

**SUMMARY REPORT**

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

**2010-2011 School Year**

**Compiled by:**

**R. Dawn Comstock, PhD**

**Christy L. Collins, MA**

**Natalie M. McIlvain, BS**

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

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



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## **Note**

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

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

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## **I. Introduction & Methodology**



## **1.1 Project Overview**

To combat the epidemic of obesity among youth in the United States (US), adolescents must be encouraged to get up off the couch and participate in physically active sports, recreation, and leisure activities. Participation in high school sports, one of the most popular physical activities among adolescents, has grown rapidly from an estimated 4.0 million participants in 1971-72 to an estimated 7.4 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 2005-06 school year, Dr. R. Dawn Comstock has conducted the National High School Sports-Related Injury Surveillance System to monitor injuries among US high school athletes participating in boys' football, boys' and girls' soccer, girls' volleyball, boys' and girls' basketball, boys' wrestling, boys' baseball, and girls' softball. This surveillance has been conducted using the time- and cost-efficient RIO™ (Reporting Information Online) surveillance system. The first three study years were funded by the Centers for Disease Control, the Research Institute at Nationwide Children's Hospital, DonJoy Orthotics, EyeBlack, and The Ohio State University. Through the generous contributions of the Centers for Disease Control, the National Federation of State High School Associations (NFHS), and the National Operating Committee on Standards for Athletic Equipment (NOCSAE), the National High School Sports-Related Injury Surveillance System was able to be continued during the 2010-11 school year.

### **1.3 Specific Aims**

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

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

- B) To calculate the rate of injuries per 1,000 athlete-competitions, per 1,000 athlete-practices, and per 1,000 athlete-exposures for US high school athletes in the 9 sports of interest.
- C) To provide detailed information about the injuries sustained by US high school athletes including the type, site, severity, initial and subsequent treatment/care, outcome, etc.
- D) To provide detailed information about the injury events including athlete demographics, position played, phase of play/activity, etc.
- E) To identify potential risk or protective factors.
- F) To compare injury rates and patterns from the 2005-06 through the 2010-11 school years.

#### **1.4 Project Design**

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

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

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

- A) Number of athlete-practices = the sum of the number of athletes at each practice during the past week. For example, if 20 athletes practiced on Monday through Thursday and 18 practiced on Friday, the number of athlete-practices would equal 98.
- B) Number of athlete-competitions = the sum of the number of athletes at each competition during the past week. For example, if 9 athletes played in a Freshman game, 12 in a JV game, and 14 in a Varsity game, the number of athlete-competitions would equal 35.

### **1.5 Sample Recruitment**

All eligible schools (i.e., all US high schools with a National Athletic Trainers' Association (NATA) affiliated certified athletic trainer (AT) willing to serve as a reporter) were categorized into 8 sampling strata by geographic location (northeast, midwest, south, and west) and high school size (enrollment  $\leq 1,000$  or  $> 1,000$  students). Participant schools were then randomly selected from each substrata to obtain 100 study schools. To maintain a nationally representative sample, if a school dropped out of the study, another school from the same stratum was randomly selected for replacement. Participating ATs were offered a \$300-\$400 honorarium depending on the number of sports reported along with individualized injury reports following the study's conclusion.

### **1.6 Data Collection**

Each AT that enrolled their school in National High School Sports-Related Injury Surveillance System received an email every Monday throughout the study period reminding them to enter their school's data into the surveillance system. Each participating AT was asked to complete 45 weekly exposure reports: one for each week from August 2, 2010 through June 12, 2011. Exposure reports collected exposure information (number of athlete-competitions and athlete-practices) and the number of reportable injuries sustained by student athletes of each

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

### **1.7 Data Management**

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

### **1.8 Data Analysis**

Data were analyzed using SAS software, version 9.1 and SPSS, version 19.0. Although fractures, concussions, and dental injuries resulting in <1 day time loss were collected, unless otherwise noted, analyses in this report excluded these injuries. With the exception of injury rates, data were weighted for all analyses to produce national estimates. For each sport in each stratum, weights account for the total number of US schools offering the sport and the average number of participating study schools reporting each week for that sport. For example, following is the algorithm used to calculate football weights for the small (enrollment  $\leq 1,000$ ) west stratum:

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

Injury rates were calculated as the ratio of unweighted case counts per 1,000 athlete-exposures, and they were compared using rate ratios (RR) with 95% confidence intervals (CI). Following is an example of the RR calculation comparing the rate of injury in boys' soccer to the rate of injury in girls' soccer:

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

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

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

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

## **II. Overall Injury Epidemiology**

**Table 2.1 Injury Rates by Sport and Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                         | # Injuries   | # Exposures      | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|-------------------------|--------------|------------------|--|---------------------------------------|
| <b>Overall total</b>    | <b>3,475</b> | <b>1,764,785</b> | <b>1.97</b>                                      | <b>1,195,815</b>                      |
| <b>Competition</b>      | <b>1,984</b> | <b>483,332</b>   | <b>4.10</b>                                      | <b>711,642</b>                        |
| <b>Practice</b>         | <b>1,491</b> | <b>1,281,453</b> | <b>1.16</b>                                      | <b>484,173</b>                        |
| Boys' football total    | 1,659        | 474,429          | 3.50   | 483,016                               |
| Competition             | 970          | 78,868           | 12.30  | 296,199                               |
| Practice                | 689          | 395,561          | 1.74   | 186,817                               |
| Boys' soccer total      | 262          | 168,389          | 1.56   | 138,974                               |
| Competition             | 156          | 50,680           | 3.08   | 81,238                                |
| Practice                | 106          | 117,709          | 0.90   | 57,736                                |
| Girls' soccer total     | 277          | 143,220          | 1.93   | 180,254                               |
| Competition             | 186          | 45,082           | 4.13   | 124,674                               |
| Practice                | 91           | 98,138           | 0.93   | 55,580                                |
| Girls' volleyball total | 154          | 159,719          | 0.96   | 50,711                                |
| Competition             | 66           | 55,800           | 1.18   | 21,416                                |
| Practice                | 88           | 103,919          | 0.85   | 29,295                                |
| Boys' basketball total  | 280          | 207,091          | 1.35   | 79,762                                |
| Competition             | 149          | 62,435           | 2.39   | 41,252                                |
| Practice                | 131          | 144,656          | 0.91   | 38,510                                |
| Girls' basketball total | 292          | 168,574          | 1.73   | 83,033                                |
| Competition             | 184          | 51,184           | 3.59   | 53,931                                |
| Practice                | 108          | 117,389          | 0.92   | 29,102                                |
| Boys' wrestling total   | 296          | 147,073          | 2.01   | 80,569                                |
| Competition             | 128          | 38,519           | 3.32   | 36,536                                |
| Practice                | 168          | 108,554          | 1.55   | 44,033                                |
| Boys' baseball total    | 133          | 164,130          | 0.81   | 46,796                                |
| Competition             | 83           | 55,577           | 1.49   | 29,789                                |
| Practice                | 50           | 108,553          | 0.46   | 17,008                                |
| Girls' softball total   | 122          | 129,861          | 0.94   | 52,700                                |
| Competition             | 62           | 42,887           | 1.45   | 26,607                                |
| Practice                | 60           | 86,974           | 0.69   | 26,093                                |

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



**Table 2.2 Proportion of Injuries Resulting in Time Loss, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                   | ≥1 days time loss | <1 day time loss | Total       |
|-------------------|-------------------|------------------|-------------|
| <b>Overall</b>    | 98.8%             | 1.2%             | <b>100%</b> |
| Boys' football    | 98.9%             | 1.1%             | <b>100%</b> |
| Boys' soccer      | 96.7%             | 3.3%             | <b>100%</b> |
| Girls' soccer     | 100.0%            | 0.0%             | <b>100%</b> |
| Girls' volleyball | 98.6%             | 1.4%             | <b>100%</b> |
| Boys' basketball  | 97.1%             | 2.9%             | <b>100%</b> |
| Girls' basketball | 100.0%            | 0.0%             | <b>100%</b> |
| Boys' wrestling   | 99.6%             | 0.4%             | <b>100%</b> |
| Boys' baseball    | 98.7%             | 1.3%             | <b>100%</b> |
| Girls' softball   | 100.0%            | 0.0%             | <b>100%</b> |

\*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.

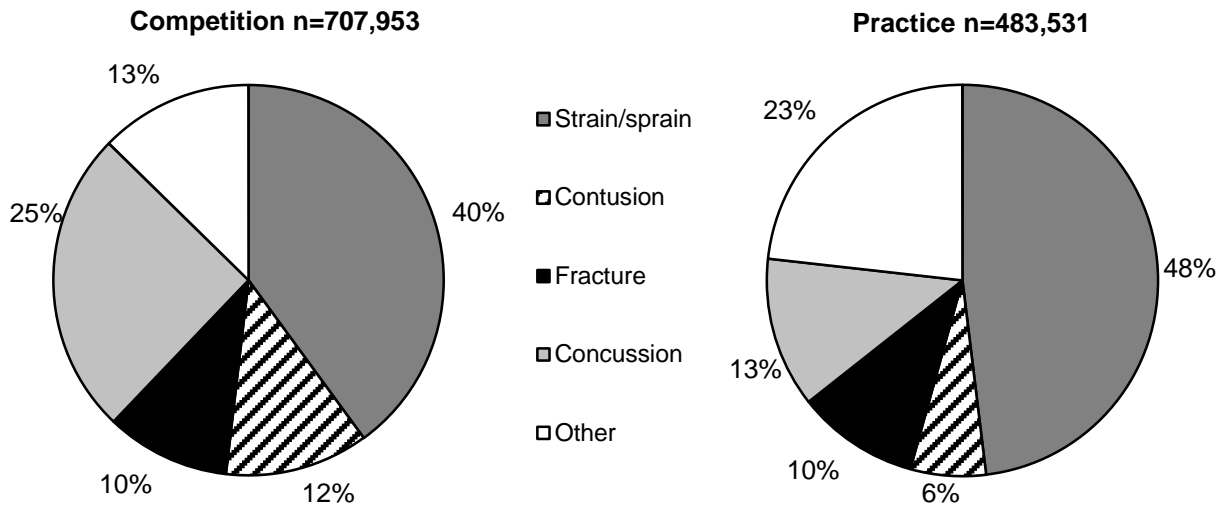
**Table 2.3 Demographic Characteristics of Injured Athletes by Sex, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                       | <b>Male</b><br>n= 817,222 | <b>Female</b><br>n=365,120 |
|-----------------------|---------------------------|----------------------------|
| <b>Year in School</b> |                           |                            |
| Freshman              | 18.5%                     | 25.0%                      |
| Sophomore             | 25.9%                     | 28.3%                      |
| Junior                | 26.0%                     | 26.5%                      |
| Senior                | 29.6%                     | 20.2%                      |
| <b>Total†</b>         | <b>100%</b>               | <b>100%</b>                |
| <b>Age (years)</b>    |                           |                            |
| Minimum               | 12                        | 13                         |
| Maximum               | 19                        | 18                         |
| Mean (St. Dev.)       | 16.1 (1.2)                | 15.7 (1.3)                 |
| <b>BMI</b>            |                           |                            |
| Minimum               | 9.1                       | 13.8                       |
| Maximum               | 51.4                      | 45.0                       |
| Mean (St. Dev.)       | 25.0 (4.7)                | 22.2 (3.3)                 |

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

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

**Figure 2.1 Injury Diagnosis by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 2.4 Body Site of Injury by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Competition    |             | Practice       |             | Overall          |             |
|---------------------|----------------|-------------|----------------|-------------|------------------|-------------|
|                     | n              | %           | n              | %           | n                | %           |
| Head/face           | 199,422        | 28.0%       | 78,516         | 16.2%       | 277,938          | 23.3%       |
| Ankle               | 132,539        | 18.6%       | 78,969         | 16.3%       | 211,508          | 17.7%       |
| Knee                | 105,555        | 14.8%       | 63,898         | 13.2%       | 169,454          | 14.2%       |
| Hand/wrist          | 58,736         | 8.3%        | 47,448         | 9.8%        | 106,184          | 8.9%        |
| Hip/thigh/upper leg | 45,326         | 6.4%        | 53,345         | 11.0%       | 98,671           | 8.3%        |
| Shoulder            | 53,736         | 7.6%        | 29,726         | 6.2%        | 83,462           | 7.0%        |
| Lower leg           | 25,675         | 3.6%        | 33,910         | 7.0%        | 59,586           | 5.0%        |
| Trunk               | 27,560         | 3.9%        | 28,527         | 5.9%        | 56,088           | 4.7%        |
| Foot                | 21,333         | 3.0%        | 26,289         | 5.4%        | 47,622           | 4.0%        |
| Arm/elbow           | 18,789         | 2.6%        | 17,706         | 3.7%        | 36,495           | 3.1%        |
| Neck                | 9,081          | 1.3%        | 13,009         | 2.7%        | 22,089           | 1.8%        |
| Other               | 13,335         | 1.9%        | 11,887         | 2.5%        | 25,222           | 2.1%        |
| <b>Total*</b>       | <b>711,087</b> | <b>100%</b> | <b>483,232</b> | <b>100%</b> | <b>1,194,319</b> | <b>100%</b> |

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

**Table 2.5 Most Commonly Injured Ankle Structures, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                                 | Male           |             | Female        |             | Total          |             |
|---------------------------------|----------------|-------------|---------------|-------------|----------------|-------------|
|                                 | n              | %           | n             | %           | n              | %           |
| <b>Ankle Ligament</b>           |                |             |               |             |                |             |
| Anterior talofibular ligament   | 79,559         | 71.7%       | 80,767        | 81.3%       | 161,463        | 76.3%       |
| Calcaneofibular ligament        | 26,118         | 23.5%       | 27,311        | 27.5%       | 54,566         | 25.8%       |
| Anterior tibiofibular ligament  | 33,309         | 30.0%       | 15,577        | 15.7%       | 50,023         | 23.7%       |
| Posterior talofibular ligament  | 9,732          | 8.8%        | 13,743        | 13.8%       | 23,475         | 11.1%       |
| Deltoid ligament                | 9,186          | 8.3%        | 5,619         | 5.7%        | 14,805         | 7.0%        |
| Posterior tibiofibular ligament | 3,269          | 2.9%        | 4,248         | 4.3%        | 8,654          | 4.1%        |
| <b>Total</b>                    | <b>110,986</b> | <b>100%</b> | <b>99,386</b> | <b>100%</b> | <b>211,508</b> | <b>100%</b> |

\*Multiple responses allowed per injury report.

**Table 2.6 Most Commonly Injured Knee Structures, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

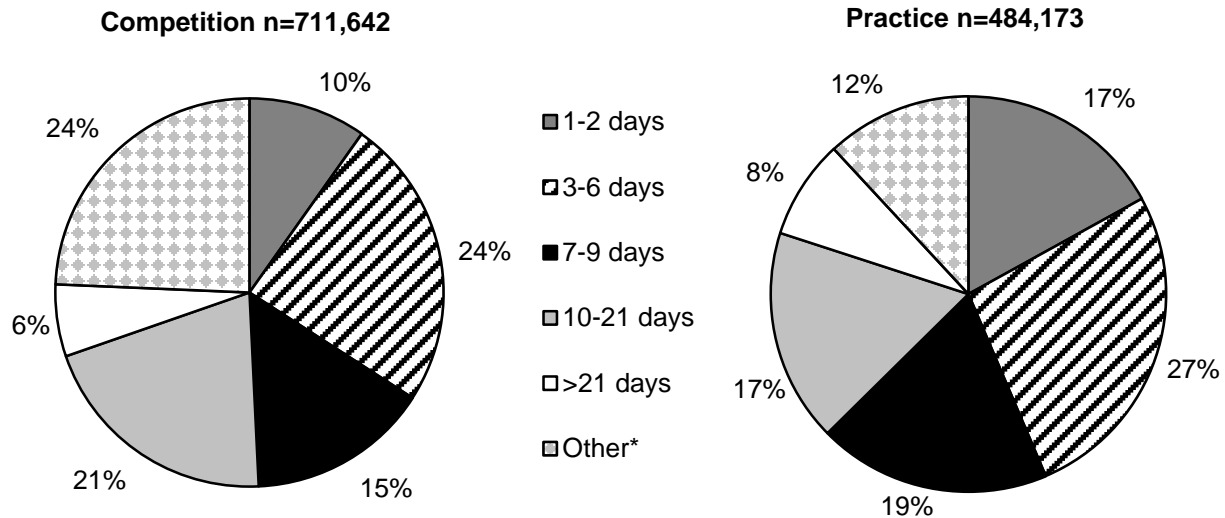
|                                | Male           |             | Female        |             | Total          |             |
|--------------------------------|----------------|-------------|---------------|-------------|----------------|-------------|
|                                | n              | %           | n             | %           | n              | %           |
| <b>Knee Ligament</b>           |                |             |               |             |                |             |
| Medial collateral ligament     | 32,718         | 28.9%       | 13,140        | 23.4%       | 45,858         | 27.1%       |
| Anterior cruciate ligament     | 24,680         | 21.8%       | 15,035        | 26.7%       | 39,714         | 23.4%       |
| Patella and/or patellar tendon | 30,550         | 27.0%       | 11,397        | 20.3%       | 41,947         | 24.8%       |
| Torn cartilage (meniscus)      | 21,080         | 18.6%       | 10,866        | 19.3%       | 31,946         | 18.9%       |
| Lateral collateral ligament    | 10,349         | 9.1%        | 2,852         | 5.1%        | 13,201         | 7.8%        |
| Posterior cruciate ligament    | 2,245          | 2.0%        | 1,592         | 2.8%        | 3,838          | 2.3%        |
| <b>Total</b>                   | <b>113,206</b> | <b>100%</b> | <b>56,247</b> | <b>100%</b> | <b>169,454</b> | <b>100%</b> |

\*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, 2010-11 School Year**

| Diagnosis                         | Competition<br>n=707,399 |        | Practice<br>n=482,586 |        | Overall<br>n=1,189,985 |        |
|-----------------------------------|--------------------------|--------|-----------------------|--------|------------------------|--------|
|                                   | n                        | %      | n                     | %      | n                      | %      |
| Head/Face Concussion              | 177,904                  | 25.10% | 60,026                | 12.40% | 237,931                | 20.00% |
| Ankle Strain/Sprain               | 122,585                  | 17.30% | 71,947                | 14.90% | 194,532                | 16.30% |
| Knee strain/sprain                | 62,121                   | 8.80%  | 29,924                | 6.20%  | 92,046                 | 7.70%  |
| Hip/thigh/upper leg strain/sprain | 27,922                   | 3.90%  | 48,809                | 10.10% | 76,731                 | 6.40%  |
| Knee other                        | 28,372                   | 4.00%  | 28,717                | 6.00%  | 57,089                 | 4.80%  |
| Hand/wrist fracture               | 27,438                   | 3.90%  | 20,272                | 4.20%  | 47,710                 | 4.00%  |
| Shoulder other                    | 27,685                   | 3.90%  | 16,616                | 3.40%  | 44,301                 | 3.70%  |
| Hand/wrist strain/sprain          | 19,041                   | 2.70%  | 13,736                | 2.80%  | 32,777                 | 2.80%  |
| Trunk strain/sprain               | 9,983                    | 1.40%  | 18,482                | 3.80%  | 28,465                 | 2.40%  |
| Shoulder strain/sprain            | 15,807                   | 2.20%  | 10,205                | 2.10%  | 26,012                 | 2.20%  |

**Figure 2.2 Time Loss by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

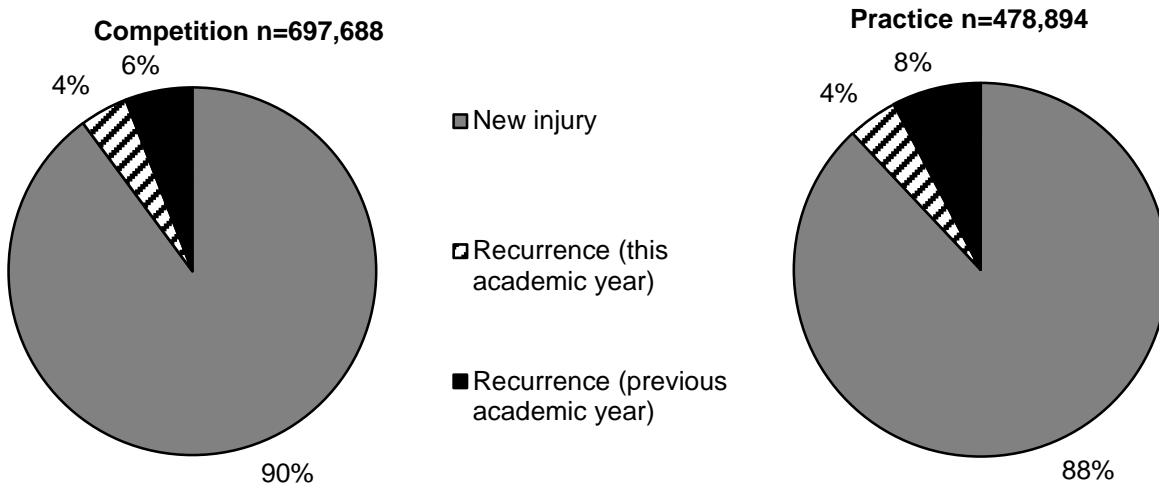


\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 2.8 Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition    |             | Practice       |             | Overall          |             |
|-------------------------|----------------|-------------|----------------|-------------|------------------|-------------|
|                         | n              | %           | n              | %           | n                | %           |
| <b>Need for surgery</b> |                |             |                |             |                  |             |
| Required surgery        | 64,317         | 9.2%        | 32,151         | 6.8%        | 96,467           | 8.2%        |
| Did not require surgery | 632,794        | 90.8%       | 440,162        | 93.2%       | 1,072,956        | 91.8%       |
| <b>Total</b>            | <b>697,111</b> | <b>100%</b> | <b>472,313</b> | <b>100%</b> | <b>1,169,423</b> | <b>100%</b> |

**Figure 2.3 New and Recurring Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 2.9 Time during Season of Injury, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n                | %           |
|-----------------------|------------------|-------------|
| <b>Time in Season</b> |                  |             |
| Preseason             | 240,839          | 20.2%       |
| Regular season        | 895,981          | 75.2%       |
| Post season           | 55,078           | 4.6%        |
| <b>Total</b>          | <b>1,191,898</b> | <b>100%</b> |

**Table 2.10 Practice-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | <b>n</b>       | <b>%</b>    |
|-------------------------|----------------|-------------|
| <b>Time in Practice</b> |                |             |
| First 1/2 hour          | 54,238         | 11.5%       |
| Second 1/2 hour         | 86,649         | 18.4%       |
| 1-2 hours into practice | 274,345        | 58.2%       |
| >2 hours into practice  | 55,758         | 11.8%       |
| <b>Total</b>            | <b>470,990</b> | <b>100%</b> |

**Table 2.11 Methods for Injury Evaluation and Assessment, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                                     | n                | %           |
|-------------------------------------|------------------|-------------|
| <b>% of Injuries Evaluated by:*</b> |                  |             |
| Certified athletic trainer          | 1,112,900        | 93.1%       |
| General physician                   | 445,830          | 37.3%       |
| Orthopedic physician                | 368,894          | 30.8%       |
| Physicians assistant                | 16,722           | 1.4%        |
| Chiropractor                        | 14,385           | 1.2%        |
| Neurologist/neuropsychologist       | 14,594           | 1.2%        |
| Nurse practitioner                  | 5,916            | 0.5%        |
| Dentist/oral surgeon                | 2,624            | 0.2%        |
| Other                               | 38,772           | 3.2%        |
| <b>Total</b>                        | <b>1,195,815</b> | <b>100%</b> |
| <b>% of Injuries Assessed by:*</b>  |                  |             |
| Evaluation                          | 1,156,993        | 96.8%       |
| X-ray                               | 432,970          | 36.2%       |
| MRI                                 | 133,864          | 11.2%       |
| CT-scan                             | 60,371           | 5.0%        |
| Surgery                             | 8,598            | 0.7%        |
| Blood work/lab test                 | 8,906            | 0.7%        |
| Other                               | 12,564           | 1.1%        |
| <b>Total</b>                        | <b>1,195,815</b> | <b>100%</b> |

\*Multiple responses allowed per injury report.

### **III. Boys' Football Injury Epidemiology**



**Table 3.1 Football Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | # Injuries   | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|--------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>1,659</b> | <b>474,429</b> | <b>3.50</b>                                      | <b>483,016</b>                        |
| Competition  | 970          | 78,868         | 12.30  | 296,199                               |
| Practice     | 689          | 395,561        | 1.74   | 186,817                               |

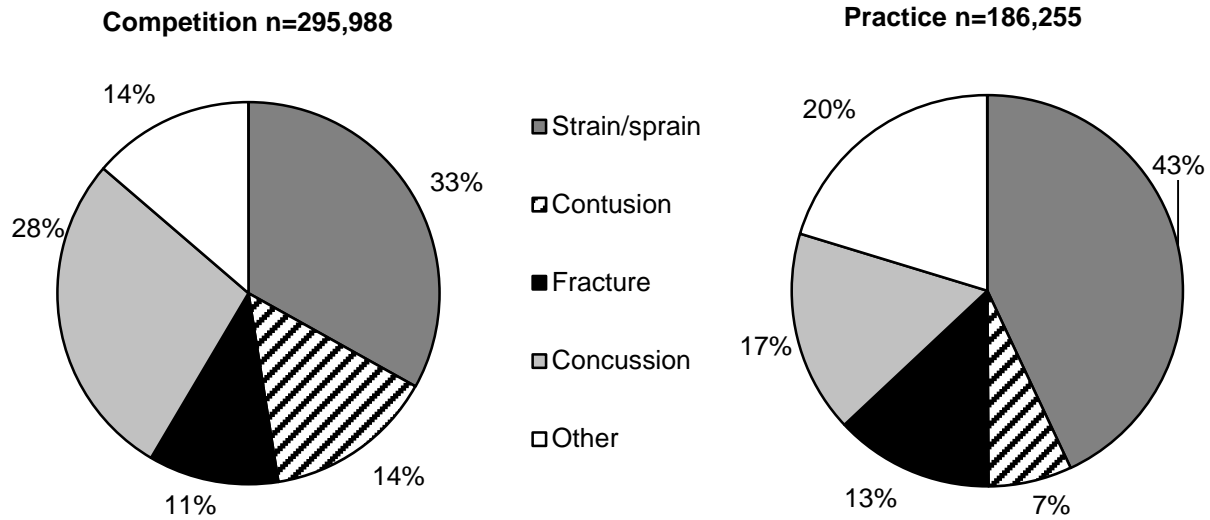
**Table 3.2 Demographic Characteristics of Injured Football Athletes, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                          |                  |
|--------------------------|------------------|
| <b>Year in School</b>    | <b>n=477,622</b> |
| Freshman                 | 20.8%            |
| Sophomore                | 23.5%            |
| Junior                   | 25.8%            |
| Senior                   | 29.9%            |
| <b>Total<sup>†</sup></b> | <b>100%</b>      |
| <b>Age (years)</b>       |                  |
| Minimum                  | 12               |
| Maximum                  | 19               |
| Mean (St. Dev.)          | 16.0 (1.2)       |
| <b>BMI</b>               |                  |
| Minimum                  | 15.1             |
| Maximum                  | 49.8             |
| Mean (St. Dev.)          | 25.8 (4.7)       |

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

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

**Figure 3.1 Diagnosis of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 3.3 Body Site of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

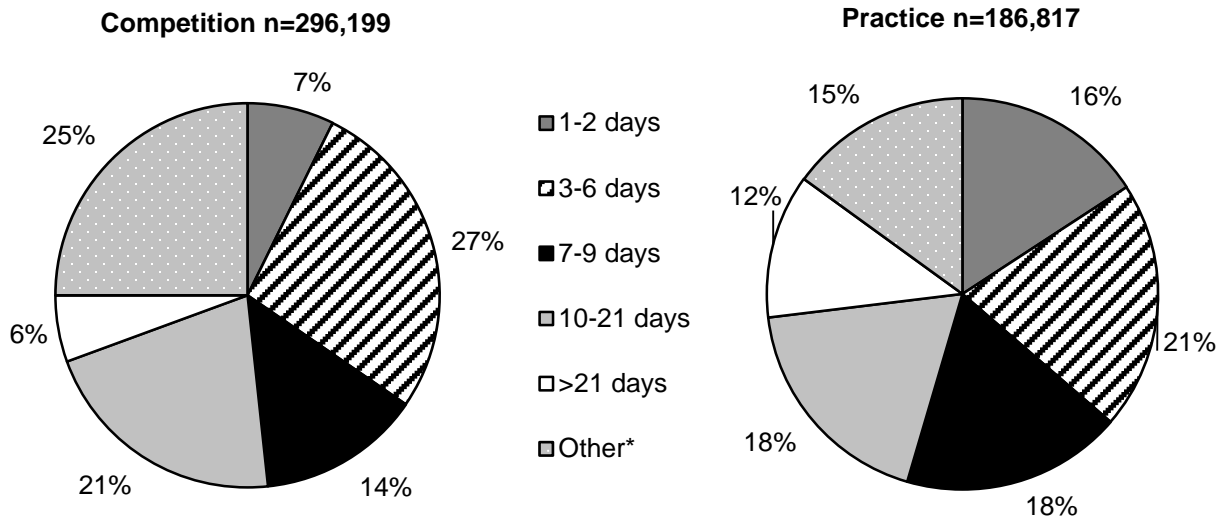
| Body Site           | Competition    |             | Practice       |             | Overall        |             |
|---------------------|----------------|-------------|----------------|-------------|----------------|-------------|
|                     | n              | %           | n              | %           | n              | %           |
| Head/face           | 83,346         | 28.1%       | 32,501         | 17.5%       | 115,848        | 24.0%       |
| Knee                | 44,322         | 15.0%       | 22,383         | 12.0%       | 66,705         | 13.8%       |
| Ankle               | 33,750         | 11.4%       | 19,728         | 10.6%       | 53,478         | 11.1%       |
| Hand/wrist          | 30,901         | 10.4%       | 22,527         | 12.1%       | 53,427         | 11.1%       |
| Shoulder            | 31,889         | 10.8%       | 18,200         | 9.8%        | 50,089         | 10.4%       |
| Hip/thigh/upper leg | 17,404         | 5.9%        | 21,197         | 11.4%       | 38,602         | 8.0%        |
| Lower leg           | 11,370         | 3.8%        | 11,429         | 6.1%        | 22,799         | 4.7%        |
| Trunk               | 12,803         | 4.3%        | 8,446          | 4.5%        | 21,249         | 4.4%        |
| Arm/elbow           | 8,955          | 3.0%        | 6,365          | 3.4%        | 15,320         | 3.2%        |
| Foot                | 7,455          | 2.5%        | 7,115          | 3.8%        | 14,570         | 3.0%        |
| Neck                | 5,864          | 2.0%        | 8,382          | 4.5%        | 14,246         | 3.0%        |
| Other               | 8,140          | 2.7%        | 7,602          | 4.2%        | 15,743         | 3.3%        |
| <b>Total</b>        | <b>296,199</b> | <b>100%</b> | <b>185,875</b> | <b>100%</b> | <b>482,074</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries and missing responses.

