

SUMMARY REPORT

HIGH SCHOOL SPORTS-RELATED INJURY SURVEILLANCE STUDY

2006-2007

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Acknowledgements

We thank the certified athletic trainers (ATCs) for their hard work and dedication in providing us with complete and accurate data. Without their efforts, this study would not have been possible. We would like to thank the National Federation of State High School Associations (NFHS) for their support of this project.

Note

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

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I. Introduction & Methodology

1.1 Project Overview

To combat the epidemic of obesity among youth in the United States (US), adolescents must be encouraged to get up off the couch and participate in physically active sports, recreation, and leisure activities. Participation in high school sports, one of the most popular physical activities among adolescents, has grown rapidly from an estimated 4.0 million participants in 1971-72 to an estimated 7.0 million in 2006-07. 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.

During the 2005-06 school year, the Centers for Disease Control provided Dr. R. Dawn Comstock with the funding support needed to implement the time- and cost-efficient RIOTM (Reporting Information One) 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. Following its initial success, High School RIO was continued during the 2006-07 school year using funds provided by Columbus Children's Center for Injury Research and Policy and the Ohio State University College of Medicine.

1.3 Specific Aims

The objective of this study was to continue the use of High School RIOTM among a nationally representative sample of US high schools. The specific aims of this study were:

- 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 these 9 sports.
- 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 between the 2005-06 and the 2006-07 school years.

1.4 Project Design

RIOTM, an internet-based sports injury surveillance system developed by Dr. Comstock at the Center for Injury Research and Policy at Columbus Children's Hospital, was utilized to perform surveillance of injuries sustained by US high school athletes throughout the 2005-06 and the 2006-07 school years. For the purpose of this study, a reportable injury was defined 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.

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 (ATC) 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 ATCs were offered a \$300 honorarium along with individualized injury reports following the study's conclusion.

1.6 Data Collection

Each ATC that enrolled their school in High School RIO™ received an email every Monday throughout the study period reminding them to enter their school's data into the surveillance system. Each participating ATC was asked to complete 45 weekly exposure reports: one for each week from July 31, 2006 through June 10, 2007. Exposure reports collected exposure information (number of athlete-competitions and athlete-practices) and the number of reportable injuries sustained by student athletes of each sport that was currently in session at their school. For each reportable injury, the ATC was asked to complete an injury report. The injury report collected detailed information about the injured player (e.g., age, year in school, etc.), the injury (e.g. site, type, severity, etc.) and the injury event (e.g., position played, phase of play, etc.). This internet-based surveillance tool provided ATCs with the ability to view all their submitted data throughout the study and update reports as needed (e.g., need for surgery, days till resuming play, etc.).

1.7 Data Management

In an effort to decrease loss-to follow up, a log of reporters' utilization of the internet-based injury surveillance system was maintained throughout the study period. Reporters who repeatedly failed to log on to complete the weekly exposure and injury reports or who had errors with their reporting were contacted by the Center for Injury Research and Policy 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 9.0 and SPSS, version 14.0. 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:

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

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 boys' soccer competition injuries to the rate of girls' soccer competition injuries:

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

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:

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

An RR or IPR >1.00 suggests a risk association while an RR or IPR <1.00 suggests a protective association. CI not including 1.00 were considered statistically significant.

II. Overall Injury Epidemiology

Table 2.1 Injury Rates by Sport and Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|-------------------------|--------------|------------------|--------------------------------------------------|---------------------------------------|
| Overall total | 4,716 | 1,820,367 | 2.59 | 1,472,849 |
| Competition | 2,378 | 487,529 | 4.88 | 766,512 |
| Practice | 2,338 | 1,332,838 | 1.75 | 706,337 |
| Boys' football total | 2,234 | 502,098 | 4.45 | 574,367 |
| Competition | 1,109 | 82,043 | 13.52 | 292,316 |
| Practice | 1,125 | 420,055 | 2.68 | 282,051 |
| Boys' soccer total | 407 | 179,519 | 2.27 | 171,874 |
| Competition | 222 | 51,564 | 4.31 | 93,295 |
| Practice | 185 | 127,955 | 1.45 | 78,579 |
| Girls' soccer total | 410 | 163,378 | 2.51 | 230,769 |
| Competition | 259 | 47,676 | 5.43 | 149,231 |
| Practice | 151 | 115,702 | 1.31 | 81,538 |
| Girls' volleyball total | 220 | 160,645 | 1.37 | 80,493 |
| Competition | 74 | 53,016 | 1.40 | 27,423 |
| Practice | 146 | 107,629 | 1.36 | 53,069 |
| Boys' basketball total | 359 | 204,897 | 1.75 | 96,670 |
| Competition | 174 | 60,561 | 2.87 | 46,109 |
| Practice | 185 | 144,336 | 1.28 | 50,561 |
| Girls' basketball total | 358 | 171,251 | 2.09 | 102,831 |
| Competition | 185 | 51,358 | 3.60 | 53,703 |
| Practice | 173 | 119,893 | 1.44 | 49,128 |
| Boys' wrestling total | 392 | 156,094 | 2.51 | 101,139 |
| Competition | 155 | 40,841 | 3.80 | 38,750 |
| Practice | 237 | 115,253 | 2.06 | 62,389 |
| Boys' baseball total | 203 | 162,931 | 1.25 | 60,296 |
| Competition | 117 | 58,141 | 2.01 | 33,494 |
| Practice | 86 | 104,790 | 0.82 | 26,802 |
| Girls' softball total | 133 | 119,554 | 1.11 | 54,411 |
| Competition | 83 | 42,329 | 1.96 | 32,191 |
| Practice | 50 | 77,225 | 0.65 | 22,220 |

Table 2.2 Demographic Characteristics of Injured Athletes by Sex, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | Male | Female |
|--------------------------|-----------------------|-----------------------|
| Year in School | | |
| Freshman | 179,263 (18.0%) | 109,467 (23.6%) |
| Sophomore | 247,549 (24.9%) | 131,079 (28.3%) |
| Junior | 282,684 (28.6%) | 118,275 (25.5%) |
| Senior | 284,332 (29.8%) | 104,222 (22.5%) |
| Total[†] | 993,829 (100%) | 463,043 (100%) |
| Age (years) | | |
| Minimum | 13 | 13 |
| Maximum | 19 | 18 |
| Mean (St. Dev.) | 16.1 (1.2) | 15.7 (1.2) |
| BMI | | |
| Minimum | 15.1 | 15.3 |
| Maximum | 49.4 | 49.9 |
| Mean (St. Dev.) | 25.0 (4.6) | 22.0 (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 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, 2006-07 School Year

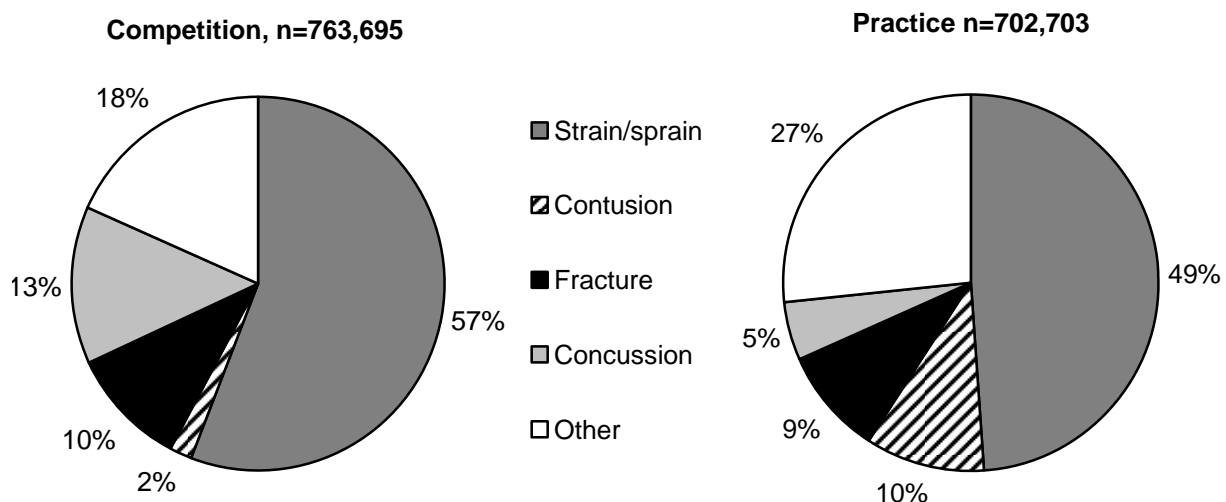


Table 2.3 Body Site of Injury by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|----------------|------------|----------------|------------|------------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 154,534 | 20.3 | 135,003 | 19.2 | 289,537 | 19.8 |
| Knee | 130,162 | 17.1 | 112,825 | 16.1 | 242,987 | 16.6 |
| Head/face | 123,215 | 16.2 | 58,847 | 8.4 | 182,062 | 12.4 |
| Hip/thigh/upper leg | 68,639 | 9.0 | 85,585 | 12.2 | 154,224 | 10.5 |
| Shoulder | 65,285 | 8.6 | 51,205 | 7.3 | 116,490 | 8.0 |
| Hand/wrist | 51,783 | 6.8 | 57,764 | 8.2 | 109,547 | 7.5 |
| Trunk | 48,632 | 6.4 | 49,430 | 7.0 | 98,062 | 6.7 |
| Lower leg | 36,245 | 4.8 | 39,928 | 5.7 | 76,173 | 5.2 |
| Foot | 21,668 | 2.8 | 36,515 | 5.2 | 58,183 | 4.0 |
| Arm/elbow | 26,699 | 3.5 | 30,131 | 4.3 | 56,830 | 3.9 |
| Neck | 14,579 | 1.9 | 13,942 | 2.0 | 28,521 | 1.9 |
| Other | 21,388 | 2.8 | 30,923 | 4.4 | 52,311 | 3.6 |
| Total | 762,829 | 100 | 702,097 | 100 | 1,464,926 | 100 |

Table 2.4 Ten Most Common Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition n=762,299 | | Practice n=700,974 | | Overall n=1,463,273 | |
|-----------------------------------|--------------------------|------|-----------------------|------|------------------------|------|
| | n | % | n | % | n | % |
| Diagnosis | | | | | | |
| Ankle strain/sprain | 138,219 | 18.1 | 122,451 | 17.5 | 260,670 | 17.8 |
| Knee strain/sprain | 80,895 | 10.6 | 47,369 | 6.8 | 128,264 | 8.8 |
| Head/face concussion | 86,612 | 11.4 | 36,017 | 5.1 | 122,629 | 8.4 |
| Hip/thigh/upper leg strain/sprain | 41,071 | 5.4 | 70,900 | 10.1 | 111,971 | 7.7 |
| Knee other | 23,484 | 3.1 | 47,438 | 6.8 | 70,921 | 4.9 |
| Shoulder other | 28,445 | 3.7 | 25,378 | 3.6 | 53,823 | 3.7 |
| Hand/wrist fracture | 20,437 | 2.7 | 28,035 | 4.0 | 48,471 | 3.3 |
| Shoulder strain/sprain | 24,607 | 3.2 | 17,191 | 2.5 | 41,798 | 2.9 |
| Trunk strain/sprain | 20,727 | 2.7 | 19,281 | 2.8 | 40,008 | 2.7 |
| Knee contusion | 22,215 | 2.9 | 15,019 | 2.1 | 37,234 | 2.5 |

Figure 2.2 Time Loss by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

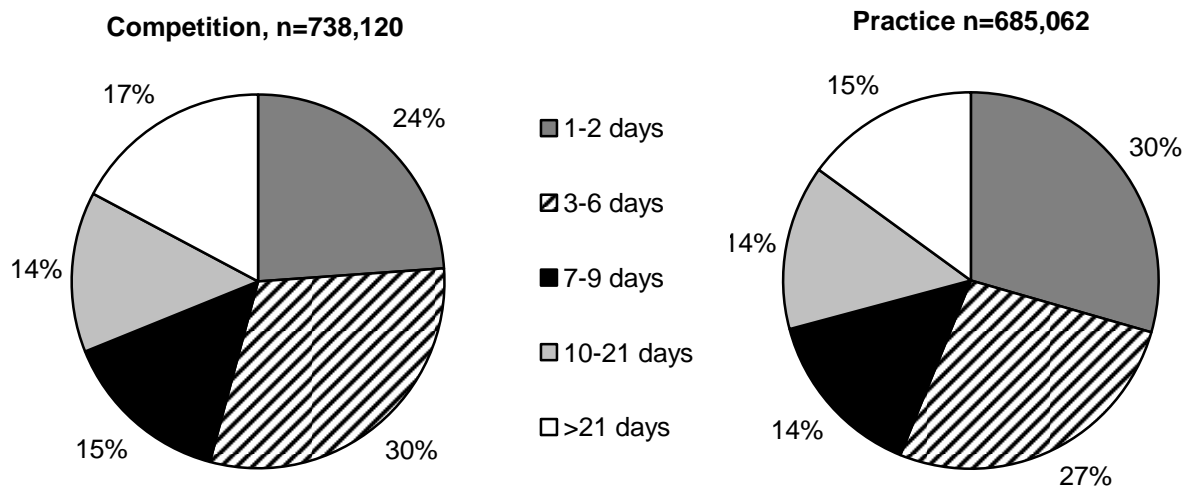


Table 2.5 Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|----------------|------------|----------------|------------|------------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 55,328 | 7.5 | 35,798 | 5.2 | 91,126 | 6.4 |
| Did not require surgery | 686,418 | 92.5 | 651,415 | 94.8 | 1,337,834 | 93.6 |
| Total | 741,746 | 100 | 687,213 | 100 | 1,428,960 | 100 |

Figure 2.3 New and Recurring Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

