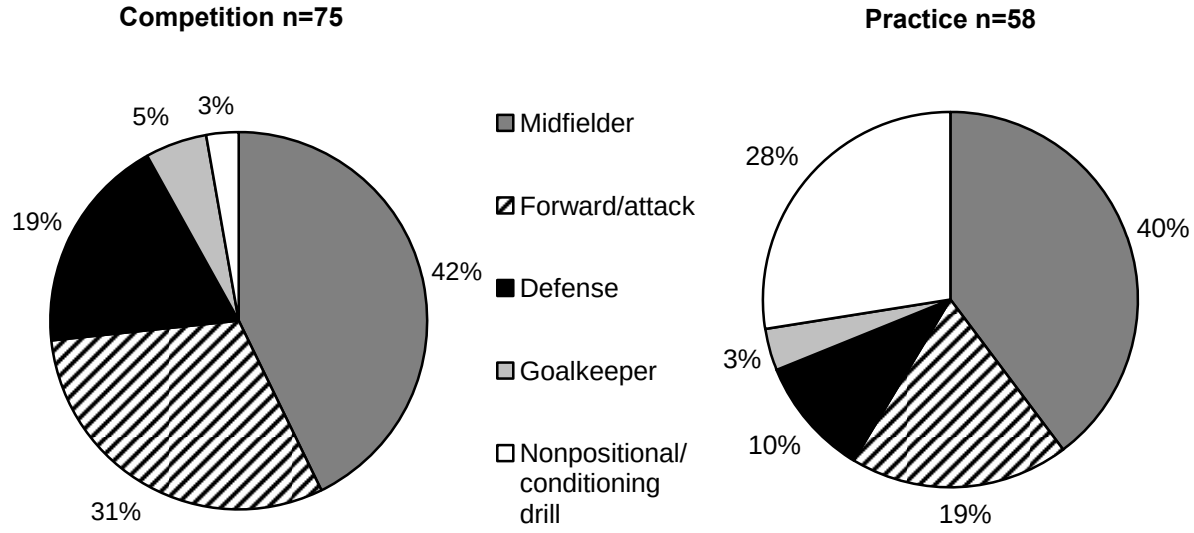
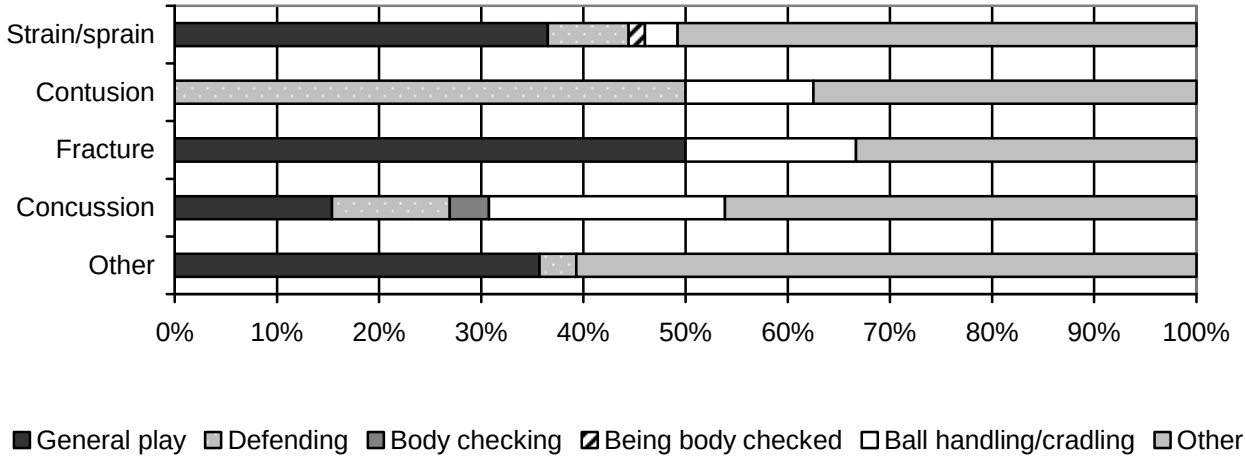


Table 17.9 Activities Leading to Girls' Lacrosse Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
General play	20	27.0%	20	34.5%	40	30.3%
Conditioning	0	0.0%	23	39.7%	23	17.4%
Defending	10	13.5%	3	5.2%	13	9.8%
Chasing loose ball	8	10.8%	3	5.2%	11	8.3%
Receiving pass	8	10.8%	2	3.4%	10	7.6%
Ball handling/cradling	9	12.2%	1	1.7%	10	7.6%
Shooting	4	5.4%	0	0.0%	4	3.0%
Being crosse/stick checked	4	5.4%	0	0.0%	4	3.0%
Goaltending	3	4.1%	1	1.7%	4	3.0%
Passing	2	2.7%	1	1.7%	3	2.3%
Other	6	8.1%	4	6.9%	10	7.6%
Total	**74**	**100%**	**58**	**100%**	**132**	**100%**

Figure 17.5 Activity Resulting in Girls' Lacrosse Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XVIII. Boys' Swimming and Diving Injury Epidemiology

Table 18.1 Boys' Swimming and Diving Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**29**	**82,269**	**0.35**
Competition	3	15,636	0.19
Practice	26	66,633	0.39

Table 18.2 Demographic Characteristics of Injured Boys' Swimming and Diving Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=28**
Freshman	32.1%
Sophomore	17.9%
Junior	32.1%
Senior	17.9%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.9 (1.3)
BMI	
Minimum	16.7
Maximum	57.6
Mean (St. Dev.)	21.3 (2.5)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 18.1 Diagnosis of Boys' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

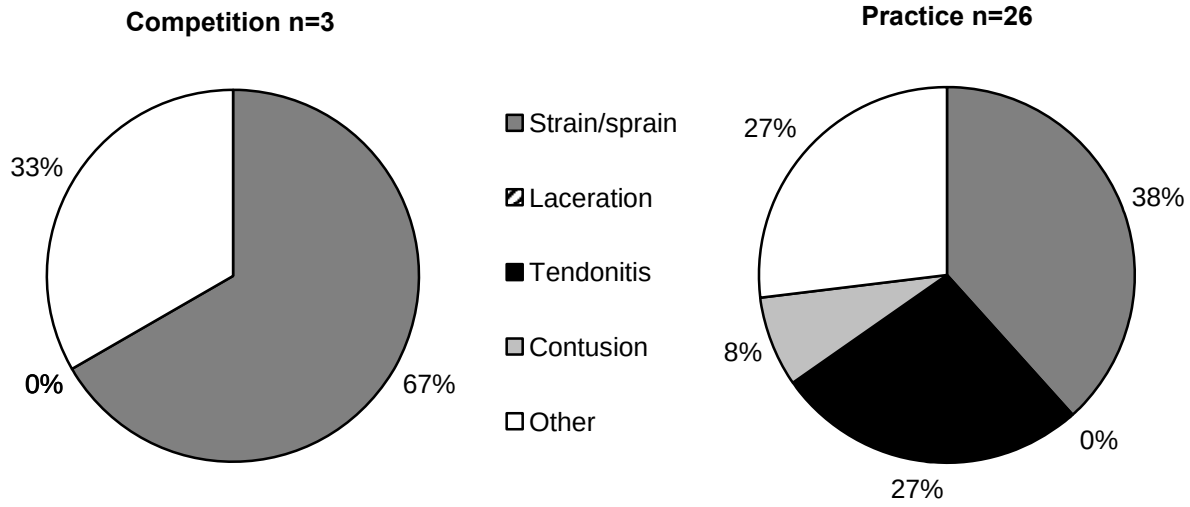


Table 18.3 Body Site of Boys' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Shoulder	1	33.3	15	57.7%	16	55.2%
Hip/thigh/upper leg	1	33.3	1	3.8%	2	6.9%
Hand/wrist	0	0.0%	2	7.7%	2	6.9%
Lower leg	0	0.0%	2	7.7%	2	6.9%
Arm/elbow	1	33.3	1	3.8%	2	6.9%
Neck	0	0.0%	2	7.7%	2	6.9%
Trunk	0	0.0%	1	3.8%	1	3.4%
Foot	0	0.0%	1	3.8%	1	3.4%
Other	0	0.0%	1	3.8%	1	3.4%
Total	**3**	**100%**	**26**	**100%**	**29**	**100%**

Table 18.4 Ten Most Common Boys' Swimming and Diving Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=3		Practice n=26		Total n=29	
	n	%	n	%	n	%
Diagnosis						
Shoulder other	0	0.0%	8	30.8%	8	27.6%
Shoulder strain/sprain	1	33.3%	6	23.1%	7	24.1%
Shoulder contusion	0	0.0%	1	3.8%	1	3.4%
Lower leg strain/sprain	0	0.0%	1	3.8%	1	3.4%
Neck other	0	0.0%	1	3.8%	1	3.4%
Lower leg other	0	0.0%	1	3.8%	1	3.4%
Neck strain/sprain	0	0.0%	1	3.8%	1	3.4%
Arm/elbow other	0	0.0%	1	3.8%	1	3.4%
Trunk other	0	0.0%	1	3.8%	1	3.4%
Arm/elbow strain/sprain	1	33.3%	0	0.0%	1	3.4%
Foot other	0	0.0%	1	3.8%	1	3.4%
Hand/wrist strain/sprain	0	0.0%	1	3.8%	1	3.4%
Hand/wrist contusion	0	0.0%	1	3.8%	1	3.4%
Hip/thigh/upper leg strain/sprain	0	0.0%	1	3.8%	1	3.4%
Hip/thigh/upper leg other	1	33.3%	0	0.0%	1	3.4%

Figure 18.2 Time Loss of Boys' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

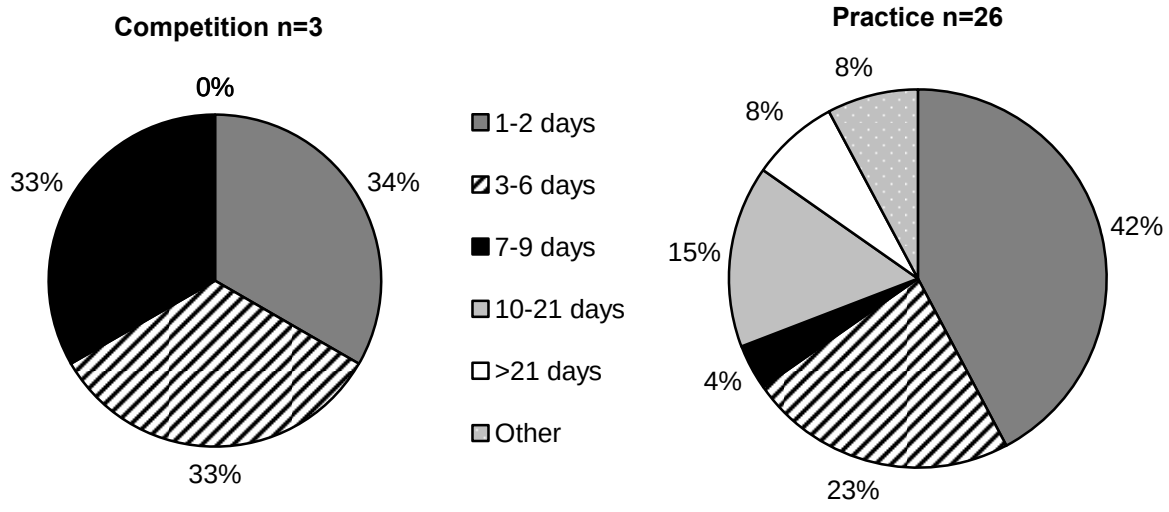


Table 18.5 Boys' Swimming and Diving Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	0	0.0%	0	0.0%	0	0.0%
Did not require surgery	3	100.0%	25	100.0%	28	100%
Total	**3**	**100%**	**25**	**100%**	**28**	**100%**