**Table 3.4 Ten Most Common Football Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                         | Competition<br>n=295,988 |       | Practice<br>n=185,317 |       | Total<br>n=481,302 |       |
|-----------------------------------|--------------------------|-------|-----------------------|-------|--------------------|-------|
|                                   | n                        | %     | n                     | %     | n                  | %     |
| Head/face concussion              | 82,370                   | 27.8% | 31,046                | 16.8% | 113,416            | 23.6% |
| Ankle strain/sprain               | 30,365                   | 10.3% | 18,808                | 10.1% | 49,173             | 10.2% |
| Knee strain/sprain                | 26,237                   | 8.9%  | 12,463                | 6.7%  | 38,700             | 8.0%  |
| Hip/thigh/upper leg strain/sprain | 9,232                    | 3.1%  | 17,717                | 9.6%  | 26,949             | 5.6%  |
| Shoulder other                    | 16,927                   | 5.7%  | 9,633                 | 5.2%  | 26,559             | 5.5%  |
| Hand/wrist fracture               | 14,835                   | 5.0%  | 11,536                | 6.2%  | 26,371             | 5.5%  |
| Knee other                        | 10,868                   | 3.7%  | 8,296                 | 4.5%  | 19,164             | 4.0%  |
| Hand/wrist strain/sprain          | 9,240                    | 3.1%  | 6,353                 | 3.4%  | 15,593             | 3.2%  |
| Shoulder strain/sprain            | 8,347                    | 2.8%  | 5,663                 | 3.1%  | 14,010             | 2.9%  |
| Hip/thigh/upper leg contusion     | 7,447                    | 2.5%  | 1,702                 | 0.9%  | 9,149              | 1.9%  |

**Figure 3.2 Time Loss of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



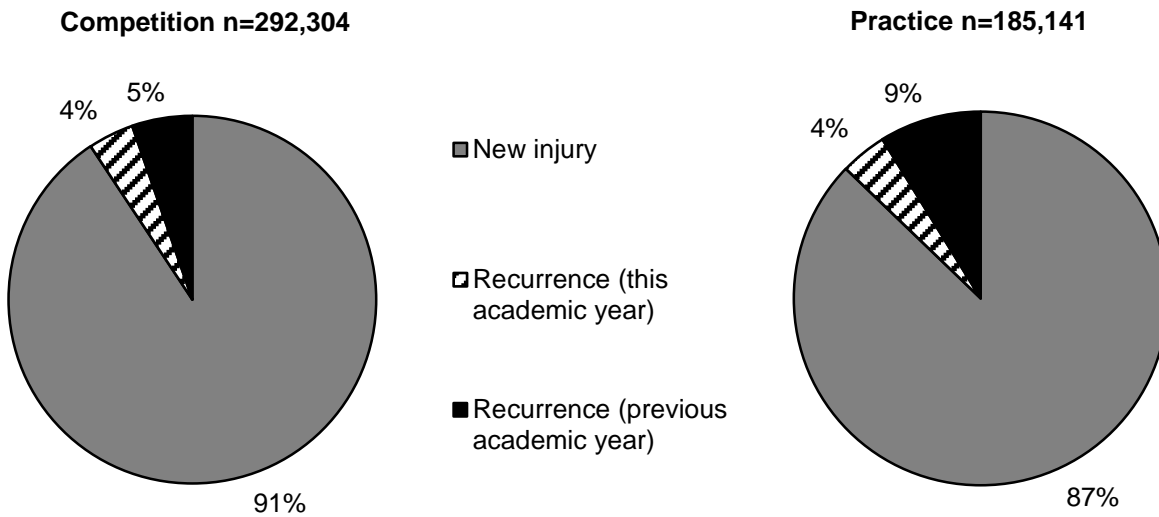
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 3.5 Football Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                         | Competition    |             | Practice       |             | Overall        |             |
|-------------------------|----------------|-------------|----------------|-------------|----------------|-------------|
|                         | n              | %           | n              | %           | n              | %           |
| <b>Need for surgery</b> |                |             |                |             |                |             |
| Required surgery        | 31,333         | 10.8%       | 17,278         | 9.4%        | 48,611         | 10.3%       |
| Did not require surgery | 258,247        | 89.2%       | 166,382        | 90.6%       | 424,629        | 89.7%       |
| <b>Total</b>            | <b>289,580</b> | <b>100%</b> | <b>183,660</b> | <b>100%</b> | <b>473,240</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Figure 3.3 History of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 3.6 Time during Season of Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n              | %           |
|-----------------------|----------------|-------------|
| <b>Time in Season</b> |                |             |
| Preseason             | 109,968        | 22.8%       |
| Regular season        | 349,591        | 72.6%       |
| Post season           | 21,967         | 4.6%        |
| <b>Total</b>          | <b>481,526</b> | <b>100%</b> |

**Table 3.7 Competition-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

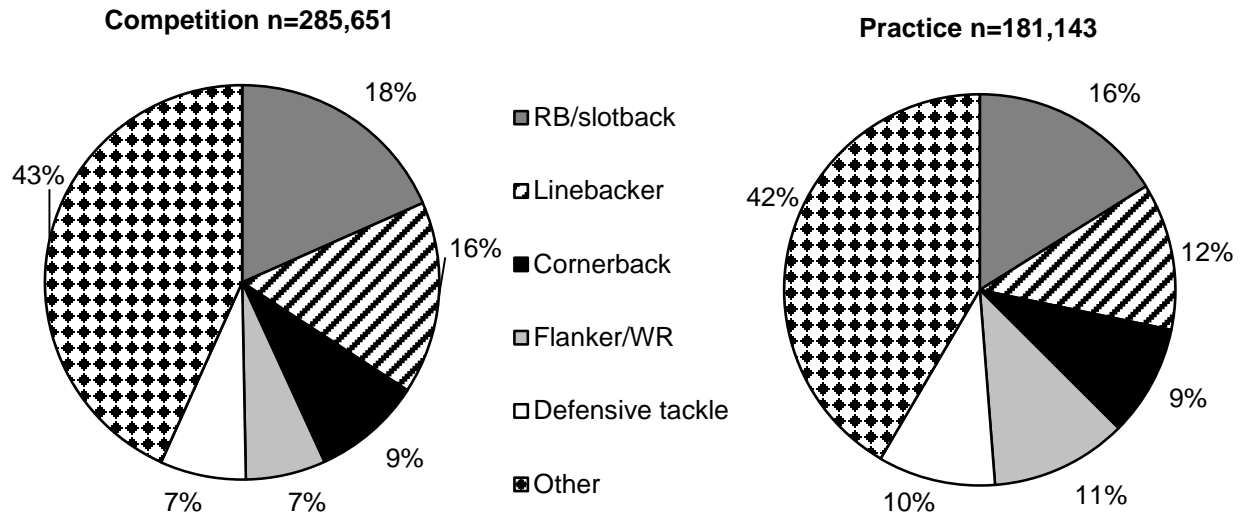
|                                      | n              | %           |
|--------------------------------------|----------------|-------------|
| <b>Time in Competition</b>           |                |             |
| Pre-competition/warm-ups             | 4,593          | 1.6%        |
| First quarter                        | 35,289         | 12.4%       |
| Second quarter                       | 85,853         | 30.3%       |
| Third quarter                        | 87,002         | 30.7%       |
| Fourth quarter                       | 70,516         | 24.8%       |
| Overtime                             | 547            | 0.2%        |
| <b>Total</b>                         | <b>283,800</b> | <b>100%</b> |
| <b>Field Location</b>                |                |             |
| Between the 20 yard lines            | 216,053        | 77.6%       |
| Red zone (20 yard line to goal line) | 55,892         | 20.1%       |
| End zone                             | 3,387          | 1.2%        |
| Off the field                        | 2,967          | 1.1%        |
| <b>Total</b>                         | <b>278,299</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Table 3.8 Practice-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | n              | %           |
|-------------------------|----------------|-------------|
| <b>Time in Practice</b> |                |             |
| First 1/2 hour          | 14,823         | 8.0%        |
| Second 1/2 hour         | 33,981         | 18.4%       |
| 1-2 hours into practice | 112,578        | 61.1%       |
| >2 hours into practice  | 23,008         | 12.5%       |
| <b>Total</b>            | <b>184,390</b> | <b>100%</b> |

**Figure 3.4 Player Position of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

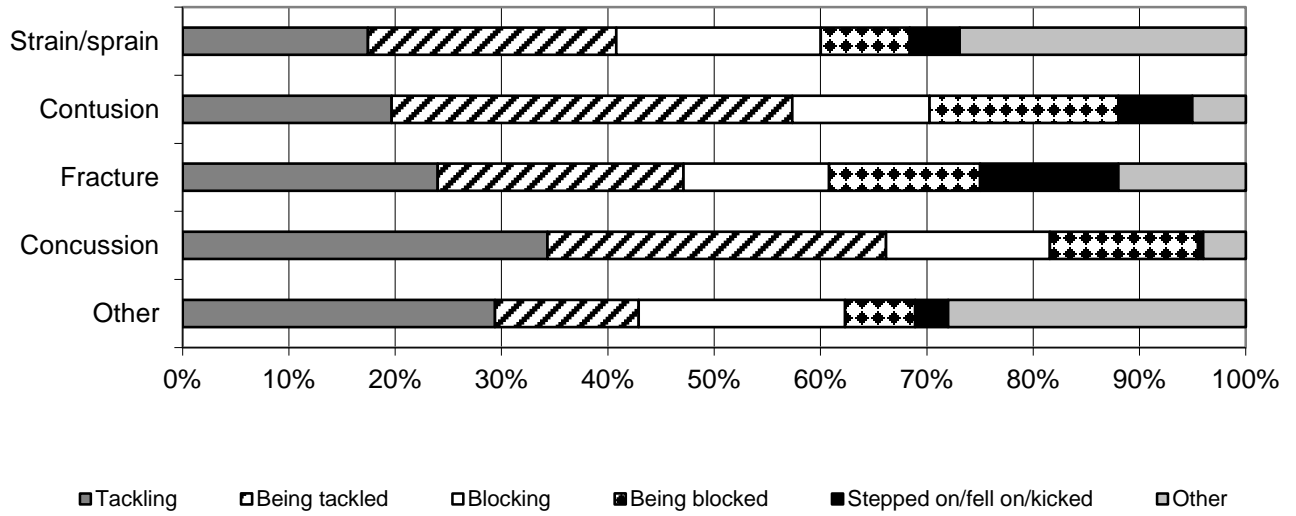


**Table 3.9 Activities Leading to Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity                                | Competition    |             | Practice       |             | Overall        |             |
|---|----------------|-------------|----------------|-------------|----------------|-------------|
|   | n              | %           | n              | %           | n              | %           |
| Being tackled                           | 89,000         | 31.1%       | 29,968         | 16.3%       | 118,968        | 25.3%       |
| Tackling                                | 75,411         | 26.4%       | 39,711         | 21.6%       | 115,122        | 24.5%       |
| Blocking                                | 46,370         | 16.2%       | 33,437         | 18.2%       | 79,807         | 17.0%       |
| Being blocked                           | 37,345         | 13.0%       | 14,837         | 8.1%        | 52,182         | 11.1%       |
| N/A (e.g., overuse, heat illness, etc.) | 5,819          | 2.0%        | 22,110         | 12.0%       | 27,929         | 5.9%        |
| Stepped on/fell on/kicked               | 11,137         | 3.9%        | 10,735         | 5.8%        | 21,872         | 4.7%        |
| Rotation around a planted foot          | 7,873          | 2.8%        | 9,846          | 5.4%        | 17,719         | 3.8%        |
| Contact with ball                       | 343            | 0.1%        | 3,323          | 1.8%        | 3,666          | 0.8%        |
| Uneven playing surface                  | 711            | 0.2%        | 1,752          | 1.0%        | 2,462          | 0.5%        |
| Contact with blocking sled/dummy        | -              | 0.0%        | 2,328          | 1.3%        | 2,328          | 0.5%        |
| Contact with out of bounds              | -              | 0.0%        | 365            | 0.1%        | 365            | 0.1%        |
| Other                                   | 12,167         | 4.3%        | 15,601         | 8.5%        | 27,768         | 5.9%        |
| <b>Total</b>                            | <b>286,176</b> | <b>100%</b> | <b>184,013</b> | <b>100%</b> | <b>470,189</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Figure 3.5 Activity Resulting in Football Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 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, 2010-11 School Year**

|              | # Injuries | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>262</b> | <b>168,389</b> | <b>1.56</b>                                      | <b>138,974</b>                        |
| Competition  | 156        | 50,680         | 3.08   | 81,238                                |
| Practice     | 106        | 117,709        | 0.90   | 57,736                                |

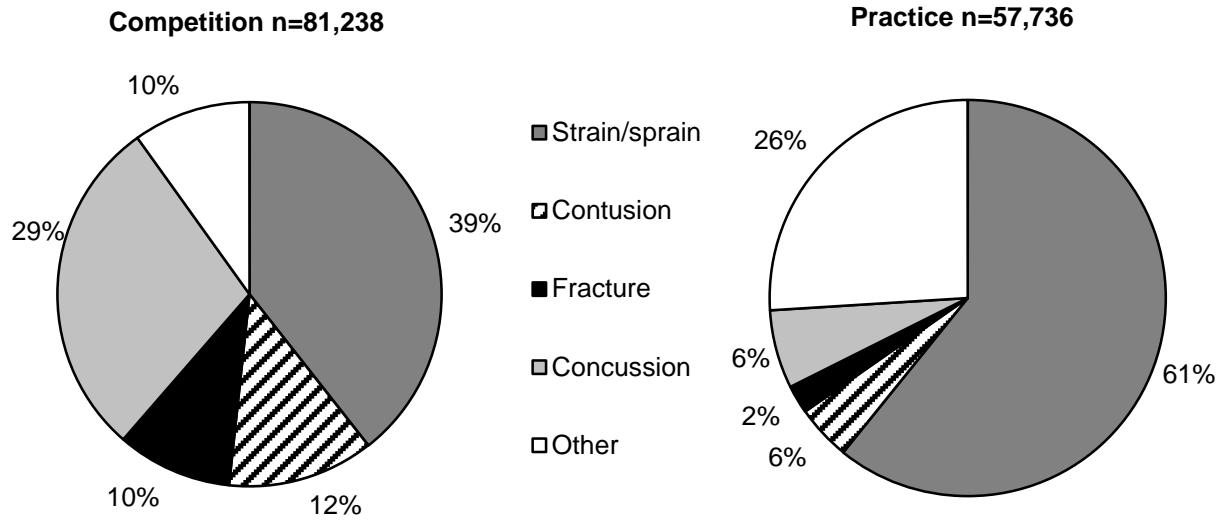
**Table 4.2 Demographic Characteristics of Injured Boys' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

| <b>Year in School</b> | <b>n= 138,591</b> |
|-----------------------|-------------------|
| Freshman              | 13.9%             |
| Sophomore             | 28.9%             |
| Junior                | 24.6%             |
| Senior                | 32.7%             |
| <b>Total†</b>         | <b>100%</b>       |
| <b>Age (years)</b>    |                   |
| Minimum               | 13                |
| Maximum               | 18                |
| Mean (St. Dev.)       | 16.1 (1.2)        |
| <b>BMI</b>            |                   |
| Minimum               | 15.2              |
| Maximum               | 38.1              |
| Mean (St. Dev.)       | 22.4 (2.3)        |

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

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

**Figure 4.1 Diagnosis of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 4.3 Body Site of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

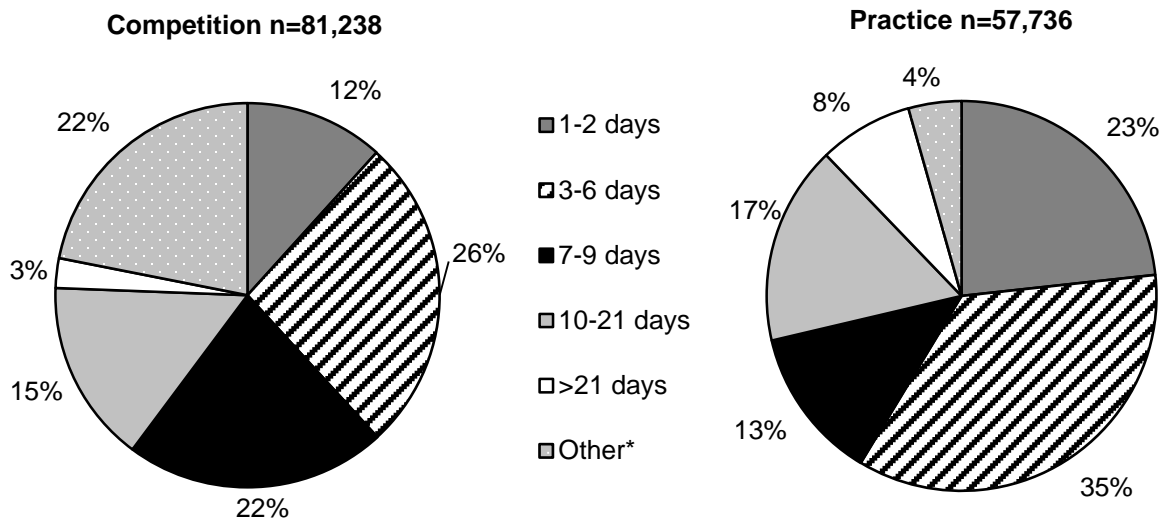
| Body Site           | Competition   |             | Practice      |             | Overall        |             |
|---------------------|---------------|-------------|---------------|-------------|----------------|-------------|
|                     | n             | %           | n             | %           | n              | %           |
| Head/face           | 30,635        | 37.7%       | 5,207         | 9.0%        | 35,842         | 25.8%       |
| Ankle               | 17,654        | 21.7%       | 6,747         | 11.7%       | 24,401         | 17.6%       |
| Knee                | 10,659        | 13.1%       | 13,521        | 23.4%       | 24,180         | 17.4%       |
| Hip/thigh/upper leg | 5,075         | 6.2%        | 11,187        | 19.4%       | 16,262         | 11.7%       |
| Foot                | 4,171         | 5.1%        | 4,794         | 8.3%        | 8,965          | 6.5%        |
| Lower leg           | 1,409         | 1.7%        | 7,452         | 12.9%       | 8,861          | 6.4%        |
| Hand/wrist          | 3,810         | 4.7%        | 3,686         | 6.4%        | 7,496          | 5.4%        |
| Trunk               | 4,188         | 5.2%        | 2,439         | 4.2%        | 6,627          | 4.8%        |
| Shoulder            | 790           | 1.0%        | 1,587         | 2.7%        | 2,377          | 1.7%        |
| Neck                | -             | 0.0%        | 984           | 1.7%        | 984            | 0.7%        |
| Arm/elbow           | 323           | 0.4%        | 66            | 0.1%        | 389            | 0.2%        |
| Other               | 2,525         | 3.1%        | 66            | 0.1%        | 2,591          | 1.8%        |
| <b>Total</b>        | <b>81,238</b> | <b>100%</b> | <b>57,736</b> | <b>100%</b> | <b>138,974</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Table 4.4 Ten Most Common Boys' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                         | Competition<br>n=81,238 |       | Practice<br>n=57,734 |       | Total<br>n=138,973 |       |
|-----------------------------------|-------------------------|-------|----------------------|-------|--------------------|-------|
|                                   | n                       | %     | n                    | %     | n                  | %     |
| Head/face concussion              | 23,333                  | 28.7% | 3,721                | 6.4%  | 27,055             | 19.5% |
| Ankle strain/sprain               | 16,996                  | 20.9% | 6,423                | 11.1% | 23,420             | 16.9% |
| Hip/thigh/upper leg strain/sprain | 3,392                   | 4.2%  | 11,055               | 19.1% | 14,447             | 10.4% |
| Knee strain/sprain                | 7,324                   | 9.0%  | 6,690                | 11.6% | 14,014             | 10.1% |
| Knee Other                        | 3,335                   | 4.1%  | 6,507                | 11.3% | 9,842              | 7.1%  |
| Foot strain/sprain                | 1,269                   | 1.6%  | 2,876                | 5.0%  | 4,145              | 3.0%  |
| Trunk strain/sprain               | 1,053                   | 1.3%  | 2,439                | 4.2%  | 3,492              | 2.5%  |
| Hand/wrist other                  | -                       | 0.0%  | 3,183                | 5.5%  | 3,183              | 2.3%  |
| Trunk contusion                   | 2,273                   | 2.8%  | -                    | 0.0%  | 2,273              | 1.6%  |
| Lower leg contusion               | 1,211                   | 1.5%  | 389                  | 0.7%  | 1,600              | 1.2%  |

**Figure 4.2 Time Loss of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

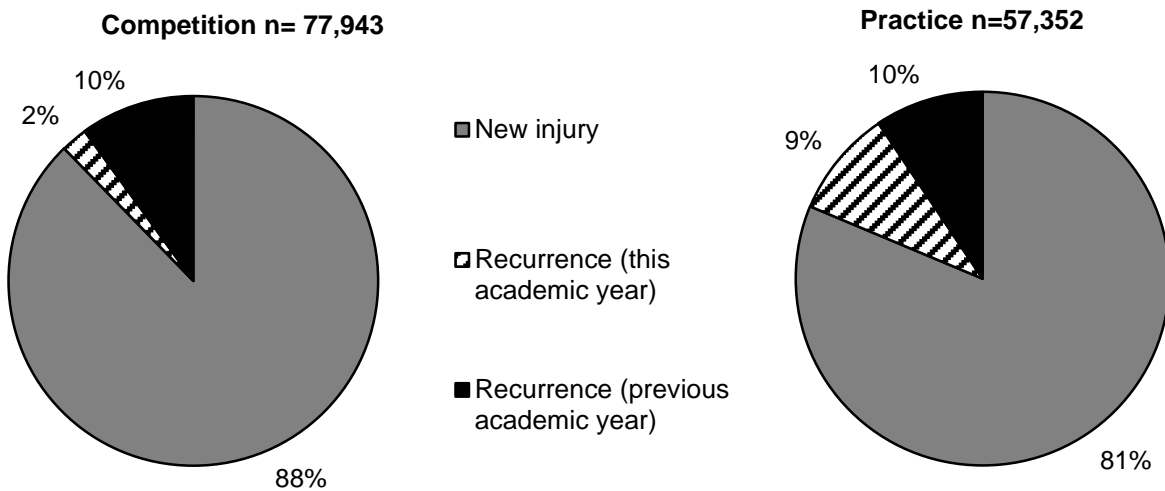


\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 4.5 Boys' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition   |             | Practice      |             | Overall        |             |
|-------------------------|---------------|-------------|---------------|-------------|----------------|-------------|
|                         | n             | %           | n             | %           | n              | %           |
| <b>Need for surgery</b> |               |             |               |             |                |             |
| Required surgery        | 6,649         | 8.4%        | 1,795         | 3.2%        | 8,443          | 6.3%        |
| Did not require surgery | 72,663        | 91.6%       | 53,602        | 96.8%       | 126,266        | 93.7%       |
| <b>Total</b>            | <b>79,312</b> | <b>100%</b> | <b>55,397</b> | <b>100%</b> | <b>134,709</b> | <b>100%</b> |

**Figure 4.3 History of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 4.6 Time during Season of Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n              | %           |
|-----------------------|----------------|-------------|
| <b>Time in Season</b> |                |             |
| Preseason             | 34,444         | 24.8%       |
| Regular season        | 95,747         | 68.9%       |
| Post season           | 8,784          | 6.3%        |
| <b>Total</b>          | <b>138,974</b> | <b>100%</b> |

**Table 4.7 Competition-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|   | <b>n</b>      | <b>%</b>    |
|---|---------------|-------------|
| <b>Time in Competition</b>                        |               |             |
| Pre-competition/warm-ups                          | 3,086         | 3.9%        |
| First half  | 23,738        | 29.7%       |
| Second half                                       | 53,050        | 66.4%       |
| Overtime  | -             | 0.0%        |
| <b>Total</b>                                      | <b>79,873</b> | <b>100%</b> |
| <b>Field Location</b>                             |               |             |
| Top of goal box extended to center line (offense) | 29,081        | 36.9%       |
| Top of goal box extended to center line (defense) | 19,264        | 24.5%       |
| Goal box (defense)                                | 12,998        | 16.5%       |
| Side of goal box (offense)                        | 5,309         | 6.7%        |
| Goal box (offense)                                | 6,146         | 7.8%        |
| Side of goal box (defense)                        | 4,801         | 6.1%        |
| Off the field                                     | 1,137         | 1.4%        |
| <b>Total</b>                                      | <b>78,737</b> | <b>100%</b> |