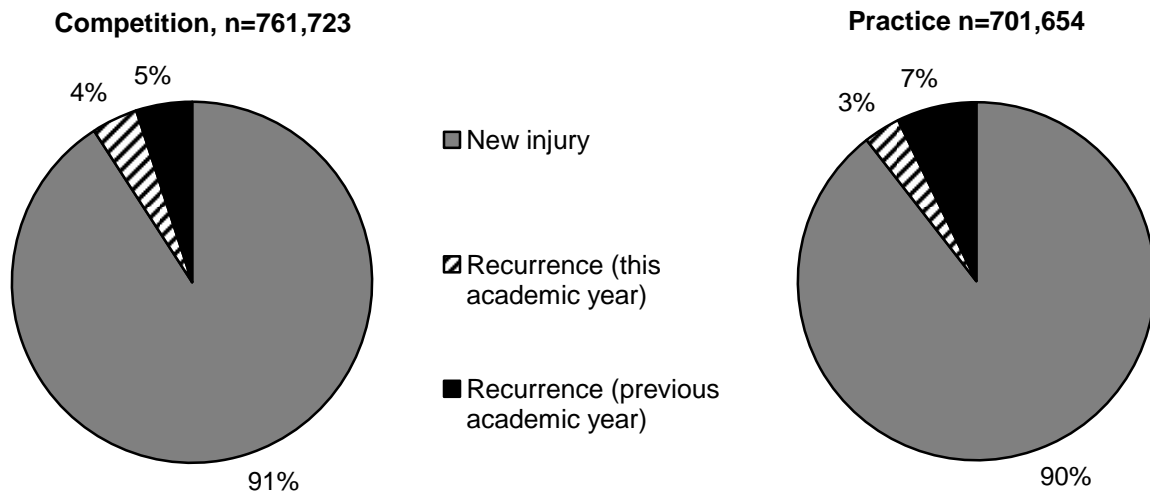


Table 2.6 Time during Season of Injury, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|------------------|------------|
| Time in Season | | |
| Preseason | 326,692 | 24.8 |
| Regular season | 931,499 | 70.6 |
| Post season | 60,977 | 4.6 |
| Total | 1,319,168 | 100 |

Table 2.7 Competition-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|------------------------------------|----------------|------------|
| Time in Competition | | |
| Warm-ups | 15,029 | 2.2 |
| Beginning | 111,791 | 16.4 |
| Middle | 363,449 | 53.2 |
| End | 193,452 | 28.3 |
| Total | 683,720 | 100 |
| Competition Location | | |
| Home | 340,158 | 49.5 |
| Away | 315,551 | 45.9 |
| Neutral site | 31,131 | 4.5 |
| Total | 686,840 | 100 |
| Injury Related to Foul Play | | |
| Yes | 50,871 | 7.6 |
| No | 617,823 | 92.4 |
| Total | 668,694 | 100 |

Table 2.8 Practice-Related Variables, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|----------------|------------|
| Time in Practice | | |
| First 1/2 hour | 110,039 | 18.0 |
| Second 1/2 hour | 168,197 | 27.5 |
| Third 1/2 hour | 187,798 | 30.7 |
| Fourth 1/2 hour | 111,148 | 18.2 |
| >2 hours into practice | 33,911 | 5.6 |
| Total | 611,093 | 100 |
| Number of Practices | | |
| Single session | 510,548 | 82.2 |
| Double session | 100,028 | 16.1 |
| Triple session | 10,497 | 1.7 |
| Total | 621,073 | 100 |
| Practice Type | | |
| Noncontact skills practice | 160,607 | 25.6 |
| Noncontact partial numbers scrimmage | 11,285 | 1.8 |
| Noncontact full scrimmage | 11,657 | 1.9 |
| Partial contact skills practice | 69,395 | 11.1 |
| Partial contact partial numbers scrimmage | 28,464 | 4.5 |
| Partial contact full scrimmage | 19,871 | 3.2 |
| Full contact skills practice | 162,590 | 25.9 |
| Full contact partial numbers scrimmage | 36,303 | 5.8 |
| Full contact full scrimmage | 97,288 | 15.5 |
| Other | 29,272 | 4.7 |
| Total | 626,731 | 100 |

Table 2.9 Methods for Injury Evaluation and Assessment, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------|------------------|------------|
| % of Injuries Evaluated by:* | | |
| Certified athletic trainer | 1,144,990 | 77.7 |
| Physician | 692,780 | 47.0 |
| Dentist/oral surgeon | 5,017 | 0.3 |
| Nurse practitioner | 3,855 | 0.3 |
| Physician's assistant | 9,945 | 0.7 |
| Other | 32,643 | 2.2 |
| Total | 1,472,849 | 100 |
| % of Injuries Assessed by:* | | |
| Evaluation | 1,210,869 | 82.2 |
| X-ray | 494,922 | 33.6 |
| MRI | 131,612 | 8.9 |
| CT-scan | 41,705 | 2.8 |
| Surgery | 23,876 | 1.6 |
| Blood work/lab test | 19,274 | 1.3 |
| Other | 20,443 | 1.4 |
| Total | 1,472,849 | 100 |

*Multiple responses allowed per injury report

III. Boys' Football Injury Epidemiology

Table 3.1 Football Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|--------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 2,234 | 502,098 | 4.45 | 574,367 |
| Competition | 1,109 | 82,043 | 13.52 | 292,316 |
| Practice | 1,125 | 420,055 | 2.68 | 282,051 |

Table 3.2 Demographic Characteristics of Injured Football Athletes, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|-----------------------|
| Year in School | |
| Freshman | 92,724 (16.3%) |
| Sophomore | 144,060 (25.3%) |
| Junior | 167,703 (29.5%) |
| Senior | 164,129 (28.9%) |
| Total[†] | 568,616 (100%) |
| Age (years) | |
| Minimum | 13 |
| Maximum | 19 |
| Mean (St. Dev.) | 16.1 (19.7) |
| BMI | |
| Minimum | 15.6 |
| Maximum | 49.4 |
| Mean (St. Dev.) | 26.2 (78.6) |

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

[†]Throughout this chapter, totals and n's represent the total 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, 2006-07 School Year

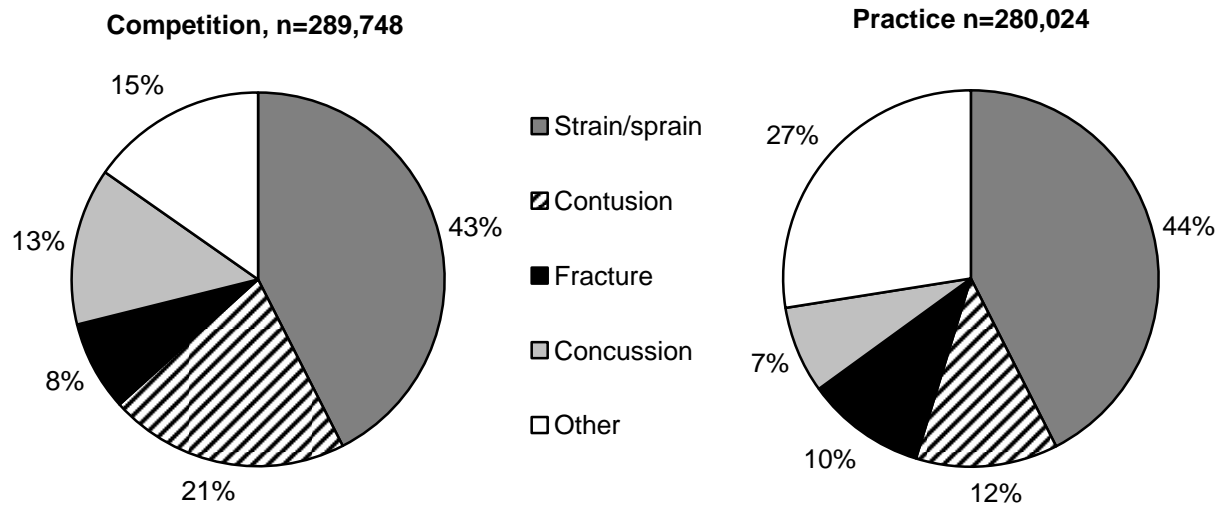


Table 3.3 Body Site of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|----------------|------------|----------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 42,091 | 14.6 | 36,480 | 13.1 | 78,571 | 13.8 |
| Knee | 47,644 | 16.5 | 41,077 | 14.7 | 88,721 | 15.6 |
| Head/face | 41,563 | 14.4 | 25,934 | 9.3 | 67,497 | 11.9 |
| Hip/thigh/upper leg | 28,640 | 9.9 | 33,465 | 12.0 | 62,105 | 10.9 |
| Shoulder | 38,455 | 13.3 | 25,999 | 9.3 | 64,454 | 11.3 |
| Hand/wrist | 20,249 | 7.0 | 26,104 | 9.4 | 46,353 | 8.2 |
| Trunk | 22,125 | 7.7 | 26,000 | 9.3 | 48,125 | 8.5 |
| Lower leg | 11,335 | 3.9 | 11,565 | 4.1 | 22,900 | 4.0 |
| Foot | 5,481 | 1.9 | 14,164 | 5.1 | 19,645 | 3.5 |
| Arm/elbow | 13,384 | 4.6 | 14,135 | 5.1 | 27,519 | 4.8 |
| Neck | 10,980 | 3.8 | 7,342 | 2.6 | 18,322 | 3.2 |
| Other | 7,253 | 2.5 | 16,777 | 6.0 | 24,030 | 4.2 |
| Total | 289,202 | 100 | 279,041 | 100 | 568,243 | 100 |

Table 3.4 Ten Most Common Football Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition n=288,671 | | Practice n=278,510 | | Total n=567,181 | |
|-----------------------------------|--------------------------|------|-----------------------|------|--------------------|------|
| | n | % | n | % | n | % |
| Diagnosis | | | | | | |
| Ankle strain/sprain | 37,317 | 12.9 | 33,439 | 12.0 | 70,756 | 12.5 |
| Head/face concussion | 38,380 | 13.3 | 20,772 | 7.5 | 59,152 | 10.4 |
| Knee strain/sprain | 32,117 | 11.1 | 19,238 | 6.9 | 51,354 | 9.1 |
| Hip/thigh/upper leg strain/sprain | 14,348 | 5.0 | 24,450 | 8.8 | 38,799 | 6.8 |
| Shoulder other | 17,714 | 6.1 | 12,134 | 4.4 | 29,848 | 5.3 |
| Knee other | 7,167 | 2.5 | 14,693 | 5.3 | 21,860 | 3.9 |
| Hand/wrist fracture | 6,823 | 2.4 | 13,626 | 4.9 | 20,449 | 3.6 |
| Hip/thigh/upper leg contusion | 13,565 | 4.7 | 5,406 | 1.9 | 18,971 | 3.3 |
| Shoulder strain/sprain | 10,811 | 3.7 | 7,807 | 2.8 | 18,617 | 3.3 |
| Trunk strain/sprain | 7,232 | 2.5 | 10,669 | 3.8 | 17,902 | 3.2 |

Figure 3.2 Time Loss of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

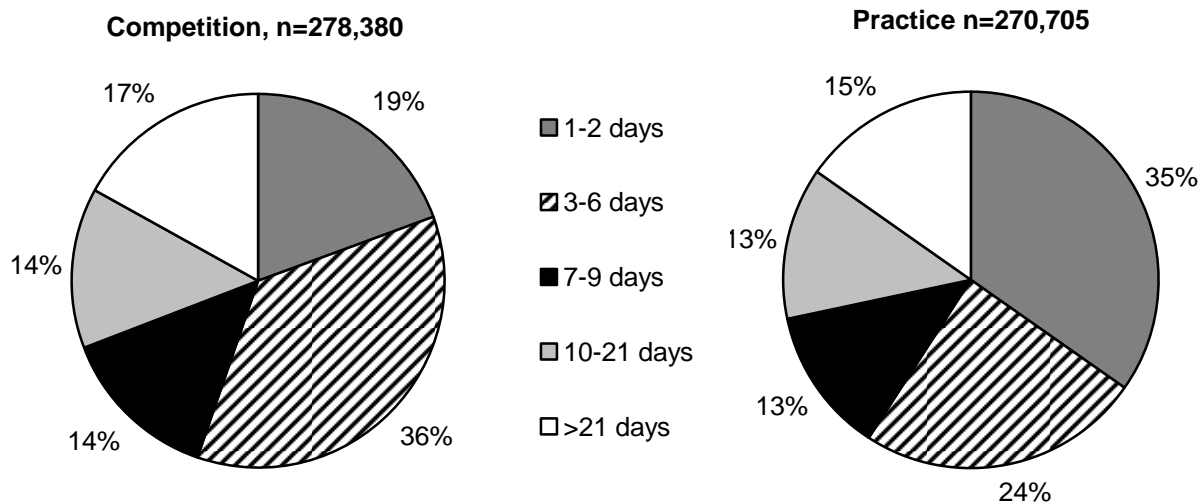


Table 3.5 Football Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|----------------|------------|----------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 17,233 | 6.2 | 14,358 | 5.3 | 31,591 | 5.8 |
| Did not require surgery | 259,983 | 93.8 | 257,530 | 94.7 | 517,513 | 94.2 |
| Total | 277,216 | 100 | 271,888 | 100 | 549,104 | 100 |