Figure 18.3 History of Boys' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

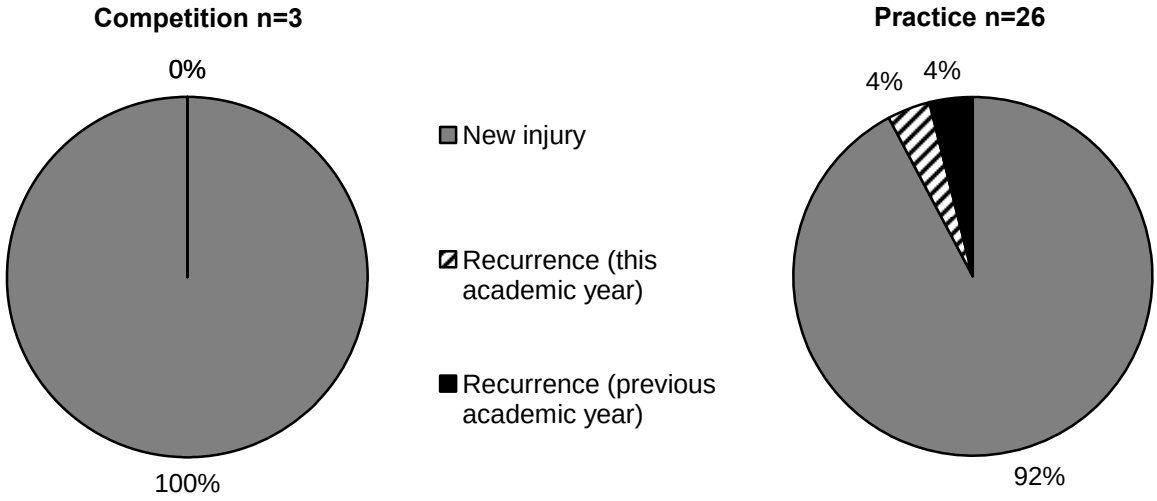


Table 18.6 Time during Season of Boys' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	3	10.3%
Regular season	26	89.7%
Post season	0	0.0%
Total	**29**	**100%**

Table 18.7 Competition-Related Variables for Boys' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Pool Location		
Starting platform	0	0.0%
In pool	3	100.0%
Poolside	0	0.0%
Other	0	0.0%
Total	**3**	**100%**

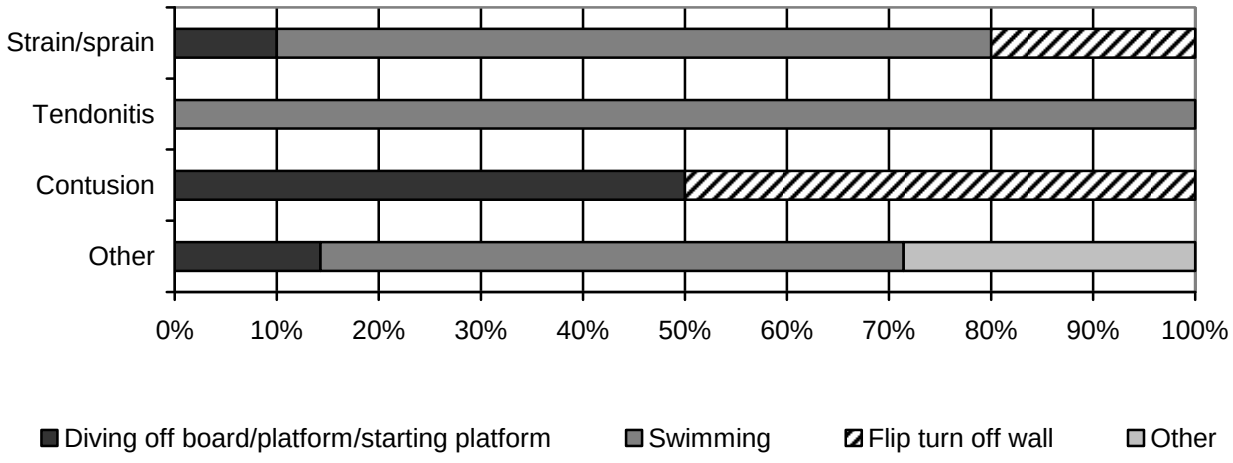
Table 18.8 Practice-Related Variables for Boys' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	7	28.0%
Second 1/2 hour	7	28.0%
1-2 hours into practice	10	40.0%
>2 hours into practice	1	4.0%
Total	**25**	**100%**

Table 18.9 Activities Leading to Boys' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Swimming	2	66.7%	18	69.2%	20	69.0%
Flip turn off wall	1	33.3%	3	11.5%	4	13.8%
Diving off board/platform/starting platform	0	0.0%	3	11.5%	3	10.3%
Other	0	0.0%	2	7.7%	2	6.9%
Total	**3**	**100%**	**26**	**100%**	**29**	**100%**

Figure 18.4 Activity Resulting in Boys' Swimming and Diving Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XIX. Girls' Swimming and Diving Injury Epidemiology

Table 19.1 Girls' Swimming and Diving Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**38**	**103,053**	**0.37**
Competition	4	20,775	0.19
Practice	34	82,278	0.41

Table 19.2 Demographic Characteristics of Injured Girls' Swimming and Diving Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=37**
Freshman	13.5%
Sophomore	35.1%
Junior	16.2%
Senior	35.1%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	18
Mean (St. Dev.)	16.0 (1.2)
BMI	
Minimum	14.6
Maximum	41.3
Mean (St. Dev.)	22.5 (5.0)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 19.1 Diagnosis of Girls' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

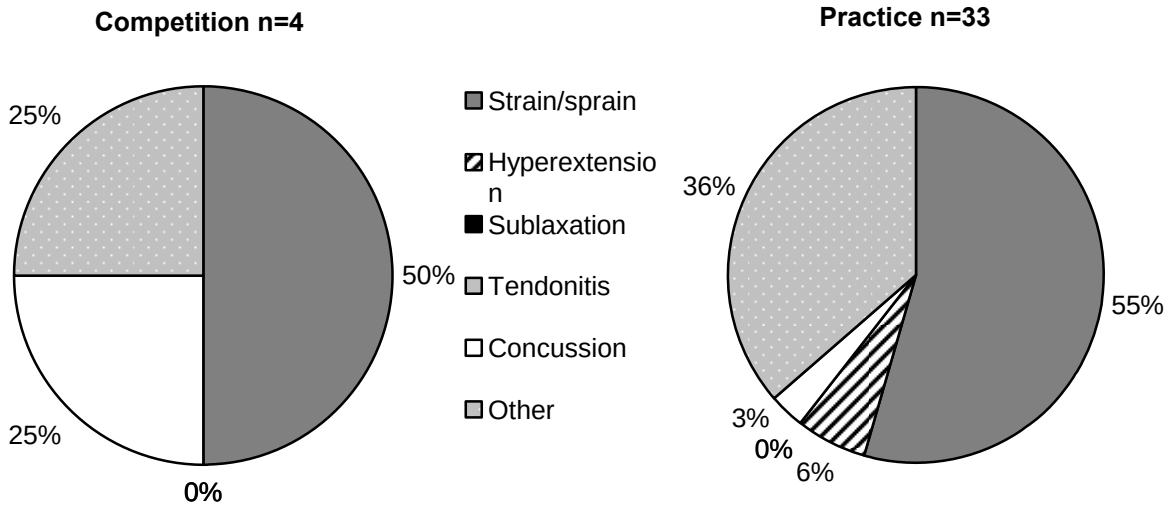


Table 19.3 Body Site of Girls' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Shoulder	2	50.0%	14	41.2%	16	42.1%
Hip/thigh/upper leg	0	0.0%	6	17.6%	6	15.8%
Trunk	0	0.0%	4	11.8%	4	10.5%
Knee	0	0.0%	3	8.8%	3	7.9%
Ankle	0	0.0%	2	5.9%	2	5.3%
Hand/wrist	1	25.0%	1	2.9%	2	5.3%
Head/face	1	25.0%	0	0.0%	1	2.6%
Lower leg	0	0.0%	1	2.9%	1	2.6%
Foot	0	0.0%	1	2.9%	1	2.6%
Neck	0	0.0%	1	2.9%	1	2.6%
Other	0	0.0%	1	2.9%	1	2.6%
Total	**4**	**100%**	**34**	**100%**	**38**	**100%**

Table 19.4 Ten Most Common Girls' Swimming and Diving Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=4		Practice n=33		Total n=37	
	n	%	n	%	n	%
Diagnosis						
Shoulder strain/sprain	2	50.0%	7	21.2%	9	24.3%
Shoulder other	0	0.0%	7	21.2%	7	18.9%
Hip/thigh/upper leg strain/sprain	0	0.0%	4	12.1%	4	10.8%
Trunk strain/sprain	0	0.0%	2	6.1%	2	5.4%
Hip/thigh/upper leg other	0	0.0%	2	6.1%	2	5.4%
Head/face concussion	1	25.0%	0	0.0%	1	2.7%
Trunk other	0	0.0%	1	3.0%	1	2.7%
Lower leg other	0	0.0%	1	3.0%	1	2.7%
Knee contusion	0	0.0%	1	3.0%	1	2.7%
Knee other	0	0.0%	1	3.0%	1	2.7%
Foot strain/sprain	0	0.0%	1	3.0%	1	2.7%
Neck strain/sprain	0	0.0%	1	3.0%	1	2.7%
Hand/wrist other	1	25.0%	0	0.0%	1	2.7%

Figure 19.2 Time Loss of Girls' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

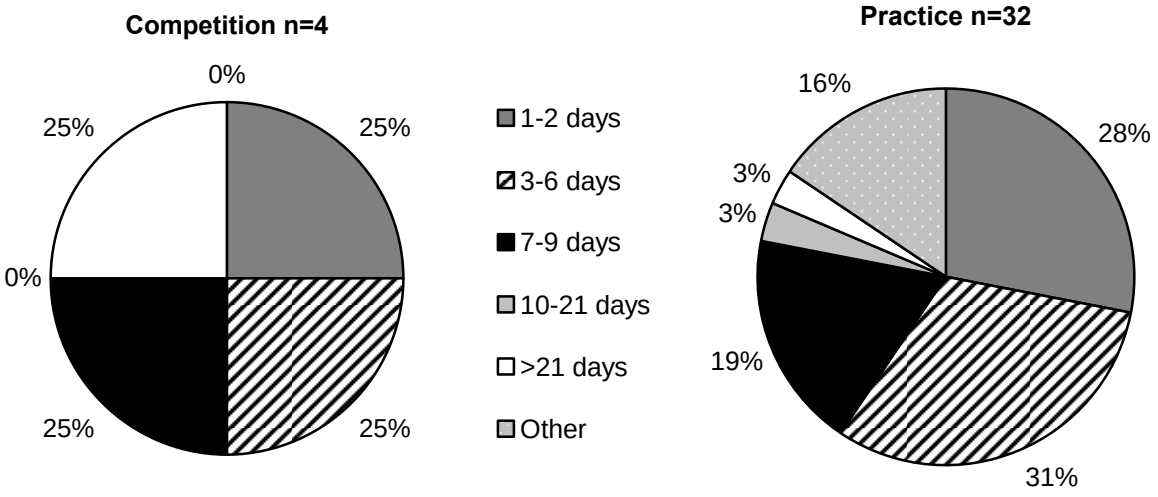


Table 19.5 Girls' Swimming and Diving Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	0	0.0%	2	5.9%	2	5.3%
Did not require surgery	4	100.0%	32	94.1%	36	94.7%
Total	**4**	**100%**	**34**	**100%**	**38**	**100%**

Figure 19.3 History of Girls' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