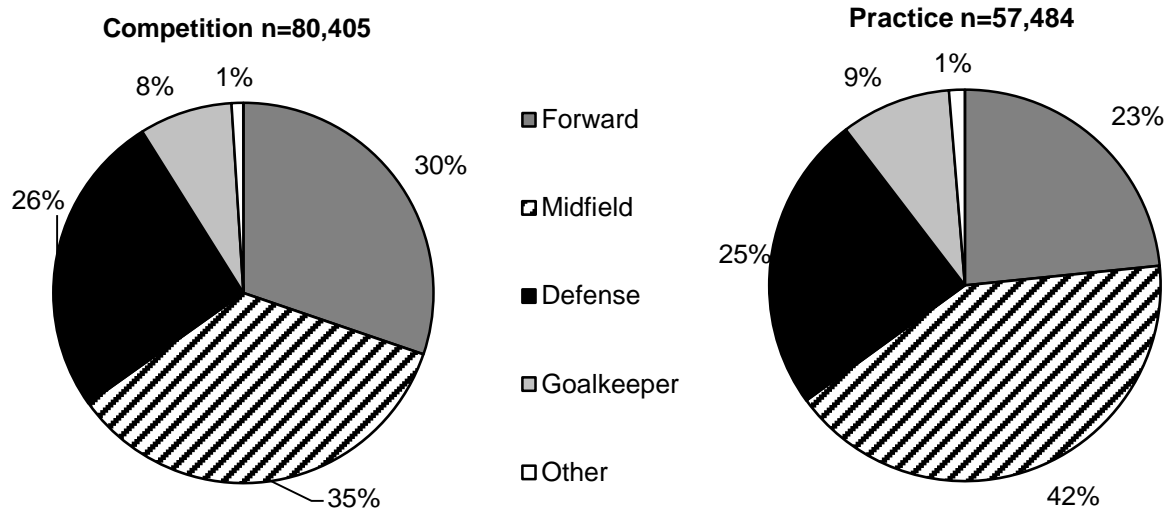
\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Table 4.8 Practice-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | <b>n</b>      | <b>%</b>    |
|-------------------------|---------------|-------------|
| <b>Time in Practice</b> |               |             |
| First 1/2 hour          | 7,781         | 13.6%       |
| Second 1/2 hour         | 11,954        | 20.9%       |
| 1-2 hours into practice | 27,760        | 48.5%       |
| >2 hours into practice  | 9,737         | 17.0%       |
| <b>Total</b>            | <b>57,233</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Figure 4.4 Player Position of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

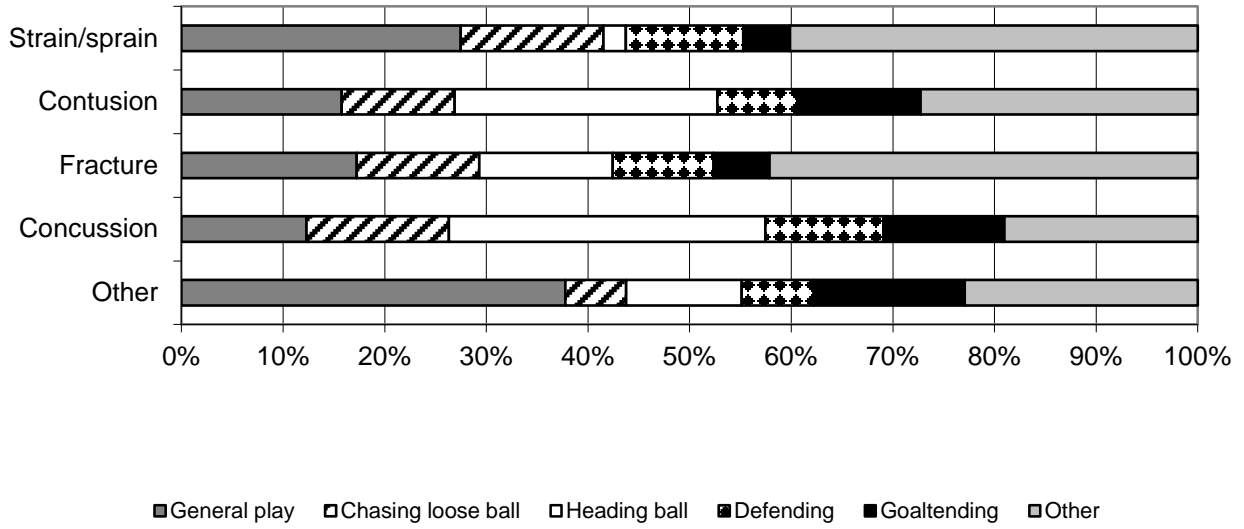


**Table 4.9 Activities Leading to Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity                  | Competition   |             | Practice      |             | Overall        |             |
|---------------------------|---------------|-------------|---------------|-------------|----------------|-------------|
|                           | n             | %           | n             | %           | n              | %           |
| General play              | 14,508        | 18.0%       | 19,014        | 33.6%       | 33,522         | 24.4%       |
| Heading ball              | 14,564        | 18.0%       | 2,405         | 4.2%        | 16,969         | 12.4%       |
| Chasing loose ball        | 10,388        | 12.9%       | 6,306         | 11.1%       | 16,694         | 12.2%       |
| Defending                 | 10,322        | 12.8%       | 3,924         | 6.9%        | 14,246         | 10.4%       |
| Goaltending               | 6,433         | 8.0%        | 5,232         | 9.2%        | 11,665         | 8.5%        |
| Receiving pass            | 3,112         | 3.9%        | 4,942         | 8.7%        | 8,055          | 5.9%        |
| Ball handling/dribbling   | 5,197         | 6.4%        | 2,451         | 4.3%        | 7,647          | 5.6%        |
| Passing (foot)            | 4,438         | 5.5%        | 2,997         | 5.3%        | 7,435          | 5.4%        |
| Shooting (foot)           | 3,417         | 4.2%        | 2,821         | 5.0%        | 6,238          | 4.5%        |
| Conditioning              | -             | 0.0%        | 4,697         | 8.3%        | 4,697          | 3.4%        |
| Receiving a slide tackle  | 3,587         | 4.4%        | -             | 0.0%        | 3,587          | 2.6%        |
| Attempting a slide tackle | 2,096         | 2.6%        | -             | 0.0%        | 2,096          | 1.5%        |
| Blocking shot             | 1,203         | 1.5%        | -             | 0.0%        | 1,203          | 0.9%        |
| Other                     | 1,521         | 1.9%        | 1,809         | 3.3%        | 3,330          | 2.4%        |
| <b>Total</b>              | <b>80,783</b> | <b>100%</b> | <b>56,599</b> | <b>100%</b> | <b>137,382</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Figure 4.5 Activity Resulting in Boys' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 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, 2010-11 School Year**

|              | # Injuries | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>277</b> | <b>143,220</b> | <b>1.93</b>                                      | <b>180,254</b>                        |
| Competition  | 186        | 45,082         | 4.13   | 124,674                               |
| Practice     | 91         | 98,138         | 0.93   | 55,580                                |

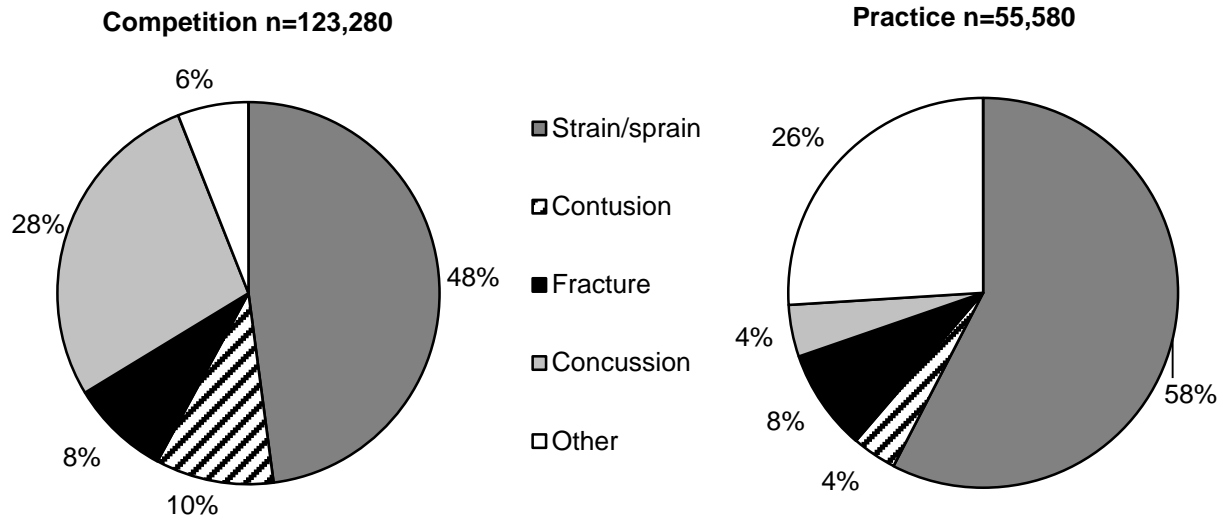
**Table 5.2 Demographic Characteristics of Injured Girls' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                          |                  |
|--------------------------|------------------|
| <b>Year in School</b>    | <b>n=179,319</b> |
| Freshman                 | 21.4%            |
| Sophomore                | 27.9%            |
| Junior                   | 29.0%            |
| Senior                   | 21.7%            |
| <b>Total<sup>†</sup></b> | <b>100%</b>      |
| <b>Age (years)</b>       |                  |
| Minimum                  | 13               |
| Maximum                  | 18               |
| Mean (St. Dev.)          | 15.7 (1.4)       |
| <b>BMI</b>               |                  |
| Minimum                  | 13.8             |
| Maximum                  | 33.5             |
| Mean (St. Dev.)          | 21.5 (2.3)       |

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

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

**Figure 5.1 Diagnosis of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 5.3 Body Site of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

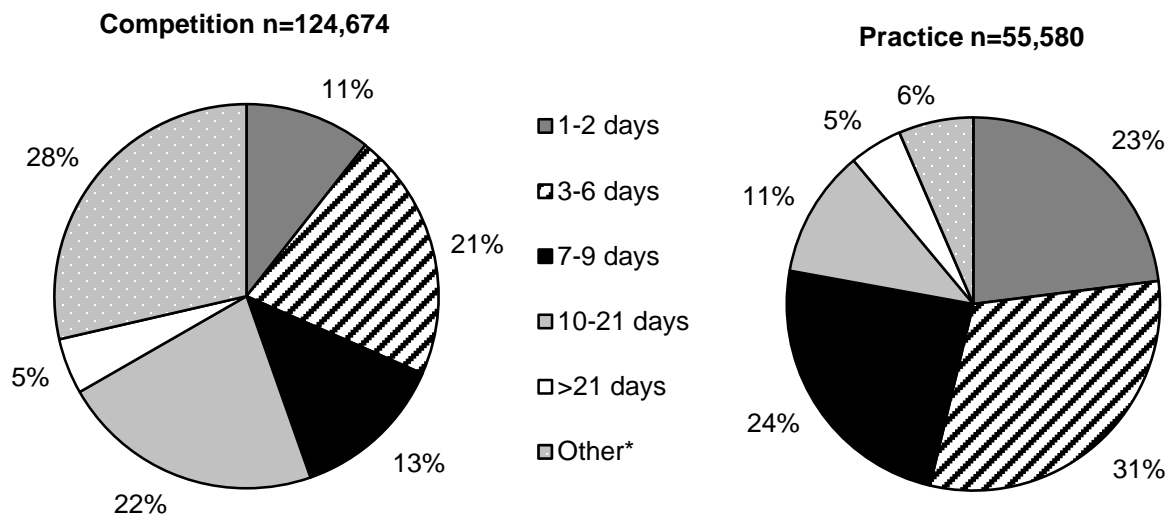
| Body Site           | Competition    |             | Practice      |             | Overall        |             |
|---------------------|----------------|-------------|---------------|-------------|----------------|-------------|
|                     | n              | %           | n             | %           | n              | %           |
| Ankle               | 36,650         | 29.4%       | 14,765        | 26.6%       | 51,415         | 28.5%       |
| Head/face           | 37,672         | 30.2%       | 2,417         | 4.3%        | 40,089         | 22.2%       |
| Knee                | 20,007         | 16.0%       | 6,450         | 11.6%       | 26,456         | 14.7%       |
| Hip/thigh/upper leg | 13,113         | 10.5%       | 13,147        | 23.7%       | 26,260         | 14.6%       |
| Lower leg           | 7,641          | 6.1%        | 9,652         | 17.4%       | 17,292         | 9.6%        |
| Foot                | 5,320          | 4.3%        | 5,297         | 9.5%        | 10,617         | 5.9%        |
| Trunk               | 1,289          | 1.1%        | 800           | 1.4%        | 2,090          | 1.2%        |
| Arm/elbow           | 547            | 0.4%        | 1,340         | 2.4%        | 1,887          | 1.0%        |
| Shoulder            | 1,752          | 1.4%        | -             | 0.0%        | 1,752          | 1.0%        |
| Hand/wrist          | 682            | 0.5%        | 800           | 1.4%        | 1,483          | 0.8%        |
| Other               | -              | 0.0%        | 913           | 1.6%        | 913            | 0.5%        |
| <b>Total</b>        | <b>124,674</b> | <b>100%</b> | <b>55,580</b> | <b>100%</b> | <b>180,254</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Table 5.4 Ten Most Common Girls' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                         | Competition<br>n=123,281 |       | Practice<br>n=55,581 |       | Total<br>n=178,861 |       |
|-----------------------------------|--------------------------|-------|----------------------|-------|--------------------|-------|
|                                   | n                        | %     | n                    | %     | n                  | %     |
| Ankle strain/sprain               | 32,946                   | 26.7% | 11,993               | 21.6% | 44,939             | 24.9% |
| Head/face concussion              | 34,142                   | 27.7% | 2,417                | 4.3%  | 36,559             | 20.4% |
| Hip/thigh/upper leg strain/sprain | 9,203                    | 7.5%  | 12,895               | 23.2% | 22,098             | 12.3% |
| Knee strain/sprain                | 13,015                   | 10.6% | 2,367                | 4.3%  | 15,382             | 8.5%  |
| Knee other                        | 3,604                    | 2.9%  | 4,083                | 7.3%  | 7,687              | 4.3%  |
| Lower leg other                   | 271                      | 0.2%  | 7,092                | 12.8% | 7,363              | 4.1%  |
| Lower leg strain/sprain           | 2,364                    | 1.9%  | 2,307                | 4.2%  | 4,671              | 2.6%  |
| Foot fracture                     | 3,334                    | 2.7%  | 519                  | 0.9%  | 3,852              | 2.2%  |
| Lower leg contusion               | 3,218                    | 2.6%  | 252                  | 0.5%  | 3,470              | 1.9%  |
| Foot strain/sprain                | 395                      | 0.3%  | 2,336                | 4.2%  | 2,730              | 1.5%  |

**Figure 5.2 Time Loss of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



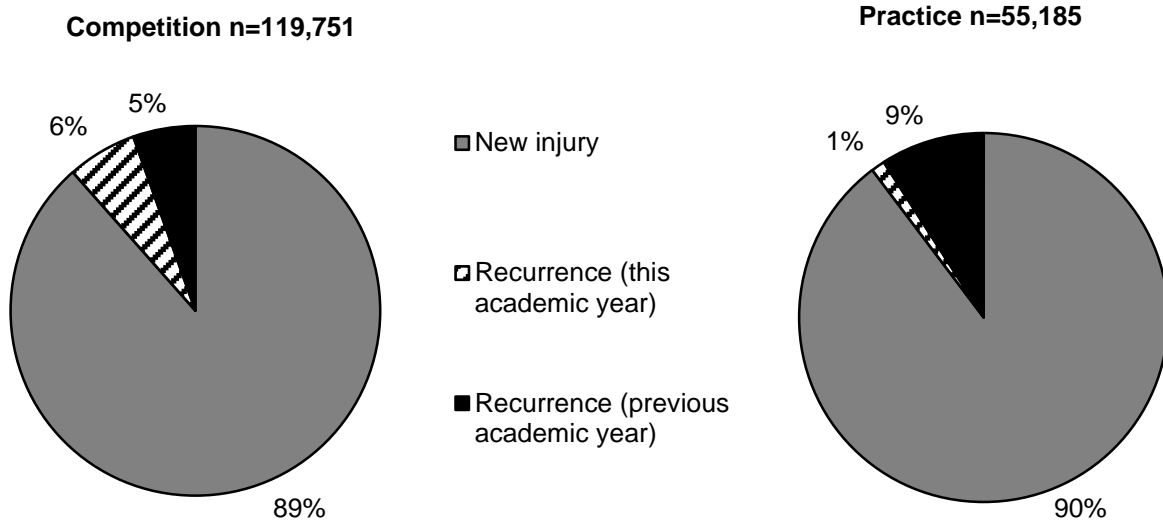
\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 5.5 Girls' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition    |             | Practice      |             | Overall        |             |
|-------------------------|----------------|-------------|---------------|-------------|----------------|-------------|
|                         | n              | %           | n             | %           | n              | %           |
| <b>Need for surgery</b> |                |             |               |             |                |             |
| Required surgery        | 10,626         | 8.6%        | 2,676         | 5.0%        | 13,302         | 7.5%        |
| Did not require surgery | 112,990        | 91.4%       | 51,293        | 95.0%       | 164,283        | 92.5%       |
| <b>Total</b>            | <b>123,616</b> | <b>100%</b> | <b>53,969</b> | <b>100%</b> | <b>177,585</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Figure 5.3 History of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 5.6 Time during Season of Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n              | %           |
|-----------------------|----------------|-------------|
| <b>Time in Season</b> |                |             |
| Preseason             | 26,793         | 14.9%       |
| Regular season        | 146,513        | 81.5%       |
| Post season           | 6,554          | 3.6%        |
| <b>Total</b>          | <b>179,860</b> | <b>100%</b> |

**Table 5.7 Competition-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

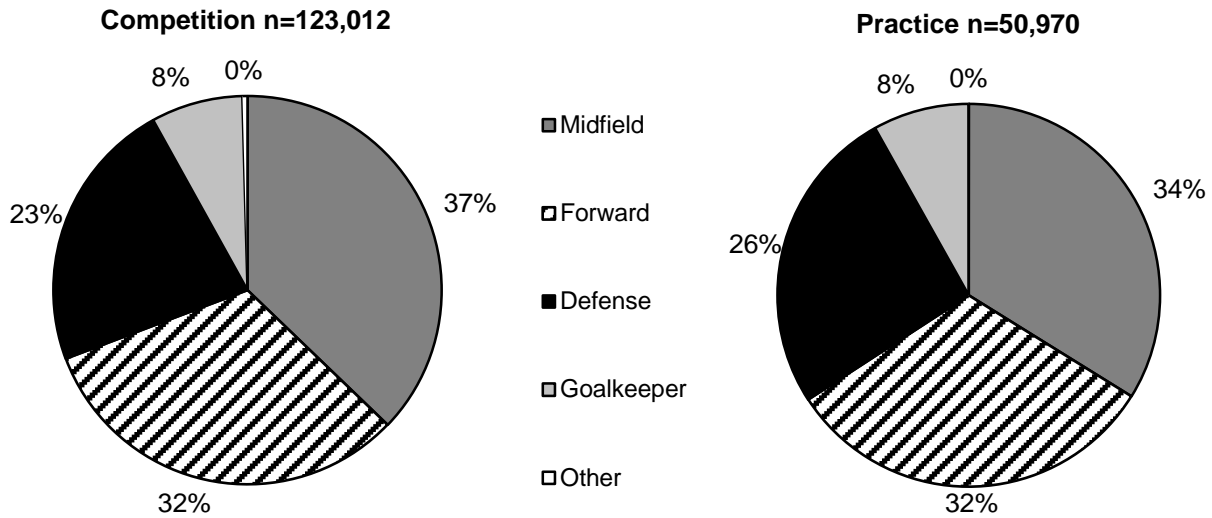
|   | n              | %           |
|---|----------------|-------------|
| <b>Time in Competition</b>                        |                |             |
| Pre-competition/warm-ups                          | 3,793          | 3.1%        |
| First half  | 43,369         | 35.3%       |
| Second half                                       | 74,266         | 60.5%       |
| Overtime  | 1,394          | 1.1%        |
| <b>Total</b>                                      | <b>122,822</b> | <b>100%</b> |
| <b>Field Location</b>                             |                |             |
| Top of goal box extended to center line (offense) | 35,329         | 29.7%       |
| Top of goal box extended to center line (defense) | 30,418         | 25.6%       |
| Goal box (defense)                                | 13,373         | 11.3%       |
| Side of goal box (defense)                        | 15,435         | 13.0%       |
| Goal box (offense)                                | 11,793         | 9.9%        |
| Side of goal box (offense)                        | 10,276         | 8.7%        |
| Off the field                                     | 2,146          | 1.8%        |
| <b>Total</b>                                      | <b>118,770</b> | <b>100%</b> |

**Table 5.8 Practice-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | n             | %           |
|-------------------------|---------------|-------------|
| <b>Time in Practice</b> |               |             |
| First 1/2 hour          | 9,605         | 17.6%       |
| Second 1/2 hour         | 7,447         | 13.7%       |
| 1-2 hours into practice | 28,970        | 53.1%       |
| >2 hours into practice  | 8,524         | 15.6%       |
| <b>Total</b>            | <b>54,545</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Figure 5.4 Player Position of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

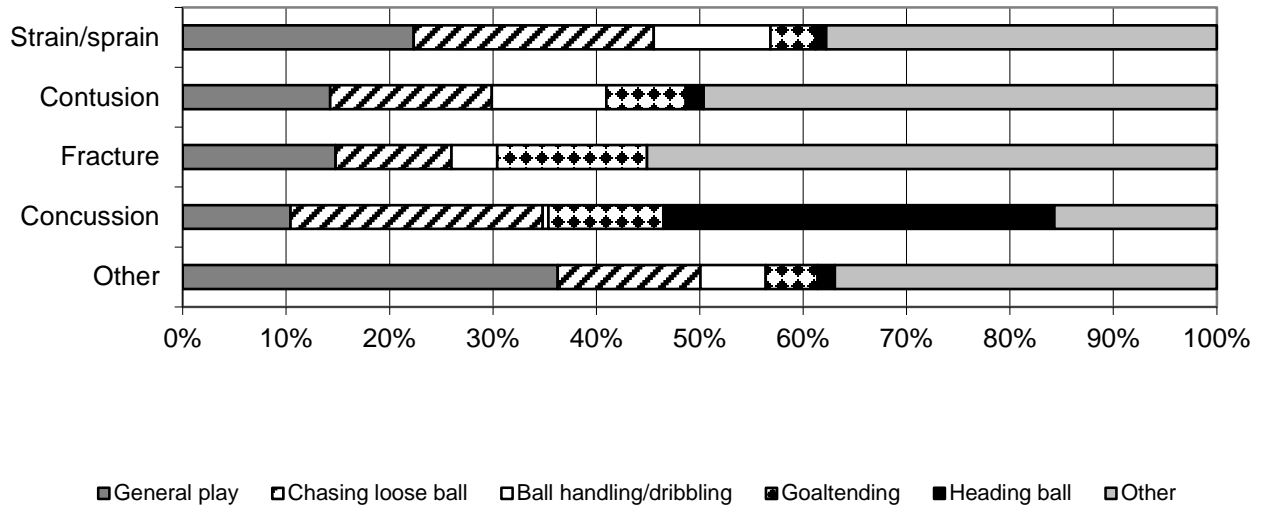


**Table 5.9 Activities Leading to Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity                | Competition    |             | Practice      |             | Overall        |             |
|-------------------------|----------------|-------------|---------------|-------------|----------------|-------------|
|                         | n              | %           | n             | %           | n              | %           |
| Defending               | 32,003         | 26.2%       | 5,537         | 10.0%       | 37,540         | 21.2%       |
| Ball handling/dribbling | 21,589         | 17.7%       | 6,587         | 11.9%       | 28,177         | 15.9%       |
| General play            | 11,068         | 9.1%        | 13,859        | 25.1%       | 24,927         | 14.1%       |
| Chasing loose ball      | 13,376         | 11.0%       | 3,911         | 7.1%        | 17,287         | 9.8%        |
| Shooting (foot)         | 10,743         | 8.8%        | 4,933         | 8.9%        | 15,677         | 8.8%        |
| Conditioning            | 1,340          | 1.1%        | 12,710        | 23.0%       | 14,049         | 7.9%        |
| Passing (foot)          | 8,058          | 6.6%        | 1,460         | 2.6%        | 9,518          | 5.4%        |
| Goaltending             | 6,445          | 5.3%        | 654           | 1.2%        | 7,099          | 4.0%        |
| Receiving pass          | 5,114          | 4.2%        | 1,743         | 3.1%        | 6,848          | 3.9%        |
| Heading ball            | 6,417          | 5.3%        | 395           | 0.7%        | 6,812          | 3.8%        |
| Other                   | 5,852          | 4.8%        | 3,403         | 6.2%        | 9,255          | 5.2%        |
| <b>Total</b>            | <b>122,005</b> | <b>100%</b> | <b>55,192</b> | <b>100%</b> | <b>177,197</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Figure 5.5 Activity Resulting in Girls' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



## **VI. Volleyball Injury Epidemiology**



**Table 6.1 Volleyball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | # Injuries | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>154</b> | <b>159,719</b> | <b>0.96</b>                                      | <b>50,711</b>                         |
| Competition  | 66         | 55,800         | 1.18   | 21,416                                |
| Practice     | 88         | 103,919        | 0.85   | 29,295                                |

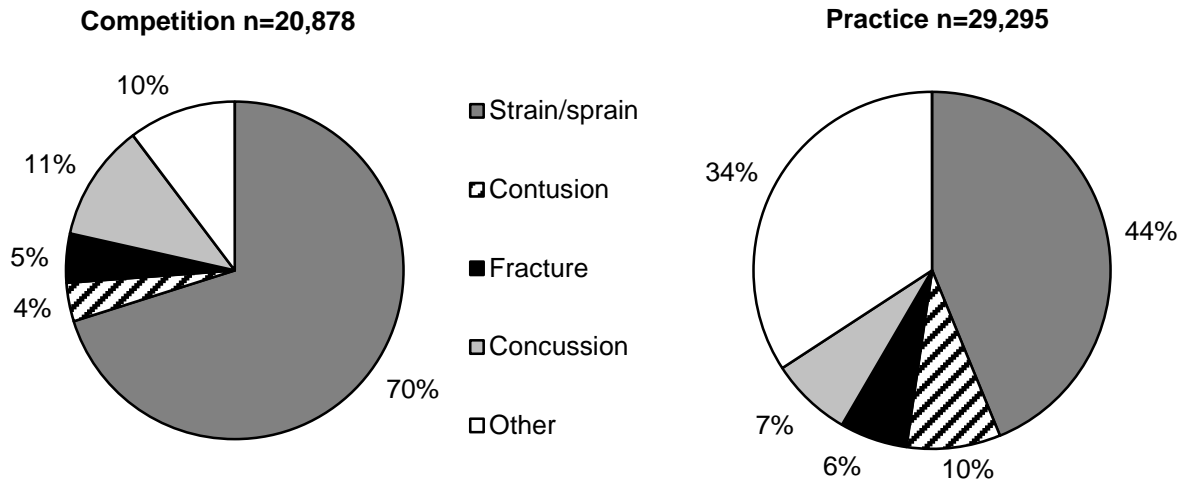
**Table 6.2 Demographic Characteristics of Injured Volleyball Athletes, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                          |                 |
|--------------------------|-----------------|
| <b>Year in School</b>    | <b>n=50,711</b> |
| Freshman                 | 26.4%           |
| Sophomore                | 27.8%           |
| Junior                   | 24.1%           |
| Senior                   | 21.6%           |
| <b>Total<sup>†</sup></b> | <b>100%</b>     |
| <b>Age (years)</b>       |                 |
| Minimum                  | 13              |
| Maximum                  | 18              |
| Mean (St. Dev.)          | 15.7 (1.2)      |
| <b>BMI</b>               |                 |
| Minimum                  | 16.7            |
| Maximum                  | 30.4            |
| Mean (St. Dev.)          | 21.3 (2.6)      |

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

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

**Figure 6.1 Diagnosis of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 6.3 Body Site of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