Figure 3.3 History of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

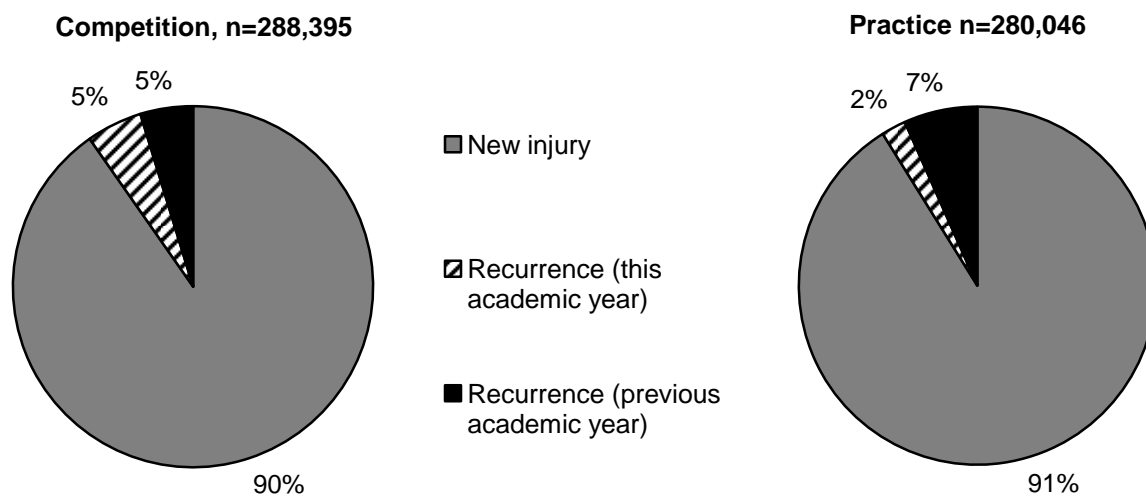


Table 3.6 Time during Season of Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|----------------|------------|
| Time in Season | | |
| Preseason | 177,756 | 31.0 |
| Regular season | 368,854 | 64.2 |
| Post season | 27,758 | 4.8 |
| Total | 574,367 | 100 |

Table 3.7 Competition-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|------------------------------------|----------------|------------|
| Time in Competition | | |
| Warm-ups | 3,638 | 1.3 |
| Beginning | 49,753 | 17.3 |
| Middle | 146,691 | 51.1 |
| End | 87,022 | 30.3 |
| Total | 287,104 | 100 |
| Competition Location | | |
| Home | 139,831 | 48.2 |
| Away | 140,140 | 48.3 |
| Neutral site | 10,231 | 3.5 |
| Total | 290,201 | 100 |
| Injury Related to Foul Play | | |
| Yes | 6,017 | 2.1 |
| No | 276,082 | 97.9 |
| Total | 282,098 | 100 |
| Field Location | | |
| End zone | 4,765 | 1.7 |
| Red zone | 52,391 | 18.6 |
| Between the 20 yrd lines | 220,314 | 78.3 |
| Off the field | 4,056 | 1.4 |
| Total | 281,526 | 100 |

Table 3.8 Practice-Related Variables for Football Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|----------------|------------|
| Time in Practice | | |
| First 1/2 hour | 37,368 | 13.7 |
| Second 1/2 hour | 69,361 | 25.5 |
| Third 1/2 hour | 87,297 | 32.1 |
| Fourth 1/2 hour | 49,030 | 18.0 |
| >2 hours into practice | 28,910 | 10.6 |
| Total | 271,967 | 100 |
| Number of Practices | | |
| Single session | 193,729 | 70.2 |
| Double session | 74,172 | 26.9 |
| Triple session | 8,213 | 3.0 |
| Total | 276,113 | 100 |
| Practice Type | | |
| Noncontact skills practice | 46,949 | 16.8 |
| Noncontact partial numbers scrimmage | 2,430 | 0.9 |
| Noncontact full scrimmage | 896 | 0.3 |
| Partial contact skills practice | 43,546 | 15.6 |
| Partial contact partial numbers scrimmage | 12,322 | 4.4 |
| Partial contact full scrimmage | 10,268 | 3.7 |
| Full contact skills practice | 96,220 | 34.4 |
| Full contact partial numbers scrimmage | 18,175 | 6.5 |
| Full contact full scrimmage | 36,853 | 13.2 |
| Other | 12,433 | 4.4 |
| Total | 280,092 | 100 |

Figure 3.4 Player Position of Football Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

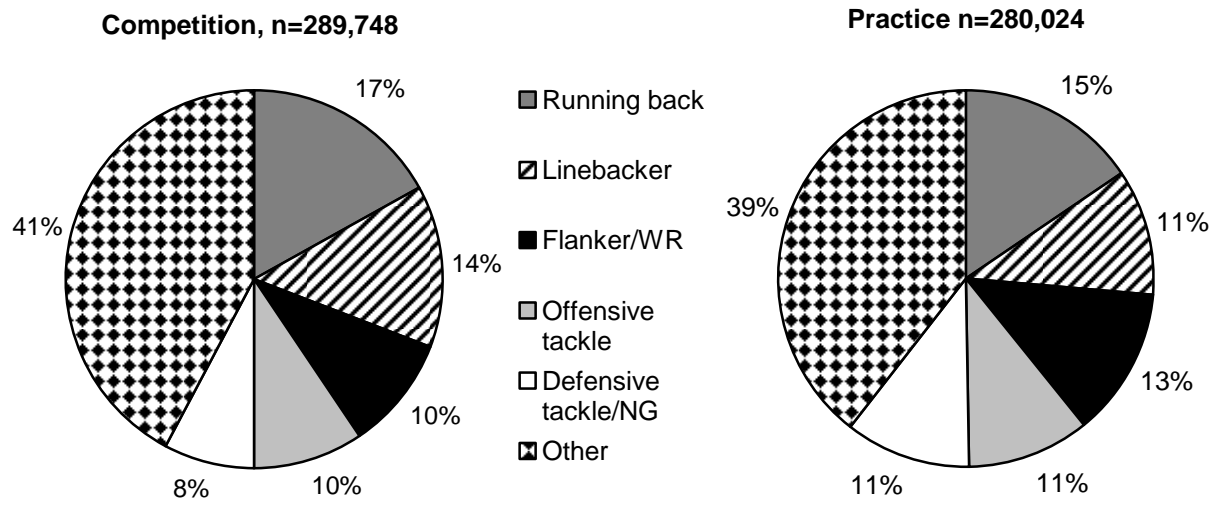
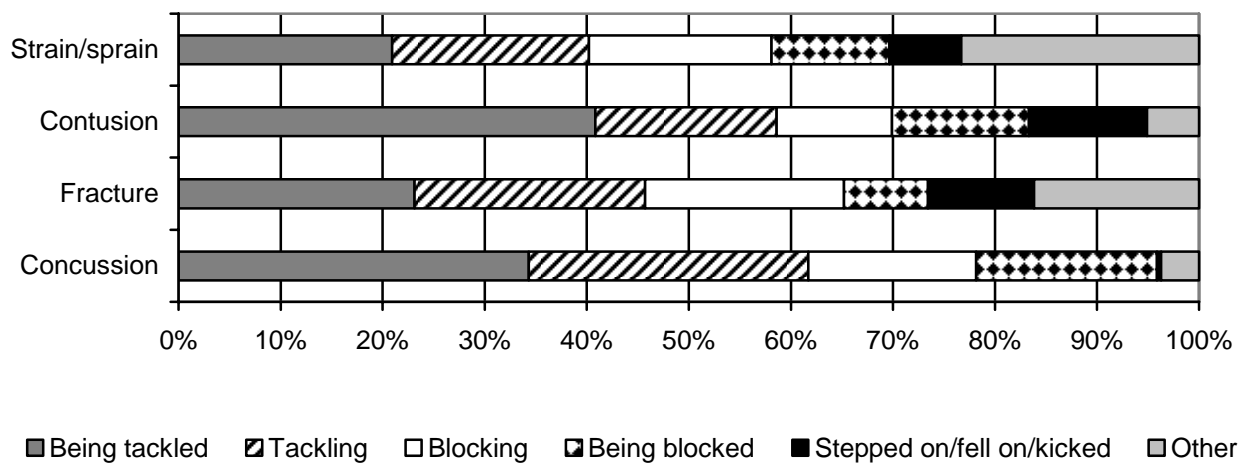


Figure 3.5 Activity Resulting in Football Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



IV. Boys' Soccer Injury Epidemiology

Table 4.1 Boys' Soccer Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 407 | 179,519 | 2.27 | 171,874 |
| Competition | 222 | 51,564 | 4.31 | 93,295 |
| Practice | 185 | 127,955 | 1.45 | 78,579 |

Table 4.2 Demographic Characteristics of Injured Boys' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|-----------------------|
| Year in School | |
| Freshman | 32,715 (19.1%) |
| Sophomore | 35,515 (20.8%) |
| Junior | 49,943 (29.2%) |
| Senior | 52,772 (30.9%) |
| Total[†] | 170,944 (100%) |
| Age (years) | |
| Minimum | 13 |
| Maximum | 19 |
| Mean (St. Dev.) | 16.1 (1.3) |
| BMI | |
| Minimum | 15.1 |
| Maximum | 35.5 |
| Mean (St. Dev.) | 22.3 (2.5) |

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

[†]Throughout this chapter, totals and n's represent the total 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, 2006-07 School Year

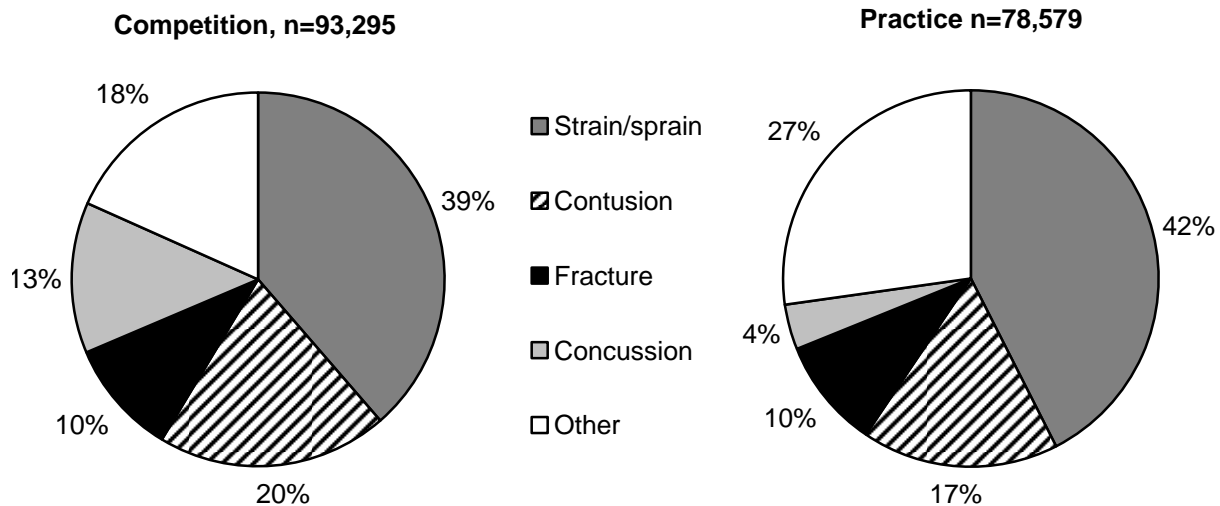


Table 4.3 Body Site of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|---------------|------------|---------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 20,512 | 22.1 | 14,120 | 18.0 | 34,632 | 20.2 |
| Knee | 11,967 | 12.9 | 16,161 | 20.6 | 28,128 | 16.4 |
| Head/face | 18,345 | 19.7 | 5,597 | 7.1 | 23,942 | 14.0 |
| Hip/thigh/upper leg | 11,308 | 12.2 | 16,374 | 20.8 | 27,682 | 16.1 |
| Shoulder | 3,183 | 3.4 | 1,938 | 2.5 | 5,121 | 3.0 |
| Hand/wrist | 4,829 | 5.2 | 4,087 | 5.2 | 8,916 | 5.2 |
| Trunk | 3,294 | 3.5 | 2,919 | 3.7 | 6,213 | 3.6 |
| Lower leg | 9,742 | 10.5 | 6,454 | 8.2 | 16,196 | 9.4 |
| Foot | 3,833 | 4.1 | 7,584 | 9.7 | 11,417 | 6.7 |
| Arm/elbow | 914 | 1.0 | 0 | 0.0 | 914 | 0.5 |
| Neck | 319 | 0.3 | 1,146 | 1.5 | 1,465 | 0.9 |
| Other | 4,731 | 5.1 | 2,200 | 2.8 | 6,931 | 4.0 |
| Total | 92,976 | 100 | 78,579 | 100 | 171,555 | 100 |

Table 4.4 Ten Most Common Boys' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition n=92,976 | | Practice n=78,579 | | Total n=171,555 | |
|-----------------------------------|-------------------------|------|----------------------|------|--------------------|------|
| | n | % | n | % | n | % |
| Diagnosis | | | | | | |
| Ankle strain/sprain | 16,328 | 17.6 | 9,184 | 11.7 | 25,512 | 14.9 |
| Hip/thigh/upper leg strain/sprain | 5,565 | 6.0 | 14,470 | 18.4 | 20,036 | 11.7 |
| Head/face concussion | 12,229 | 13.2 | 3,039 | 3.9 | 15,268 | 8.9 |
| Knee other | 3,657 | 3.9 | 8,423 | 10.7 | 12,080 | 7.0 |
| Knee strain/sprain | 6,708 | 7.2 | 4,539 | 5.8 | 11,247 | 6.6 |
| Lower leg contusion | 4,062 | 4.4 | 2,611 | 3.3 | 6,673 | 3.9 |
| Hip/thigh/upper leg contusion | 4,915 | 5.3 | 1,402 | 1.8 | 6,317 | 3.7 |
| Head/face other | 4,886 | 5.3 | 490 | 0.6 | 5,376 | 3.1 |
| Hand/wrist fracture | 2,020 | 2.2 | 3,261 | 4.2 | 5,280 | 3.1 |
| Ankle contusion | 2,351 | 2.5 | 2,645 | 3.4 | 4,996 | 2.9 |