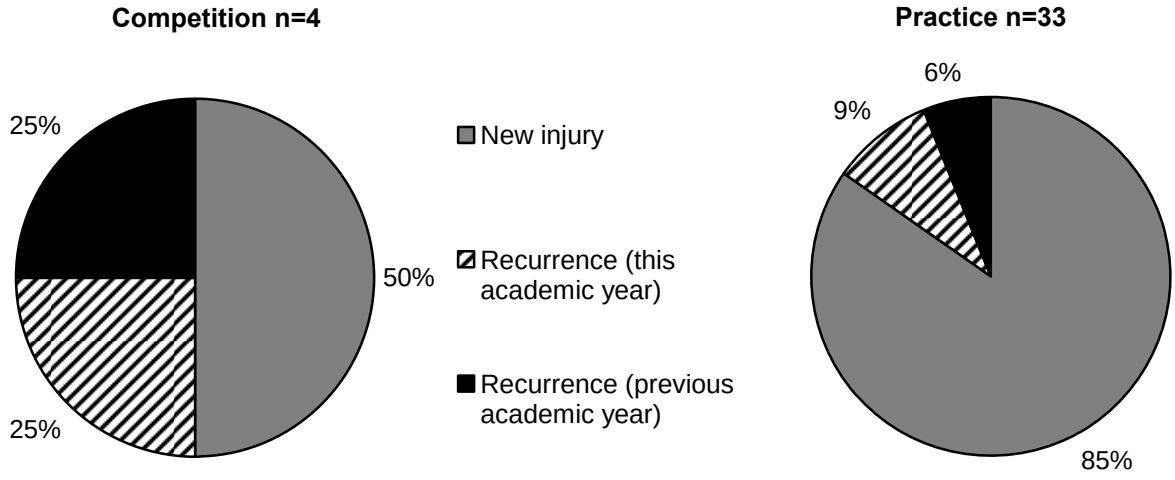


Table 19.6 Time during Season of Girls' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	10	27.0%
Regular season	27	73.0%
Post season	0	0.0%
Total	**37**	**100%**

Table 19.7 Competition-Related Variables for Girls' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Pool Location		
In pool	2	66.7%
Poolside	1	33.3%
Starting platform/board/blocks	0	0.0%
Other	0	0.0%
Total	**3**	**100%**

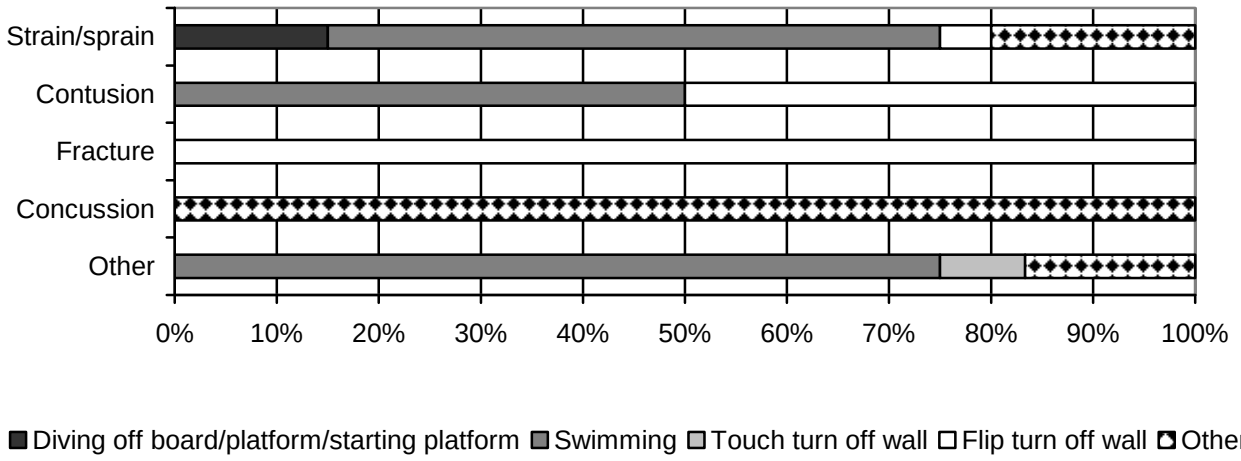
Table 19.8 Practice-Related Variables for Girls' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	10	30.3%
Second 1/2 hour	5	15.2%
1-2 hours into practice	15	45.5%
>2 hours into practice	3	9.1%
Total	**33**	**100%**

Table 19.9 Activities Leading to Girls' Swimming and Diving Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Swimming	3	75.0%	20	60.6%	23	62.2%
Diving off board/platform/starting platform	0	0.0%	3	9.1%	3	8.1%
Flip turn off wall	0	0.0%	3	9.1%	3	8.1%
Touch turn off wall	0	0.0%	1	3.0%	1	2.7%
Other	1	25.0%	6	18.2%	7	18.9%
Total	**4**	**100%**	**33**	**100%**	**37**	**100%**

Figure 19.4 Activity Resulting in Girls' Swimming and Diving Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XX. Boys' Track and Field Injury Epidemiology

Table 20.1 Boys' Track and Field Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**223**	**260,811**	**0.86**
Competition	81	49,536	1.64
Practice	142	211,275	0.67

Table 20.2 Demographic Characteristics of Injured Boys' Track and Field Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=219**
Freshman	23.7%
Sophomore	22.8%
Junior	29.2%
Senior	24.2%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	18
Mean (St. Dev.)	16.1 (1.3)
BMI	
Minimum	15.6
Maximum	34.8
Mean (St. Dev.)	22.6 (2.8)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 20.1 Diagnosis of Boys' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

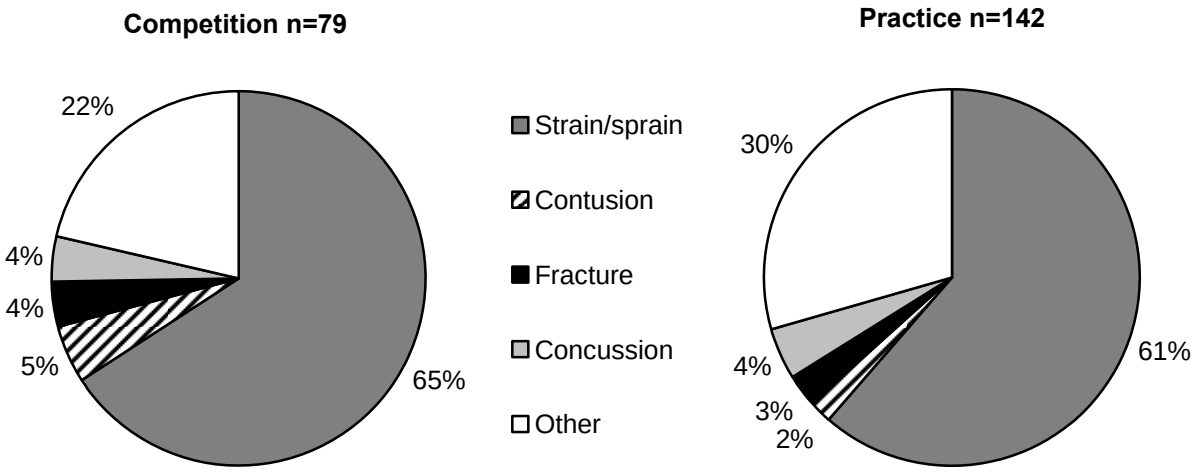


Table 20.3 Body Site of Boys' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Hip/thigh/upper leg	48	60.0%	53	37.3%	101	45.5%
Lower leg	6	7.5%	27	19.0%	33	14.9%
Knee	13	16.3%	14	9.9%	27	12.2%
Ankle	3	3.8%	15	10.6%	18	8.1%
Foot	4	5.0%	13	9.2%	17	7.7%
Head/face	3	3.8%	6	4.2%	9	4.1%
Trunk	1	1.3%	5	3.5%	6	2.7%
Shoulder	0	0.0%	5	3.5%	5	2.3%
Hand/wrist	1	1.3%	2	1.4%	3	1.4%
Arm/elbow	1	1.3%	2	1.4%	3	1.4%
Total	**80**	**100%**	**142**	**100%**	**222**	**100%**

Table 20.4 Ten Most Common Boys' Track and Field Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=79		Practice n=142		Total n=221	
	n	%	n	%	n	%
Diagnosis						
Hip/thigh/upper leg strain/sprain	44	55.7%	47	33.1%	91	41.2%
Knee other	9	11.4%	9	6.3%	18	8.1%
Lower leg other	3	3.8%	15	10.6%	18	8.1%
Ankle strain/sprain	1	1.3%	13	9.2%	14	6.3%
Lower leg strain/sprain	2	2.5%	12	8.5%	14	6.3%
Hip/thigh/upper leg other	4	5.1%	6	4.2%	10	4.5%
Head/face concussion	3	3.8%	6	4.2%	9	4.1%
Knee strain/sprain	2	2.5%	5	3.5%	7	3.2%
Foot other	0	0.0%	6	4.2%	6	2.7%
Trunk strain/sprain	1	1.3%	3	2.1%	4	1.8%
Foot strain/sprain	1	1.3%	3	2.1%	4	1.8%
Foot contusion	2	2.5%	2	1.4%	4	1.8%

Figure 20.2 Time Loss of Boys' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

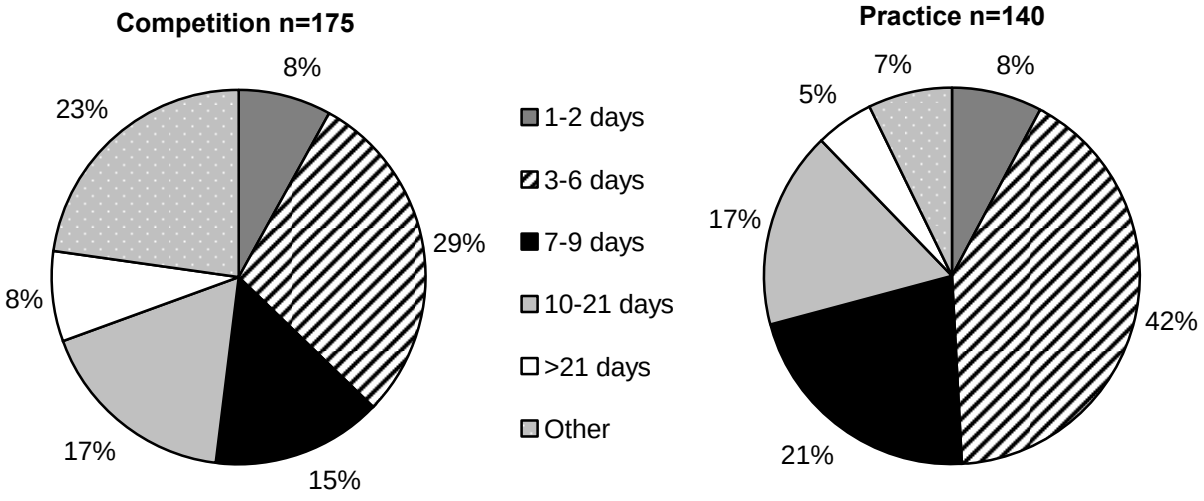


Table 20.5 Boys' Track and Field Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	3	3.9%	3	2.1%	6	2.8%
Did not require surgery	74	96.1%	137	97.9%	211	97.2%
Total	**77**	**100%**	**140**	**100%**	**217**	**100%**

Figure 20.3 History of Boys' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