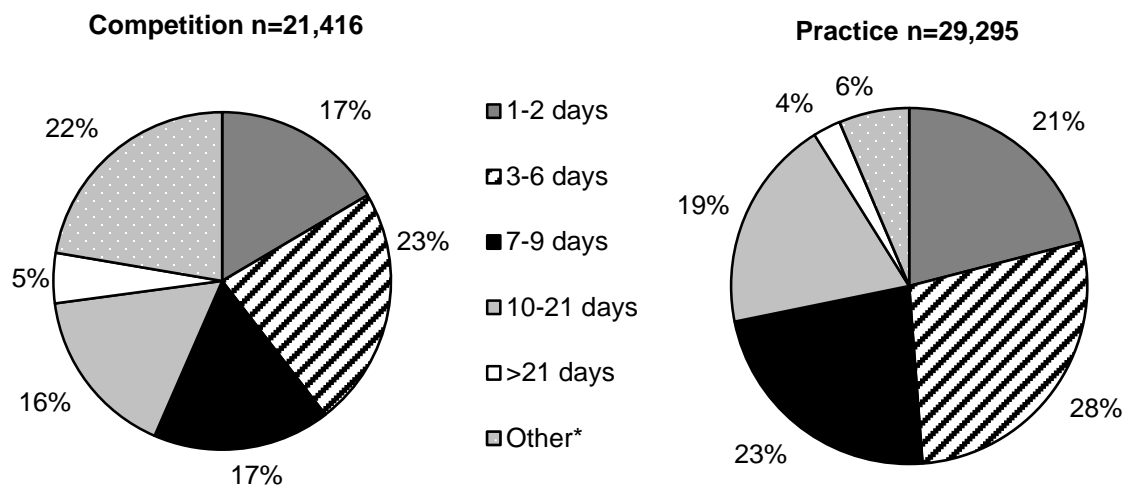
| Body Site           | Competition   |             | Practice      |             | Overall       |             |
|---------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                     | n             | %           | n             | %           | n             | %           |
| Ankle               | 7,875         | 36.8%       | 9,913         | 33.8%       | 17,788        | 35.1%       |
| Knee                | 3,781         | 17.7%       | 4,429         | 15.1%       | 8,210         | 16.2%       |
| Head/face           | 2,925         | 13.7%       | 2,783         | 9.5%        | 5,708         | 11.3%       |
| Hand/wrist          | 2,287         | 10.7%       | 2,152         | 7.3%        | 4,439         | 8.8%        |
| Trunk               | 1,782         | 8.3%        | 2,299         | 7.8%        | 4,081         | 8.0%        |
| Foot                | 554           | 2.6%        | 2,462         | 8.4%        | 3,016         | 5.9%        |
| Lower leg           | 733           | 3.4%        | 1,457         | 5.0%        | 2,189         | 4.3%        |
| Shoulder            | -             | 0.0%        | 1,644         | 5.6%        | 1,644         | 3.2%        |
| Arm/elbow           | 265           | 1.2%        | 82            | 0.3%        | 347           | 0.7%        |
| Hip/thigh/upper leg | -             | 0.0%        | 229           | 0.8%        | 229           | 0.5%        |
| Neck                | 680           | 3.2%        | 118           | 0.4%        | 798           | 1.6%        |
| Other               | 533           | 2.5%        | 1,727         | 5.9%        | 2,261         | 4.5%        |
| <b>Total</b>        | <b>21,416</b> | <b>100%</b> | <b>29,295</b> | <b>100%</b> | <b>50,711</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Table 6.4 Ten Most Common Volleyball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                | Competition<br>n=20,878 |       | Practice<br>n=29,294 |       | Total<br>n=50,170 |       |
|--------------------------|-------------------------|-------|----------------------|-------|-------------------|-------|
|                          | n                       | %     | n                    | %     | n                 | %     |
| Ankle strain/sprain      | 7,757                   | 37.2% | 8,694                | 29.7% | 16,451            | 32.8% |
| Head/face concussion     | 2,335                   | 11.2% | 2,163                | 7.4%  | 4,498             | 9.0%  |
| Knee other               | 1,494                   | 7.2%  | 2,968                | 10.1% | 4,462             | 8.9%  |
| Hand/wrist strain/sprain | 1,875                   | 9.0%  | 1,041                | 3.6%  | 2,916             | 5.8%  |
| Trunk strain/sprain      | 1,782                   | 8.5%  | 894                  | 3.1%  | 2,676             | 5.3%  |
| Knee strain/sprain       | 1,748                   | 8.4%  | 147                  | 0.5%  | 1,896             | 3.8%  |
| Shoulder other           | -                       | 0.0%  | 1,497                | 5.1%  | 1,497             | 3.0%  |
| Foot other               | -                       | 0.0%  | 1,066                | 3.6%  | 1,066             | 2.1%  |
| Head/face contusion      | 473                     | 2.3%  | 473                  | 1.6%  | 946               | 1.9%  |
| Lower leg strain/sprain  | 82                      | 0.4%  | 828                  | 2.8%  | 909               | 1.8%  |

**Figure 6.2 Time Loss of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

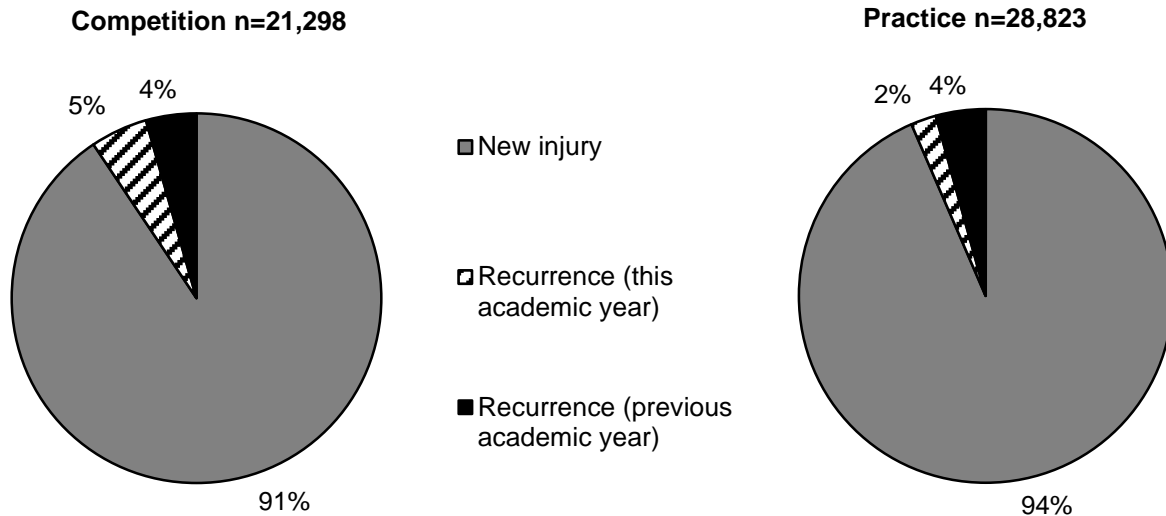


\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 6.5 Volleyball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| <b>Need for surgery</b> |               |             |               |             |               |             |
| Required surgery        | 2,074         | 11.1%       | 629           | 2.1%        | 2,703         | 5.4%        |
| Did not require surgery | 18,539        | 89.9%       | 28,666        | 97.9%       | 47,205        | 94.6%       |
| <b>Total</b>            | <b>20,613</b> | <b>100%</b> | <b>29,295</b> | <b>100%</b> | <b>49,908</b> | <b>100%</b> |

**Figure 6.3 History of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 6.6 Time during Season of Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n             | %           |
|-----------------------|---------------|-------------|
| <b>Time in Season</b> |               |             |
| Preseason             | 12,087        | 23.9%       |
| Regular season        | 35,709        | 70.6%       |
| Post season           | 2,797         | 5.5%        |
| <b>Total</b>          | <b>50,593</b> | <b>100%</b> |

**Table 6.7 Competition-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

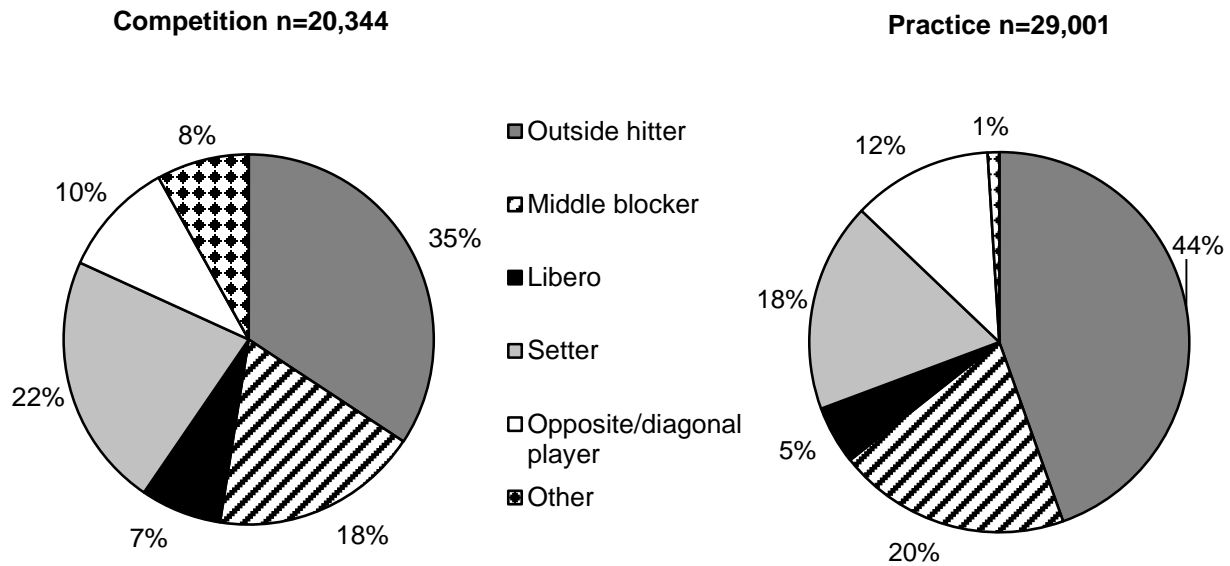
|                            | n             | %           |
|----------------------------|---------------|-------------|
| <b>Time in Competition</b> |               |             |
| Pre-competition/warm-ups   | 3,337         | 16.4%       |
| First game                 | 2,418         | 11.9%       |
| Second game                | 6,819         | 33.5%       |
| Third game                 | 5,772         | 28.4%       |
| Fourth game                | 1,999         | 9.8%        |
| <b>Total</b>               | <b>20,344</b> | <b>100%</b> |
| <b>Court Location</b>      |               |             |
| Right back (server)        | 1,076         | 5.7%        |
| Right forward              | 1,856         | 9.8%        |
| Middle forward             | 6,409         | 34.0%       |
| Left back                  | 2,485         | 13.2%       |
| Left forward               | 1,423         | 7.5%        |
| Outside the playable area  | 1,986         | 10.5%       |
| At the net                 | 1,852         | 9.8%        |
| Outside court (your side)  | 1,762         | 9.4%        |
| <b>Total</b>               | <b>18,849</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Table 6.8 Practice-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | n             | %           |
|-------------------------|---------------|-------------|
| <b>Time in Practice</b> |               |             |
| First 1/2 hour          | 5,380         | 18.9%       |
| Second 1/2 hour         | 3,494         | 12.3%       |
| 1-2 hours into practice | 17,907        | 63.0%       |
| >2 hours into practice  | 1,649         | 5.8%        |
| <b>Total</b>            | <b>28,430</b> | <b>100%</b> |

**Figure 6.4 Player Position of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

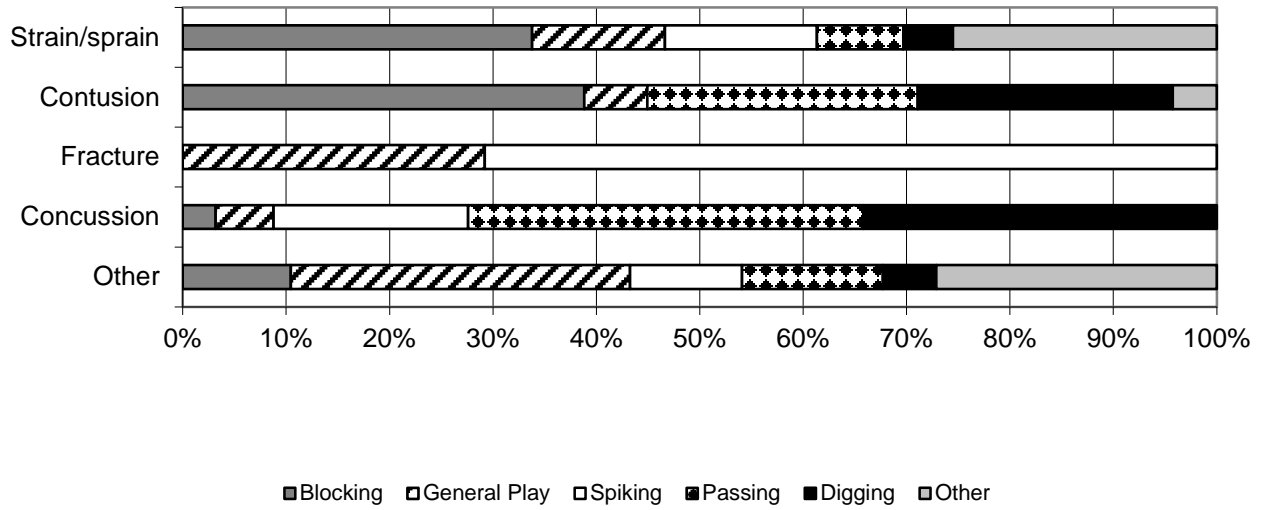


**Table 6.9 Activities Leading to Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity     | Competition   |             | Practice      |             | Overall       |             |
|--------------|---------------|-------------|---------------|-------------|---------------|-------------|
|              | n             | %           | n             | %           | n             | %           |
| General play | 3,414         | 16.4%       | 8,277         | 29.0%       | 11,691        | 23.7%       |
| Blocking     | 4,465         | 21.5%       | 5,913         | 20.7%       | 10,378        | 21.0%       |
| Digging      | 5,130         | 24.7%       | 4,194         | 14.7%       | 9,325         | 18.9%       |
| Spiking      | 1,956         | 9.4%        | 3,056         | 10.7%       | 5,013         | 10.2%       |
| Conditioning | -             | 0.0%        | 3,756         | 13.2%       | 3,756         | 7.6%        |
| Passing      | 1,082         | 5.2%        | 1,563         | 5.5%        | 2,644         | 5.4%        |
| Serving      | 2,077         | 10.0%       | 521           | 1.8%        | 2,598         | 5.3%        |
| Setting      | 974           | 4.7%        | 200           | 0.7%        | 1,173         | 2.4%        |
| Other        | 1,667         | 8%          | 1,068         | 3.7%        | 2,735         | 5.5%        |
| <b>Total</b> | <b>20,765</b> | <b>100%</b> | <b>28,548</b> | <b>100%</b> | <b>49,313</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Figure 6.5 Activity Resulting in Volleyball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



## **VII. Boys' Basketball Injury Epidemiology**



**Table 7.1 Boys' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | # Injuries | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>280</b> | <b>207,091</b> | <b>1.35</b>                                      | <b>79,762</b>                         |
| Competition  | 149        | 62,435         | 2.39   | 41,252                                |
| Practice     | 131        | 144,656        | 0.91   | 38,510                                |

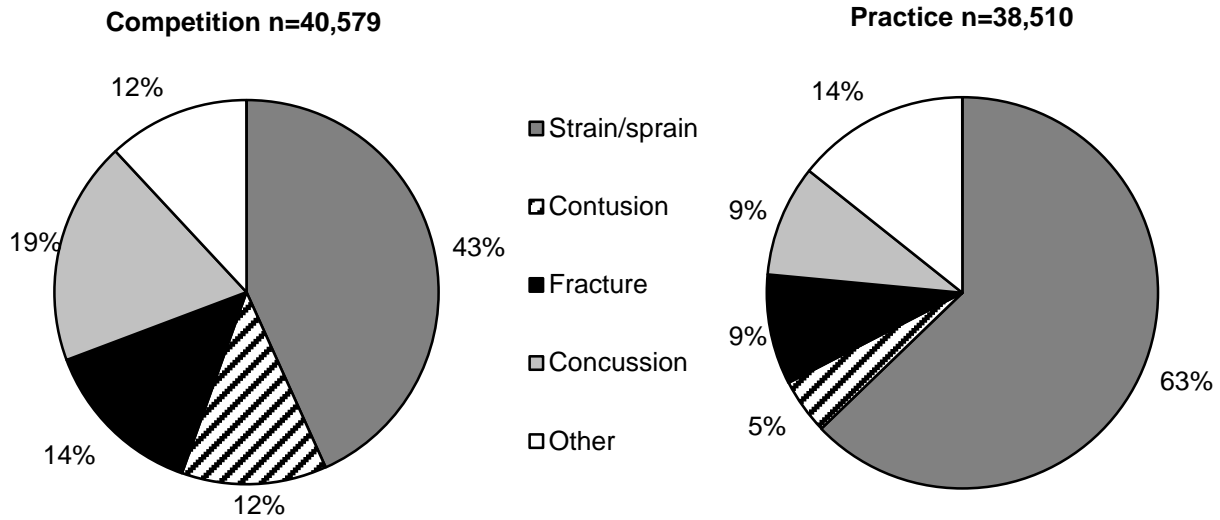
**Table 7.2 Demographic Characteristics of Injured Boys' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                          |                 |
|--------------------------|-----------------|
| <b>Year in School</b>    | <b>n=78,528</b> |
| Freshman                 | 16.6%           |
| Sophomore                | 31.3%           |
| Junior                   | 25.3%           |
| Senior                   | 26.8%           |
| <b>Total<sup>†</sup></b> | <b>100%</b>     |
| <b>Age (years)</b>       |                 |
| Minimum                  | 14              |
| Maximum                  | 18              |
| Mean (St. Dev.)          | 16.2 (1.2)      |
| <b>BMI</b>               |                 |
| Minimum                  | 9.1             |
| Maximum                  | 51.4            |
| Mean (St. Dev.)          | 22.8 (3.1)      |

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

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

**Figure 7.1 Diagnosis of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



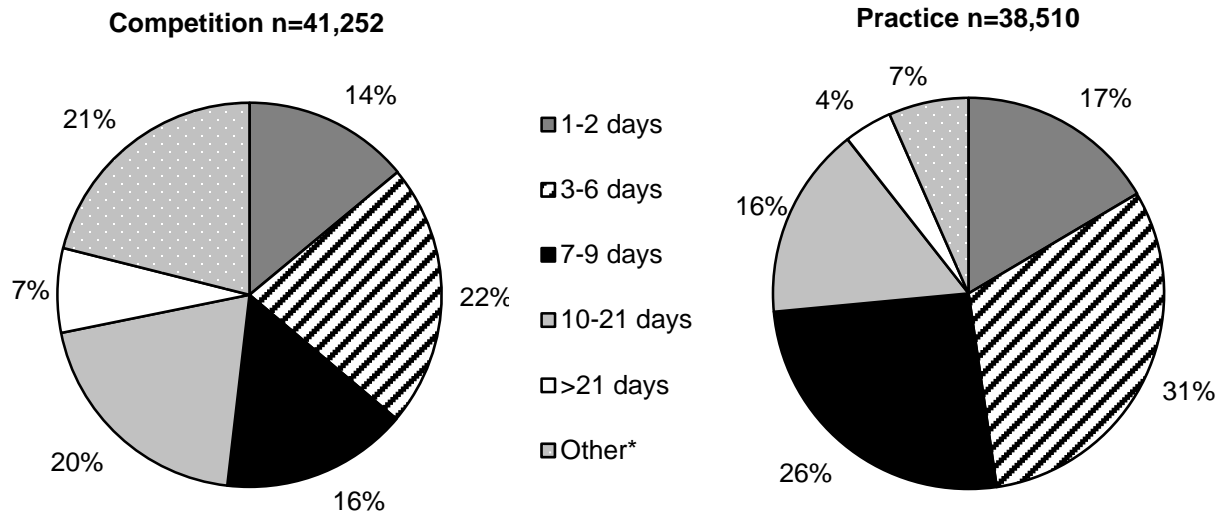
**Table 7.3 Body Site of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Competition   |             | Practice      |             | Overall       |             |
|---------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                     | n             | %           | n             | %           | n             | %           |
| Ankle               | 11,143        | 27.0%       | 13,772        | 35.8%       | 24,915        | 31.2%       |
| Head/face           | 11,884        | 28.8%       | 7,125         | 18.5%       | 19,009        | 23.8%       |
| Knee                | 5,310         | 12.9%       | 2,730         | 7.1%        | 8,040         | 10.1%       |
| Hand/wrist          | 3,430         | 8.3%        | 3,805         | 9.9%        | 7,235         | 9.1%        |
| Foot                | 1,854         | 4.5%        | 3,752         | 9.7%        | 5,605         | 7.0%        |
| Trunk               | 1,745         | 4.2%        | 3,022         | 7.8%        | 4,767         | 6.0%        |
| Hip/thigh/upper leg | 2,422         | 5.9%        | 2,275         | 5.9%        | 4,697         | 5.9%        |
| Lower leg           | 1,450         | 3.5%        | 1,151         | 3.0%        | 2,601         | 3.3%        |
| Shoulder            | 1,379         | 3.3%        | 234           | 0.6%        | 1,613         | 2.0%        |
| Arm/elbow           | 489           | 1.2%        | 645           | 1.7%        | 1,134         | 1.4%        |
| Other               | 145           | 0.4%        | -             | 0.0%        | 145           | 0.2%        |
| <b>Total</b>        | <b>41,252</b> | <b>100%</b> | <b>38,510</b> | <b>100%</b> | <b>79,762</b> | <b>100%</b> |

**Table 7.4 Ten Most Common Boys' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                         | Competition<br>n=40,576 |       | Practice<br>n=38,512 |       | Total<br>n=79,090 |       |
|-----------------------------------|-------------------------|-------|----------------------|-------|-------------------|-------|
|                                   | n                       | %     | n                    | %     | n                 | %     |
| Ankle strain/sprain               | 10,026                  | 24.7% | 13,655               | 35.5% | 23,681            | 29.9% |
| Head/face concussion              | 7,638                   | 18.8% | 3,549                | 9.2%  | 11,187            | 14.0% |
| Hand/wrist strain/sprain          | 1,342                   | 3.3%  | 2,262                | 5.9%  | 3,604             | 4.6%  |
| Knee strain/sprain                | 2,115                   | 5.2%  | 1,336                | 3.5%  | 3,451             | 4.3%  |
| Hip/thigh/upper leg strain/sprain | 672                     | 1.7%  | 2,208                | 5.7%  | 2,880             | 3.6%  |
| Foot strain/sprain                | 735                     | 1.8%  | 1,846                | 4.8%  | 2,581             | 3.3%  |
| Knee contusion                    | 1,434                   | 3.5%  | 1,160                | 3.0%  | 2,593             | 3.3%  |
| Head/face fracture                | 1,777                   | 4.4%  | 379                  | 1.0%  | 2,157             | 2.7%  |
| Knee other                        | 1,762                   | 4.3%  | 234                  | 0.6%  | 1,996             | 2.5%  |
| Hip/thigh/upper leg contusion     | 1,750                   | 4.3%  | -                    | 0.0%  | 1,750             | 2.2%  |

**Figure 7.2 Time Loss of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

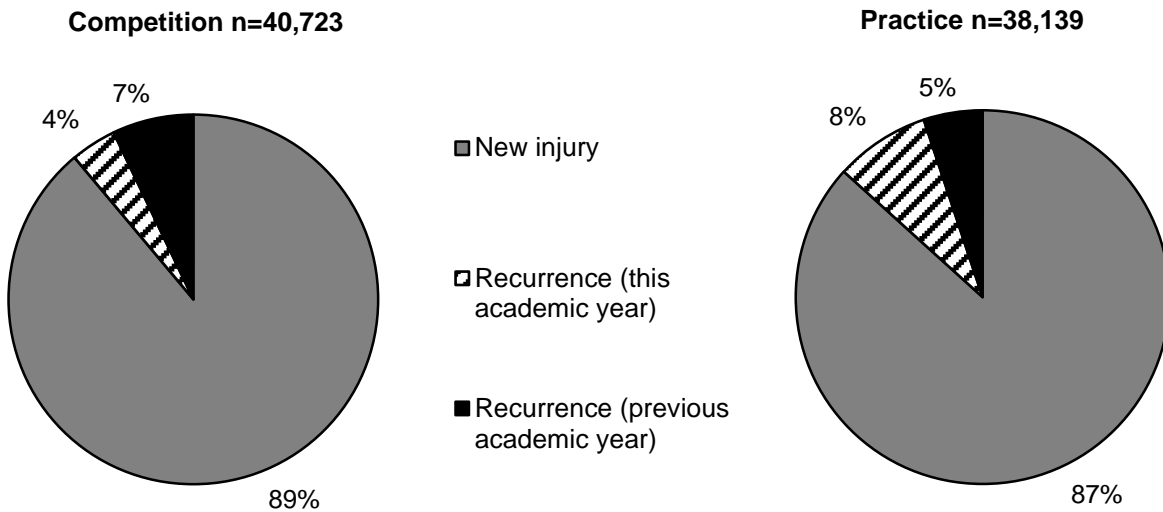


\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 7.5 Boys' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| <b>Need for surgery</b> |               |             |               |             |               |             |
| Required surgery        | 3,324         | 8.3%        | 1,617         | 4.3%        | 4,492         | 6.4%        |
| Did not require surgery | 36,635        | 91.7%       | 36,154        | 95.7%       | 72,788        | 93.6%       |
| <b>Total</b>            | <b>39,959</b> | <b>100%</b> | <b>37,771</b> | <b>100%</b> | <b>77,730</b> | <b>100%</b> |

**Figure 7.3 History of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 7.6 Time during Season of Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n             | %           |
|-----------------------|---------------|-------------|
| <b>Time in Season</b> |               |             |
| Preseason             | 13,070        | 16.4%       |
| Regular season        | 64,139        | 80.4%       |
| Post season           | 2,553         | 3.2%        |
| <b>Total</b>          | <b>79,762</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Table 7.7 Competition-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

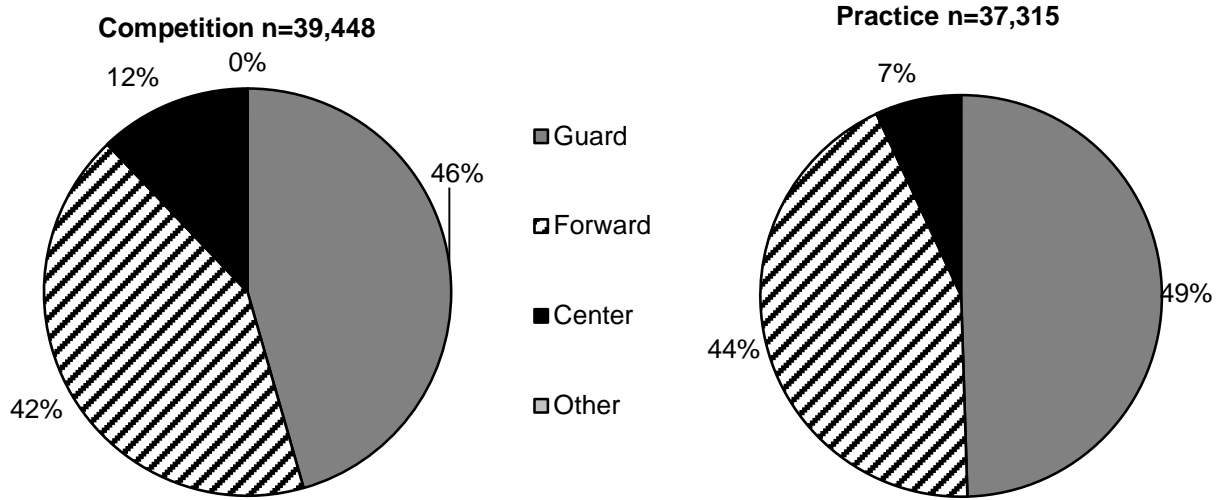
|                                     | n             | %           |
|-------------------------------------|---------------|-------------|
| <b>Time in Competition</b>          |               |             |
| Pre-competition/warm-ups            | 1,317         | 3.4%        |
| First quarter                       | 2,133         | 5.5%        |
| Second quarter                      | 12,296        | 31.7%       |
| Third quarter                       | 13,083        | 33.7%       |
| Fourth quarter                      | 10,001        | 25.8%       |
| <b>Total</b>                        | <b>38,830</b> | <b>100%</b> |
| <b>Court Location</b>               |               |             |
| Inside lane (offense)               | 10,869        | 29.2%       |
| Inside lane (defense)               | 8,554         | 23.0%       |
| Between 3 pt arc and lane (defense) | 5,479         | 14.7%       |
| Backcourt                           | 4,506         | 12.1%       |
| Outside 3 point arc - offense       | 2,647         | 7.1%        |
| Between 3 pt arc and lane (offense) | 2,174         | 5.8%        |
| Out of bounds                       | 1,872         | 5.0%        |
| Outside 3 point arc - defense       | 1,113         | 3.0%        |
| <b>Total</b>                        | <b>37,214</b> | <b>100%</b> |