Figure 4.2 Time Loss of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

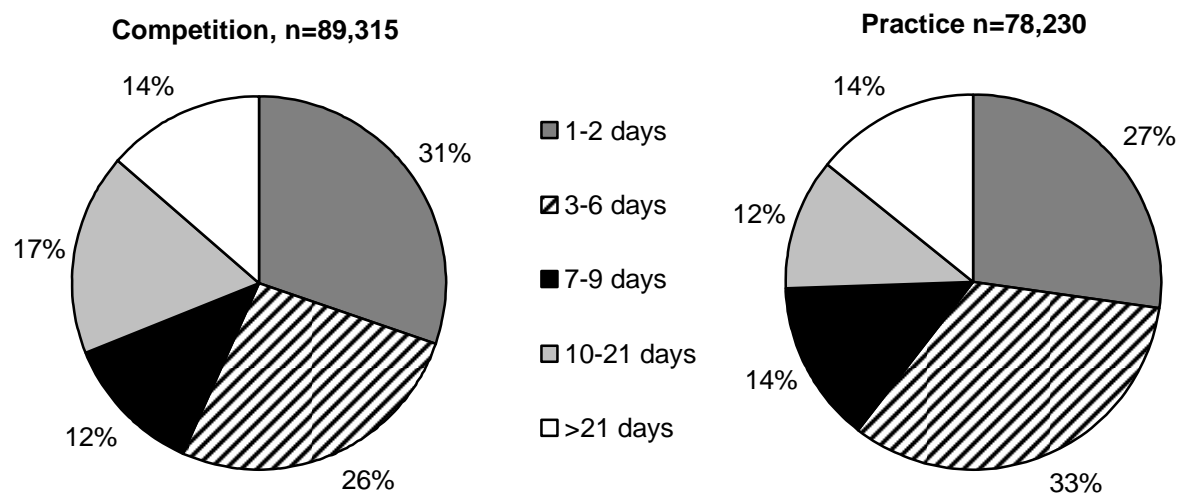


Table 4.5 Boys' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|---------------|------------|---------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 6,729 | 7.4 | 3,106 | 4.0 | 9,835 | 5.8 |
| Did not require surgery | 84,367 | 92.6 | 74,229 | 96.0 | 158,596 | 94.2 |
| Total | 91,097 | 100 | 77,335 | 100 | 168,432 | 100 |

Figure 4.3 History of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

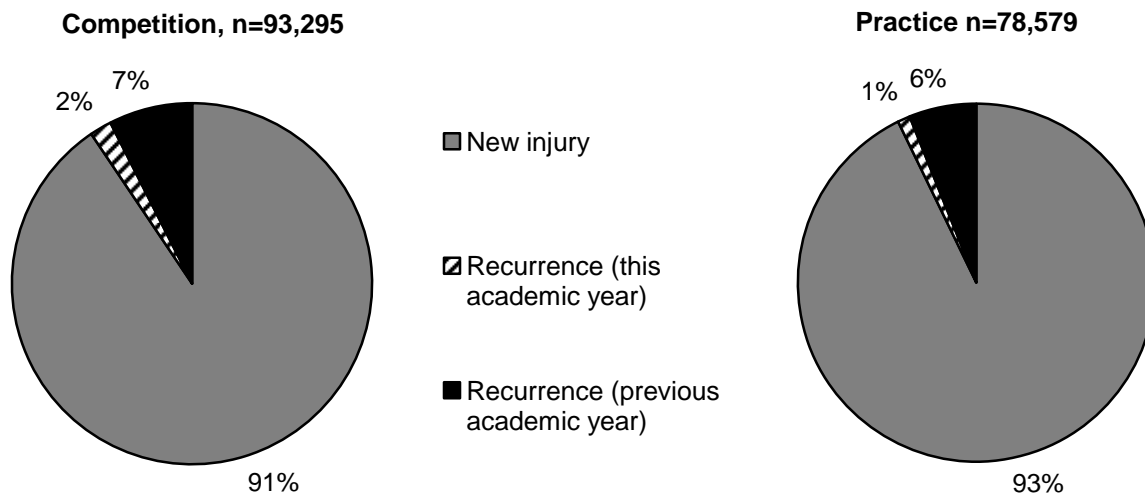


Table 4.6 Time during Season of Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|----------------|------------|
| Time in Season | | |
| Preseason | 47,773 | 27.8 |
| Regular season | 120,812 | 70.3 |
| Post season | 3,288 | 1.9 |
| Total | 171,874 | 100 |

Table 4.7 Competition-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|---------------------------------------------------|---------------|------------|
| Time in Competition | | |
| Warm-ups | 2,150 | 2.3 |
| Beginning | 14,134 | 15.2 |
| Middle | 52,088 | 55.8 |
| End | 24,923 | 26.7 |
| Total | 93,295 | 100 |
| Competition Location | | |
| Home | 46,410 | 49.8 |
| Away | 44,256 | 47.4 |
| Neutral site | 2,629 | 2.8 |
| Total | 93,295 | 100 |
| Injury Related to Foul Play | | |
| Yes | 12,032 | 13.2 |
| No | 79,240 | 86.8 |
| Total | 91,272 | 100 |
| Field Location | | |
| Goal box (defense) | 10,644 | 13.8 |
| Side of goal box (defense) | 8,129 | 10.6 |
| Goal box (offense) | 6,162 | 8.0 |
| Side of goal box (offense) | 7,865 | 10.2 |
| Top of goal box extended to center line (offense) | 22,853 | 29.7 |
| Top of goal box extended to center line (defense) | 19,971 | 25.9 |
| Off the field | 1,341 | 1.7 |
| Total | 76,964 | 100 |

Table 4.8 Practice-Related Variables for Boys' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|---------------|------------|
| Time in Practice | | |
| First 1/2 hour | 13,467 | 17.6 |
| Second 1/2 hour | 21,468 | 28.0 |
| Third 1/2 hour | 20,458 | 26.7 |
| Fourth 1/2 hour | 18,890 | 24.7 |
| >2 hours into practice | 2,278 | 3.0 |
| Total | 76,561 | 100 |
| Number of Practices | | |
| Single session | 59,511 | 76.2 |
| Double session | 16,721 | 21.4 |
| Triple session | 1,828 | 2.3 |
| Total | 78,060 | 100 |
| Practice Type | | |
| Noncontact skills practice | 20,853 | 26.7 |
| Noncontact partial numbers scrimmage | 2,882 | 3.7 |
| Noncontact full scrimmage | 3,202 | 4.1 |
| Partial contact skills practice | 10,532 | 13.5 |
| Partial contact partial numbers scrimmage | 3,984 | 5.1 |
| Partial contact full scrimmage | 2,832 | 3.6 |
| Full contact skills practice | 7,671 | 9.8 |
| Full contact partial numbers scrimmage | 4,578 | 5.9 |
| Full contact full scrimmage | 17,514 | 22.5 |
| Other | 3,942 | 5.0 |
| Total | 77,990 | 100 |

Figure 4.4 Player Position of Boys' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

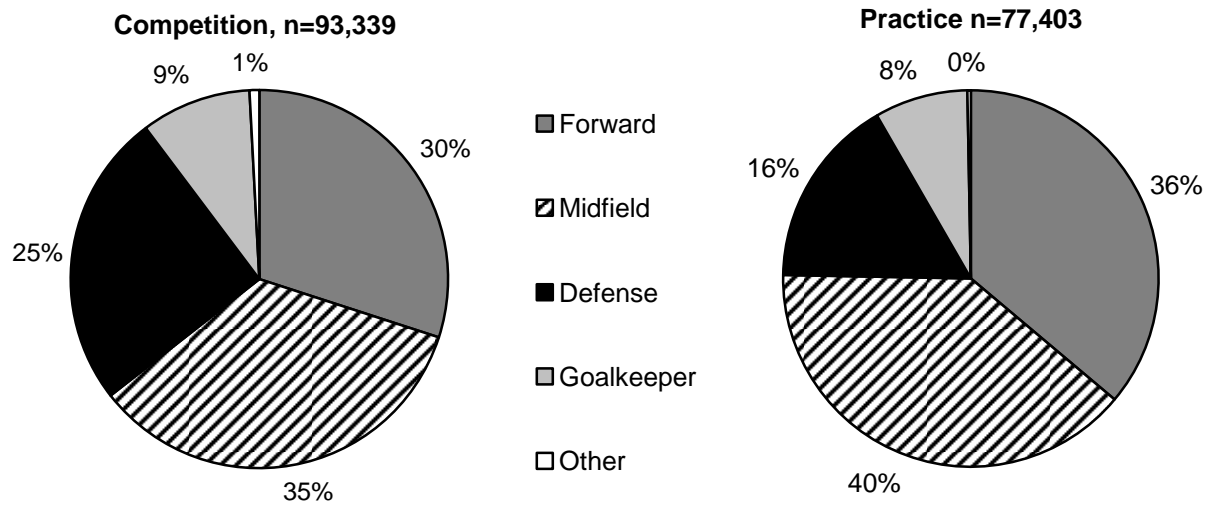
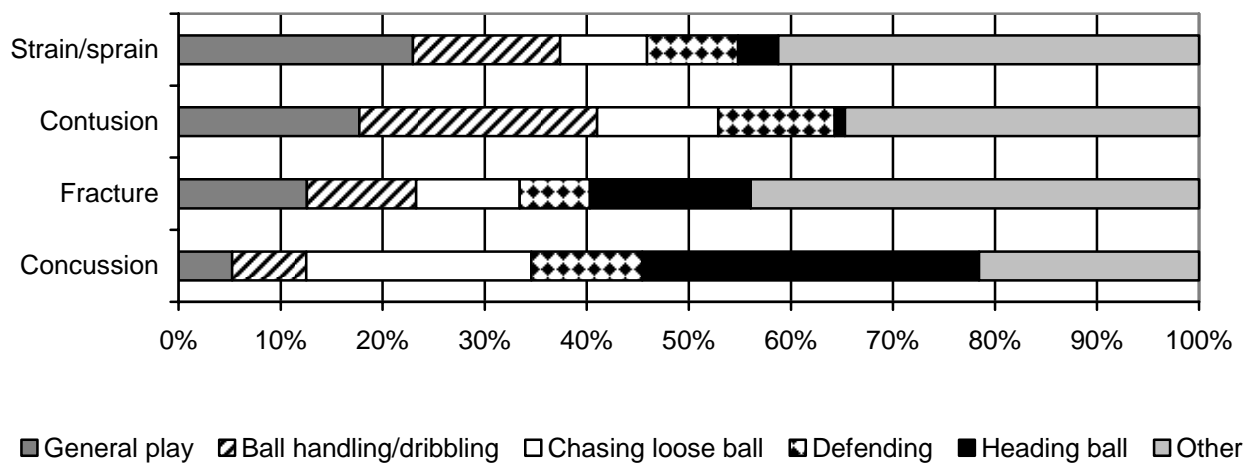


Figure 4.5 Activity Resulting in Boys' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



V. Girls' Soccer Injury Epidemiology

Table 5.1 Girls' Soccer Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 410 | 163,378 | 2.51 | 230,769 |
| Competition | 259 | 47,676 | 5.43 | 149,231 |
| Practice | 151 | 115,702 | 1.31 | 81,538 |

Table 5.2 Demographic Characteristics of Injured Girls' Soccer Athletes, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|-----------------------|
| Year in School | |
| Freshman | 44,883 (19.5%) |
| Sophomore | 77,687 (33.8%) |
| Junior | 61,263 (26.7%) |
| Senior | 45,866 (20.0%) |
| Total[†] | 229,699 (100%) |
| Age (years) | |
| Minimum | 13 |
| Maximum | 18 |
| Mean (St. Dev.) | 15.8 (1.1) |
| BMI | |
| Minimum | 15.5 |
| Maximum | 37.9 |
| Mean (St. Dev.) | 22.0 (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 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, 2006-07 School Year

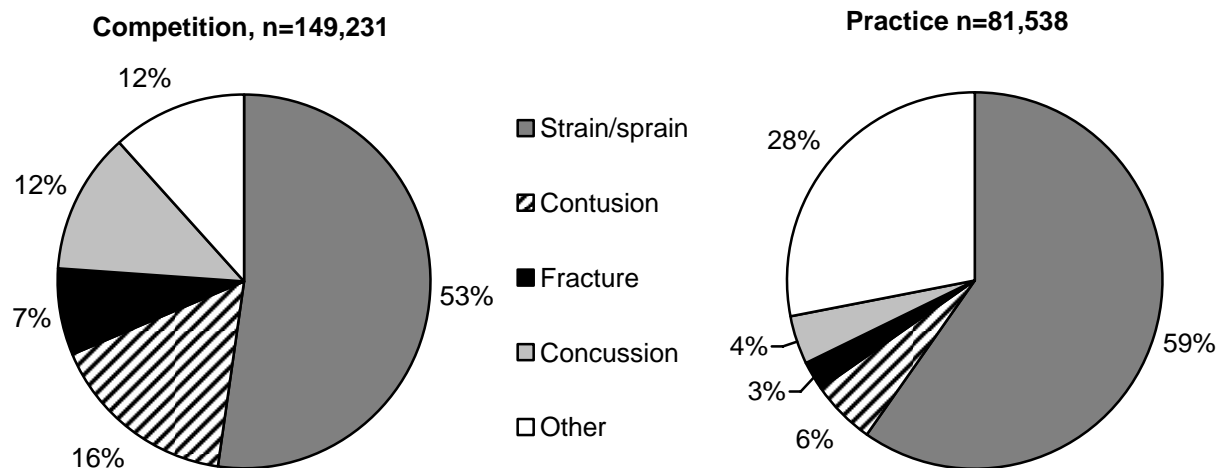


Table 5.3 Body Site of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|----------------|------------|---------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 31,923 | 21.4 | 13,096 | 16.1 | 45,019 | 19.5 |
| Knee | 37,197 | 24.9 | 22,857 | 28.0 | 60,054 | 26.0 |
| Head/face | 24,586 | 16.5 | 4,355 | 5.3 | 28,941 | 12.5 |
| Hip/thigh/upper leg | 15,460 | 10.4 | 16,751 | 20.5 | 32,211 | 14.0 |
| Shoulder | 2,663 | 1.8 | 1,461 | 1.8 | 4,124 | 1.8 |
| Hand/wrist | 4,483 | 3.0 | 1,610 | 2.0 | 6,093 | 2.6 |
| Trunk | 6,992 | 4.7 | 2,333 | 2.9 | 9,325 | 4.0 |
| Lower leg | 10,292 | 6.9 | 11,687 | 14.3 | 21,979 | 9.5 |
| Foot | 9,309 | 6.2 | 5,845 | 7.2 | 15,154 | 6.6 |
| Arm/elbow | 3,313 | 2.2 | 533 | 0.7 | 3,846 | 1.7 |
| Neck | 535 | 0.4 | 0 | 0.0 | 535 | 0.2 |
| Other | 2,478 | 1.7 | 1,010 | 1.2 | 3,488 | 1.5 |
| Total | 149,231 | 100 | 81,538 | 100 | 230,769 | 100 |