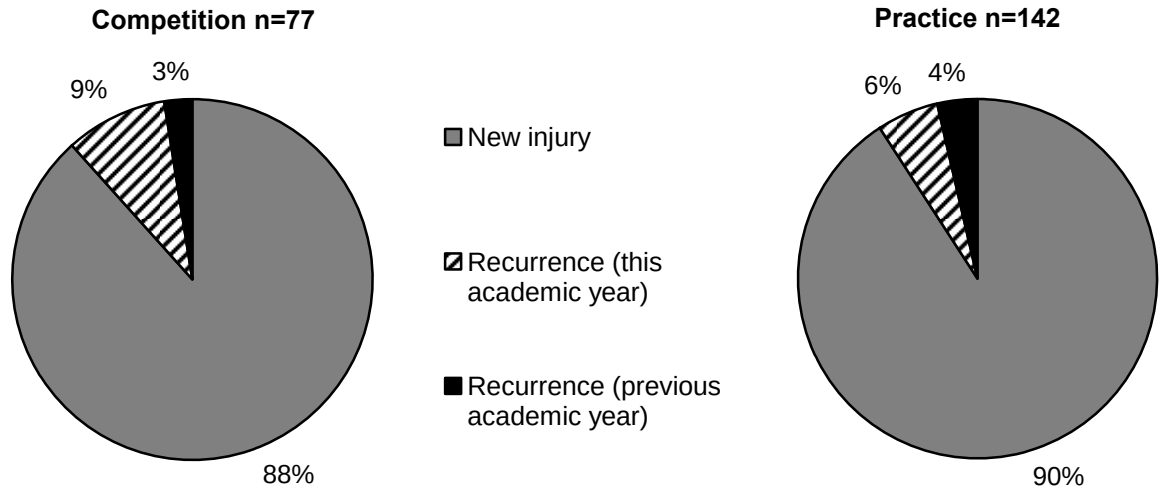


Table 20.6 Time during Season of Boys' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	53	24.0%
Regular season	159	71.9%
Post season	9	4.1%
Total	**221**	**100%**

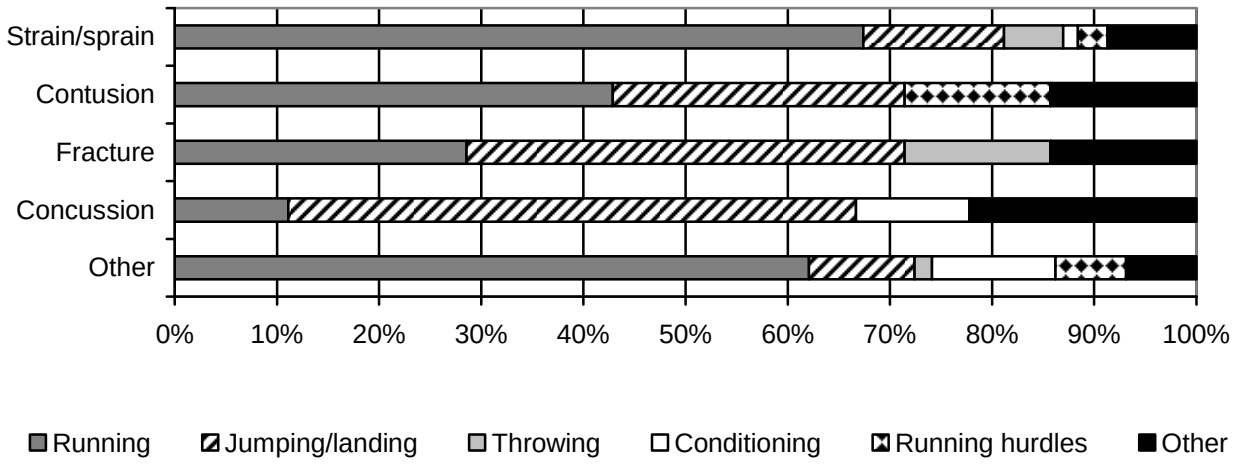
Table 20.7 Practice-Related Variables for Boys' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	30	21.7%
Second 1/2 hour	34	24.6%
1-2 hours into practice	61	44.2%
>2 hours into practice	13	9.4%
Total	**138**	**100%**

Table 20.8 Activities Leading to Boys' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Running	48	61.5%	87	61.7%	135	61.6%
Jumping/landing	12	15.4%	23	16.3%	35	16.0%
Throwing	3	3.8%	7	5.0%	10	4.6%
Conditioning	1	1.3%	9	6.4%	10	4.6%
Running hurdles	5	6.4%	4	2.8%	9	4.1%
Leaving block	2	2.6%	3	2.1%	5	2.3%
Warming up	4	5.1%	1	0.7%	5	2.3%
Baton hand off	1	1.3%	2	1.4%	3	1.4%
Other	2	2.6%	5	3.5%	7	3.2%
Total	**78**	**100%**	**141**	**100%**	**219**	**100%**

Figure 20.4 Activity Resulting in Boys' Track and Field Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XXI. Girls' Track and Field Injury Epidemiology

Table 21.1 Girls' Track and Field Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**254**	**214,146**	**1.19**
Competition	58	41,578	1.39
Practice	196	172,568	1.14

Table 21.2 Demographic Characteristics of Injured Girls' Track and Field Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=250**
Freshman	28.4%
Sophomore	29.2%
Junior	21.2%
Senior	21.2%
Total†	**100%**
Age (years)	
Minimum	13
Maximum	19
Mean (St. Dev.)	15.7 (1.3)
BMI	
Minimum	10.5
Maximum	45.8
Mean (St. Dev.)	21.6 (3.5)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 21.1 Diagnosis of Girls' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

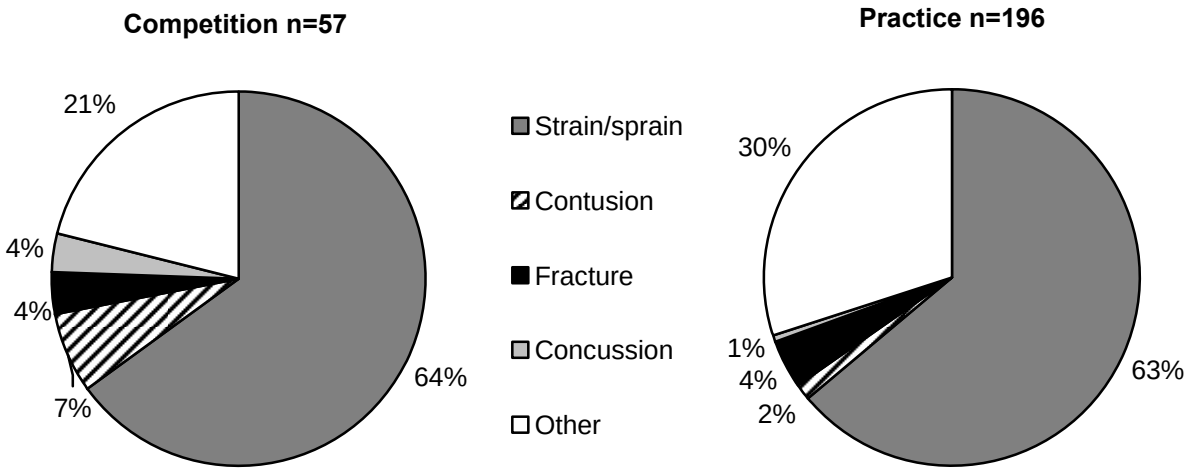


Table 21.3 Body Site of Girls' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Body Site						
Hip/thigh/upper leg	20	35.1%	55	28.1%	75	29.6%
Lower leg	5	8.8%	47	24.0%	52	20.6%
Ankle	7	12.3%	29	14.8%	36	14.2%
Knee	8	14.0%	25	12.8%	33	13.0%
Foot	6	10.5%	14	7.1%	20	7.9%
Trunk	1	1.8%	10	5.1%	11	4.3%
Shoulder	3	5.3%	4	2.0%	7	2.8%
Head/face	3	5.3%	3	1.5%	6	2.4%
Hand/wrist	1	1.8%	5	2.6%	6	2.4%
Arm/elbow	2	3.5%	1	0.5%	3	1.2%
Neck	0	0.0%	1	0.5%	1	0.4%
Other	1	1.8%	2	1.0%	3	1.2%
Total	**57**	**100%**	**196**	**100%**	**253**	**100%**

Table 21.4 Ten Most Common Girls' Track and Field Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=56		Practice n=196		Total n=252	
	n	%	n	%	n	%
Diagnosis						
Hip/thigh/upper leg strain/sprain	18	32.1%	51	26.0%	69	27.4%
Lower leg strain/sprain	4	7.1%	27	13.8%	31	12.3%
Ankle strain/sprain	5	8.9%	22	11.2%	27	10.7%
Lower leg other	1	1.8%	20	10.2%	21	8.3%
Knee other	4	7.1%	17	8.7%	21	8.3%
Knee strain/sprain	2	3.6%	7	3.6%	9	3.6%
Trunk strain/sprain	1	1.8%	8	4.1%	9	3.6%
Foot strain/sprain	3	5.4%	6	3.1%	9	3.6%
Foot other	2	3.6%	4	2.0%	6	2.4%
Ankle other	1	1.8%	5	2.6%	6	2.4%

Figure 21.2 Time Loss of Girls' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

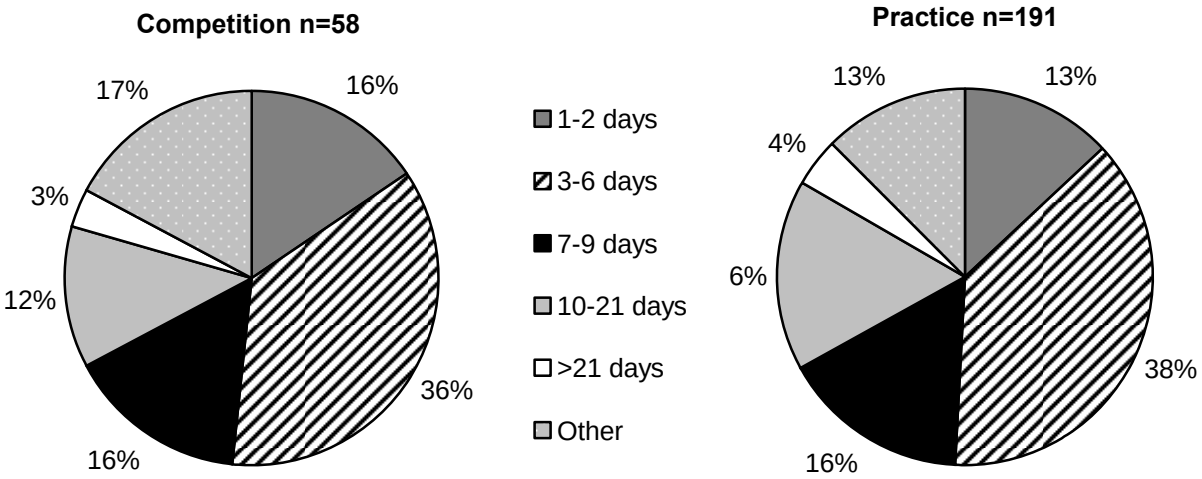


Table 21.5 Girls' Track and Field Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Need for surgery						
Required surgery	1	1.7%	1	0.5%	2	0.8%
Did not require surgery	57	98.3%	193	99.5%	250	99.2%
Total	**58**	**100%**	**194**	**100%**	**252**	**100%**

Figure 21.3 History of Girls' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