\*Totals and n's are not always equal due to slight rounding of weighted number of injuries

**Table 7.8 Practice-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | n             | %           |
|-------------------------|---------------|-------------|
| <b>Time in Practice</b> |               |             |
| First 1/2 hour          | 3,206         | 8.6%        |
| Second 1/2 hour         | 8,702         | 23.4%       |
| 1-2 hours into practice | 24,224        | 65.1%       |
| >2 hours into practice  | 1,081         | 2.9%        |
| <b>Total</b>            | <b>37,214</b> | <b>100%</b> |

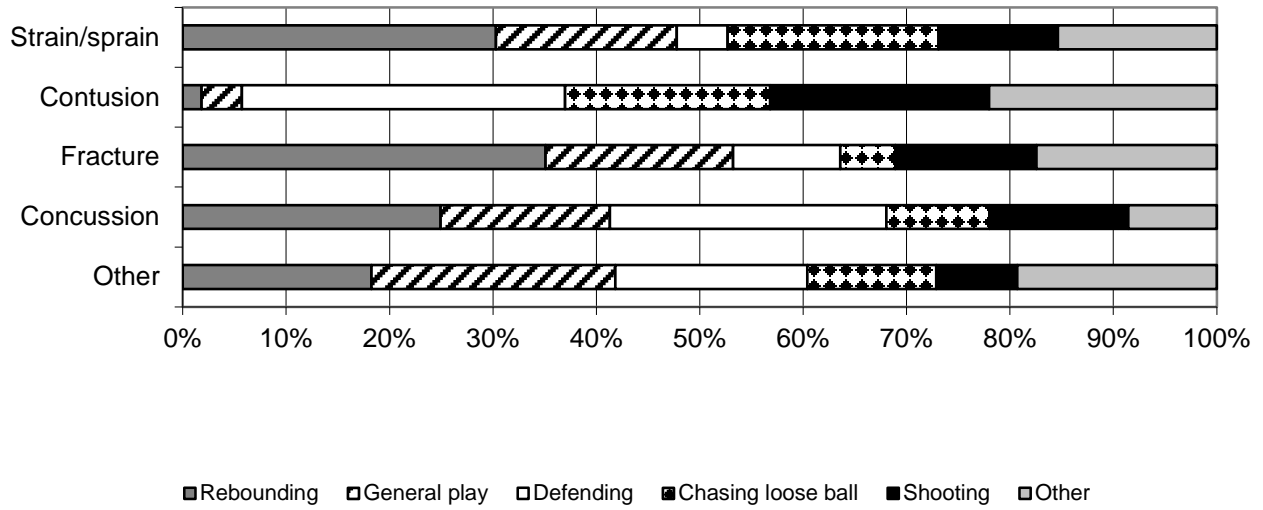
**Figure 7.4 Player Position of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 7.9 Activities Leading to Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity                | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| Rebounding              | 9,893         | 24.7%       | 8,854         | 23.4%       | 18,747        | 24.1%       |
| Defending               | 6,373         | 15.9%       | 7,580         | 20.0%       | 13,953        | 17.9%       |
| Shooting                | 6,240         | 15.6%       | 3,974         | 10.5%       | 10,214        | 13.1%       |
| General play            | 4,700         | 11.8%       | 4,766         | 12.6%       | 9,466         | 12.2%       |
| Chasing loose ball      | 5,983         | 15.0%       | 1,938         | 5.1%        | 7,921         | 10.2%       |
| Ball handling/dribbling | 3,430         | 8.6%        | 1,981         | 5.2%        | 5,411         | 6.9%        |
| Receiving pass          | 1,528         | 3.8%        | 1,754         | 4.6%        | 3,282         | 4.2%        |
| Conditioning            | 528           | 1.3%        | 2,745         | 7.2%        | 3,273         | 4.2%        |
| Other                   | 1,071         | 2.7%        | 2,077         | 5.5%        | 3,149         | 4.0%        |
| Passing                 | -             | 0.0%        | 1,290         | 3.4%        | 1,290         | 1.7%        |
| Screening               | 234           | 0.6%        | 926           | 2.4%        | 1,160         | 1.5%        |
| <b>Total</b>            | <b>39,981</b> | <b>100%</b> | <b>37,886</b> | <b>100%</b> | <b>77,867</b> | <b>100%</b> |

**Figure 7.5 Activity Resulting in Boys' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



## **VIII. Girls' Basketball Injury Epidemiology**



**Table 8.1 Girls' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | # Injuries | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>292</b> | <b>168,574</b> | <b>1.73</b>                                      | <b>83,033</b>                         |
| Competition  | 184        | 51,185         | 3.59   | 53,931                                |
| Practice     | 108        | 117,389        | 0.92   | 29,102                                |

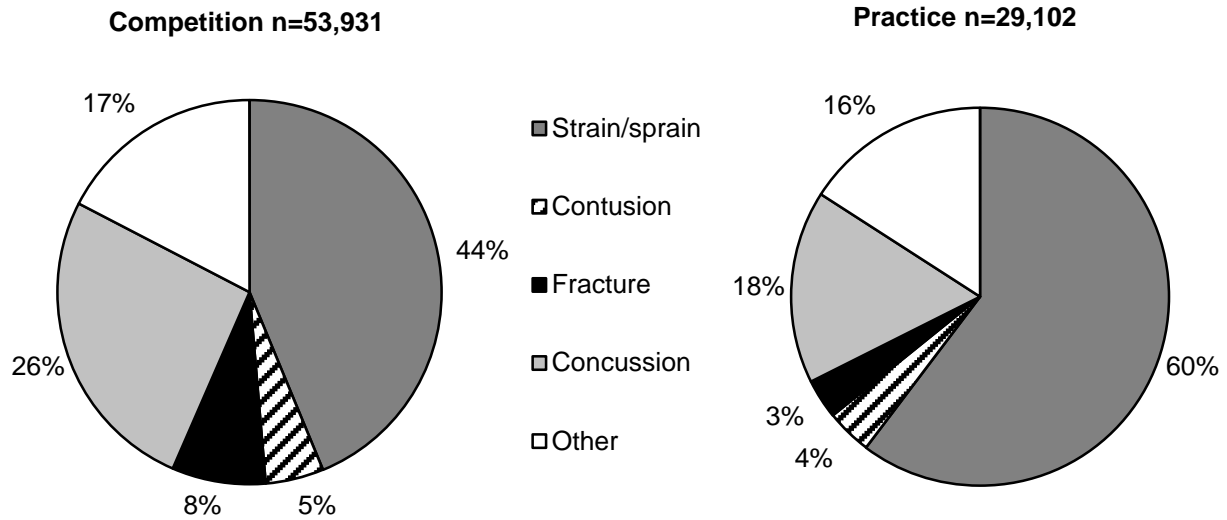
**Table 8.2 Demographic Characteristics of Injured Girls' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                          |                 |
|--------------------------|-----------------|
| <b>Year in School</b>    | <b>n=81,948</b> |
| Freshman                 | 28.2%           |
| Sophomore                | 30.8%           |
| Junior                   | 25.4%           |
| Senior                   | 15.6%           |
| <b>Total<sup>†</sup></b> | <b>100%</b>     |
| <b>Age (years)</b>       |                 |
| Minimum                  | 13              |
| Maximum                  | 18              |
| Mean (St. Dev.)          | 15.8 (1.3)      |
| <b>BMI</b>               |                 |
| Minimum                  | 14.5            |
| Maximum                  | 37.4            |
| Mean (St. Dev.)          | 22.5 (3.5)      |

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

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

**Figure 8.1 Diagnosis of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



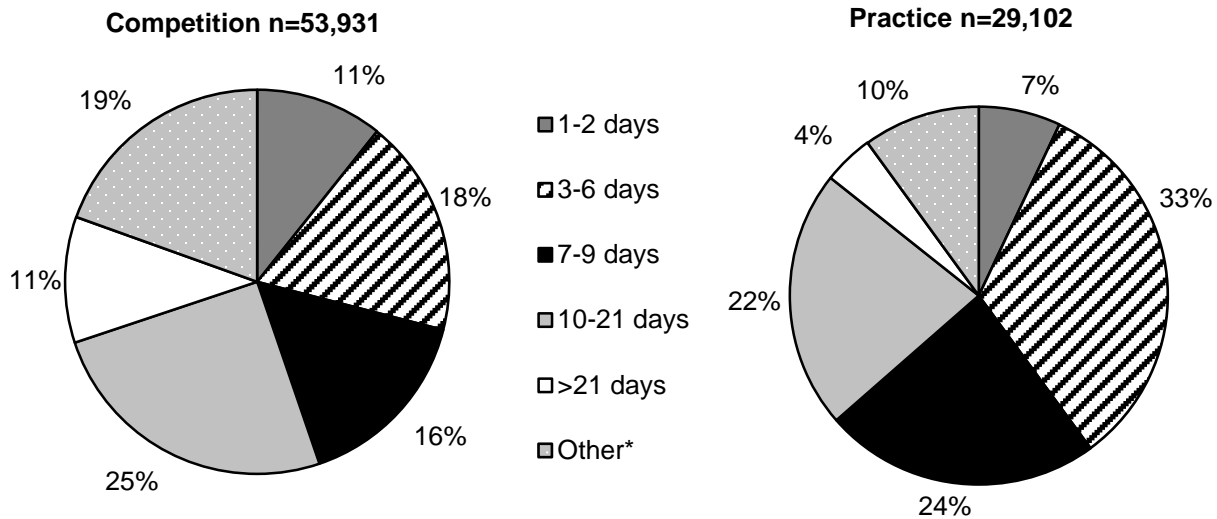
**Table 8.3 Body Site of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Competition   |             | Practice      |             | Overall       |             |
|---------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                     | n             | %           | n             | %           | n             | %           |
| Ankle               | 12,859        | 24.1%       | 7,323         | 25.2%       | 20,181        | 24.5%       |
| Head/face           | 14,998        | 28.1%       | 5,140         | 17.7%       | 20,138        | 24.4%       |
| Knee                | 11,704        | 21.9%       | 5,114         | 17.6%       | 16,818        | 20.4%       |
| Hand/wrist          | 5,425         | 10.2%       | 3,110         | 10.7%       | 8,536         | 10.3%       |
| Trunk               | 1,148         | 2.2%        | 3,760         | 12.9%       | 4,908         | 6.0%        |
| Hip/thigh/upper leg | 684           | 1.3%        | 2,340         | 8.0%        | 3,024         | 3.7%        |
| Shoulder            | 2,521         | 4.7%        | -             | 0.0%        | 2,521         | 3.1%        |
| Lower leg           | 1,369         | 2.6%        | 879           | 3.0%        | 2,249         | 2.7%        |
| Foot                | 1,296         | 2.4%        | 945           | 3.2%        | 2,241         | 2.7%        |
| Arm/elbow           | 1,242         | 2.3%        | 149           | 0.5%        | 1,390         | 1.7%        |
| Neck                | 130           | 0.2%        | 342           | 1.2%        | 472           | 0.6%        |
| <b>Total</b>        | <b>53,377</b> | <b>100%</b> | <b>29,102</b> | <b>100%</b> | <b>82,479</b> | <b>100%</b> |

**Table 8.4 Ten Most Common Girls' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                         | Competition<br>n=53,376 |       | Practice<br>n=29,102 |       | Total<br>n=82,478 |       |
|-----------------------------------|-------------------------|-------|----------------------|-------|-------------------|-------|
|                                   | n                       | %     | n                    | %     | n                 | %     |
| Ankle strain/sprain               | 12,785                  | 24.0% | 7,323                | 25.2% | 20,108            | 24.2% |
| Head/face concussion              | 13,547                  | 25.4% | 4,798                | 16.5% | 18,344            | 22.2% |
| Knee strain/sprain                | 6,238                   | 11.7% | 2,131                | 7.3%  | 8,369             | 10.1% |
| Knee other                        | 4,439                   | 8.3%  | 2,612                | 9.0%  | 7,051             | 8.5%  |
| Hand/wrist fracture               | 3,229                   | 6.0%  | 907                  | 3.1%  | 4,136             | 5.0%  |
| Trunk strain/sprain               | 538                     | 1.0%  | 2,787                | 9.6%  | 3,325             | 4.0%  |
| Hand/wrist strain/sprain          | 1,639                   | 3.1%  | 1,536                | 5.3%  | 3,175             | 3.8%  |
| Hip/thigh/upper leg strain/sprain | 342                     | 0.6%  | 2,266                | 7.8%  | 2,608             | 3.2%  |
| Shoulder other                    | 1,854                   | 3.5%  | -                    | 0.0%  | 1,854             | 2.2%  |
| Knee contusion                    | 1,027                   | 1.9%  | 371                  | 1.3%  | 1,398             | 1.7%  |
| Foot strain/sprain                | 758                     | 1.4%  | 658                  | 2.4%  | 1,443             | 1.7%  |

**Figure 8.2 Time Loss of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

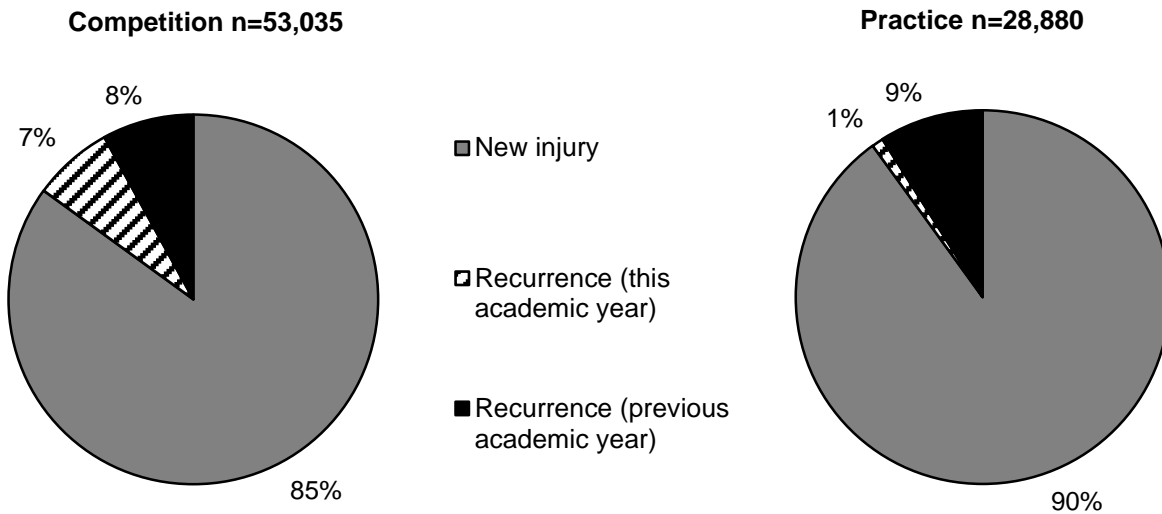


\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 8.5 Girls' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| <b>Need for surgery</b> |               |             |               |             |               |             |
| Required surgery        | 4,647         | 9.0%        | 2,956         | 10.5%       | 7,604         | 9.6%        |
| Did not require surgery | 46,801        | 91.0%       | 25,119        | 89.5%       | 71,919        | 90.4%       |
| <b>Total</b>            | <b>51,448</b> | <b>100%</b> | <b>28,075</b> | <b>100%</b> | <b>79,523</b> | <b>100%</b> |

**Figure 8.3 History of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 8.6 Time during Season of Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n             | %           |
|-----------------------|---------------|-------------|
| <b>Time in Season</b> |               |             |
| Preseason             | 12,256        | 14.8%       |
| Regular season        | 67,011        | 80.7%       |
| Post season           | 3,767         | 4.5%        |
| <b>Total</b>          | <b>83,033</b> | <b>100%</b> |

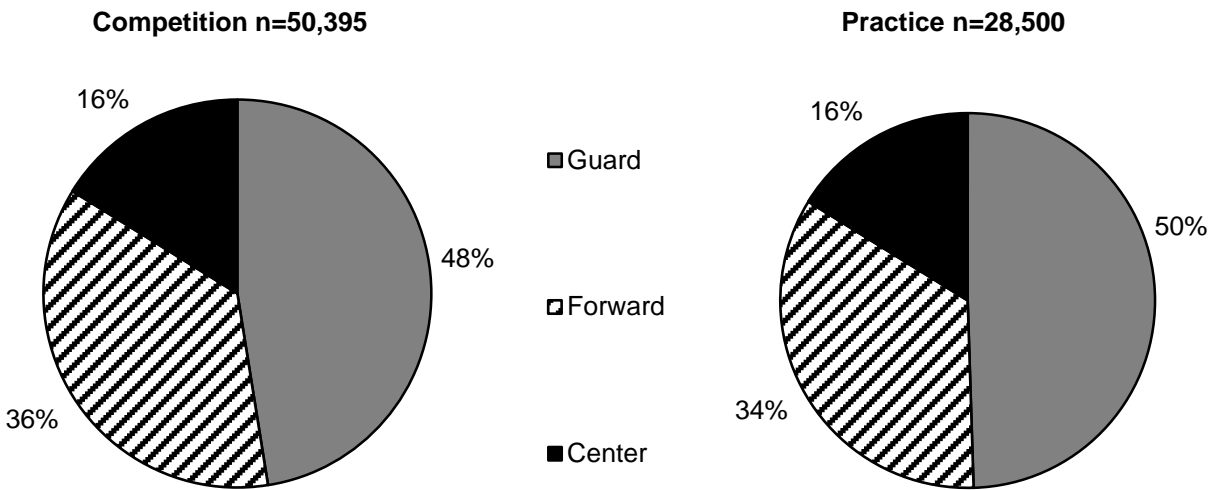
**Table 8.7 Competition-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                                     | n             | %           |
|-------------------------------------|---------------|-------------|
| <b>Time in Competition</b>          |               |             |
| Pre-competition/warm-ups            | -             | 0.0%        |
| First quarter                       | 2,888         | 6.0%        |
| Second quarter                      | 11,177        | 23.3%       |
| Third quarter                       | 17,503        | 36.4%       |
| Fourth quarter                      | 16,336        | 34.0%       |
| Overtime                            | 130           | 0.3%        |
| <b>Total</b>                        | <b>48,033</b> | <b>100%</b> |
| <b>Court Location</b>               |               |             |
| Inside lane (offense)               | 12,789        | 26.7%       |
| Inside lane (defense)               | 9,686         | 20.2%       |
| Between 3 pt arc and lane (defense) | 5,768         | 12.0%       |
| Outside 3 point arc - offense       | 5,646         | 11.8%       |
| Between 3 pt arc and lane (offense) | 5,606         | 11.7%       |
| Outside 3 point arc - defense       | 4,552         | 9.5%        |
| Backcourt                           | 2,058         | 4.3%        |
| Out of bounds                       | 1,112         | 2.3%        |
| Off the court                       | 741           | 1.5%        |
| <b>Total</b>                        | <b>47,958</b> | <b>100%</b> |

**Table 8.8 Practice-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | n             | %           |
|-------------------------|---------------|-------------|
| <b>Time in Practice</b> |               |             |
| First 1/2 hour          | 3,417         | 12.1%       |
| Second 1/2 hour         | 5,088         | 18.0%       |
| 1-2 hours into practice | 18,106        | 64.1%       |
| >2 hours into practice  | 1,629         | 5.8%        |
| <b>Total</b>            | <b>28,240</b> | <b>100%</b> |

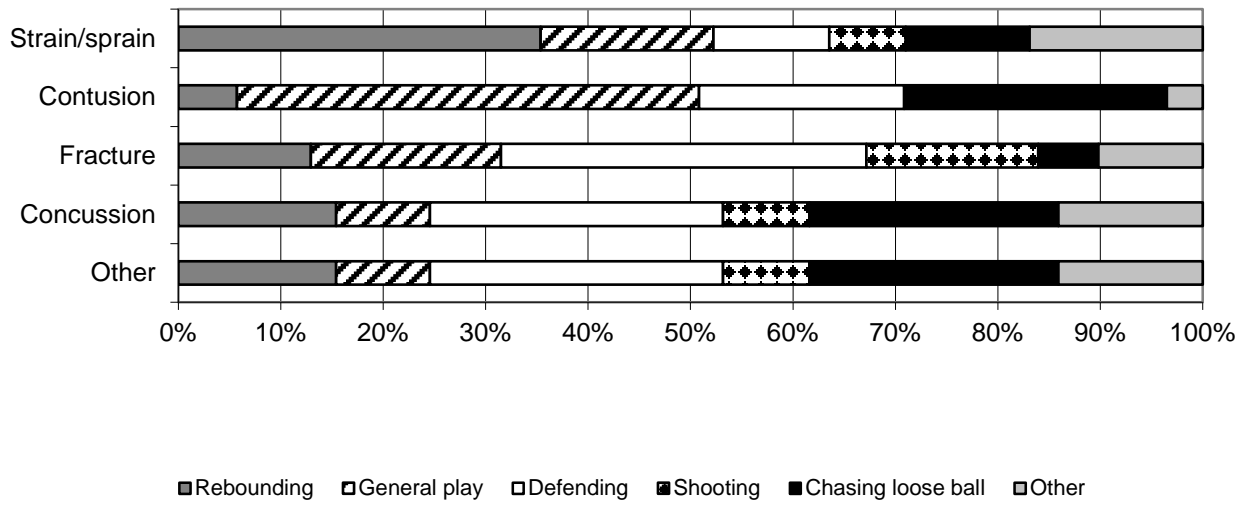
**Figure 8.4 Player Position of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 8.9 Activities Leading to Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity                | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| General play            | 11,359        | 22.3%       | 8,116         | 28.0%       | 19,475        | 24.3%       |
| Defending               | 10,745        | 21.0%       | 4,204         | 14.5%       | 14,949        | 18.7%       |
| Rebounding              | 9,436         | 18.5%       | 3,513         | 12.1%       | 12,950        | 16.2%       |
| Chasing loose ball      | 5,519         | 10.8%       | 3,483         | 12.0%       | 9,002         | 11.2%       |
| Shooting                | 7,332         | 14.4%       | 1,595         | 5.5%        | 8,928         | 11.1%       |
| Ball handling/dribbling | 3,116         | 6.1%        | 1,119         | 3.9%        | 4,236         | 5.3%        |
| Conditioning            | 73            | 0.1%        | 3,100         | 10.7%       | 3,173         | 4.0%        |
| Receiving pass          | 1,082         | 2.1%        | 2,065         | 7.1%        | 3,147         | 3.9%        |
| Passing                 | 555           | 1.1%        | 1,491         | 5.1%        | 2,045         | 2.6%        |
| Screening               | 668           | 1.3%        | -             | 0.0%        | 668           | 0.8%        |
| Other                   | 1,165         | 2.3%        | 342           | 1.2%        | 1,508         | 1.9%        |
| <b>Total</b>            | <b>51,052</b> | <b>100%</b> | <b>29,029</b> | <b>100%</b> | <b>80,081</b> | <b>100%</b> |

**Figure 8.5 Activity Resulting in Girls' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



## **IX. Wrestling Injury Epidemiology**



**Table 9.1 Wrestling Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | # Injuries | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>296</b> | <b>147,073</b> | <b>2.01</b>                                      | <b>80,569</b>                         |
| Competition  | 128        | 38519          | 3.32   | 36536                                 |
| Practice     | 168        | 108,554        | 1.55   | 44,033                                |

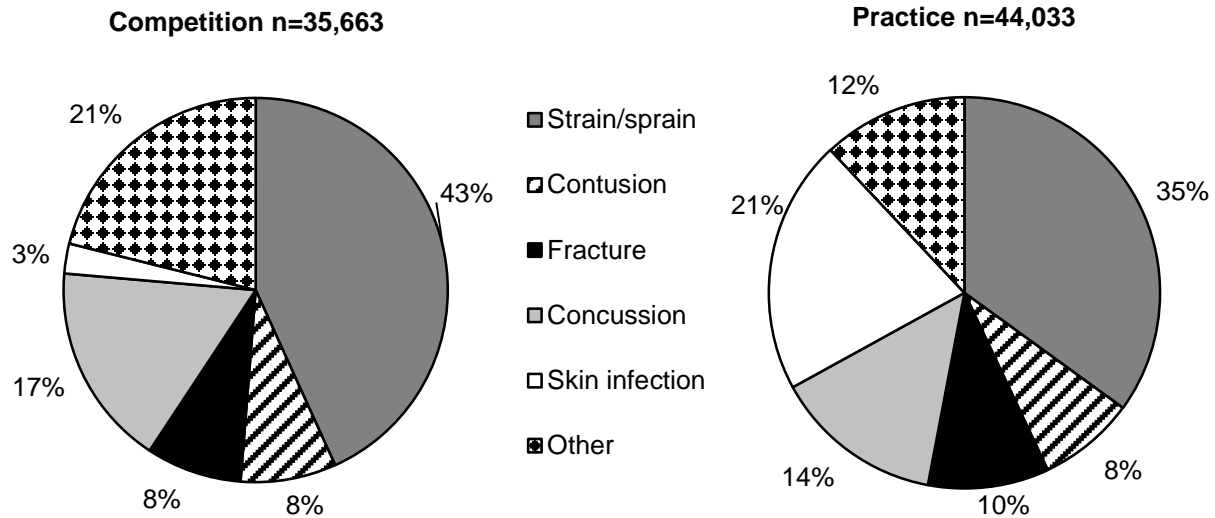
**Table 9.2 Demographic Characteristics of Injured Wrestlers, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

|                          |                 |
|--------------------------|-----------------|
| <b>Year in School</b>    | <b>n=79,381</b> |
| Freshman                 | 12.0%           |
| Sophomore                | 26.4%           |
| Junior                   | 31.1%           |
| Senior                   | 30.5%           |
| <b>Total<sup>†</sup></b> | <b>100%</b>     |
| <b>Age (years)</b>       |                 |
| Minimum                  | 14              |
| Maximum                  | 19              |
| Mean (St. Dev.)          | 16.3 (1.2)      |
| <b>BMI</b>               |                 |
| Minimum                  | 15.7            |
| Maximum                  | 43.5            |
| Mean (St. Dev.)          | 23.5 (4.8)      |