Table 5.4 Ten Most Common Girls' Soccer Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| Diagnosis | Competition n=149,231 | | Practice n=81,538 | | Total n=230,769 | |
|-----------------------------------|--------------------------|------|----------------------|------|--------------------|------|
| | n | % | n | % | n | % |
| Ankle strain/sprain | 27,749 | 18.6 | 12,918 | 15.8 | 40,666 | 17.6 |
| Knee strain/sprain | 22,661 | 15.2 | 12,809 | 15.7 | 35,470 | 15.4 |
| Hip/thigh/upper leg strain/sprain | 11,866 | 8.0 | 15,318 | 18.8 | 27,184 | 11.8 |
| Head/face concussion | 18,188 | 12.2 | 3,382 | 4.2 | 21,570 | 9.4 |
| Knee other | 5,140 | 3.4 | 8,334 | 10.2 | 13,474 | 5.8 |
| Lower leg other | 2,132 | 1.4 | 8,419 | 10.3 | 10,551 | 4.6 |
| Knee contusion | 7,267 | 4.9 | 1,714 | 2.1 | 8,981 | 3.9 |
| Foot strain/sprain | 4,929 | 3.3 | 3,450 | 4.2 | 8,379 | 3.6 |
| Lower leg contusion | 4,452 | 3.0 | 1,038 | 1.3 | 5,490 | 2.4 |
| Hip/thigh/upper leg contusion | 3,595 | 2.4 | 1,038 | 1.3 | 4,633 | 2.0 |

Figure 5.2 Time Loss of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

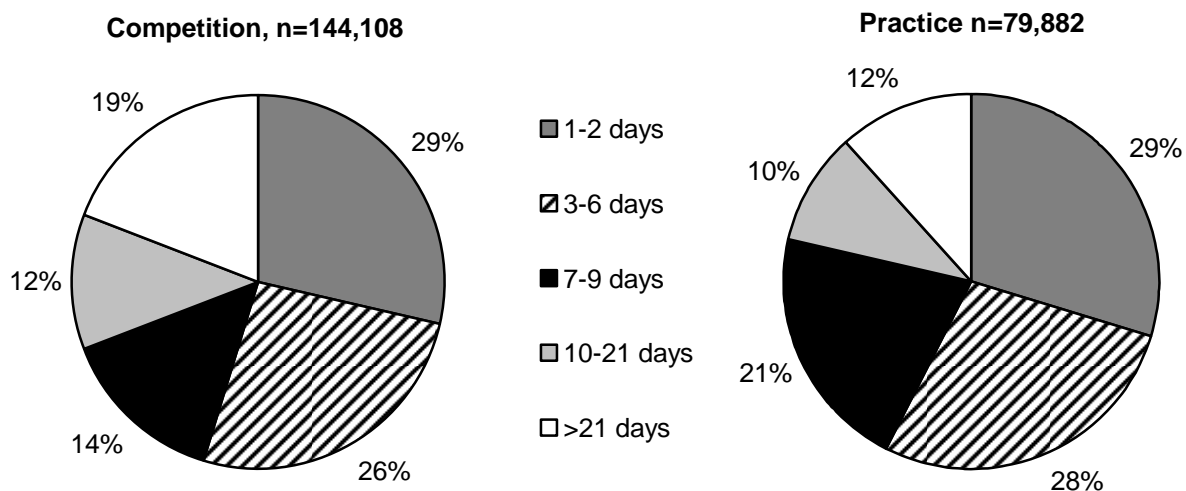


Table 5.5 Girls' Soccer Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|----------------|------------|---------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 12,411 | 8.5 | 3,918 | 4.9 | 16,329 | 7.2 |
| Did not require surgery | 134,208 | 91.5 | 76,046 | 95.1 | 210,254 | 92.8 |
| Total | 146,619 | 100 | 79,964 | 100 | 226,583 | 100 |

Figure 5.3 History of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

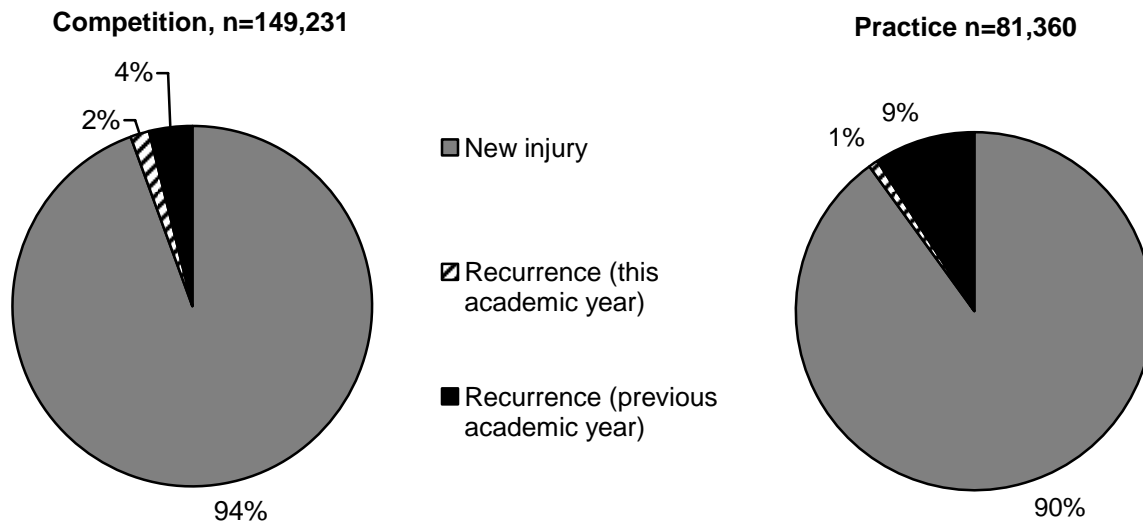


Table 5.6 Time during Season of Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|----------------|------------|
| Time in Season | | |
| Preseason | 32,263 | 14.0 |
| Regular season | 186,670 | 80.9 |
| Post season | 11,836 | 5.1 |
| Total | 230,769 | 100 |

Table 5.7 Competition-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|---------------------------------------------------|----------------|------------|
| Time in Competition | | |
| Warm-ups | 2,977 | 2.0 |
| Beginning | 18,303 | 12.6 |
| Middle | 79,005 | 54.3 |
| End | 45,176 | 31.1 |
| Total | 145,462 | 100 |
| Competition Location | | |
| Home | 77,974 | 53.1 |
| Away | 60,822 | 41.4 |
| Neutral site | 8,001 | 5.4 |
| Total | 146,798 | 100 |
| Injury Related to Foul Play | | |
| Yes | 18,150 | 12.8 |
| No | 123,406 | 87.2 |
| Total | 141,557 | 100 |
| Field Location | | |
| Goal box (defense) | 14,205 | 10.7 |
| Side of goal box (defense) | 13,297 | 10.0 |
| Goal box (offense) | 11,140 | 8.4 |
| Side of goal box (offense) | 15,236 | 11.5 |
| Top of goal box extended to center line (offense) | 46,451 | 34.9 |
| Top of goal box extended to center line (defense) | 28,467 | 21.4 |
| Off the field | 4,114 | 3.1 |
| Total | 132,910 | 100 |

Table 5.8 Practice-Related Variables for Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|---------------|------------|
| Time in Practice | | |
| First 1/2 hour | 10,602 | 13.5 |
| Second 1/2 hour | 24,683 | 31.4 |
| Third 1/2 hour | 31,945 | 40.6 |
| Fourth 1/2 hour | 9,922 | 12.6 |
| >2 hours into practice | 1,433 | 1.8 |
| Total | 78,585 | 100 |
| Number of Practices | | |
| Single session | 74,203 | 90.2 |
| Double session | 8,076 | 9.8 |
| Total | 82,279 | 100 |
| Practice Type | | |
| Noncontact skills practice | 26,670 | 32.2 |
| Noncontact partial numbers scrimmage | 1,703 | 2.1 |
| Noncontact full scrimmage | 1,151 | 1.4 |
| Partial contact skills practice | 5,645 | 6.8 |
| Partial contact partial numbers scrimmage | 8,754 | 10.6 |
| Partial contact full scrimmage | 2,491 | 3.0 |
| Full contact skills practice | 14,305 | 17.3 |
| Full contact partial numbers scrimmage | 9,949 | 12.0 |
| Full contact full scrimmage | 8,532 | 10.3 |
| Other | 3,642 | 4.4 |
| Total | 82,842 | 100 |

Figure 5.4 Player Position of Girls' Soccer Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

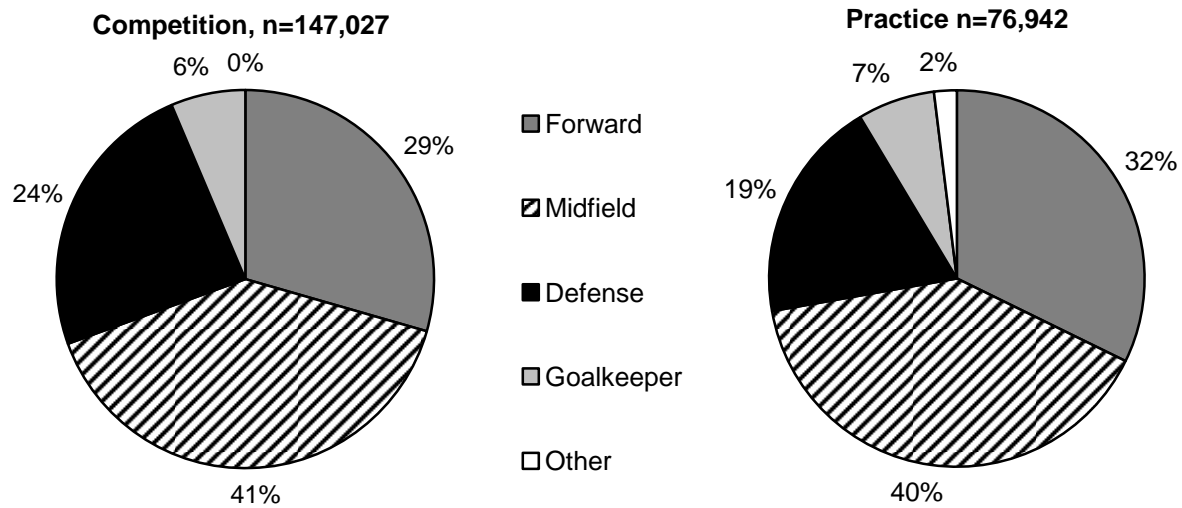
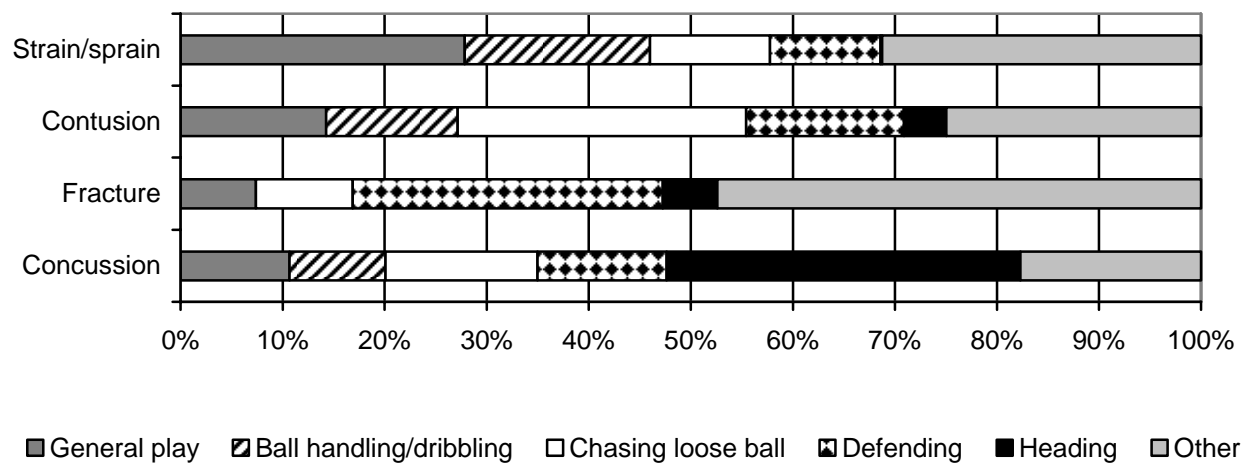