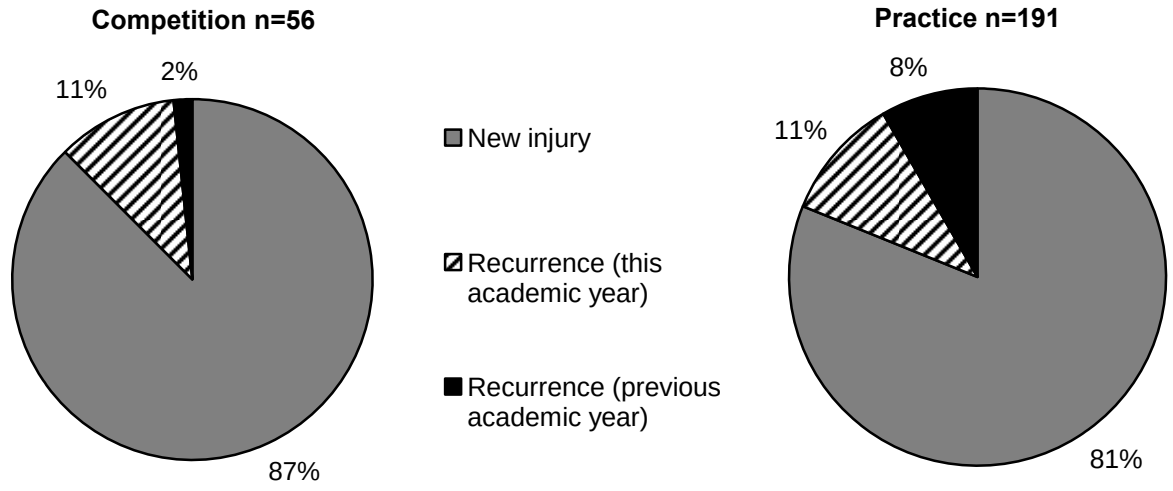


Table 21.6 Time during Season of Girls' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	86	33.9%
Regular season	162	63.8%
Post season	6	2.4%
Total	**254**	**100%**

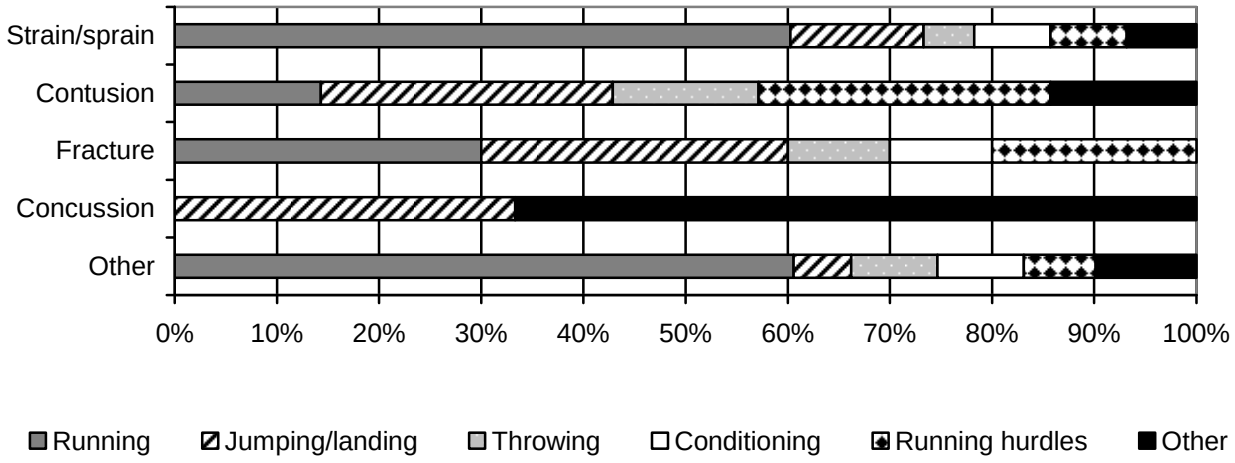
Table 21.7 Practice-Related Variables for Girls' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	31	16.1%
Second 1/2 hour	53	27.5%
1-2 hours into practice	94	48.7%
>2 hours into practice	15	7.8%
Total	**193**	**100%**

Table 21.8 Activities Leading to Girls' Track and Field Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Overall	
	n	%	n	%	n	%
Activity						
Running	22	37.9%	122	62.6%	144	56.9%
Jumping/landing	11	19.0%	20	10.3%	31	12.3%
Running hurdles	13	22.4%	9	4.6%	22	8.7%
Conditioning	0	0.0%	19	9.7%	19	7.5%
Throwing	3	5.2%	13	6.7%	16	6.3%
Warming up	4	6.9%	5	2.6%	9	3.6%
Leaving block	3	5.2%	2	1.0%	5	2.0%
Hit by shot put/discus/javelin/hammer	1	1.7%	0	0.0%	1	0.4%
Baton hand off	0	0.0%	1	0.5%	1	0.4%
Other	1	1.7%	4	2.1%	5	2.0%
Total	**58**	**100%**	**195**	**100%**	**253**	**100%**

Figure 21.4 Activity Resulting in Girls' Track and Field Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XXII. Cheerleading Injury Epidemiology

Table 22.1 Cheerleading Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	# Injuries	# Exposures	Injury rate (per 1,000 athlete-exposures)
Total	**133**	**200,247**	**0.66**
Competition	11	16,412	0.67
Practice	100	145,124	0.69
Performance	22	38,711	0.57

Table 22.2 Demographic Characteristics of Injured Cheerleading Athletes, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year*

Year in School	**n=129**
Freshman	17.1%
Sophomore	23.3%
Junior	30.2%
Senior	29.5%
Total†	**100%**
Age (years)	
Minimum	14
Maximum	18
Mean (St. Dev.)	15.8 (1.2)
BMI	
Minimum	16.7
Maximum	36.4
Mean (St. Dev.)	22.5 (3.6)

*All analyses in this chapter present un-weighted data.
†Throughout this report, totals and n's represent the total un-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 22.1 Diagnosis of Cheerleading Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

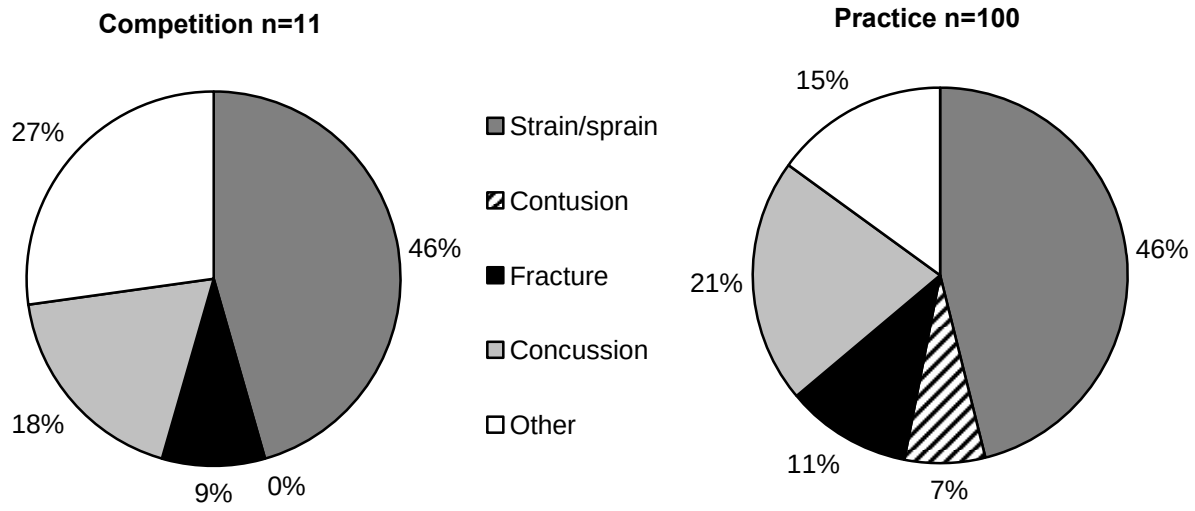


Table 22.3 Body Site of Cheerleading Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Performance		Overall	
	n	%	n	%	n	%	n	%
Body Site								
Head/face	2	18.2%	29	29.0%	4	18.2%	35	26.3%
Ankle	4	36.4%	12	12.0%	3	13.6%	19	14.3%
Hand/wrist	1	9.1%	12	12.0%	2	9.1%	15	11.3%
Trunk	1	9.1%	9	9.0%	2	9.1%	12	9.0%
Knee	1	9.1%	6	6.0%	4	18.2%	11	8.3%
Neck	0	0.0%	8	8.0%	3	13.6%	11	8.3%
Shoulder	2	18.2%	5	5.0%	0	0.0%	7	5.3%
Arm/elbow	0	0.0%	7	7.0%	0	0.0%	7	5.3%
Hip/thigh/upper leg	0	0.0%	4	4.0%	2	9.1%	6	4.5%
Lower leg	0	0.0%	4	4.0%	2	9.1%	6	4.5%
Foot	0	0.0%	4	4.0%	0	0.0%	4	3.0%
Total	**11**	**100%**	**100**	**100%**	**22**	**100.0%**	**133**	**100%**

Table 22.4 Ten Most Common Cheerleading Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition n=11		Practice n=100		Performance n=22		Total n=133	
	n	%	n	%	n	%	n	%
Diagnosis								
Head/face concussion	2	18.2%	19	19.0%	4	18.2%	25	18.8%
Ankle strain/sprain	4	36.4%	12	12.0%	3	13.6%	19	14.3%
Hand/wrist strain/sprain	1	9.1%	9	9.0%	2	9.1%	12	9.0%
Knee strain/sprain	0	0.0%	4	4.0%	2	9.1%	6	4.5%
Hip/thigh/upper leg strain/sprain	0	0.0%	4	4.0%	2	9.1%	6	4.5%
Shoulder other	2	18.2%	4	4.0%	0	0.0%	6	4.5%
Trunk strain/sprain	0	0.0%	4	4.0%	2	9.1%	6	4.5%
Neck strain/sprain	0	0.0%	5	5.0%	1	4.5%	6	4.5%
Knee other	1	9.1%	2	2.0%	2	9.1%	5	3.8%
Head/face fracture	0	0.0%	5	5.0%	0	0.0%	5	3.8%

Figure 22.2 Time Loss of Cheerleading Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

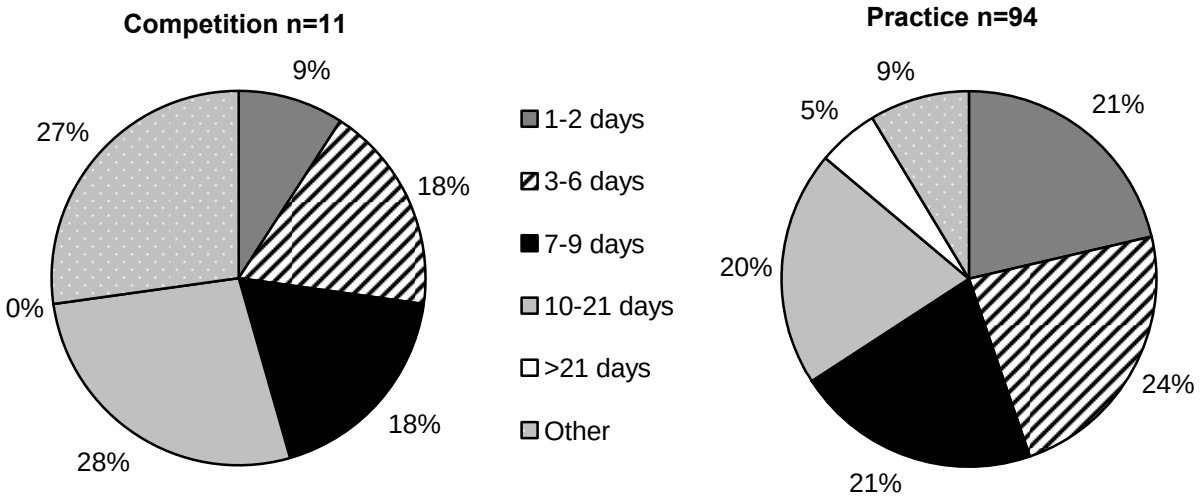


Table 22.5 Cheerleading Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Performance		Overall	
	n	%	n	%	n	%	n	%
Need for surgery								
Required surgery	1	9.1%	6	6.1%	2	9.1%	9	6.8%
Did not require surgery	10	90.9%	93	93.9%	20	90.9%	123	93.2%
Total	**11**	**100%**	**99**	**100%**	**22**	**100%**	**132**	**100%**

Figure 22.3 History of Cheerleading Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