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

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

**Figure 9.1 Diagnosis of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



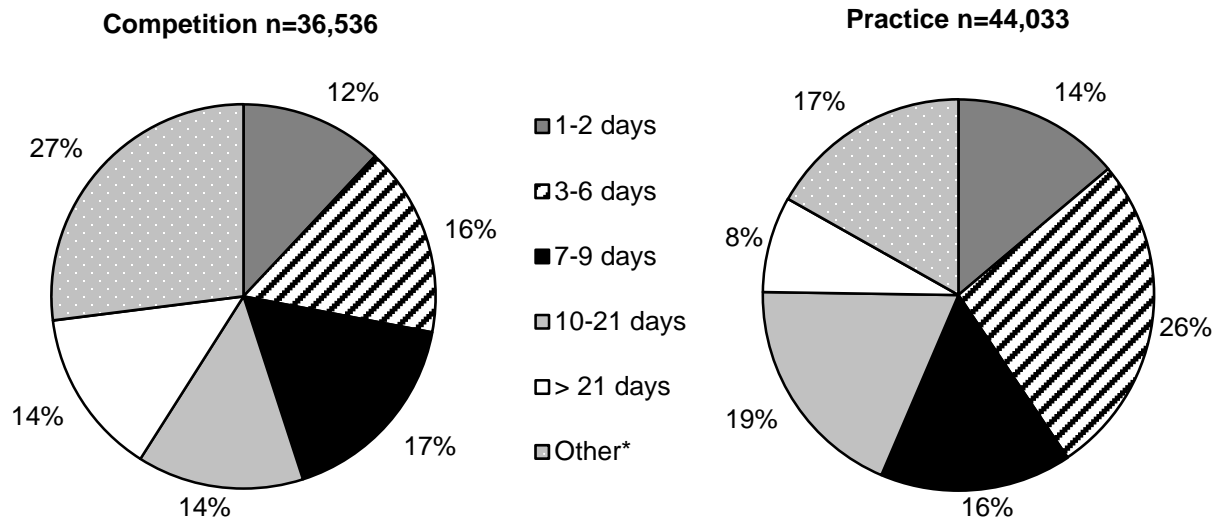
**Table 9.3 Body Site of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Competition   |             | Practice      |             | Overall       |             |
|---------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                     | n             | %           | n             | %           | n             | %           |
| Head/face           | 7,316         | 20.0%       | 11,071        | 25.1%       | 18,387        | 22.8%       |
| Shoulder            | 7,441         | 20.4%       | 5,765         | 13.1%       | 13,206        | 16.4%       |
| Knee                | 5,343         | 14.6%       | 5,399         | 12.3%       | 10,743        | 13.3%       |
| Trunk               | 3,322         | 9.1%        | 5,978         | 13.6%       | 9,300         | 11.5%       |
| Hand/wrist          | 2,150         | 5.9%        | 4,463         | 10.1%       | 6,613         | 8.2%        |
| Ankle               | 3,130         | 8.6%        | 2,298         | 5.2%        | 5,428         | 6.7%        |
| Arm/elbow           | 2,859         | 7.8%        | 2,326         | 5.3%        | 5,185         | 6.4%        |
| Neck                | 1,945         | 5.3%        | 2,912         | 6.6%        | 4,857         | 6.0%        |
| Hip/thigh/upper leg | 1,392         | 3.8%        | 816           | 1.9%        | 2,208         | 2.7%        |
| Foot                | 219           | 0.6%        | 1,003         | 2.3%        | 1,222         | 1.5%        |
| Lower leg           | 352           | 1.0%        | 616           | 1.4%        | 968           | 1.3%        |
| Other               | 1,065         | 2.9%        | 1,387         | 3.2%        | 2,452         | 3.1%        |
| <b>Total</b>        | <b>36,536</b> | <b>100%</b> | <b>44,033</b> | <b>100%</b> | <b>80,569</b> | <b>100%</b> |

**Table 9.4 Ten Most Common Wrestling Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                | Competition<br>n=35,659 |       | Practice<br>n=44,035 |       | Total<br>n=79,694 |       |
|--------------------------|-------------------------|-------|----------------------|-------|-------------------|-------|
|                          | n                       | %     | n                    | %     | n                 | %     |
| Head/face concussion     | 6,039                   | 16.9% | 6,107                | 13.9% | 12,146            | 15.2% |
| Shoulder strain/sprain   | 4,021                   | 11.3% | 2,528                | 5.7%  | 6,549             | 8.2%  |
| Knee strain/sprain       | 1,812                   | 5.1%  | 3,335                | 7.6%  | 5,147             | 6.5%  |
| Neck strain/sprain       | 1,828                   | 5.1%  | 2,912                | 6.6%  | 4,739             | 5.9%  |
| Ankle strain/sprain      | 2,665                   | 7.5%  | 2,007                | 4.6%  | 4,672             | 5.9%  |
| Knee other               | 2,471                   | 6.9%  | 1,599                | 3.6%  | 4,071             | 5.1%  |
| Trunk strain/sprain      | 1,913                   | 5.4%  | 2,003                | 4.5%  | 3,915             | 4.9%  |
| Arm/elbow other          | 1,341                   | 3.8%  | 2,137                | 7.4%  | 3,478             | 4.4%  |
| Head/face skin infection | 378                     | 1.1%  | 2,754                | 6.3%  | 3,132             | 3.9%  |
| Arm/elbow strain/sprain  | 155                     | 0.4%  | 189                  | 0.4%  | 344               | 0.4%  |

**Figure 9.2 Time Loss of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

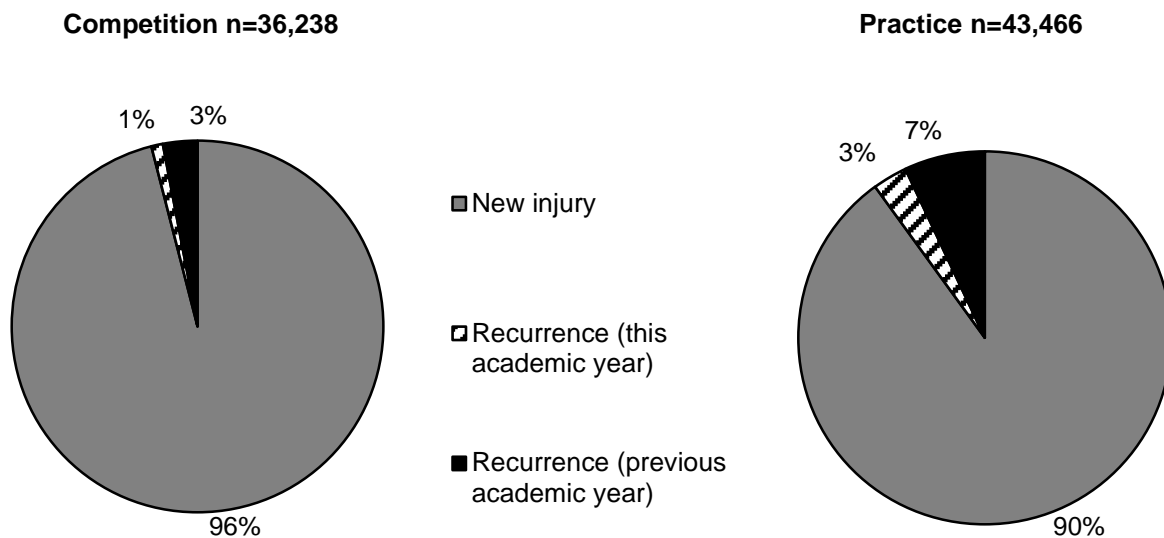


\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 9.5 Wrestling Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| <b>Need for surgery</b> |               |             |               |             |               |             |
| Required surgery        | 1,092         | 3.0%        | 1,210         | 2.8%        | 2,302         | 2.9%        |
| Did not require surgery | 35,096        | 97.0%       | 41,701        | 97.2%       | 76,797        | 97.1%       |
| <b>Total</b>            | <b>36,188</b> | <b>100%</b> | <b>42,911</b> | <b>100%</b> | <b>79,099</b> | <b>100%</b> |

**Figure 9.3 History of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 9.6 Time during Season of Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n             | %           |
|-----------------------|---------------|-------------|
| <b>Time in Season</b> |               |             |
| Preseason             | 8,298         | 10.3%       |
| Regular season        | 68,329        | 84.9%       |
| Post season           | 3,870         | 4.8%        |
| <b>Total</b>          | <b>80,497</b> | <b>100%</b> |

**Table 9.7 Competition-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                            | n             | %           |
|----------------------------|---------------|-------------|
| <b>Time in Competition</b> |               |             |
| Pre-competition/warm-ups   | 932           | 2.8%        |
| First period               | 8,745         | 26.4%       |
| Second period              | 14,234        | 43.0%       |
| Third period               | 9,178         | 27.7%       |
| <b>Total</b>               | <b>33,090</b> | <b>100%</b> |
| <b>Mat Location</b>        |               |             |
| Within 28 ft. circle       | 32,450        | 94.3%       |
| Out of bounds              | 1,955         | 5.7%        |
| Off the mat                | -             | 0.0%        |
| <b>Total</b>               | <b>34,405</b> | <b>100%</b> |

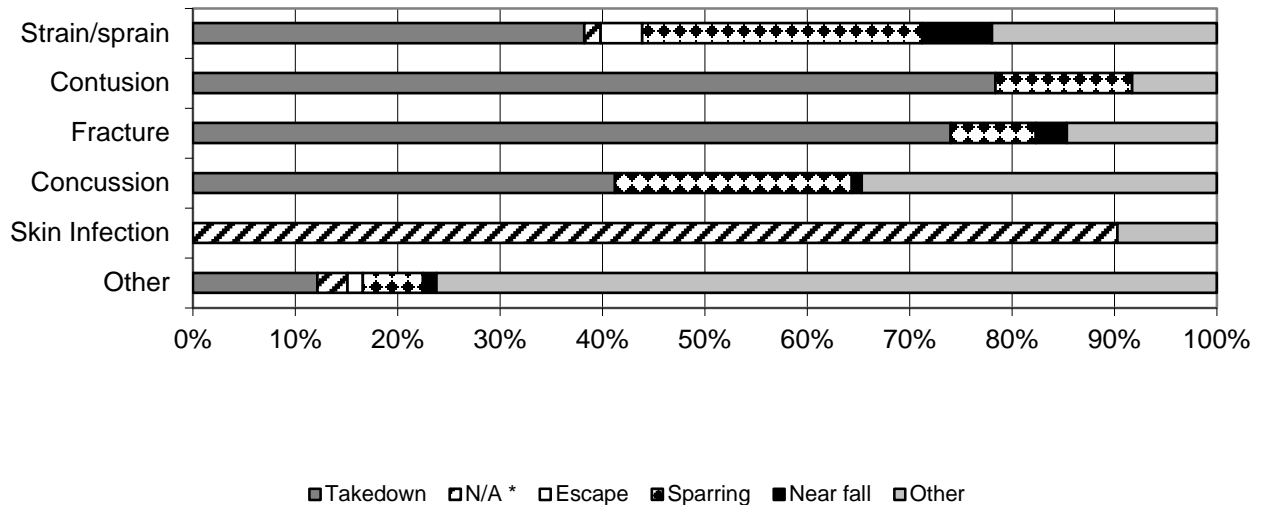
**Table 9.8 Practice-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | n             | %           |
|-------------------------|---------------|-------------|
| <b>Time in Practice</b> |               |             |
| First 1/2 hour          | 3,676         | 9.3%        |
| Second 1/2 hour         | 6,687         | 16.9%       |
| 1-2 hours into practice | 23,412        | 59.2%       |
| >2 hours into practice  | 5,805         | 14.7%       |
| <b>Total</b>            | <b>39,581</b> | <b>100%</b> |

**Table 9.9 Activities Leading to Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity                                  | Competition   |             | Practice      |             | Overall       |             |
|---|---------------|-------------|---------------|-------------|---------------|-------------|
|   | n             | %           | n             | %           | n             | %           |
| Takedown                                  | 20,431        | 56.8%       | 14,285        | 33.5%       | 34,716        | 44.2%       |
| Sparring                                  | 5,712         | 15.9%       | 10,455        | 24.5%       | 16,167        | 20.6%       |
| N/A (e.g., skin infection, overuse, etc.) | 779           | 2.2%        | 7,105         | 16.7%       | 7,884         | 10.0%       |
| Fall                                      | 1,293         | 3.6%        | 3,116         | 7.3%        | 4,409         | 5.6%        |
| Conditioning                              | -             | 0.0%        | 3,481         | 8.2%        | 3,481         | 4.4%        |
| Near fall                                 | 2,289         | 6.4%        | 932           | 2.2%        | 3,221         | 4.1%        |
| Escape                                    | 964           | 2.7%        | 1,227         | 2.9%        | 2,191         | 2.8%        |
| Riding                                    | 1,277         | 3.5%        | 117           | 0.3%        | 1,394         | 1.8%        |
| Reversal                                  | 1,072         | 3.0%        | 72            | 0.2%        | 1,144         | 1.5%        |
| Other                                     | 2,157         | 6.0%        | 1,831         | 4.3%        | 3,988         | 5.1%        |
| <b>Total</b>                              | <b>35,974</b> | <b>100%</b> | <b>42,621</b> | <b>100%</b> | <b>78,594</b> | <b>100%</b> |

**Figure 9.4 Activities Resulting in Wrestling Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



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

## **X. Baseball Injury Epidemiology**

**Table 10.1 Baseball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | # Injuries | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>133</b> | <b>164,130</b> | <b>0.81</b>                                      | <b>46,796</b>                         |
| Competition  | 83         | 55,577         | 1.49   | 29,789                                |
| Practice     | 50         | 108,553        | 0.46   | 17,008                                |

**Table 10.2 Demographic Characteristics of Injured Baseball Athletes, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

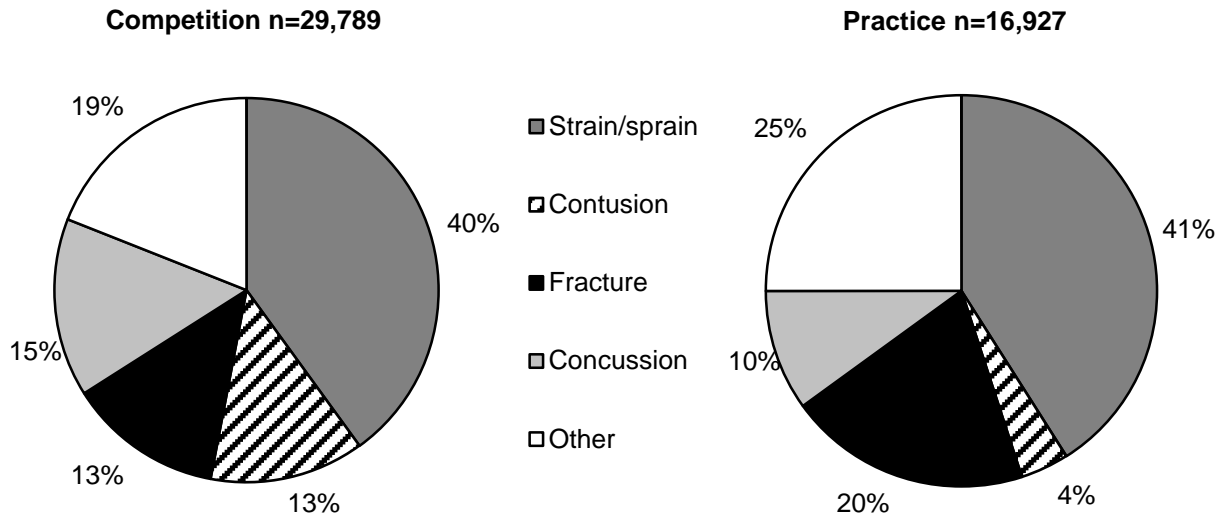
| <b>Year in School</b>    | <b>n=45,736</b> |
|--------------------------|-----------------|
| Freshman                 | 19.4%           |
| Sophomore                | 30.1%           |
| Junior                   | 30.2%           |
| Senior                   | 20.3%           |
| <b>Total<sup>†</sup></b> | <b>100%</b>     |
| <b>Age (years)</b>       |                 |
| Minimum                  | 13              |
| Maximum                  | 18              |
| Mean (St. Dev.)          | 16.1 (1.3)      |
| <b>BMI</b>               |                 |
| Minimum                  | 17.6            |
| Maximum                  | 40.9            |
| Mean (St. Dev.)          | 24.2 (3.7)      |

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

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



**Figure 10.1 Diagnosis of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



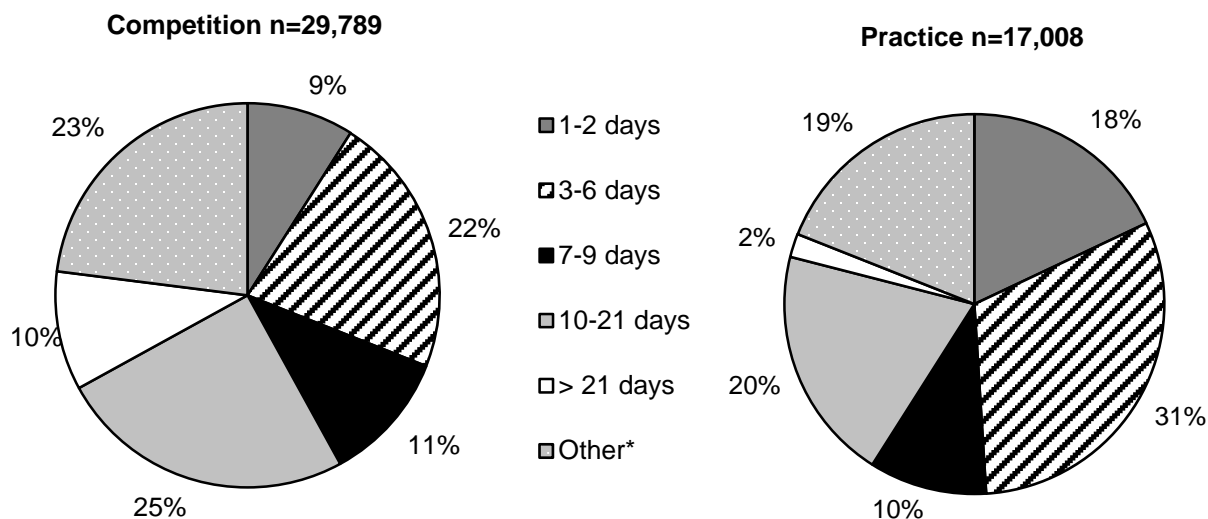
**Table 10.3 Body Site of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Competition   |             | Practice      |             | Overall       |             |
|---------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                     | n             | %           | n             | %           | n             | %           |
| Head/face           | 5,940         | 19.9%       | 5,669         | 33.3%       | 11,609        | 24.8%       |
| Shoulder            | 6,802         | 22.8%       | 1,460         | 8.6%        | 8,262         | 17.7%       |
| Hip/thigh/upper leg | 4,669         | 15.7%       | 1,266         | 7.4%        | 5,935         | 12.7%       |
| Arm/elbow           | 2,010         | 6.7%        | 3,520         | 20.7%       | 5,531         | 11.8%       |
| Hand/wrist          | 3,223         | 10.8%       | 1,058         | 6.2%        | 4,282         | 9.2%        |
| Ankle               | 2,479         | 8.3%        | 1,421         | 8.4%        | 3,900         | 8.3%        |
| Knee                | 1,731         | 5.8%        | 1,671         | 9.8%        | 3,402         | 7.3%        |
| Trunk               | 1,283         | 4.3%        | 400           | 2.3%        | 1,682         | 3.6%        |
| Lower leg           | 534           | 1.8%        | 80            | 0.5%        | 614           | 1.3%        |
| Neck                | -             | 0.0%        | 271           | 1.6%        | 271           | 0.6%        |
| Foot                | 191           | 0.7%        | -             | 0.0%        | 191           | 0.4%        |
| Other               | 926           | 3.1%        | 191           | 1.1%        | 1,117         | 2.4%        |
| <b>Total</b>        | <b>29,789</b> | <b>100%</b> | <b>17,008</b> | <b>100%</b> | <b>46,796</b> | <b>100%</b> |

**Table 10.4 Ten Most Common Baseball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                         | Competition<br>n=29,791 |       | Practice<br>n=16,929 |       | Total<br>n=46,719 |       |
|-----------------------------------|-------------------------|-------|----------------------|-------|-------------------|-------|
|                                   | n                       | %     | n                    | %     | n                 | %     |
| Head/face concussion              | 4,527                   | 15.2% | 1,737                | 10.3% | 6,264             | 13.4% |
| Hip/thigh/upper leg strain/sprain | 3,336                   | 11.2% | 1,266                | 7.5%  | 4,602             | 9.8%  |
| Arm/elbow strain/sprain           | 1,469                   | 4.9%  | 2,642                | 15.6% | 4,111             | 8.8%  |
| Ankle strain/sprain               | 2,208                   | 7.4%  | 1,421                | 8.4%  | 3,629             | 7.8%  |
| Shoulder strain/sprain            | 2,092                   | 7.0%  | 400                  | 2.4%  | 2,492             | 5.3%  |
| Knee other                        | 398                     | 1.3%  | 1,137                | 6.7%  | 1,536             | 3.3%  |
| Hand/wrist fracture               | 1,285                   | 4.3%  | 271                  | 1.6%  | 1,507             | 3.2%  |
| Knee strain/sprain                | 933                     | 3.1%  | 534                  | 3.2%  | 1,467             | 3.1%  |
| Head/face contusion               | -                       | 0.0%  | 534                  | 3.2%  | 534               | 1.1%  |
| Lower leg contusion               | 534                     | 1.8%  | -                    | 0.0%  | 534               | 1.1%  |

**Figure 10.2 Time Loss of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

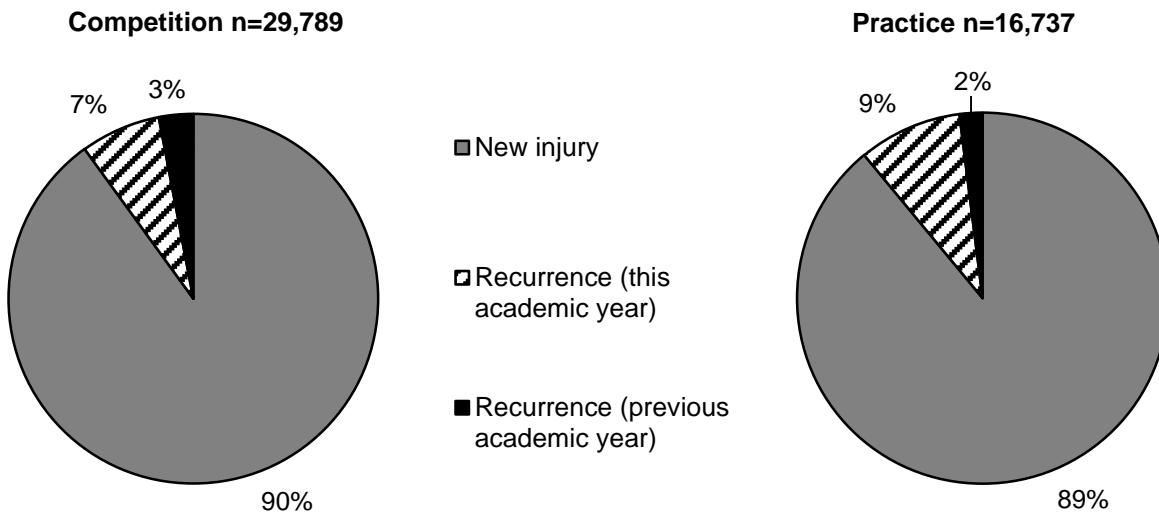


\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 10.5 Baseball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| <b>Need for surgery</b> |               |             |               |             |               |             |
| Required surgery        | 2,403         | 8.1%        | 1,870         | 11.2%       | 4,272         | 9.2%        |
| Did not require surgery | 27,386        | 91.9%       | 14,867        | 88.8%       | 42,253        | 90.8%       |
| <b>Total</b>            | <b>29,789</b> | <b>100%</b> | <b>16,737</b> | <b>100%</b> | <b>46,525</b> | <b>100%</b> |

**Figure 10.3 History of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 10.6 Time during Season of Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n             | %           |
|-----------------------|---------------|-------------|
| <b>Time in Season</b> |               |             |
| Preseason             | 8,071         | 17.2%       |
| Regular season        | 36,460        | 77.9%       |
| Post season           | 2,266         | 4.8%        |
| <b>Total</b>          | <b>46,796</b> | <b>100%</b> |

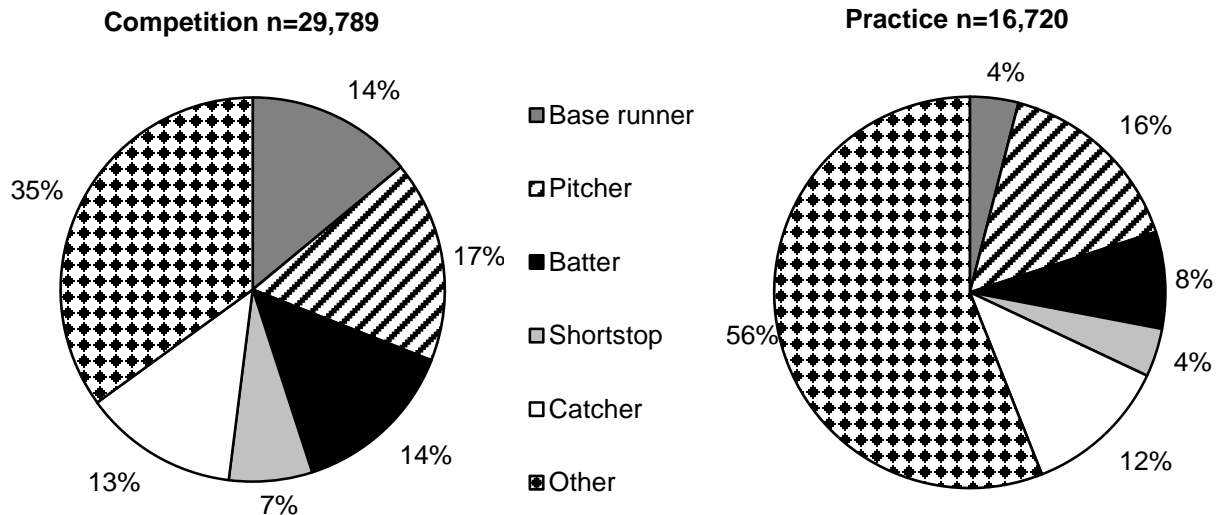
**Table 10.7 Competition-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                            | n             | %           |
|----------------------------|---------------|-------------|
| <b>Time in Competition</b> |               |             |
| Pre-competition/warm-ups   | 1,413         | 4.9%        |
| First inning               | 2,208         | 7.7%        |
| Second inning              | 2,299         | 8.0%        |
| Third inning               | 4,574         | 15.9%       |
| Fourth inning              | 6,483         | 22.6%       |
| Fifth inning               | 5,725         | 19.9%       |
| Sixth inning               | 4,540         | 15.8%       |
| Seventh inning             | 1,476         | 5.1%        |
| <b>Total</b>               | <b>28,719</b> | <b>100%</b> |
| <b>Field Location</b>      |               |             |
| Home plate                 | 8,778         | 30.9%       |
| First base                 | 3,151         | 11.1%       |
| Second base                | 3,407         | 12.0%       |
| Third base                 | 2,962         | 10.4%       |
| Infield                    | 1,507         | 5.3%        |
| Pitcher's mound            | 4,487         | 15.8%       |
| Outfield                   | 1,882         | 6.6%        |
| Foul territory             | 1,199         | 4.3%        |
| Other                      | 996           | 3.5%        |
| <b>Total</b>               | <b>28,367</b> | <b>100%</b> |

**Table 10.8 Practice-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | n             | %           |
|-------------------------|---------------|-------------|
| <b>Time in Practice</b> |               |             |
| First 1/2 hour          | 2,044         | 13.0%       |
| Second 1/2 hour         | 4,640         | 29.5%       |
| 1-2 hours into practice | 5,911         | 37.6%       |
| >2 hours into practice  | 3,131         | 19.9%       |
| <b>Total</b>            | <b>15,725</b> | <b>100%</b> |