Figure 5.5 Activity Resulting in Girls' Soccer Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



VI. Volleyball Injury Epidemiology

Table 6.1 Volleyball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 220 | 160,645 | 1.37 | 80,493 |
| Competition | 74 | 53,016 | 1.40 | 27,423 |
| Practice | 146 | 107,629 | 1.36 | 53,069 |

Table 6.2 Demographic Characteristics of Injured Volleyball Athletes, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|----------------------|
| Year in School | |
| Freshman | 18,338 (22.9%) |
| Sophomore | 15,091 (18.9%) |
| Junior | 22,007 (27.5%) |
| Senior | 24,579 (30.7%) |
| Total[†] | 80,016 (100%) |
| Age (years) | |
| Minimum | 13 |
| Maximum | 18 |
| Mean (St. Dev.) | 15.7 (1.2) |
| BMI | |
| Minimum | 15.8 |
| Maximum | 33.7 |
| Mean (St. Dev.) | 21.7 (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 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, 2006-07 School Year

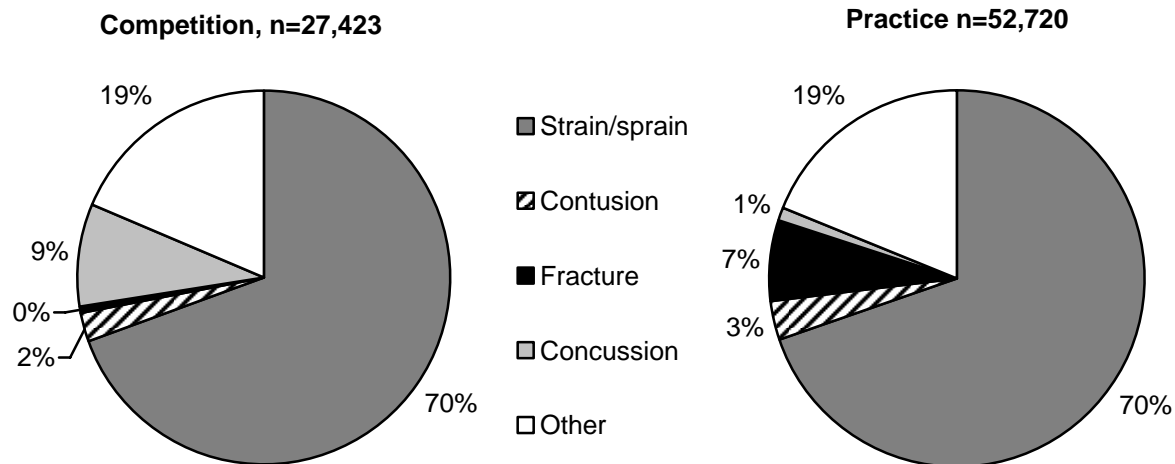


Table 6.3 Body Site of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 13,015 | 47.5 | 26,662 | 50.2 | 39,677 | 49.3 |
| Knee | 2,447 | 8.9 | 4,457 | 8.4 | 6,904 | 8.6 |
| Head/face | 2,588 | 9.4 | 697 | 1.3 | 3,285 | 4.1 |
| Hip/thigh/upper leg | 221 | 0.8 | 2,124 | 4.0 | 2,345 | 2.9 |
| Shoulder | 1,620 | 5.9 | 4,111 | 7.8 | 5,731 | 7.1 |
| Hand/wrist | 3,477 | 12.7 | 6,238 | 11.8 | 9,715 | 12.1 |
| Trunk | 3,122 | 11.4 | 3,280 | 6.2 | 6,402 | 8.0 |
| Lower leg | 544 | 2.0 | 2,736 | 5.2 | 3,280 | 4.1 |
| Foot | 0 | 0.0 | 1,123 | 2.1 | 1,123 | 1.4 |
| Arm/elbow | 119 | 0.4 | 1,019 | 1.9 | 1,138 | 1.4 |
| Neck | 0 | 0 | 0 | 0 | 0 | 0.0 |
| Other | 272 | 1.0 | 621 | 1.2 | 893 | 1.1 |
| Total | 27,423 | 100 | 53,069 | 100 | 80,492 | 100 |

Table 6.4 Ten Most Common Volleyball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition n=27,423 | | Practice n=52,720 | | Total n=80,143 | |
|-----------------------------------|-------------------------|------|----------------------|------|-------------------|------|
| | n | % | n | % | n | % |
| Diagnosis | | | | | | |
| Ankle strain/sprain | 12,810 | 46.7 | 24,618 | 46.7 | 37,428 | 46.7 |
| Hand/wrist strain/sprain | 2,889 | 10.5 | 2,521 | 4.8 | 5,411 | 6.8 |
| Trunk other | 2,305 | 8.4 | 1,919 | 3.6 | 4,224 | 5.3 |
| Shoulder other | 1,178 | 4.3 | 2,327 | 4.4 | 3,505 | 4.4 |
| Knee strain/sprain | 1,598 | 5.8 | 1,679 | 3.2 | 3,277 | 4.1 |
| Head/face concussion | 2,469 | 9.0 | 493 | 0.9 | 2,962 | 3.7 |
| Knee other | 848 | 3.1 | 1,738 | 3.3 | 2,586 | 3.2 |
| Lower leg strain/sprain | 272 | 1.0 | 2,118 | 4.0 | 2,390 | 3.0 |
| Hip/thigh/upper leg strain/sprain | 110 | 0.4 | 2,124 | 4.0 | 2,235 | 2.8 |
| Trunk strain/sprain | 817 | 3.0 | 1,360 | 2.6 | 2,177 | 2.7 |

Figure 6.2 Time Loss of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

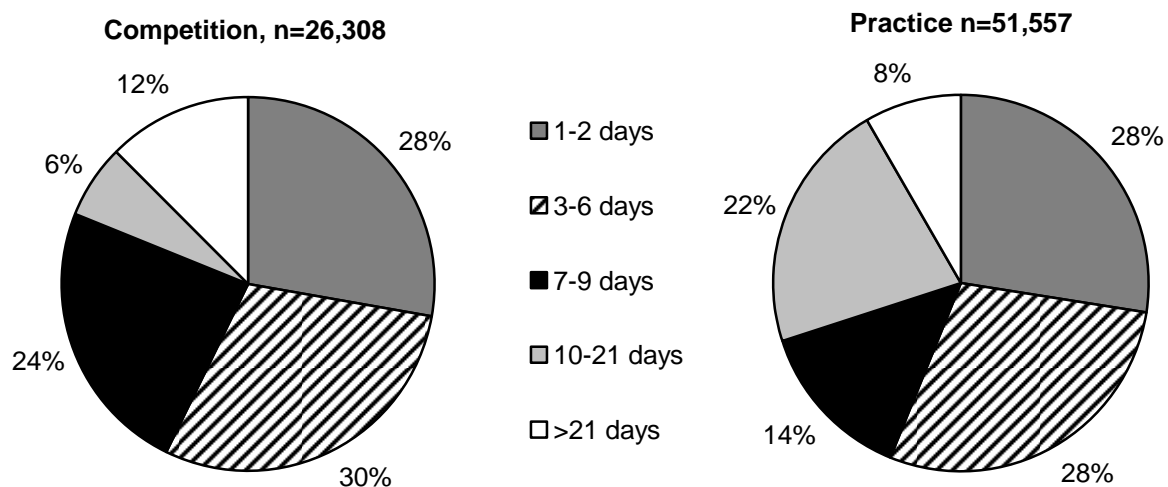


Table 6.5 Volleyball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 1,338 | 5.0 | 695 | 1.3 | 2,033 | 2.6 |
| Did not require surgery | 25,663 | 95.0 | 51,526 | 98.7 | 77,189 | 97.4 |
| Total | 27,001 | 100 | 52,221 | 100 | 79,222 | 100 |

Figure 6.3 History of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

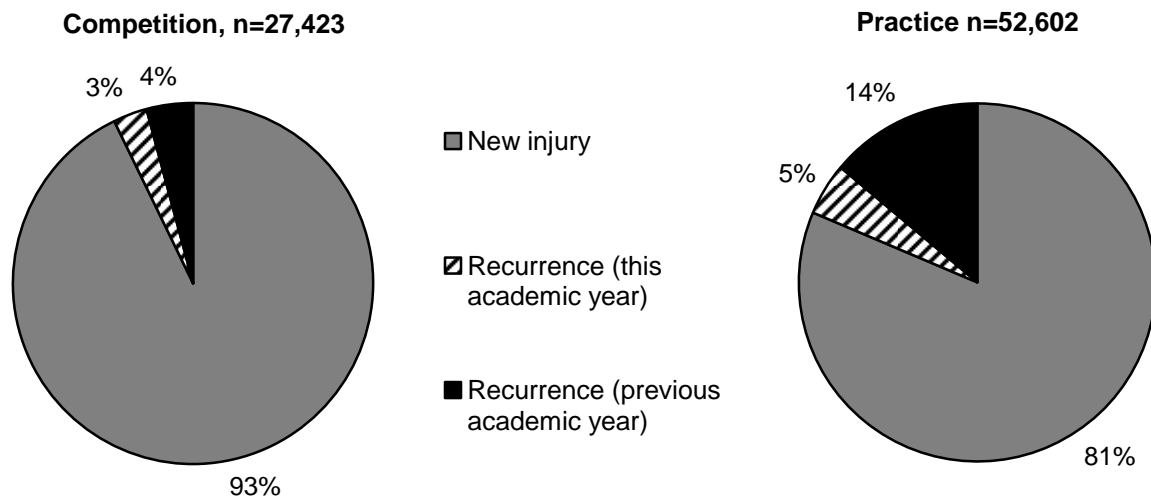


Table 6.6 Time during Season of Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|---------------|------------|
| Time in Season | | |
| Preseason | 24,721 | 30.7 |
| Regular season | 49,926 | 62.0 |
| Post season | 5,846 | 7.3 |
| Total | 80,493 | 100 |

Table 6.7 Competition-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|------------------------------------|---------------|--------------|
| Time in Competition | | |
| Warm-ups | 1,469 | 5.4 |
| Beginning | 5,908 | 21.6 |
| Middle | 13,731 | 50.1 |
| End | 6,291 | 23.0 |
| Total | 27,400 | 100 |
| Competition Location | | |
| Home | 14,564 | 52.7 |
| Away | 11,174 | 40.4 |
| Neutral site | 1,891 | 6.8 |
| Total | 27,628 | 100 |
| Injury Related to Foul Play | | |
| Yes | 1,077 | 4.1 |
| No | 25,473 | 95.9 |
| Total | 26,551 | 100 |
| Court Location | | |
| Right back (server) | 2,118 | 8.5 |
| Right forward | 7,162 | 28.8 |
| Outside court (your side) | 205 | 0.8 |
| Middle forward | 9,192 | 36.9 |
| Left forward | 2,577 | 10.4 |
| Left back | 2,654 | 10.7 |
| Off the court | 970 | 3.9 |
| Total | 24,878 | 100.0 |

Table 6.8 Practice-Related Variables for Volleyball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|---------------|------------|
| Time in Practice | | |
| First 1/2 hour | 16,024 | 30.3 |
| Second 1/2 hour | 15,841 | 30.0 |
| Third 1/2 hour | 11,438 | 21.6 |
| Fourth 1/2 hour | 7,884 | 14.9 |
| >2 hours into practice | 1,661 | 3.1 |
| Total | 52,849 | 100 |
| Number of Practices | | |
| Single session | 44,548 | 84.4 |
| Double session | 7,900 | 15.0 |
| Triple session | 349 | 0.7 |
| Total | 52,797 | 100 |
| Practice Type | | |
| Noncontact skills practice | 24,512 | 46.2 |
| Noncontact partial numbers scrimmage | 1,769 | 3.3 |
| Noncontact full scrimmage | 3,427 | 6.5 |
| Partial contact skills practice | 2,338 | 4.4 |
| Partial contact partial numbers scrimmage | 1,545 | 2.9 |
| Partial contact full scrimmage | 554 | 1.0 |
| Full contact skills practice | 10,322 | 19.4 |
| Full contact partial numbers scrimmage | 1,647 | 3.1 |
| Full contact full scrimmage | 3,454 | 6.5 |
| Other | 3,502 | 6.6 |
| Total | 53,069 | 100 |

Figure 6.4 Player Position of Volleyball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