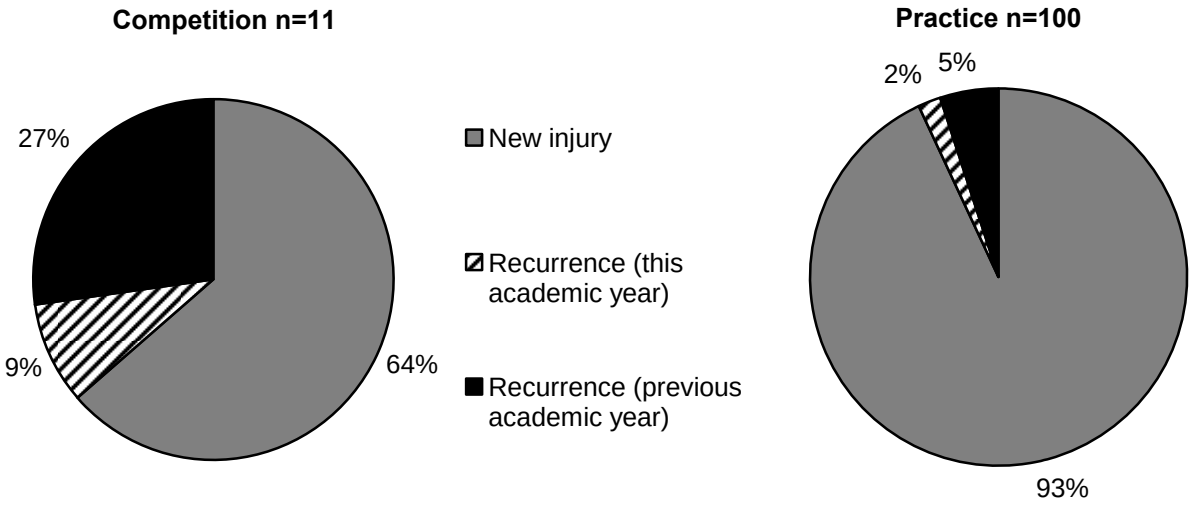


Table 22.6 Time during Season of Cheerleading Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Season		
Preseason	19	14.6%
Regular season	104	80.0%
Post season	7	5.4%
Total	**130**	**100%**

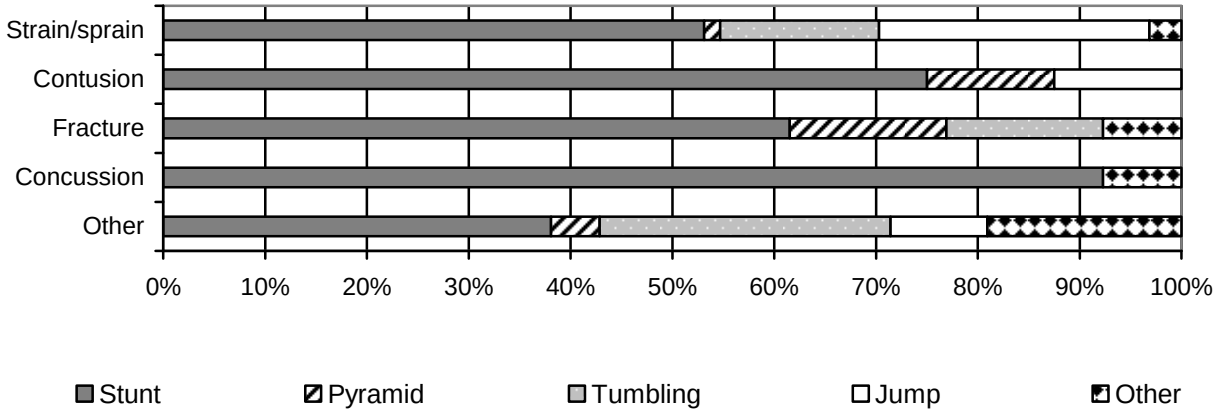
Table 22.7 Practice-Related Variables for Cheerleading Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	n	%
Time in Practice		
First 1/2 hour	13	13.3%
Second 1/2 hour	18	18.4%
1-2 hours into practice	59	60.2%
>2 hours into practice	8	8.2%
Total	**98**	**100%**

Table 22.8 Activities Leading to Cheerleading Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Competition		Practice		Performance		Overall	
	n	%	n	%	n	%	n	%
Activity								
Stunt	5	45.5%	63	63.6%	12	54.5%	80	60.6%
Jump	1	9.1%	14	14.1%	5	22.7%	20	15.2%
Tumbling	2	18.2%	12	12.1%	4	18.2%	18	13.6%
Pyramid	0	0.0%	5	5.1%	0	0.0%	5	3.8%
Other	3	27.3%	5	5.1%	1	4.5%	9	6.8%
Total	**11**	**100%**	**99**	**100%**	**22**	**100%**	**132**	**100%**

Figure 22.4 Activity Resulting in Cheerleading Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year



XXIII. Gender Differences within Sports

23.1 Boys' and Girls' Soccer

Table 23.1 Comparison of Boys' and Girls' Soccer Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' soccer	Girls' soccer*	RR (95% CI)†
Total	1.79	**2.11**	**1.18 (1.04-1.34)**
Competition	3.58	**4.48**	**1.25 (1.06-1.47)**
Practice	1.00	**1.04**	1.03 (0.84-1.28)

*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 23.10 Comparison of Body Sites of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Body Site			
Ankle	17.4%	**23.2%**	1.50 (0.84-2.66)
Knee	14.4%	**22.8%**	**2.15 (1.18-3.95)**
Head/face	17.0%	**18.6%**	0.75 (0.47-1.20)
Hip/thigh/upper leg	**19.1%**	10.6%	1.70 (0.84-3.46)
Hand/wrist	**6.2%**	3.8%	0.89 (0.23-3.39)
Shoulder	1.5%	**1.7%**	0.81 (0.10-6.46)
Trunk	**5.8%**	5.6%	1.31 (0.49-3.50)
Lower leg	**8.8%**	7.9%	1.35 (0.55-3.30)
Arm/elbow	**2.8%**	1.0%	2.11 (0.38-11.63)
Foot	**6.2%**	4.0%	1.30 (0.40-4.19)
Neck	0.4%	**0.8%**	1.50 (0.13-16.67)
Other	**0.2%**	0.0%	---
Total	**100%**	**100%**	---

Table 23.11 Comparison of Diagnoses of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Diagnosis			
Strain/sprain	44.9%	**51.5%**	**1.61 (1.14-2.28)**
Contusion	**18.5%**	12.6%	**1.67 (1.01-2.76)**
Fracture	**11.4%**	5.0%	**2.24 (1.02-4.91)**
Concussion	10.8%	**15.7%**	0.93 (0.52-1.66)
Other	14.4%	**15.3%**	1.22 (0.59-2.51)
Total	**100%**	**100%**	---

Table 23.12 Most Common Boys' and Girls' Soccer Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Diagnosis			
Hip/thigh/upper leg strain/sprain	**15.7%**	7.9%	2.05 (0.85-4.91)
Ankle strain/sprain	14.7%	**21.3%**	**1.96 (1.02-3.78)**
Head/face concussion	10.8%	**15.7%**	0.93 (0.52-1.66)
Knee strain/sprain	6.0%	**11.9%**	**3.35 (1.27-8.87)**
Knee other	4.3%	**7.5%**	2.33 (0.57-9.47)

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

Table 23.13 Comparison of Time Loss of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Time Loss			
1-2 days	**20.0%**	16.7%	1.73 (0.91-3.26)
3-6 days	27.9%	**29.1%**	1.55 (0.96-2.52)
7-9 days	**18.5%**	13.5%	1.61 (0.94-2.74)
10-21 days	13.7%	**15.6%**	0.84 (0.45-1.56)
22 days or more	5.2%	**7.1%**	1.86 (0.63-5.50)
Other	14.6%	**18.2%**	1.35 (0.79-2.32)
Total	**100%**	**100%**	---

Table 23.14 Comparison of Mechanisms of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Soccer Mechanism			
Contact with ball	9.8%	**10.4%**	1.42 (0.60-3.35)
Contact with goal	0.7%	**0.8%**	---
Stepped on/fell on/kicked	**12.0%**	11.2%	1.19 (0.65-2.15)
Slide tackle	**6.8%**	5.3%	2.27 (0.84-6.15)
Contact with another player	**31.4%**	30.1%	1.00 (0.74-1.35)
Rotation around planted foot/inversion	9.2%	**17.2%**	1.87 (0.84-4.14)
Uneven playing surface	2.2%	**3.2%**	35.37 (4.00-312.37)
N/A (overuse, heat illness, conditioning, etc.)	**19.2%**	14.6%	**3.05 (1.03-9.01)**
Other	**8.9%**	7.2%	1.35 (0.51-3.62)
Total	**100%**	**100%**	---

Table 23.15 Comparison of Activities of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' soccer	Girls' soccer	IPR (95% CI)
Soccer Activity			
General play	**24.0%**	20.7%	1.34 (0.79-2.27)
Defending	9.7%	**13.1%**	1.54 (0.77-3.08)
Chasing loose ball	11.4%	**12.1%**	1.64 (0.87-3.11)
Ball handling/dribbling	**11.6%**	11.2%	1.50 (0.68-3.30)
Goaltending	6.8%	**8.0%**	0.55 (0.23-1.34)
Heading ball	**7.9%**	6.9%	1.56 (0.71-3.43)
Receiving pass	5.7%	**6.0%**	0.99 (0.38-2.61)
Passing (foot)	**5.9%**	5.8%	0.67 (0.24-1.87)
Shooting (foot)	4.8%	**5.4%**	**3.64 (1.23-10.76)**
Other	**12.2%**	10.8%	1.61 (0.54-4.74)
Total	**100%**	**100%**	---

23.2 Boys' and Girls' Volleyball

Table 23.2 Comparison of Boys' and Girls' Volleyball Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' volleyball	Girls' volleyball	RR (95% CI)*
Total	0.90	**1.01**	1.13 (0.66-1.93)
Competition	**1.33**	1.01	1.32 (0.61-2.85)
Practice	0.68	**1.01**	1.51 (0.71-3.22)

Table 23.20 Comparison of Body Sites of Boys' and Girls' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' volleyball	Girls' volleyball	IPR (95% CI)
Body Site			
Ankle	**64.3%**	36.0%	**1.72 (1.01-2.94)**
Knee	0.0%	**15.4%**	---
Head/face	0.0%	**9.7%**	---
Hip/thigh/upper leg	0.0%	**9.7%**	---
Hand/wrist	0.0%	**8.9%**	---
Shoulder	**7.1%**	4.9%	0.98 (0.94-1.01)
Trunk	**7.1%**	5.3%	1.04 (1.00-1.08)
Lower leg	**7.1%**	3.6%	1.01 (0.99-1.04)
Arm/elbow	0.0%	**1.2%**	**---**
Foot	0.0%	**4.0%**	---
Other	**14.3%**	1.2%	0.71 (0.45-1.14)
Total	**100%**	**100%**	---

Table 23.21 Comparison of Diagnoses of Boys' and Girls' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' volleyball	Girls' volleyball	IPR (95% CI)
Diagnosis			
Strain/sprain	**71.4%**	61.5%	1.05 (0.21-6.38)
Contusion	**7.1%**	6.9%	2.34 (0.32-17.37)
Fracture	0.0%	**3.2%**	---
Concussion	0.0%	**8.5%**	**---**
Other	**21.4%**	19.8%	1.46 (0.21-10.09)
Total	**100%**	**100%**	---

Table 23.22 Most Common Boys' and Girls' Volleyball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' volleyball	Girls' volleyball	IPR (95% CI)
Diagnosis			
Ankle strain/sprain	**64.3%**	33.6%	**1.78 (1.04-3.04)**
Head/face concussion	0.0%	**8.5%**	**---**
Hip/thigh/upper leg strain/sprain	0.0%	**8.5%**	**---**
Shoulder other	**7.1%**	2.8%	5.47 (0.20-149.90)
Trunk strain/sprain	**7.1%**	2.8%	2.73 (0.14-55.30)