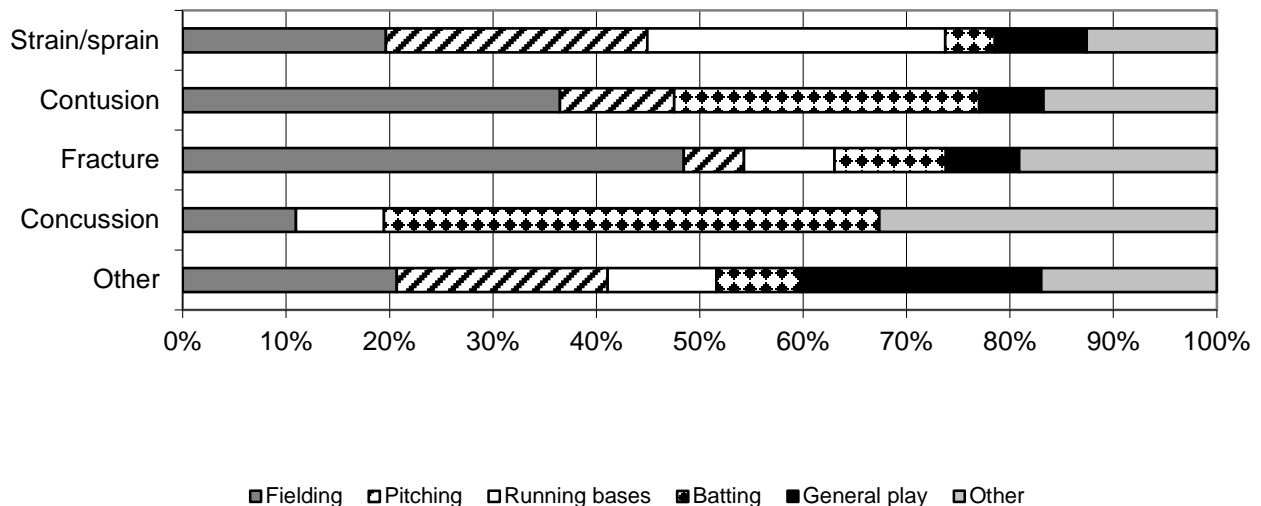
**Figure 10.4 Player Position of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 10.9 Activities Leading to Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity                | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| Fielding a batted ball  | 3,452         | 11.6%       | 4,322         | 25.5%       | 7,774         | 16.6%       |
| Pitching                | 4,678         | 15.7%       | 2,885         | 17.0%       | 7,563         | 16.2%       |
| Running bases           | 4,159         | 14.0%       | 2,047         | 12.1%       | 6,207         | 13.3%       |
| Batting                 | 4,609         | 15.5%       | 1,156         | 6.8%        | 5,765         | 12.3%       |
| Sliding                 | 4,826         | 16.2%       | -             | 0.0%        | 4,826         | 10.3%       |
| Catching                | 3,237         | 10.9%       | 1,070         | 6.3%        | 4,308         | 9.2%        |
| Throwing (not pitching) | 2,871         | 9.6%        | 1,007         | 5.9%        | 3,878         | 8.3%        |
| Fielding a thrown ball  | 933           | 3.1%        | 1,197         | 7.1%        | 2,130         | 4.6%        |
| General play            | 671           | 2.3%        | 802           | 4.7%        | 1,473         | 3.2%        |
| Conditioning            | -             | 0.0%        | 1,022         | 6.0%        | 1,022         | 2.2%        |
| Other                   | 351           | 1.2%        | 1,419         | 8.4%        | 1,770         | 3.8%        |
| <b>Total</b>            | <b>29,789</b> | <b>100%</b> | <b>16,927</b> | <b>100%</b> | <b>46,716</b> | <b>100%</b> |

**Figure 10.5 Activity Resulting in Baseball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



## **XI. Softball Injury Epidemiology**

**Table 11.1 Softball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | # Injuries | # Exposures    | Injury rate<br>(per 1,000 athlete-<br>exposures) | Nationally<br>Estimated<br># Injuries |
|--------------|------------|----------------|--|---------------------------------------|
| <b>Total</b> | <b>122</b> | <b>129,861</b> | <b>0.94</b>                                      | <b>52,700</b>                         |
| Competition  | 62         | 42,887         | 1.45   | 26,607                                |
| Practice     | 60         | 86,974         | 0.69   | 26,093                                |

**Table 11.2 Demographic Characteristics of Injured Softball Athletes, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year\***

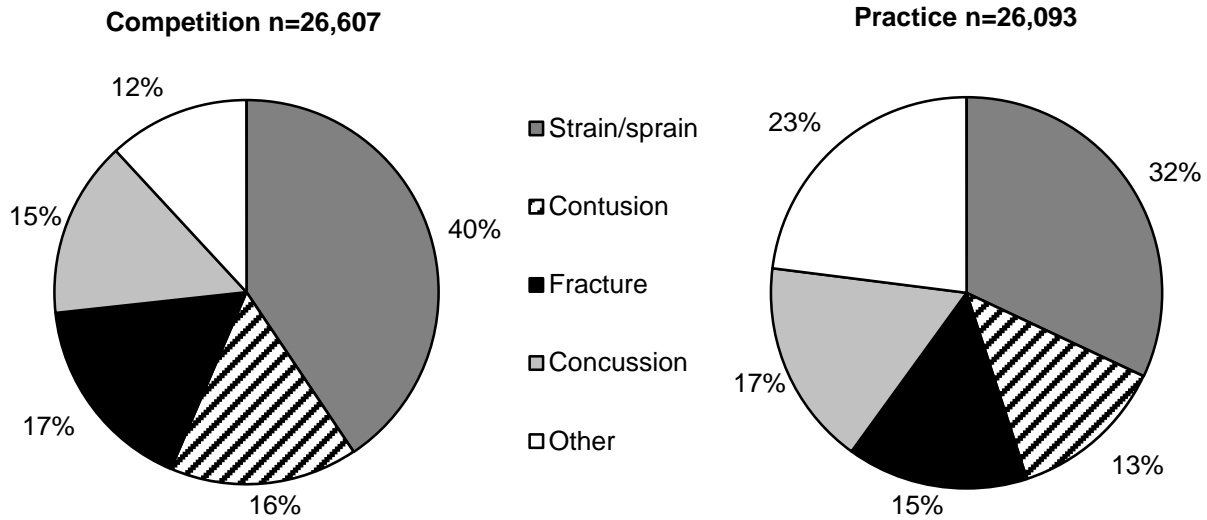
|                          |                 |
|--------------------------|-----------------|
| <b>Year in School</b>    | <b>n=52,191</b> |
| Freshman                 | 33.5%           |
| Sophomore                | 26.9%           |
| Junior                   | 20.1%           |
| Senior                   | 19.6%           |
| <b>Total<sup>†</sup></b> | <b>100%</b>     |
| <b>Age (years)</b>       |                 |
| Minimum                  | 14              |
| Maximum                  | 18              |
| Mean (St. Dev.)          | 15.7 (1.2)      |
| <b>BMI</b>               |                 |
| Minimum                  | 16.3            |
| Maximum                  | 45.0            |
| Mean (St. Dev.)          | 23.7 (5.3)      |

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

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



**Figure 11.1 Diagnosis of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



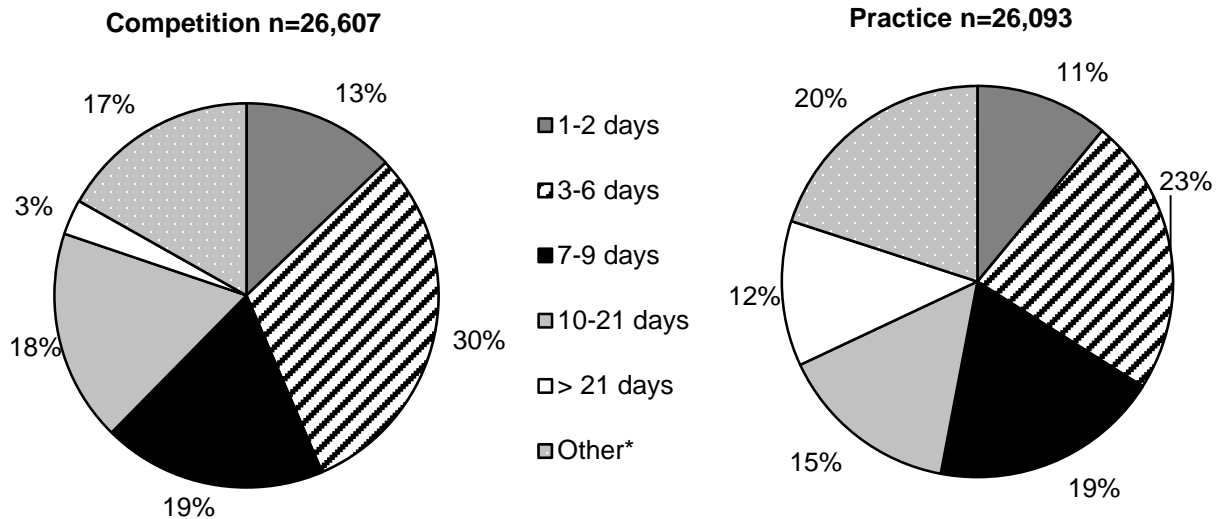
**Table 11.3 Body Site of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Competition   |             | Practice      |              | Overall       |             |
|---------------------|---------------|-------------|---------------|--------------|---------------|-------------|
|                     | n             | %           | n             | %            | n             | %           |
| Hand/wrist          | 6,828         | 25.7%       | 5,846         | 22.4%        | 12,675        | 24.1%       |
| Head/face           | 4,704         | 17.7%       | 6,604         | 25.3%        | 11,307        | 21.5%       |
| Ankle               | 6,998         | 26.3%       | 3,003         | 11.5%        | 10,002        | 19.0%       |
| Arm/elbow           | 2,099         | 7.9%        | 3,213         | 12.3%        | 5,312         | 10.1%       |
| Knee                | 2,699         | 10.1%       | 2,202         | 8.4%         | 4,901         | 9.3%        |
| Lower leg           | 818           | 3.1%        | 1,195         | 4.6%         | 2,013         | 3.8%        |
| Shoulder            | 1,161         | 4.4%        | 837           | 3.2%         | 1,998         | 3.8%        |
| Hip/thigh/upper leg | 566           | 2.1%        | 888           | 3.4%         | 1,455         | 2.8%        |
| Trunk               | -             | 0.0%        | 1,383         | 5.3%         | 1,383         | 2.6%        |
| Foot                | 273           | 1.0%        | 921           | 3.5%         | 1,195         | 2.3%        |
| Neck                | 460           | 1.7%        | -             | 0.0%         | 460           | 0.8%        |
| <b>Total</b>        | <b>26,607</b> | <b>100%</b> | <b>26,093</b> | <b>100.0</b> | <b>52,700</b> | <b>100%</b> |

**Table 11.4 Ten Most Common Softball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Diagnosis                         | Competition<br>n=26,606 |       | Practice<br>n=26,090 |       | Total<br>n=52,698 |       |
|-----------------------------------|-------------------------|-------|----------------------|-------|-------------------|-------|
|                                   | n                       | %     | n                    | %     | n                 | %     |
| Head/face concussion              | 3,972                   | 14.9% | 4,489                | 17.2% | 8,462             | 16.1% |
| Ankle strain/sprain               | 6,836                   | 25.7% | 1,621                | 6.2%  | 8,457             | 16.0% |
| Hand/wrist fracture               | 2,495                   | 9.4%  | 1,866                | 7.2%  | 4,361             | 8.3%  |
| Knee strain/sprain                | 2,699                   | 10.1% | 921                  | 3.5%  | 3,620             | 6.9%  |
| Hand/wrist contusion              | 2,038                   | 7.7%  | 921                  | 3.5%  | 2,959             | 5.6%  |
| Hand/wrist strain/sprain          | 756                     | 2.8%  | 1,842                | 7.1%  | 2,598             | 4.9%  |
| Trunk strain/sprain               | -                       | 0.0%  | 1,383                | 5.3%  | 1,383             | 2.6%  |
| Arm/elbow strain/sprain           | 214                     | 0.8%  | 921                  | 3.5%  | 1,135             | 2.2%  |
| Hip/thigh/upper leg strain/sprain | 352                     | 1.3%  | 428                  | 1.6%  | 780               | 1.5%  |
| Shoulder strain/sprain            | 81                      | 0.3%  | 214                  | 0.8%  | 295               | 0.6%  |

**Figure 11.2 Time Loss of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

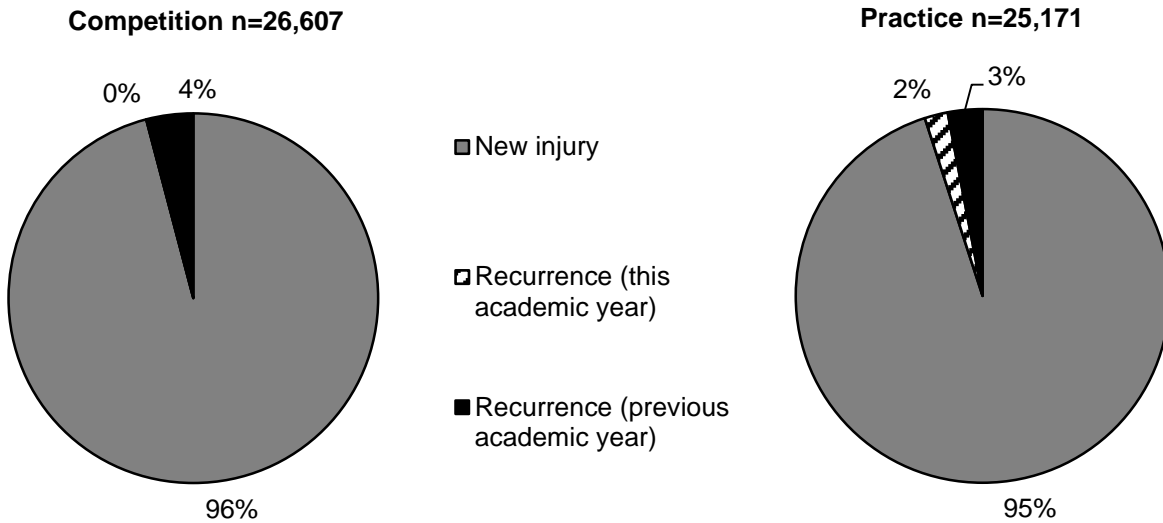


\*Other category is made up of medical disqualification for season, medical disqualification for career, athlete chooses not to continue, and season ended before athlete returned to play

**Table 11.5 Softball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| <b>Need for surgery</b> |               |             |               |             |               |             |
| Required surgery        | 2,168         | 8.1%        | 3,715         | 8.7%        | 4,288         | 8.4%        |
| Did not require surgery | 24,439        | 91.9%       | 22,378        | 91.3%       | 46,817        | 91.6%       |
| <b>Total</b>            | <b>26,607</b> | <b>100%</b> | <b>26,093</b> | <b>100%</b> | <b>51,105</b> | <b>100%</b> |

**Figure 11.3 History of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 11.6 Time during Season of Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                       | n             | %           |
|-----------------------|---------------|-------------|
| <b>Time in Season</b> |               |             |
| Preseason             | 15,853        | 31.2%       |
| Regular season        | 32,484        | 63.9%       |
| Post season           | 2,521         | 5.0%        |
| <b>Total</b>          | <b>50,857</b> | <b>100%</b> |

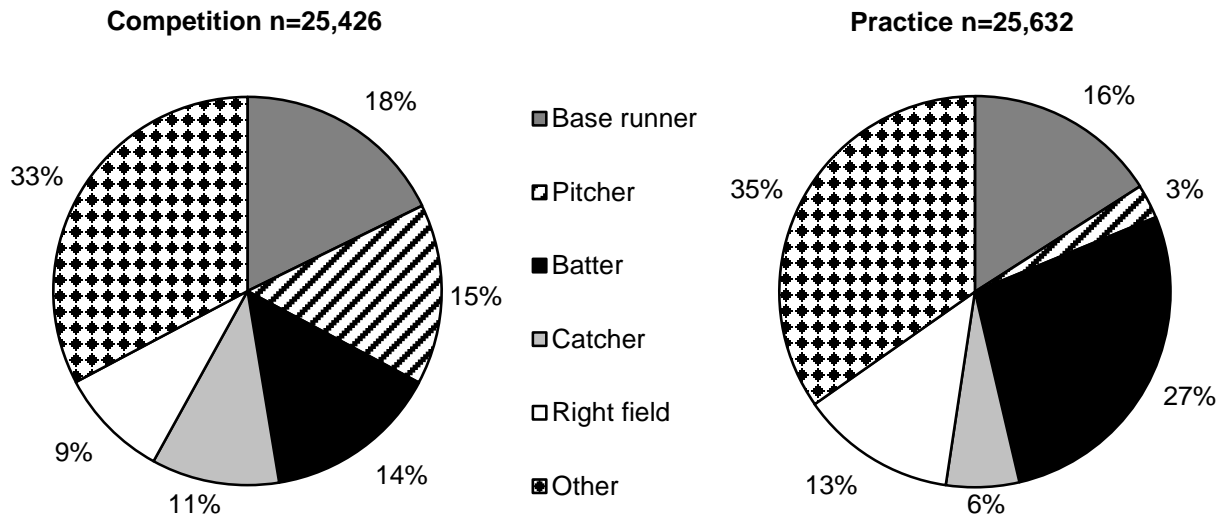
**Table 11.7 Competition-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                            | n             | %           |
|----------------------------|---------------|-------------|
| <b>Time in Competition</b> |               |             |
| Pre-competition/warm-ups   | 1,758         | 6.9%        |
| First inning               | 652           | 2.5%        |
| Second inning              | 1,575         | 6.2%        |
| Third inning               | 5,663         | 22.1%       |
| Fourth inning              | 7,485         | 29.3%       |
| Fifth inning               | 3,793         | 14.8%       |
| Sixth inning               | 2,818         | 11.0%       |
| Seventh inning             | 815           | 3.2%        |
| Extra innings              | 1,019         | 4.0%        |
| <b>Total</b>               | <b>25,579</b> | <b>100%</b> |
| <b>Field Location</b>      |               |             |
| Home plate                 | 7,599         | 29.8%       |
| First base                 | 4,865         | 19.1%       |
| Second base                | 2,043         | 8.0%        |
| Third base                 | 4,082         | 16.0%       |
| Infield                    | 485           | 1.9%        |
| Pitcher's mound            | 780           | 3.1%        |
| Outfield                   | 3,964         | 15.5%       |
| Foul territory             | 214           | 0.8%        |
| Other                      | 1,492         | 5.8%        |
| <b>Total</b>               | <b>25,523</b> | <b>100%</b> |

**Table 11.8 Practice-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | n             | %           |
|-------------------------|---------------|-------------|
| <b>Time in Practice</b> |               |             |
| First 1/2 hour          | 4,306         | 16.8%       |
| Second 1/2 hour         | 4,656         | 18.2%       |
| 1-2 hours into practice | 15,475        | 60.4%       |
| >2 hours into practice  | 1,195         | 4.7%        |
| <b>Total</b>            | <b>25,632</b> | <b>100%</b> |

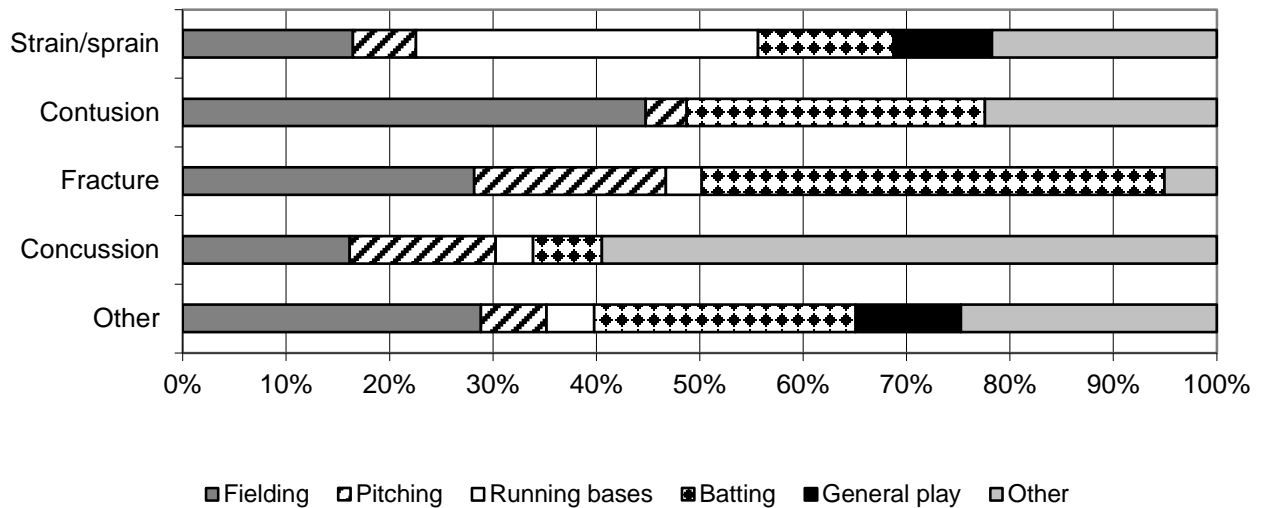
**Figure 11.4 Player Position of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



**Table 11.9 Activities Leading to Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Activity                | Competition   |             | Practice      |             | Overall       |             |
|-------------------------|---------------|-------------|---------------|-------------|---------------|-------------|
|                         | n             | %           | n             | %           | n             | %           |
| Running bases           | 6,629         | 24.9%       | 3,063         | 11.7%       | 9,692         | 18.4%       |
| Fielding a batted ball  | 4,417         | 16.6%       | 3,849         | 14.8%       | 8,266         | 15.7%       |
| Fielding a thrown ball  | 3,135         | 11.8%       | 3,136         | 12.0%       | 6,271         | 11.9%       |
| Catching                | 2,517         | 9.5%        | 2,162         | 8.3%        | 4,679         | 8.9%        |
| Batting                 | 2,904         | 10.9%       | 1,544         | 5.9%        | 4,448         | 8.4%        |
| Sliding                 | 3,924         | 14.7%       | 214           | 0.8%        | 4,138         | 7.9%        |
| Throwing (not pitching) | 652           | 2.4%        | 3,007         | 11.5%       | 3,659         | 6.9%        |
| Pitching                | 1,075         | 4.0%        | 2,033         | 7.8%        | 3,109         | 5.9%        |
| Conditioning            | -             | 0.0%        | 2,603         | 10.0%       | 2,603         | 4.9%        |
| General play            | -             | 0.0%        | 2,368         | 9.1%        | 2,368         | 4.5%        |
| Other                   | 1,355         | 5.1%        | 2,114         | 8.1%        | 3,468         | 6.6%        |
| <b>Total</b>            | <b>26,607</b> | <b>100%</b> | <b>26,093</b> | <b>100%</b> | <b>52,700</b> | <b>100%</b> |

**Figure 11.5 Activity Resulting in Softball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**



## **XII. Gender Differences within Sports**

## 12.1 Boys' and Girls' Soccer

**Table 12.1 Comparison of Boys' and Girls' Soccer Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | Boys' soccer | Girls' soccer* | RR (95% CI) <sup>†</sup> |
|--------------|--------------|----------------|--------------------------|
| <b>Total</b> | 1.56         | <b>1.93</b>    | <b>1.24 (1.05-1.47)</b>  |
| Competition  | 3.08         | <b>4.13</b>    | <b>1.34 (1.08-1.66)</b>  |
| Practice     | 0.90         | <b>0.93</b>    | 1.03 (0.78-1.36)         |

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

<sup>†</sup>Throughout this chapter, statistically significant RR and IPR are bolded.

**Table 12.2 Comparison of Body Sites of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Boys' soccer | Girls' soccer | IPR (95% CI)             |
|---------------------|--------------|---------------|--------------------------|
| Hip/thigh/upper leg | 11.7%        | <b>14.6%</b>  | 1.25 (0.69-2.24)         |
| Head/face           | <b>25.8%</b> | 22.2%         | 1.16 (0.78-1.73)         |
| Ankle               | 17.6%        | <b>28.5%</b>  | <b>1.63 (1.07-2.47)</b>  |
| Knee                | <b>17.4%</b> | 14.7%         | 1.19 (0.71-1.99)         |
| Hand/wrist          | <b>5.4%</b>  | 0.8%          | <b>6.56 (2.25-19.09)</b> |
| Foot                | <b>6.5%</b>  | 5.9%          | 1.10 (0.48-2.49)         |
| Lower leg           | 6.4%         | <b>9.6%</b>   | 1.51 (0.65-3.49)         |
| Trunk               | <b>4.8%</b>  | 1.2%          | <b>4.11 (1.37-12.31)</b> |
| Arm/elbow           | 0.3%         | <b>1.0%</b>   | 3.74 (0.41-34.11)        |
| Shoulder            | <b>1.7%</b>  | 1.0%          | 1.76 (0.26-11.81)        |
| Neck                | 0.7%         | -             | ---                      |
| Other               | <b>1.9%</b>  | 0.5%          | 3.68 (0.57-23.58)        |
| <b>Total</b>        | <b>100%</b>  | <b>100%</b>   | ---                      |



**Table 12.3 Comparison of Diagnoses of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                  | Boys' soccer | Girls' soccer | IPR (95% CI)     |
|------------------|--------------|---------------|------------------|
| <b>Diagnosis</b> |              |               |                  |
| Strain/sprain    | 48.3%        | <b>50.9%</b>  | 1.06 (0.84-1.33) |
| Contusion        | <b>9.1%</b>  | 8.0%          | 1.13 (0.55-2.32) |
| Fracture         | 6.6%         | <b>8.4%</b>   | 1.26 (0.59-2.69) |
| Concussion       | 19.5%        | <b>20.4%</b>  | 1.05 (0.67-1.65) |
| Other            | <b>16.6%</b> | 12.2%         | 1.36 (0.76-2.42) |
| <b>Total</b>     | <b>100%</b>  | <b>100%</b>   | ---              |

**Table 12.4 Most Common Boys' and Girls' Soccer Injury Diagnoses\*, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                                   | Boys' soccer | Girls' soccer | IPR (95% CI)     |
|-----------------------------------|--------------|---------------|------------------|
| <b>Diagnosis</b>                  |              |               |                  |
| Ankle strain/sprain               | 16.9%        | <b>24.9%</b>  | 1.48 (0.95-2.30) |
| Head/face concussion              | 19.5%        | <b>20.4%</b>  | 1.05 (0.67-1.65) |
| Hip/thigh/upper leg strain/sprain | 10.4%        | <b>12.3%</b>  | 1.18 (0.62-2.26) |
| Knee strain/sprain                | <b>10.1%</b> | 8.5%          | 1.18 (0.59-2.37) |
| Knee other                        | 7.1%         | <b>4.3%</b>   | 1.66 (0.67-4.14) |

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

**Table 12.5 Comparison of Time Loss of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                  | Boys' soccer | Girls' soccer | IPR (95% CI)     |
|------------------|--------------|---------------|------------------|
| <b>Time Loss</b> |              |               |                  |
| 1-2 days         | <b>16.5%</b> | 14.4%         | 1.15 (0.65-2.01) |
| 3-6 days         | <b>30.2%</b> | 24.1%         | 1.25 (0.86-1.84) |
| 7-9 days         | <b>18.1%</b> | 16.4%         | 1.10 (0.68-1.78) |
| 10-21 days       | 15.9%        | <b>18.7%</b>  | 1.18 (0.72-1.93) |
| 22 days or more  | <b>4.7%</b>  | 4.6%          | 1.03 (0.41-2.55) |
| Other            | 14.6%        | <b>21.8%</b>  | 1.49 (0.93-2.39) |
| <b>Total</b>     | <b>100%</b>  | <b>100%</b>   | ---              |

**Table 12.6 Comparison of Mechanisms of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|   | Boys' soccer | Girls' soccer | IPR (95% CI)     |
|---|--------------|---------------|------------------|
| <b>Soccer Mechanism</b>                   |              |               |                  |
| Contact with another player               | <b>30.4%</b> | 28.7%         | 1.06 (0.75-1.50) |
| Stepped on/fell on/kicked                 | <b>11.3%</b> | 8.8%          | 1.28 (0.66-2.48) |
| Rotation around a planted foot/inversion  | 12.2%        | <b>18.5%</b>  | 1.51 (0.88-2.61) |
| Overuse, heat illness, conditioning, etc. | 15.6%        | <b>17.2%</b>  | 1.10 (0.65-1.85) |
| Contact with ball                         | 8.6%         | <b>9.7%</b>   | 1.13 (0.57-2.26) |
| Uneven playing surface                    | 2.1%         | <b>2.2%</b>   | 1.09 (0.27-4.42) |
| Slide tackle                              | <b>6.4%</b>  | 4.7%          | 1.35 (0.56-3.23) |
| Contact with goal                         | -            | 0.8%          | ---              |
| Other                                     | <b>13.4%</b> | 9.3%          | 1.44 (0.82-2.87) |
| <b>Total</b>                              | <b>100%</b>  | <b>100%</b>   | ---              |