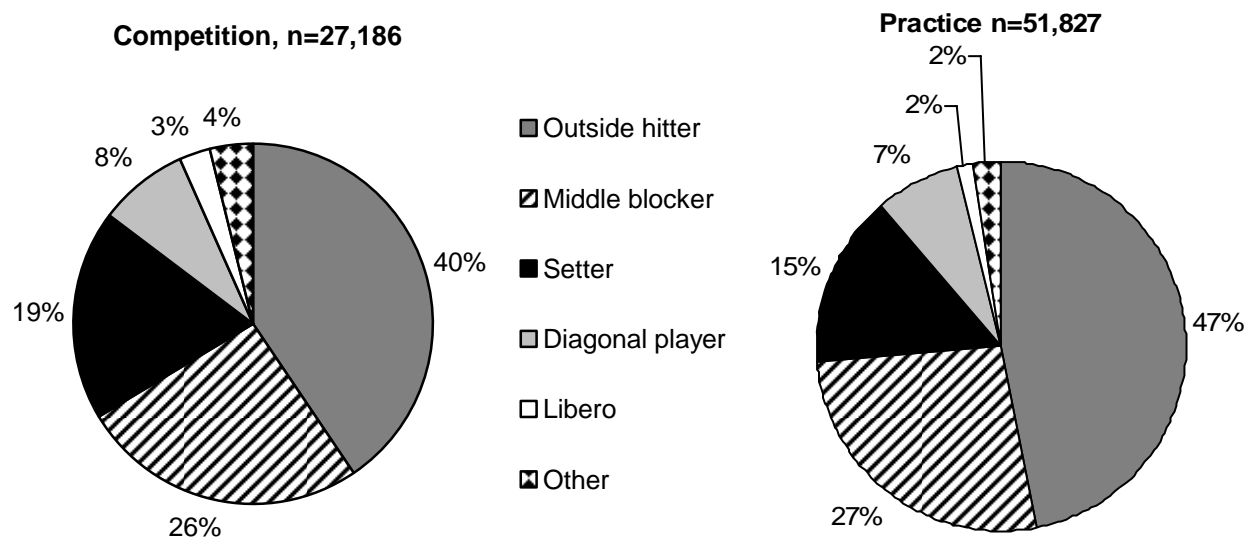
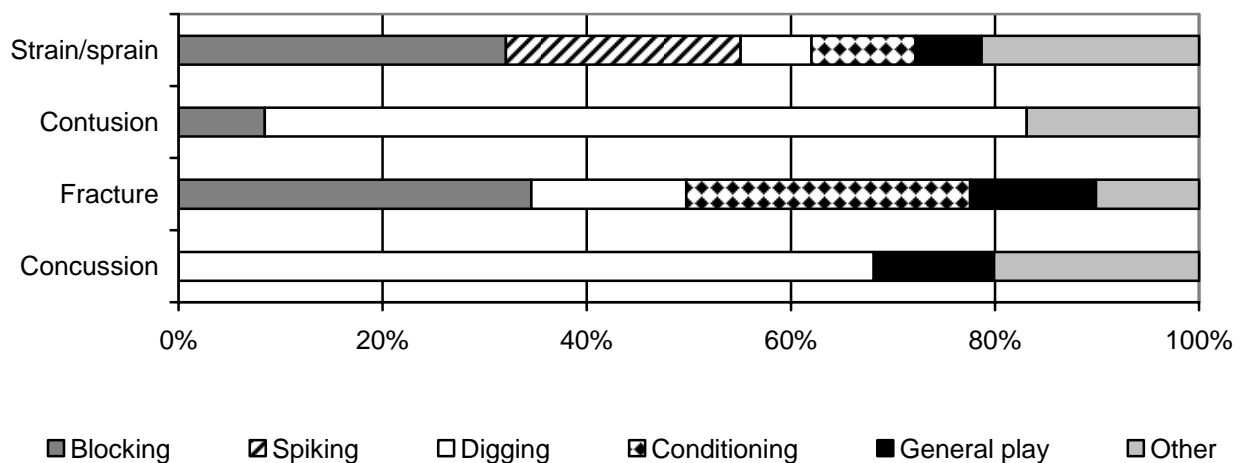


Figure 6.5 Activity Resulting in Volleyball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



VII. Boys' Basketball Injury Epidemiology

Table 7.1 Boys' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 359 | 204,897 | 1.75 | 96,670 |
| Competition | 174 | 60,561 | 2.87 | 46,109 |
| Practice | 185 | 144,336 | 1.28 | 50,561 |

Table 7.2 Demographic Characteristics of Injured Boys' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|----------------------|
| Year in School | |
| Freshman | 14,302 (15.0%) |
| Sophomore | 23,335 (24.4%) |
| Junior | 29,292 (30.7%) |
| Senior | 28,580 (29.9%) |
| Total[†] | 95,508 (100%) |
| Age (years) | |
| Minimum | 14 |
| Maximum | 19 |
| Mean (St. Dev.) | 16.2 (1.1) |
| BMI | |
| Minimum | 15.4 |
| Maximum | 32.4 |
| Mean (St. Dev.) | 22.5 (2.7) |

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

[†]Throughout this chapter, totals and n's represent the total 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, 2006-07 School Year

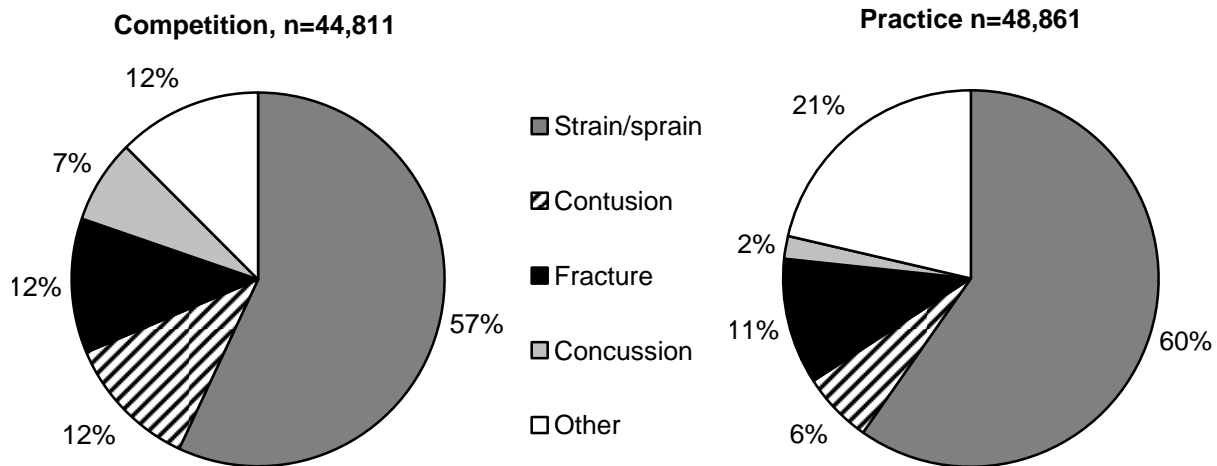


Table 7.3 Body Site of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 18,158 | 39.4 | 17,288 | 34.2 | 35,446 | 36.7 |
| Knee | 5,887 | 12.8 | 5,380 | 10.6 | 11,267 | 11.7 |
| Head/face | 8,349 | 18.1 | 4,807 | 9.5 | 13,156 | 13.6 |
| Hip/thigh/upper leg | 3,625 | 7.9 | 3,635 | 7.2 | 7,260 | 7.5 |
| Shoulder | 645 | 1.4 | 780 | 1.5 | 1,425 | 1.5 |
| Hand/wrist | 2,717 | 5.9 | 4,691 | 9.3 | 7,408 | 7.7 |
| Trunk | 2,684 | 5.8 | 5,668 | 11.2 | 8,352 | 8.6 |
| Lower leg | 1,243 | 2.7 | 1,863 | 3.7 | 3,106 | 3.2 |
| Foot | 806 | 1.8 | 3,101 | 6.1 | 3,907 | 4.0 |
| Arm/elbow | 569 | 1.2 | 460 | 0.9 | 1,029 | 1.1 |
| Neck | 512 | 1.1 | 214 | 0.4 | 726 | 0.8 |
| Other | 915 | 2.0 | 2,673 | 5.3 | 3,588 | 3.7 |
| Total | 46,109 | 100 | 50,561 | 100 | 96,670 | 100 |

Table 7.4 Ten Most Common Boys' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| Diagnosis | Competition n=46,109 | | Practice n=50,318 | | Total n=96,427 | |
|-----------------------------------|-------------------------|------|----------------------|------|-------------------|------|
| | n | % | n | % | n | % |
| Ankle strain/sprain | 17,784 | 38.6 | 16,905 | 33.6 | 34,689 | 36.0 |
| Hip/thigh/upper leg strain/sprain | 2,164 | 4.7 | 3,257 | 6.5 | 5,421 | 5.6 |
| Knee strain/sprain | 3,186 | 6.9 | 1,859 | 3.7 | 5,045 | 5.2 |
| Head/face other | 2,598 | 5.6 | 2,266 | 4.5 | 4,864 | 5.0 |
| Knee other | 2,243 | 4.9 | 2,523 | 5.0 | 4,766 | 4.9 |
| Head/face concussion | 3,403 | 7.4 | 1,049 | 2.1 | 4,452 | 4.6 |
| Hand/wrist fracture | 1,372 | 3.0 | 1,886 | 3.8 | 3,258 | 3.4 |
| Trunk strain/sprain | 865 | 1.9 | 2,378 | 4.7 | 3,242 | 3.4 |
| Head/face fracture | 1,861 | 4.0 | 1,248 | 2.5 | 3,110 | 3.2 |
| Trunk contusion | 1,819 | 4.0 | 895 | 1.8 | 2,714 | 2.8 |

Figure 7.2 Time Loss of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

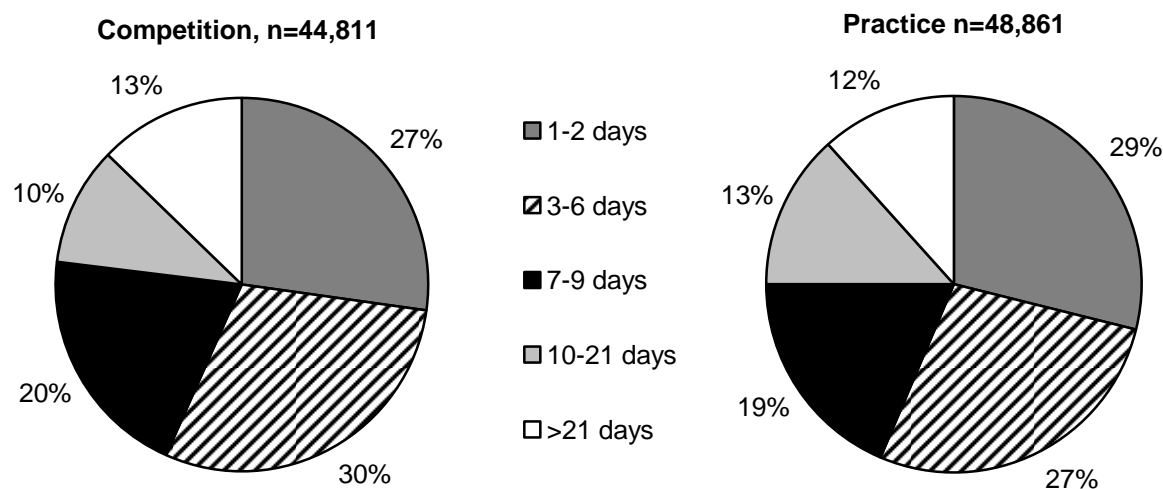


Table 7.5 Boys' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 2,995 | 6.6 | 3,001 | 6.0 | 5,996 | 6.3 |
| Did not require surgery | 42,278 | 93.4 | 46,834 | 94.0 | 89,112 | 93.7 |
| Total | 45,273 | 100 | 49,835 | 100 | 95,108 | 100 |

Figure 7.3 History of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

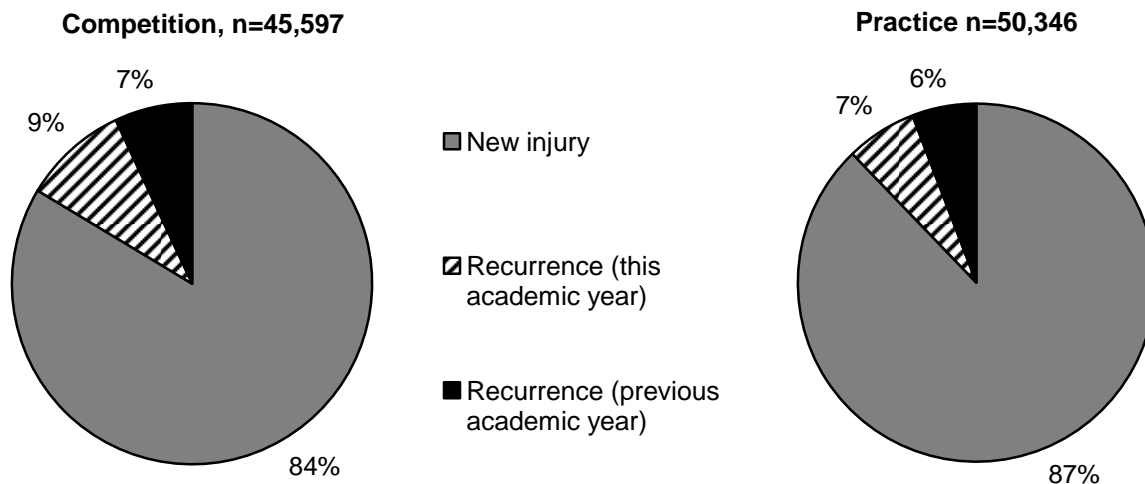


Table 7.6 Time during Season of Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|---------------|------------|
| Time in Season | | |
| Preseason | 19,944 | 20.8 |
| Regular season | 71,685 | 75.0 |
| Post season | 4,014 | 4.2 |
| Total | 95,643 | 100 |

Table 7.7 Competition-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------|---------------|------------|
| Time in Competition | | |
| Warm-ups | 1,025 | 2.3 |
| Beginning | 6,999 | 15.6 |
| Middle | 23,932 | 53.5 |
| End | 12,774 | 28.6 |
| Total | 44,731 | 100 |
| Competition Location | | |
| Home | 24,039 | 52.4 |
| Away | 19,640 | 42.8 |
| Neutral site | 2,187 | 4.8 |
| Total | 45,865 | 100 |
| Injury Related to Foul Play | | |
| Yes | 4,590 | 10.6 |
| No | 38,607 | 89.4 |
| Total | 43,197 | 100 |
| Court Location | | |
| Inside lane (offense) | 12,751 | 29.9 |
| Inside lane (defense) | 15,931 | 37.4 |
| Between 3 pt arc and lane (offense) | 2,541 | 6.0 |
| Between 3 pt arc and lane (defense) | 4,375 | 10.3 |
| Outside 3 point arc (offense) | 3,819 | 9.0 |
| Outside 3 point arc (defense) | 2,376 | 5.6 |
| Out of bounds | 593 | 1.4 |
| Off the court | 214 | 0.5 |
| Total | 42,600 | 100 |