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

Table 23.23 Comparison of Time Loss of Boys' and Girls' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' volleyball	Girls' volleyball	IPR (95% CI)
Time Loss			
1-2 days	7.1%	**18.0%**	0.90 (0.84-0.97)
3-6 days	7.1%	**27.9%**	1.64 (0.26-10.51)
7-9 days	**28.6%**	17.2%	**3.31 (1.49-7.35)**
10-21 days	**50.0%**	17.2%	1.45 (0.41-5.05)
22 days or more	0.0%	**5.3%**	**---**
Other	7.1%	**14.3%**	0.79 (0.71-0.88)
Total	**100%**	**100%**	---

Table 23.24 Comparison of Mechanisms of Boys' and Girls' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' volleyball	Girls' volleyball	IPR (95% CI)
Volleyball Mechanism			
Jumping/landing	**28.6%**	23.0%	2.12 (0.81-5.53)
N/A (overuse, heat illness, conditioning, etc.)	7.1%	**16.4%**	0.57 (0.03-10.34)
Diving for ball	7.1%	**15.6%**	3.41 (0.23-51.28)
Contact with teammate	14.3%	**15.2%**	0.62 (0.18-2.20)
Rotation around planted foot/inversion	7.1%	**10.7%**	1.90 (0.12-29.39)
Contact with ball	0.0%	**8.2%**	**---**
Contact with opponent	**7.1%**	4.5%	0.53 (0.03-8.15)
Contact with standard/pole	0.0%	**0.8%**	---
Contact with seats/bleachers/table	0.0%	**0.4%**	---
Contact with officials stand	0.0%	**0.4%**	---
Other	**28.6%**	4.9%	**11.29 (1.86-68.34)**
Total	**100%**	**100%**	---

Table 23.25 Comparison of Activities of Boys' and Girls' Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' volleyball	Girls' volleyball	IPR (95% CI)
Volleyball Activity			
General play	**21.4%**	21.2%	0.64 (0.04-10.11)
Blocking	**64.3%**	20.7%	**3.47 (2.12-5.69)**
Digging	7.1%	**14.5%**	2.53 (0.16-38.56)
Spiking	0.0%	**14.1%**	---
Passing	0.0%	**10.8%**	---
Conditioning	0.0%	**7.1%**	---
Setting	0.0%	**5.0%**	**---**
Serving	0.0%	**2.9%**	**---**
Other	**7.1%**	3.7%	3.67 (0.44-30.76)
Total	**100%**	**100%**	---

23.3 Boys' and Girls' Basketball

Table 23.3 Comparison of Boys' and Girls' Basketball Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' basketball	Girls' basketball	RR (95% CI)*
Total	1.54	**1.55**	1.01 (0.88-1.16)
Competition	**2.82**	2.61	1.08 (0.90-1.30)
Practice	1.00	**1.08**	1.08 (0.89-1.32)

Table 23.30 Comparison of Body Sites of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Body Site			
Ankle	34.4%	**37.5%**	1.15 (0.80-1.65)
Knee	11.7%	**13.5%**	1.01 (0.54-1.91)
Head/face	**19.9%**	15.9%	0.98 (0.57-1.69)
Hip/thigh/upper leg	**6.1%**	5.5%	**2.95 (1.02-8.55)**
Hand/wrist	**8.4%**	8.1%	2.91 (0.74-11.47)
Shoulder	3.2%	**3.4%**	2.35 (0.72-7.70)
Trunk	**5.2%**	4.9%	0.50 (0.16-1.55)
Lower leg	2.6%	**3.1%**	0.66 (0.04-10.53)
Arm/elbow	1.5%	**1.8%**	1.26 (0.28-5.65)
Foot	**5.6%**	5.2%	0.82 (0.23-2.98)
Neck	**0.2%**	0.0%	---
Other	**1.1%**	1.0%	---
Total	**100%**	**100%**	---

Table 23.31 Comparison of Diagnoses of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Diagnosis			
Strain/sprain	53.8%	**59.5%**	1.13 (0.86-1.48)
Contusion	**9.8%**	6.3%	1.46 (0.65-3.28)
Fracture	**7.8%**	7.6%	2.30 (0.80-6.66)
Concussion	**13.9%**	12.1%	0.98 (0.53-1.84)
Other	**14.8%**	14.5%	0.79 (0.37-1.68)
Total	**100%**	**100%**	---

Table 23.32 Most Common Boys' and Girls' Basketball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Diagnosis			
Ankle strain/sprain	33.0%	**36.1%**	0.80 (0.54-1.19)
Head/face concussion	**13.9%**	12.1%	0.97 (0.52-1.81)
Knee strain/sprain	5.0%	**6.1%**	1.56 (0.58-4.18)
Knee other	3.7%	**6.3%**	1.44 (0.41-4.99)
Hip/thigh/upper leg strain/sprain	3.0	**4.7%**	0.55 (0.11-2.66)

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

Table 23.33 Comparison of Time Loss of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Time Loss			
1-2 days	**17.5%**	13.6%	**2.61 (1.24-5.48)**
3-6 days	**28.9%**	27.0%	1.03 (0.65-1.63)
7-9 days	16.4%	**18.4%**	1.28 (0.72-2.29)
10-21 days	17.3%	**19.4%**	1.30 (0.72-2.36)
22 days or more	**7.7%**	7.6%	0.53 (0.17-1.64)
Other	12.3%	**13.9%**	0.80 (0.43-1.49)
Total	**100%**	**100%**	---

Table 23.34 Comparison of Mechanisms of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Basketball Mechanism			
Collision with another player	**28.1%**	26.0%	1.15 (0.74-1.78)
Jumping/landing	**29.2%**	21.7%	1.56 (0.95-2.54)
Rotation around a planted foot/inversion	10.3%	**16.6%**	**2.16 (1.08-4.29)**
N/A (e.g., overuse, heat illness, etc.)	7.7%	**11.3%**	0.46 (0.09-2.26)
Stepped on/fell on/kicked	**7.9%**	7.5%	0.66 (0.27-1.62)
Contact with ball	2.9%	**5.6%**	0.27 (0.05-1.35)
Other	**13.2%**	10.1%	0.70 (0.35-1.38)
Total	**100%**	**100%**	---

Table 23.35 Comparison of Activities of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' basketball	Girls' basketball	IPR (95% CI)
Basketball Activity			
Rebounding	**24.5%**	24.1%	0.99 (0.60-1.63)
General play	16.8%	**18.7%**	1.88 (0.98-3.62)
Defending	15.9%	**16.8%**	1.03 (0.57-1.88)
Chasing loose ball	11.3%	**13.4%**	1.65 (0.83-3.29)
Shooting	**14.6%**	7.0%	**3.24 (1.17-8.97)**
Receiving pass	4.2%	**6.7%**	0.48 (0.10-2.31)
Ball handling/dribbling	**6.0%**	5.1%	1.21 (0.30-4.80)
Other	6.8%	**8.3%**	1.79 (0.36-8.92)
Total	**100%**	**100%**	---

23.4 Boys' Baseball and Girls' Softball

Table 23.4 Comparison of Baseball and Softball Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Baseball	Softball	RR (95% CI)
Total	0.93	1.15	**1.23 (1.01-1.48)**
Competition	1.51	1.68	1.11 (0.86-1.45)
Practice	0.63	0.87	**1.40 (1.06-1.84)**

Table 23.40 Comparison of Body Sites of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Baseball	Softball	IPR (95% CI)
Body Site			
Ankle	10.8%	**13.7%**	1.53 (0.59-3.97)
Knee	**8.6%**	7.8%	0.85 (0.30-2.38)
Head/face	11.7%	**19.6%**	0.85 (0.39-1.87)
Hip/thigh/upper leg	**9.9%**	9.8%	1.02 (0.34-3.07)
Hand/wrist	15.8%	**20.6%**	0.88 (0.38-2.02)
Shoulder	**15.8%**	9.3%	0.79 (0.19-3.25)
Trunk	**8.1%**	5.4%	0.63 (0.07-5.93)
Lower leg	4.1%	**4.4%**	0.98 (0.15-6.22)
Arm/elbow	**12.6%**	5.4%	4.77 (0.98-23.20)
Foot	2.3%	**2.9%**	---
Neck	0.5%	**1.0%**	---
Total	**100%**	**100%**	---

Table 23.41 Comparison of Diagnoses of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Baseball	Softball	IPR (95% CI)
Diagnosis			
Strain/sprain	37.3%	**42.9%**	1.40 (0.86-2.26)
Contusion	**14.5%**	11.3%	1.86 (0.63-5.48)
Fracture	**15.9%**	13.8%	**4.27 (1.35-13.51)**
Concussion	5.0%	**14.3%**	2.12 (0.69-6.52)
Other	**27.3%**	17.7%	0.93 (0.42-2.03)
Total	**100%**	**100%**	---

Table 23.42 Most Common Baseball and Softball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Baseball	Softball	IPR (95% CI)
Diagnosis			
Head/face concussion	5.0%	**14.3%**	2.20 (0.71-6.77)
Ankle strain/sprain	8.7%	**11.3%**	1.50 (0.52-4.27)
Hand/wrist fracture	8.7%	**9.9%**	0.34 (0.08-1.35)
Hip/thigh/upper leg strain/sprain	7.8%	**7.9%**	0.73 (0.23-2.30)
Shoulder other	**10.5%**	3.9%	2.13 (0.34-13.17)

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

Table 23.43 Comparison of Time Loss of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Baseball	Softball	IPR (95% CI)
Time Loss			
1-2 days	**13.5%**	13.4%	0.59 (0.17-2.10)
3-6 days	**27.0%**	23.8%	1.30 (0.61-2.74)
7-9 days	13.1%	**20.3%**	**2.47 (1.04-5.84)**
10-21 days	13.1%	**19.8%**	1.22 (0.56-2.67)
22 days or more	**10.8%**	7.9%	2.72 (0.78-9.45)
Other	**22.5%**	14.9%	1.93 (0.89-4.21)
Total	**100%**	**100%**	---

Table 23.44 Comparison of Mechanisms of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Baseball	Softball	IPR (95% CI)
Baseball/Softball Mechanism			
N/A (overuse, heat illness, conditioning, etc.)	15.3%	**15.8%**	2.01 (0.49-8.32)
Contact with another player	**14.0%**	8.9%	2.16 (0.81-5.72)
Contact with bases	10.8%	10.8%	---
Hit by pitch	**9.5%**	7.4%	**3.91 (1.05-14.58)**
Hit by batted ball	8.1%	**12.8%**	2.40 (0.72-8.00)
Throwing - pitching	**8.1%**	5.4%	0.69 (0.18-2.72)
Rotation around a planted foot/inversion	7.2%	**7.9%**	0.77 (0.23-2.53)
Throwing - not pitching	**7.2%**	6.9%	0.36 (0.06-2.04)
Contact with thrown ball (non-pitch)	1.8%	**9.9%**	0.76 (0.18-3.20)
Other	**18.2%**	14.3%	0.93 (0.40-2.19)
Total	**100%**	**100%**	---

Table 23.45 Comparison of Activities of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Baseball	Softball	IPR (95% CI)
Baseball/Softball Activity			
Pitching	**15.8%**	10.5%	1.32 (0.53-3.25)
Throwing (not pitching)	7.7%	**9.5%**	2.76 (0.49-15.56)
Fielding a thrown ball	5.0%	**8.0%**	0.51 (0.16-1.68)
Fielding a batted ball	14.4%	**18.0%**	1.26 (0.53-2.96)
Batting	**13.1%**	11.5%	1.39 (0.53-3.68)
Running bases	**15.8%**	14.0%	0.78 (0.36-1.66)
Sliding	**9.0%**	7.5%	0.65 (0.17-2.49)
Catching	5.9%	**7.0%**	3.37 (0.54-20.97)
Conditioning	2.3%	**2.5%**	---
General play	**7.7%**	6.0%	0.98 (0.06-15.74)
Other	3.6%	**5.5%**	0.54 (0.07-4.00)
Total	**100%**	**100%**	---