**Table 12.7 Comparison of Activities of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                         | Boys' soccer | Girls' soccer | IPR (95% CI)            |
|-------------------------|--------------|---------------|-------------------------|
| <b>Soccer Activity</b>  |              |               |                         |
| General play            | <b>24.4%</b> | 14.1%         | <b>1.74 (1.06-2.83)</b> |
| Defending               | 10.4%        | <b>21.2%</b>  | <b>2.04 (1.20-3.49)</b> |
| Chasing loose ball      | <b>12.2%</b> | 9.8%          | 1.25 (0.67-2.30)        |
| Ball handling/dribbling | 5.6%         | <b>15.9%</b>  | <b>2.86 (1.39-5.86)</b> |
| Goaltending             | <b>8.5%</b>  | 4.0%          | 2.12 (0.95-4.74)        |
| Shooting (foot)         | 4.5%         | <b>8.8%</b>   | 1.95 (0.84-4.55)        |
| Heading ball            | <b>12.4%</b> | 3.8%          | <b>3.21 (1.36-7.57)</b> |
| Passing (foot)          | 5.4%         | 5.4%          | 1.01 (0.41-2.49)        |
| Receiving pass          | <b>5.9%</b>  | 3.9%          | 1.52 (0.58-3.96)        |
| Conditioning            | 3.4%         | <b>7.9%</b>   | 2.32 (0.83-6.48)        |
| Other                   | <b>7.4%</b>  | 5.2%          | 1.42 (0.64-2.31)        |
| <b>Total</b>            | <b>100%</b>  | <b>100%</b>   | ---                     |

## 12.2 Boys' and Girls' Basketball

**Table 12.8 Comparison of Boys' and Girls' Basketball Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | Boys' basketball | Girls' basketball | RR (95% CI)*            |
|--------------|------------------|-------------------|-------------------------|
| <b>Total</b> | 1.35             | <b>1.73</b>       | <b>1.28 (1.09-1.51)</b> |
| Competition  | 2.39             | <b>3.59</b>       | <b>1.51 (1.21-1.87)</b> |
| Practice     | 0.91             | <b>0.92</b>       | 1.02 (0.79-1.31)        |

**Table 12.9 Comparison of Body Sites of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Boys' basketball | Girls' basketball | IPR (95% CI)            |
|---------------------|------------------|-------------------|-------------------------|
| Ankle               | <b>31.2%</b>     | 24.5%             | 1.28 (0.93-1.75)        |
| Knee                | 10.1%            | <b>20.4%</b>      | <b>2.02 (1.22-3.37)</b> |
| Head/face           | 23.8%            | <b>24.4%</b>      | 1.02 (0.73-1.44)        |
| Hip/thigh/upper leg | <b>5.9%</b>      | 3.7%              | 1.61 (0.66-3.93)        |
| Hand/wrist          | 9.1%             | <b>10.3%</b>      | 1.14 (0.64-2.04)        |
| Shoulder            | 2.0%             | <b>3.1%</b>       | 1.51 (0.46-5.02)        |
| Trunk               | 6.0%             | 6.0%              | 1.00 (0.46-2.18)        |
| Lower leg           | <b>3.3%</b>      | 2.7%              | 1.20 (0.44-3.24)        |
| Arm/elbow           | 1.4%             | <b>1.7%</b>       | 1.19 (0.24-5.87)        |
| Foot                | <b>7.0%</b>      | 2.7%              | 2.59 (0.96-6.98)        |
| Neck                | -                | 0.6%              | ---                     |
| Other               | 0.2%             | -                 | ---                     |
| <b>Total</b>        | <b>100%</b>      | <b>100%</b>       | ---                     |

**Table 12.10 Comparison of Diagnoses of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                  | Boys' basketball | Girls' basketball | IPR (95% CI)            |
|------------------|------------------|-------------------|-------------------------|
| <b>Diagnosis</b> |                  |                   |                         |
| Strain/sprain    | <b>52.7%</b>     | 49.6%             | 1.06 (0.88-1.29)        |
| Contusion        | <b>8.5%</b>      | 4.5%              | 1.88 (0.91-3.89)        |
| Fracture         | <b>11.5%</b>     | 6.3%              | 1.83 (0.97-3.47)        |
| Concussion       | 14.1%            | <b>22.8%</b>      | <b>1.61 (1.06-2.45)</b> |
| Other            | 13.1%            | <b>16.8%</b>      | 1.29 (0.80-2.06)        |
| <b>Total</b>     | <b>100%</b>      | <b>100%</b>       | ---                     |

**Table 12.11 Most Common Boys' and Girls' Basketball Injury Diagnoses\*, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                      | Boys' basketball | Girls' basketball | IPR (95% CI)            |
|----------------------|------------------|-------------------|-------------------------|
| <b>Diagnosis</b>     |                  |                   |                         |
| Ankle strain/sprain  | <b>29.9%</b>     | 24.2%             | 1.24 (0.90-1.70)        |
| Head/face concussion | 14.0%            | <b>22.2%</b>      | <b>1.59 (1.04-2.42)</b> |
| Knee strain/sprain   | 4.3%             | <b>10.1%</b>      | <b>2.33 (1.08-5.05)</b> |
| Knee other           | 2.5%             | <b>8.5%</b>       | 3.39 (1.18-9.75)        |

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

**Table 12.12 Comparison of Time Loss of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                  | Boys' basketball | Girls' basketball | IPR (95% CI)     |
|------------------|------------------|-------------------|------------------|
| <b>Time Loss</b> |                  |                   |                  |
| 1-2 days         | <b>15.2%</b>     | 9.4%              | 1.62 (0.95-2.76) |
| 3-6 days         | <b>26.5%</b>     | 23.4%             | 1.13 (0.81-1.59) |
| 7-9 days         | <b>20.6%</b>     | 18.5%             | 1.11 (0.75-1.65) |
| 10-21 days       | 18.1%            | <b>24.1%</b>      | 1.33 (0.91-1.94) |
| 22 days or more  | 5.6%             | <b>8.4%</b>       | 1.52 (0.74-3.12) |
| Other            | 14.1%            | <b>16.2%</b>      | 1.15 (0.73-1.82) |
| <b>Total</b>     | <b>100%</b>      | <b>100%</b>       | ---              |

**Table 12.13 Comparison of Mechanisms of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|   | Boys' basketball | Girls' basketball | IPR (95% CI)     |
|---|------------------|-------------------|------------------|
| <b>Basketball Mechanism</b>               |                  |                   |                  |
| Collision with another player             | 33.6%            | <b>37.0%</b>      | 1.10 (0.84-1.44) |
| Jumping/landing                           | <b>22.3%</b>     | 16.1%             | 1.39 (0.93-2.08) |
| Overuse, heat illness, conditioning, etc. | 9.4%             | <b>11.4%</b>      | 1.21 (0.68-2.14) |
| Rotation around a planted foot/inversion  | 10.7%            | <b>11.0%</b>      | 1.02 (0.60-1.76) |
| Stepped on/fell on/kicked                 | <b>10.4%</b>     | 7.3%              | 1.41 (0.73-2.74) |
| Contact with ball                         | 3.2%             | <b>5.5%</b>       | 1.71 (0.67-4.34) |
| Other                                     | 10.4%            | <b>11.7%</b>      | 1.13 (0.65-1.96) |
| <b>Total</b>                              | <b>100%</b>      | <b>100%</b>       | ---              |

**Table 12.14 Comparison of Activities of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                            | Boys' basketball | Girls' basketball | IPR (95% CI)            |
|----------------------------|------------------|-------------------|-------------------------|
| <b>Basketball Activity</b> |                  |                   |                         |
| Rebounding                 | <b>24.1%</b>     | 16.2%             | <b>1.49 (1.00-2.22)</b> |
| General play               | 12.2%            | <b>24.3%</b>      | <b>2.00 (1.30-3.08)</b> |
| Defending                  | 17.9%            | <b>18.7%</b>      | 1.04 (0.69-1.58)        |
| Chasing loose ball         | 10.2%            | <b>11.2%</b>      | 1.11 (0.63-1.93)        |
| Shooting                   | <b>13.1%</b>     | 11.1%             | 1.18 (0.67-2.05)        |
| Conditioning               | <b>4.2%</b>      | 4.0%              | 1.06 (0.43-2.63)        |
| Ball handling/dribbling    | <b>6.9%</b>      | 5.3%              | 1.31 (0.94-1.03)        |
| Receiving pass             | <b>4.2%</b>      | 3.9%              | 1.07 (0.44-2.63)        |
| Other                      | <b>7.2%</b>      | 5.3%              | 1.36 (0.60-3.12)        |
| <b>Total</b>               | <b>100%</b>      | <b>100%</b>       | ---                     |

### 12.3 Boys' Baseball and Girls' Softball

**Table 12.15 Comparison of Baseball and Softball Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|              | Baseball    | Softball    | RR (95% CI)             |
|--------------|-------------|-------------|-------------------------|
| <b>Total</b> | 0.81        | <b>0.94</b> | 1.16 (0.91-1.48)        |
| Competition  | <b>1.49</b> | 1.45        | 1.03 (0.74-1.44)        |
| Practice     | 0.46        | <b>0.69</b> | <b>1.50 (1.03-2.18)</b> |

**Table 12.16 Comparison of Body Sites of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

| Body Site           | Baseball     | Softball     | IPR (95% CI)             |
|---------------------|--------------|--------------|--------------------------|
| Ankle               | 8.3%         | <b>19.0%</b> | <b>2.28 (1.04-5.00)</b>  |
| Knee                | 7.3%         | <b>9.3%</b>  | 1.28 (0.50-3.30)         |
| Head/face           | <b>24.8%</b> | 21.5%        | 1.15 (0.68-1.98)         |
| Hip/thigh/upper leg | <b>12.7%</b> | 2.8%         | <b>4.60 (1.66-12.74)</b> |
| Hand/wrist          | 9.2%         | <b>24.1%</b> | <b>2.63 (1.27-5.46)</b>  |
| Shoulder            | <b>17.7%</b> | 3.8%         | <b>4.66 (1.78-12.20)</b> |
| Trunk               | <b>3.6%</b>  | 2.6%         | 1.37 (0.28-6.67)         |
| Lower leg           | 1.3%         | <b>3.8%</b>  | 2.91 (0.40-21.43)        |
| Arm/elbow           | <b>11.8%</b> | 10.1%        | 1.17 (0.52-2.63)         |
| Foot                | 0.4%         | <b>2.3%</b>  | 5.56 (0.45-68.00)        |
| Neck                | 0.6%         | <b>0.9%</b>  | 1.51 (0.10-24.02)        |
| Other               | <b>2.4%</b>  | -            | ---                      |
| <b>Total</b>        | <b>100%</b>  | <b>100%</b>  | ---                      |

**Table 12.17 Comparison of Diagnoses of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                  | Baseball     | Softball     | IPR (95% CI)     |
|------------------|--------------|--------------|------------------|
| <b>Diagnosis</b> |              |              |                  |
| Strain/sprain    | <b>40.4%</b> | 36.4%        | 1.11 (0.77-1.60) |
| Contusion        | 9.6%         | <b>14.3%</b> | 1.48 (0.64-3.43) |
| Fracture         | 15.3%        | <b>15.9%</b> | 1.04 (0.54-2.01) |
| Concussion       | 13.4%        | <b>16.1%</b> | 1.20 (0.58-2.48) |
| Other            | <b>21.2%</b> | 17.3%        | 1.22 (0.70-2.13) |
| <b>Total</b>     | <b>100%</b>  | <b>100%</b>  | ---              |

**Table 12.18 Most Common Baseball and Softball Injury Diagnoses\*, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                                   | Baseball    | Softball     | IPR (95% CI)             |
|-----------------------------------|-------------|--------------|--------------------------|
| <b>Diagnosis</b>                  |             |              |                          |
| Ankle strain/sprain               | 7.8%        | <b>16.0%</b> | 2.07 (0.89-4.79)         |
| Hand/wrist fracture               | 3.2%        | <b>8.3%</b>  | 2.57 (0.68-9.68)         |
| Head/face concussion              | 13.4%       | <b>16.1%</b> | 1.20 (0.58-2.49)         |
| Hip/thigh/upper leg strain/sprain | <b>9.8%</b> | 1.5%         | <b>6.64 (2.00-22.04)</b> |
| Knee strain/sprain                | 3.1%        | <b>6.9%</b>  | 2.19 (0.54-8.82)         |

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

**Table 12.19 Comparison of Time Loss of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                  | Baseball     | Softball     | IPR (95% CI)     |
|------------------|--------------|--------------|------------------|
| <b>Time Loss</b> |              |              |                  |
| 1-2 days         | <b>12.4%</b> | 12.1%        | 1.02 (0.47-2.23) |
| 3-6 days         | 25.2%        | <b>26.9%</b> | 1.02 (0.86-1.22) |
| 7-9 days         | 10.6%        | <b>18.9%</b> | 1.78 (0.88-3.63) |
| 10-21 days       | <b>23.1%</b> | 16.5%        | 1.09 (0.94-1.26) |
| 22 days or more  | <b>7.2%</b>  | 7.1%         | 1.01 (0.36-2.85) |
| Other            | <b>21.5%</b> | 18.5%        | 1.16 (0.67-2.03) |
| <b>Total</b>     | <b>100%</b>  | <b>100%</b>  | ---              |

**Table 12.20 Comparison of Mechanisms of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|   | Baseball     | Softball     | IPR (95% CI)             |
|---|--------------|--------------|--------------------------|
| <b>Baseball/Softball Mechanism</b>        |              |              |                          |
| Overuse, heat illness, conditioning, etc. | <b>10.9%</b> | 7.8%         | 1.39 (0.62-3.13)         |
| Contact with another player               | <b>9.0%</b>  | 6.1%         | 1.47 (0.49-4.36)         |
| Contact with bases                        | 9.1%         | <b>12.3%</b> | 1.35 (0.58-3.14)         |
| Throwing - not pitching                   | <b>6.1%</b>  | 4.6%         | 1.32 (0.40-4.31)         |
| Throwing - pitching                       | <b>12.8%</b> | 3.3%         | <b>3.94 (1.31-11.83)</b> |
| Contact with thrown ball (non-pitch)      | 5.3%         | <b>12.2%</b> | 2.28 (0.88-5.94)         |
| Rotation around a planted foot/inversion  | 3.6%         | <b>12.6%</b> | 3.46 (1.11-10.79)        |
| Hit by batted ball                        | <b>17.0%</b> | 13.9%        | 1.23 (0.60-2.51)         |
| Hit by pitch                              | <b>8.2%</b>  | 4.9%         | 1.68 (0.52-5.41)         |
| Other                                     | 18.0%        | <b>22.4%</b> | 1.25 (0.70-2.21)         |
| <b>Total</b>                              | <b>100%</b>  | <b>100%</b>  | ---                      |

**Table 12.21 Comparison of Activities of Baseball and Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2010-11 School Year**

|                                   | Baseball     | Softball     | IPR (95% CI)            |
|-----------------------------------|--------------|--------------|-------------------------|
| <b>Baseball/Softball Activity</b> |              |              |                         |
| Fielding a batted ball            | <b>16.6%</b> | 15.7%        | 1.06 (0.55-2.06)        |
| Fielding a thrown ball            | 4.6%         | <b>11.9%</b> | 2.61 (0.92-7.40)        |
| Running bases                     | 13.3%        | <b>18.4%</b> | 1.38 (0.71-2.71)        |
| Pitching                          | <b>16.2%</b> | 5.9%         | <b>2.75 (1.20-6.26)</b> |
| Batting                           | <b>12.3%</b> | 8.4%         | 1.46 (0.57-3.77)        |
| Sliding                           | <b>10.3%</b> | 7.9%         | 1.32 (0.55-3.13)        |
| Throwing (not pitching)           | <b>8.3%</b>  | 6.9%         | 1.20 (0.46-3.14)        |
| General play                      | 3.2%         | <b>4.5%</b>  | 1.43 (0.32-6.33)        |
| Conditioning                      | 2.2%         | <b>4.9%</b>  | 2.26 (0.43-11.89)       |
| Catching                          | <b>9.2%</b>  | 8.9%         | 1.04 (0.42-2.57)        |
| Other                             | 3.8%         | <b>6.6%</b>  | 1.74 (0.51-5.98)        |
| <b>Total</b>                      | <b>100%</b>  | <b>100%</b>  | ---                     |



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

**Table 13.1 Injury Rates by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005-11 School Years**

|                         | 2005-06     | 2006-07     | 2007-08     | 2008-09     | 2009-10     | 2010-11     | p-value for trend* |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------------|
| <b>Overall total</b>    | <b>2.51</b> | <b>2.59</b> | <b>2.31</b> | <b>2.01</b> | <b>2.10</b> | <b>1.97</b> | <b>.012</b>        |
| <b>Competition</b>      | <b>4.63</b> | <b>4.88</b> | <b>4.45</b> | <b>4.05</b> | <b>4.19</b> | <b>4.10</b> | <b>.040</b>        |
| <b>Practice</b>         | <b>1.69</b> | <b>1.75</b> | <b>1.52</b> | <b>1.26</b> | <b>1.32</b> | <b>1.16</b> | <b>.007</b>        |
| Boys' football total    | 4.36        | 4.45        | 4.18        | 3.50        | 3.81        | 3.50        | <b>.023</b>        |
| Competition             | 12.09       | 13.50       | 12.80       | 11.26       | 12.95       | 12.30       | .781               |
| Practice                | 2.54        | 2.68        | 2.47        | 1.92        | 2.06        | 1.74        | <b>.014</b>        |
| Boys' soccer total      | 2.43        | 2.27        | 1.75        | 1.62        | 1.75        | 1.56        | <b>.017</b>        |
| Competition             | 4.22        | 4.31        | 3.63        | 3.43        | 3.39        | 3.08        | <b>.004</b>        |
| Practice                | 1.58        | 1.45        | 0.96        | 0.87        | 1.04        | 0.90        | <b>.041</b>        |
| Girls' soccer total     | 2.36        | 2.51        | 2.35        | 2.07        | 2.00        | 1.93        | <b>.013</b>        |
| Competition             | 5.21        | 5.43        | 5.15        | 4.59        | 4.67        | 4.13        | <b>.012</b>        |
| Practice                | 1.10        | 1.31        | 1.16        | 1.00        | 0.85        | 0.93        | .075               |
| Girls' volleyball total | 1.64        | 1.37        | 1.22        | 0.89        | 0.99        | 0.96        | <b>.014</b>        |
| Competition             | 1.92        | 1.40        | 1.43        | 0.90        | 1.00        | 1.18        | .062               |
| Practice                | 1.48        | 1.36        | 1.12        | 0.88        | 0.99        | 0.85        | <b>.007</b>        |
| Boys' basketball total  | 1.89        | 1.75        | 1.39        | 1.35        | 1.45        | 1.34        | <b>.034</b>        |
| Competition             | 2.98        | 2.87        | 2.23        | 2.32        | 2.72        | 2.30        | .193               |
| Practice                | 1.46        | 1.28        | 1.04        | 0.95        | 0.92        | 0.91        | <b>.008</b>        |
| Girls' basketball total | 2.01        | 2.09        | 1.61        | 1.54        | 1.58        | 1.73        | .135               |
| Competition             | 3.60        | 3.60        | 3.30        | 3.13        | 2.84        | 3.59        | .400               |
| Practice                | 1.37        | 1.44        | 0.90        | 0.87        | 1.02        | 0.92        | .087               |
| Boys' wrestling total   | 2.50        | 2.51        | 2.27        | 2.17        | 1.98        | 2.01        | <b>.003</b>        |
| Competition             | 3.93        | 3.80        | 3.70        | 3.35        | 3.09        | 3.32        | <b>.013</b>        |
| Practice                | 2.04        | 2.06        | 1.76        | 1.75        | 1.56        | 1.55        | <b>.004</b>        |
| Boys' baseball total    | 1.19        | 1.25        | 0.93        | 0.78        | 0.82        | 0.81        | <b>.026</b>        |
| Competition             | 1.77        | 2.01        | 1.37        | 1.32        | 1.27        | 1.49        | .144               |
| Practice                | 0.87        | 0.82        | 0.68        | 0.48        | 0.57        | 0.46        | <b>.008</b>        |
| Girls' softball total   | 1.13        | 1.11        | 1.29        | 1.04        | 1.12        | 0.94        | .267               |
| Competition             | 1.78        | 1.96        | 1.86        | 1.62        | 1.66        | 1.45        | <b>.048</b>        |
| Practice                | 0.79        | 0.65        | 0.98        | 0.72        | 0.85        | 0.69        | .894               |

\*Statistically significant tests for trend are bolded.

**Table 13.2 Nationally Estimated Number of Injuries by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005-11 School Years**

|                         | 2005-06          | 2006-07          | 2007-08          | 2008-09          | 2009-10          | 2010-11          |
|-------------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| <b>Overall total</b>    | <b>1,442,533</b> | <b>1,472,849</b> | <b>1,419,723</b> | <b>1,248,126</b> | <b>1,359,897</b> | <b>1,195,815</b> |
| <b>Competition</b>      | <b>759,334</b>   | <b>766,512</b>   | <b>763,034</b>   | <b>690,525</b>   | <b>754,091</b>   | <b>711,642</b>   |
| <b>Practice</b>         | <b>683,199</b>   | <b>706,337</b>   | <b>656,689</b>   | <b>557,601</b>   | <b>605,805</b>   | <b>484,173</b>   |
| Boys' football total    | 516,150          | 574,367          | 616,665          | 527,321          | 581,414          | 483,016          |
| Competition             | 280,919          | 292,316          | 311,780          | 288,637          | 322,801          | 296,199          |
| Practice                | 235,231          | 282,051          | 304,885          | 238,684          | 258,614          | 186,817          |
| Boys' soccer total      | 218,760          | 171,874          | 159,351          | 149,229          | 153,485          | 138,974          |
| Competition             | 119,703          | 93,295           | 99,785           | 87,082           | 83,985           | 81,238           |
| Practice                | 99,058           | 78,579           | 59,566           | 62,147           | 69,500           | 57,736           |
| Girls' soccer total     | 185,770          | 230,769          | 215,850          | 192,108          | 181,159          | 180,254          |
| Competition             | 122,803          | 149,231          | 146,102          | 123,312          | 129,754          | 124,674          |
| Practice                | 62,967           | 81,538           | 69,748           | 68,796           | 51,405           | 55,580           |
| Girls' volleyball total | 81,813           | 80,493           | 72,261           | 56,609           | 67,760           | 50,711           |
| Competition             | 32,677           | 27,423           | 26,539           | 19,764           | 21,728           | 21,416           |
| Practice                | 49,136           | 53,069           | 45,722           | 36,845           | 46,032           | 29,295           |
| Boys' basketball total  | 100,058          | 96,670           | 82,612           | 79,230           | 85,063           | 79,762           |
| Competition             | 44,826           | 46,109           | 36,766           | 40,152           | 46,787           | 41,252           |
| Practice                | 55,232           | 50,561           | 45,846           | 39,078           | 38,276           | 38,510           |
| Girls' basketball total | 103,566          | 102,831          | 73,283           | 64,933           | 78,709           | 83,033           |
| Competition             | 53,812           | 53,703           | 45,236           | 38,277           | 44,026           | 53,931           |
| Practice                | 49,753           | 49,128           | 28,047           | 26,656           | 34,684           | 29,102           |
| Boys' wrestling total   | 105,542          | 101,139          | 91,625           | 88,996           | 80,390           | 80,569           |
| Competition             | 36,259           | 38,750           | 40,698           | 39,029           | 37,742           | 36,536           |
| Practice                | 69,283           | 62,389           | 50,927           | 49,967           | 42,647           | 44,033           |
| Boys' baseball total    | 67,560           | 60,296           | 44,760           | 39,869           | 64,053           | 46,796           |
| Competition             | 33,639           | 33,494           | 22,803           | 25,584           | 36,502           | 29,789           |
| Practice                | 33,922           | 26,802           | 21,957           | 14,285           | 27,551           | 17,008           |
| Girls' softball total   | 63,313           | 54,411           | 63,316           | 49,831           | 67,862           | 52,700           |
| Competition             | 34,696           | 32,191           | 33,325           | 28,688           | 30,767           | 26,607           |
| Practice                | 28,618           | 22,220           | 29,991           | 21,143           | 37,096           | 26,093           |

**Table 13.3 Body Site of Injury by Year, High School Sports-Related Injury Surveillance Study, US, 2005-11 School Years\***

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

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

**Table 13.4 Injury Diagnosis by Year, High School Sports-Related Injury Surveillance Study, US, 2005-11 School Years**

|                  | <b>2005-06,</b><br>n=1,444,172 | <b>2006-07,</b><br>n=1,466,398 | <b>2007-08</b><br>n=1,414,139 | <b>2008-09</b><br>n=1,248,126 | <b>2009-10</b><br>n=1,359,897 | <b>2010-11</b><br>n=1,191,484 |
|------------------|--------------------------------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>Diagnosis</b> |                                |                                |                               |                               |                               |                               |
| Strain/sprain    | 52.0%                          | 48.2%                          | 48.3%                         | 45.7%                         | 44.7%                         | 43.2%                         |
| Contusion        | 12.2%                          | 13.7%                          | 12.4%                         | 11.5%                         | 14.0%                         | 9.6%                          |
| Fracture         | 9.8%                           | 8.9%                           | 10.2%                         | 10.9%                         | 9.9%                          | 10.2%                         |
| Concussion       | 9.1%                           | 8.4%                           | 9.2%                          | 11.8%                         | 14.0%                         | 20.0%                         |
| Other            | 16.8%                          | 20.9%                          | 19.9%                         | 20.2%                         | 17.5%                         | 17.0%                         |
| <b>Total</b>     | <b>100%</b>                    | <b>100%</b>                    | <b>100%</b>                   | <b>100%</b>                   | <b>100%</b>                   | <b>100%</b>                   |

**Table 13.5 Most Common Injury Diagnoses by Year, High School Sports-Related Injury Surveillance Study, US, 2005-11 School Years**

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

**Table 13.6 Time Loss of Injuries by Year, High School Sports-Related Injury Surveillance Study, US, 2005-11 School Years**

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

**Table 13.7 Injuries Requiring Surgery by Year, High School Sports-Related Injury Surveillance Study, US, 2005-11 School Years**

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

## **IX. Reporter Demographics & Compliance**

During the 2010-11 school year, 105 ATs were invited to participate in the study at the beginning of the school year. ATs were expected to report for every week in which they were enrolled. For example, an AT who joined the study as a replacement school in week 10 was not expected to report for weeks 1-9. Overall, 92 enrolled ATs reported an average of 41 study weeks. The majority of ATs (84.8%) reported all the weeks during which they were enrolled, with only 5 ATs (5.4%) missing over 10 weeks. Internal validity checks yielded 96.3% sensitivity, 100.0% specificity, a positive predictive value of 100.0%, and a negative predictive value of 99.5%.

Prior to the start of the 2010-11 High School RIO™ study, participating ATs were asked to complete a short demographics survey. Three-quarters (81.5%) of participating high schools were public schools, with the remainder being private. All ATs provided services to athletes of their high school on 5 or more days each week. Nearly 90% (87.0%) of ATs participating during the 2010-11 study year had previously participated in the High School RIO™ study.

An online “End of Season” survey gave all participating ATs (both in the original study as well as in the expanded study (n=176 combined) the opportunity to provide feedback on their experiences with High School RIO™. This survey was completed by 116 ATs (65.9%). Average reporting time burdens were 19 minutes for the weekly exposure report and 9 minutes for the injury report form. Using a 5 point Likert scale, RIO™ was overwhelmingly reported to be either very easy (61.2%) or somewhat easy (33.6%) to use (5 and 4 on the Likert scale, respectively), with ATs being either very satisfied (68.1%) or somewhat satisfied (28.4%) with the study (5 and 4 on the Likert scale, respectively). Suggestions provided by ATs, such as the addition or clarification of

questions or answer choices, will be used to improve the National High School Sports-Related Injury Surveillance Study for the 2011-12 school year.



## **X. Summary**

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

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

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

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

committed to maintaining a permanent national high school sports injury surveillance system.

While the health benefits of a physically active lifestyle including sports participation are undeniable, participants are at risk of injury because a certain endemic level of injury can be expected during any physical activity, especially those with a competitive component. However, injury rates among high school athletes should be reduced to the lowest possible level without discouraging adolescents from engaging in this important form of physical activity. This goal can best be accomplished by monitoring injury rates and patterns of injury among high school athletes over time; investigating the etiology of preventable injuries; and developing, implementing, and evaluating evidence-based preventive interventions. Surveillance systems such as the model used for this study are critical in achieving these goals.