23.5 Boys' and Girls' Swimming

Table 23.5 Comparison of Boys' and Girls' Swimming Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' swimming	Girls' swimming*	RR (95% CI)†
Total	0.35	**0.37**	1.05 (0.65-1.70)
Competition	0.19	0.19	---
Practice	0.39	**0.41**	1.06 (0.64-1.76)

*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 23.50 Comparison of Body Sites of Boys' and Girls' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' swimming	Girls' swimming	IPR (95% CI)
Body Site			
Ankle	0.0%	**5.3%**	---
Knee	0.0%	**7.9%**	---
Head/face	0.0%	**2.6%**	---
Hip/thigh/upper leg	6.9%	**15.8%**	0.33 (0.02-7.14)
Hand/wrist	**6.9%**	5.3%	0.57 (0.03-12.39)
Shoulder	**55.2%**	42.1%	0.67 (0.10-4.35)
Trunk	3.4%	**10.5%**	0.78 (0.11-30.30)
Lower leg	**6.9%**	2.6%	2.62 (0.25-27.51)
Arm/elbow	**6.9%**	0.0%	---
Foot	**3.4%**	2.6%	1.31 (0.09-20.08)
Neck	**6.9%**	2.6%	2.62 (0.25-27.51)
Other	**3.4%**	2.6%	1.31 (0.09-20.08)
Total	**100%**	**100%**	**---**

Table 23.51 Comparison of Diagnoses of Boys' and Girls' Swimming Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' swimming	Girls' swimming	IPR (95% CI)
Diagnosis			
Strain/sprain	41.4%	**54.1%**	0.75 (0.21-2.66)
Concussion	**6.9%**	5.4%	1.33 (0.76-2.35)
Contusion	0.0%	**2.7%**	---
Fracture	0.0%	**2.7%**	---
Other	**51.7%**	35.1%	1.33 (0.13-13.74)
Total	**100%**	**100%**	---

Table 23.52 Most Common Boys' and Girls' Swimming Injury Diagnoses, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' swimming	Girls' swimming	IPR (95% CI)
Diagnosis			
Shoulder strain/sprain	24.1%	**24.3%**	1.50 (0.23-9.80)
Shoulder other	**27.6%**	18.9%	1.46 (0.60-3.55)
Hip/thigh/upper leg strain/sprain	3.4%	**10.8%**	3.14 (0.37-26.56)
Trunk strain/sprain	0.0%	**5.4%**	**---**
Hip/thigh/upper leg other	3.4%	**5.4%**	1.57 (0.15-16.45)

Table 23.53 Comparison of Time Loss of Boys' and Girls' Swimming Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' swimming	Girls' swimming	IPR (95% CI)
Time Loss			
1-2 days	**41.4%**	27.8%	1.33 (0.13-13.74)
3-6 days	24.1%	**30.6%**	0.75 (0.07-7.73)
7-9 days	6.9%	**19.4%**	0.75 (0.07-7.73)
10-21 days	**13.8%**	2.8%	2.86 (0.44-18.48)
22 days or more	**6.9%**	5.6%	0.57 (0.03-12.4)
Other	6.9%	**13.9%**	2.01 (0.42-9.63)
Total	**100%**	**100%**	---

Table 23.54 Comparison of Mechanisms of Boys' and Girls' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' swimming	Girls' swimming	IPR (95% CI)
Swimming Mechanism			
N/A (overuse, heat illness, conditioning, etc.)	**72.4%**	68.4%	1.06 (0.78-1.45)
Contact with wall	**10.3%**	7.9%	1.31 (0.29-6.02)
Contact with deck	0.0%	**7.9%**	---
Contact with another person	**3.4%**	2.6%	1.31 (0.09-20.08)
Contact with platform	0.0%	**2.6%**	---
Contact with lane lines	**6.9%**	0.0%	---
Contact with bottom of the pool	**3.4%**	0.0%	---
Other	3.4%	**10.5%**	3.05 (0.36-25.87)
Total	**100%**	**100%**	**---**

Table 23.55 Comparison of Activities of Boys' and Girls' Swimming and Diving Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' swimming	Girls' swimming	IPR (95% CI)
Swimming Activity			
Swimming	**69.0%**	62.2%	1.11 (0.78-1.58)
Flip turn off wall	**13.8%**	8.1%	1.70 (0.41-7.01)
Diving off board/platform/starting platform	**10.3%**	8.1%	1.28 (0.28-5.86)
Touch turn off wall	0.0%	**2.7%**	**---**
Other	6.9%	**18.9%**	1.60 (0.06-45.90)
Total	**100%**	**100%**	---

23.6 Boys' and Girls' Track and Field

Table 23.6 Comparison of Boys' and Girls' Track and Field Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' track	Girls' track*	RR (95% CI)†
Total	0.86	**1.19**	**1.39 (1.16-1.66)**
Competition	**1.64**	1.39	1.17 (0.84-1.64)
Practice	0.67	**1.14**	**1.69 (1.36-2.10)**

*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 23.60 Comparison of Body Sites of Boys' and Girls' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' track	Girls' track	IPR (95% CI)
Body Site			
Ankle	8.1%	**14.2%**	3.28 (0.88-12.13)
Knee	12.2%	**13.0%**	0.86 (0.38-1.95)
Head/face	**4.1%**	2.4%	0.71 (0.15-3.40)
Hip/thigh/upper leg	**45.5%**	29.6%	1.71 (1.15-2.54)
Hand/wrist	1.4%	**2.4%**	1.40 (0.09-21.97)
Shoulder	2.3%	**2.8%**	8.47 (0.43-165.90)
Trunk	2.7%	**4.3%**	1.40 (0.09-21.97)
Lower leg	14.9%	**20.6%**	1.17 (0.38-3.65)
Arm/elbow	**1.4%**	1.2%	2.85 (0.28-28.55)
Foot	7.7%	**7.9%**	2.11 (0.62-7.12)
Neck	0.0%	**0.4%**	---
Other	0.0%	**1.2%**	---
Total	**100%**	**100%**	---

Table 23.61 Comparison of Diagnoses of Boys' and Girls' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' track	Girls' track	IPR (95% CI)
Diagnosis			
Strain/sprain	62.9%	**64.0%**	0.99 (0.77-1.26)
Contusion	**3.2%**	2.8%	0.72 (0.19-2.77)
Fracture	3.2%	**4.0%**	0.92 (0.16-5.35)
Concussion	**4.1%**	1.2%	1.08 (0.19-6.27)
Other	26.7%	**28.1%**	0.98 (0.51-1.89)
Total	**100%**	**100%**	---

Table 23.62 Most Common Boys' and Girls' Track and Field Injury Diagnoses, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' track	Girls' track	IPR (95% CI)
Diagnosis			
Shoulder other	**27.6%**	18.9%	1.46 (0.60-3.55)
Shoulder strain/sprain	24.1%	**24.3%**	1.01 (0.43-2.38)
Hip/thigh/upper leg strain/sprain	3.4%	**10.8%**	3.14 (0.37-26.56)
Trunk strain/sprain	0.0%	**5.4%**	---
Hip/thigh/upper leg other	3.4%	**5.4%**	1.57 (0.15-16.45)

Table 23.63 Comparison of Time Loss of Boys' and Girls' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' track	Girls' track	IPR (95% CI)
Time Loss			
1-2 days	7.9%	**13.7%**	1.94 (0.73-5.14)
3-6 days	37.2%	**37.3%**	1.23 (0.76-2.02)
7-9 days	**19.1%**	16.1%	0.95 (0.42-2.13)
10-21 days	17.2%	**15.3%**	0.70 (0.30-1.63)
22 days or more	**6.0%**	4.0%	2.32 (0.49-11.07)
Other	12.6%	**13.7%**	0.76 (0.38-1.54)
Total	**100%**	**100%**	---

Table 23.64 Comparison of Mechanisms of Boys' and Girls' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' track	Girls' track	IPR (95% CI)
Track Mechanism			
N/A (e.g., overuse, heat illness, conditioning, etc.)	55.5%	**59.7%**	1.08 (0.92-1.26)
Contact with ground/track/surface	**20.9%**	12.6%	1.65 (1.09-2.50)
Fall/trip	3.6%	**7.1%**	1.96 (0.87-4.41)
Contact with field equipment	5.0%	**5.1%**	1.03 (0.47-2.25)
Rotation around planted foot/inversion	3.2%	**3.6%**	1.12 (0.42-2.95)
Uneven playing surface	0.9%	**1.6%**	1.74 (0.32-9.40)
Contact with another person	**1.4%**	1.2%	1.15 (0.23-5.64)
Stepped on/kicked	**0.5%**	0.0%	---
Other	9.1%	9.1%	1.00 (0.56-1.77)
Total	**100%**	**100%**	---

Table 23.65 Comparison of Activities of Boys' and Girls' Track and Field Injuries, High School Sports-Related Injury Surveillance Study, US, 2009-10 School Year

	Boys' track	Girls' track	IPR (95% CI)
Track Activity			
Running	**61.6%**	56.9%	1.08 (0.93-1.26)
Jumping/landing	**16.0%**	12.3%	1.30 (0.83-2.04)
Conditioning	4.6%	**7.5%**	1.65 (0.78-3.46)
Throwing	4.6%	**6.3%**	1.39 (0.64-2.99)
Running hurdles	4.1%	**8.7%**	**2.13 (1.00-4.52)**
Warming up	2.3%	**3.6%**	1.56 (0.53-4.58)
Leaving block	**2.3%**	2.0%	1.16 (0.34-3.94)
Baton hand off	**1.4%**	0.4%	3.47 (0.36-33.07)
Hit by shot put/discus/javelin/hammer	0.0%	**0.4%**	---
Other	**3.2%**	2.0%	1.62 (0.52-5.02)
Total	**100%**	**100%**	---

XXIV. Reporter Demographics & Compliance

During the 2009-10 school year, 208 ATCs were invited to participate in the study at the beginning of the school year. ATCs were expected to report for every week in which they were enrolled. For example, an ATC who joined the study as a replacement school in week 10 was not expected to report for weeks 1-9. Overall, 192 enrolled ATCs reported an average of 40 study weeks. The majority of ATCs (81.3%) reported all the weeks during which they were enrolled, with only 13.5% of ATCs missing over 10 weeks. Internal validity checks yielded 92.3% sensitivity, 99.6% specificity, a positive predictive value of 96.0%, and a negative predictive value of 99.2%.

Prior to the start of the 2009-10 High School RIO™ study, participating ATCs were asked to complete a short demographics survey. Three-quarters (77.4%) of participating high schools were public schools, with the remainder being private. All ATCs provided services to athletes of their high school on 5 or more days each week. Nearly 70% (67.2%) of ATCs participating during the 2009-10 study year had previously participated in the High School RIO™ study.

An online "End of Season" survey gave all participating ATCs (both in the original study as well as in the expanded study (n=184 combined) the opportunity to provide feedback on their experiences with High School RIO™. This survey was completed by 116 ATCs (63.0%). Average reporting time burdens were 20 minutes for the weekly exposure report and 8 minutes for the injury report form. Using a 5 point Likert scale, RIO™ was overwhelmingly reported to be either very easy (55.2%) or somewhat easy (35.3%) to use (5 and 4 on the Likert scale, respectively), with ATCs being either very satisfied (56.0%) or somewhat satisfied (34.5%) with the study (5 and 4 on the Likert scale, respectively). Suggestions provided by ATCs, such as the

addition or clarification of questions or answer choices, will be used to improve the National High School Sports-Related Injury Surveillance Study for the 2010-11 school year.

XXV. 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 large nationally disperse 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.