Table 7.8 Practice-Related Variables for Boys' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|---------------|------------|
| Time in Practice | | |
| First 1/2 hour | 9,861 | 19.7 |
| Second 1/2 hour | 16,267 | 32.5 |
| Third 1/2 hour | 15,009 | 30.0 |
| Fourth 1/2 hour | 8,022 | 16.0 |
| >2 hours into practice | 858 | 1.7 |
| Total | 50,018 | 100 |
| Number of Practices | | |
| Single session | 49,533 | 98.5 |
| Double session | 756 | 1.5 |
| Total | 50,289 | 100 |
| Practice Type | | |
| Noncontact skills practice | 8,878 | 17.6 |
| Noncontact partial numbers scrimmage | 1,891 | 3.8 |
| Noncontact full scrimmage | 2,832 | 5.6 |
| Partial contact skills practice | 4,538 | 9.0 |
| Partial contact partial numbers scrimmage | 2,592 | 5.2 |
| Partial contact full scrimmage | 2,456 | 4.9 |
| Full contact skills practice | 7,818 | 15.6 |
| Full contact partial numbers scrimmage | 5,020 | 10.0 |
| Full contact full scrimmage | 13,027 | 25.9 |
| Other | 1,238 | 2.5 |
| Total | 50,289 | 100 |

Figure 7.4 Player Position of Boys' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

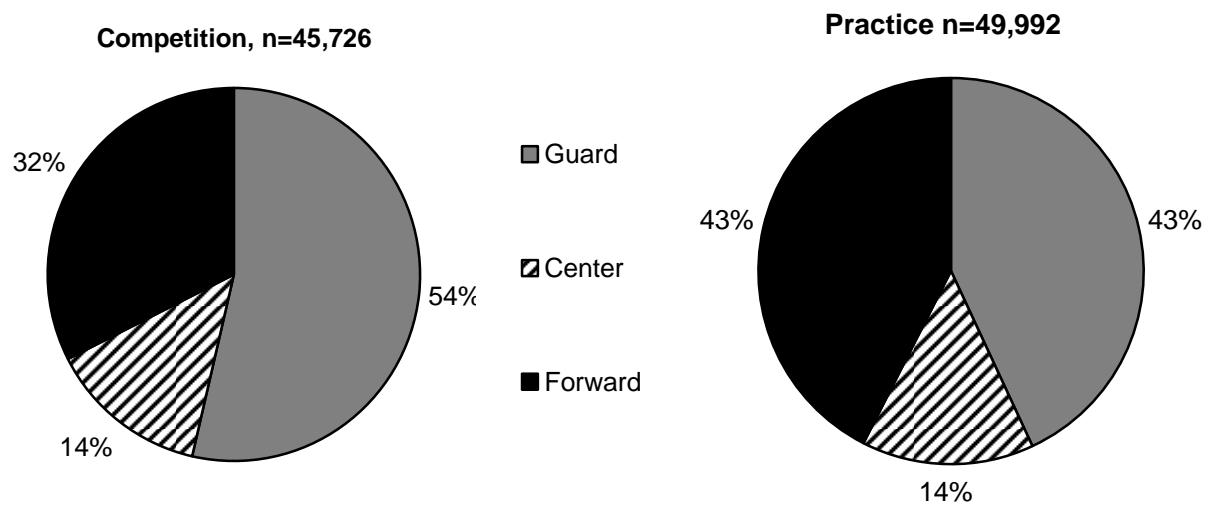
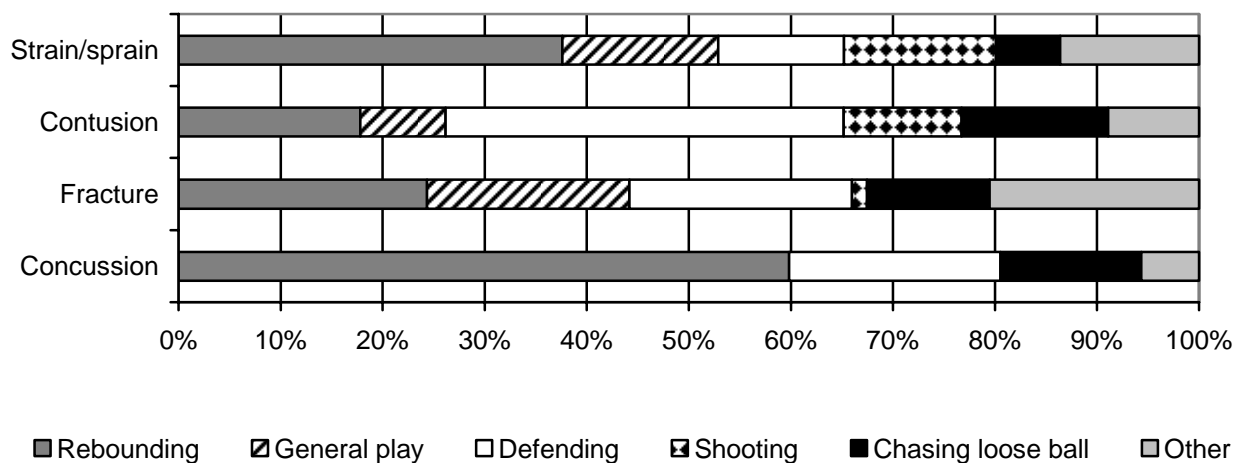


Figure 7.5 Activity Resulting in Boys' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



VIII. Girls' Basketball Injury Epidemiology

Table 8.1 Girls' Basketball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 358 | 171,251 | 2.09 | 102,831 |
| Competition | 185 | 51,358 | 3.60 | 53,703 |
| Practice | 173 | 119,893 | 1.44 | 49,128 |

Table 8.2 Demographic Characteristics of Injured Girls' Basketball Athletes, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|-----------------------|
| Year in School | |
| Freshman | 33,102 (32.8%) |
| Sophomore | 25,049 (24.8%) |
| Junior | 19,865 (19.7%) |
| Senior | 22,949 (22.7%) |
| Total[†] | 100,965 (100%) |
| Age (years) | |
| Minimum | 14 |
| Maximum | 18 |
| Mean (St. Dev.) | 15.6 (1.1) |
| BMI | |
| Minimum | 15.8 |
| Maximum | 49.9 |
| Mean (St. Dev.) | 22.1 (3.5) |

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

[†]Throughout this chapter, totals and n's represent the total 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, 2006-07 School Year

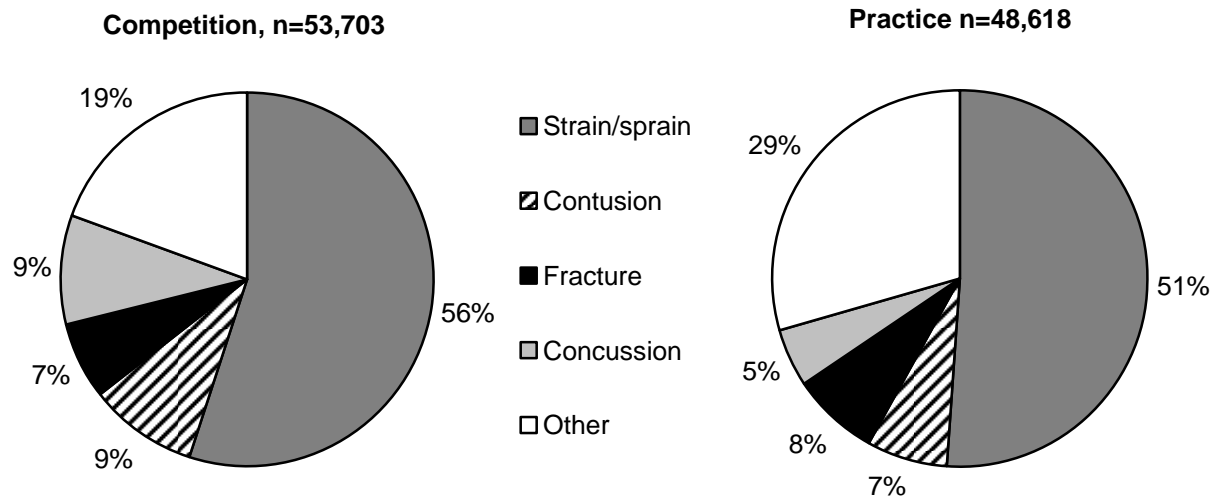


Table 8.3 Body Site of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|---------------|------------|---------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 17,343 | 32.3 | 11,616 | 23.9 | 28,959 | 28.3 |
| Knee | 9,985 | 18.6 | 10,930 | 22.5 | 20,915 | 20.4 |
| Head/face | 9,759 | 18.2 | 3,405 | 7.0 | 13,164 | 12.9 |
| Hip/thigh/upper leg | 3,187 | 5.9 | 5,574 | 11.5 | 8,761 | 8.6 |
| Shoulder | 2,632 | 4.9 | 1,751 | 3.6 | 4,383 | 4.3 |
| Hand/wrist | 3,984 | 7.4 | 5,096 | 10.5 | 9,080 | 8.9 |
| Trunk | 2,029 | 3.8 | 2,703 | 5.6 | 4,732 | 4.6 |
| Lower leg | 1,157 | 2.2 | 3,521 | 7.2 | 4,678 | 4.6 |
| Foot | 725 | 1.4 | 1,325 | 2.7 | 2,050 | 2.0 |
| Arm/elbow | 1,787 | 3.3 | 266 | 0.6 | 2,053 | 2.0 |
| Neck | 376 | 0.7 | 652 | 1.3 | 1,028 | 1.0 |
| Other | 739 | 1.4 | 1,779 | 3.7 | 2,518 | 2.5 |
| Total | 53,703 | 100 | 48,618 | 100 | 102,321 | 100 |

Table 8.4 Ten Most Common Girls' Basketball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| Diagnosis | Competition n=53,703 | | Practice n=48,618 | | Total n=102,321 | |
|-----------------------------------|-------------------------|------|----------------------|------|--------------------|------|
| | n | % | n | % | n | % |
| Ankle strain/sprain | 16,387 | 30.5 | 11,122 | 22.9 | 27,509 | 26.9 |
| Knee strain/sprain | 6,826 | 12.7 | 3,433 | 7.1 | 10,260 | 10.0 |
| Knee other | 1,427 | 2.7 | 6,470 | 13.3 | 7,897 | 7.7 |
| Head/face concussion | 5,084 | 9.5 | 2,468 | 5.1 | 7,552 | 7.4 |
| Hip/thigh/upper leg strain/sprain | 1,429 | 2.7 | 4,847 | 10.0 | 6,275 | 6.1 |
| Hand/wrist fracture | 1,536 | 2.9 | 2,971 | 6.1 | 4,507 | 4.4 |
| Head/face other | 3,800 | 7.1 | 418 | 0.9 | 4,218 | 4.1 |
| Hand/wrist strain/sprain | 2,195 | 4.1 | 1,322 | 2.7 | 3,517 | 3.4 |
| Shoulder other | 1,451 | 2.7 | 1,599 | 3.3 | 3,050 | 3.0 |
| Trunk other | 1,469 | 2.7 | 1,431 | 2.9 | 2,900 | 2.8 |

Figure 8.2 Time Loss of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

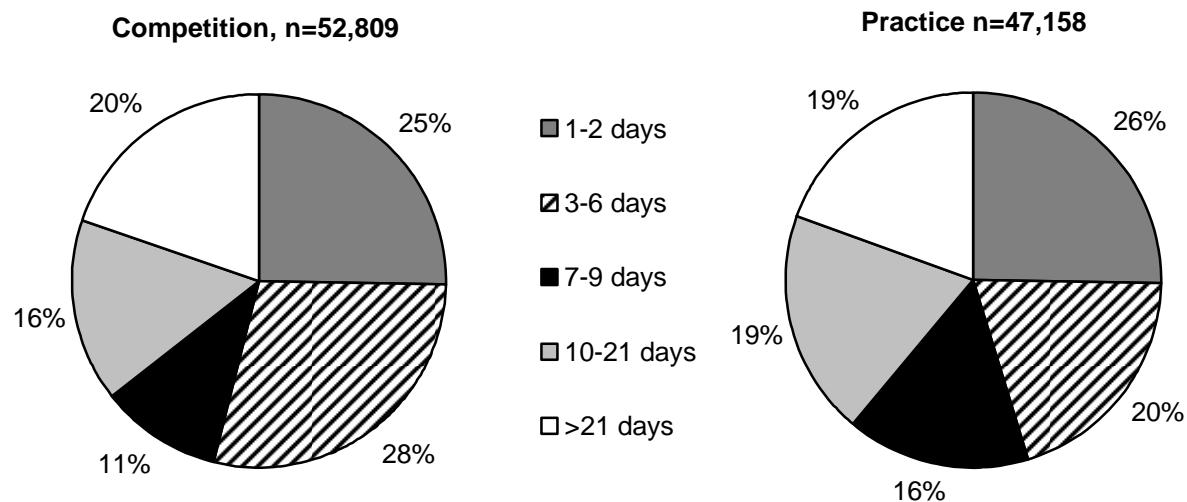


Table 8.5 Girls' Basketball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|---------------|------------|---------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 6,370 | 11.9 | 6,029 | 12.6 | 12,399 | 12.2 |
| Did not require surgery | 47,181 | 88.1 | 41,989 | 87.4 | 89,170 | 87.8 |
| Total | 53,551 | 100 | 48,018 | 100 | 101,569 | 100 |

Figure 8.3 History of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

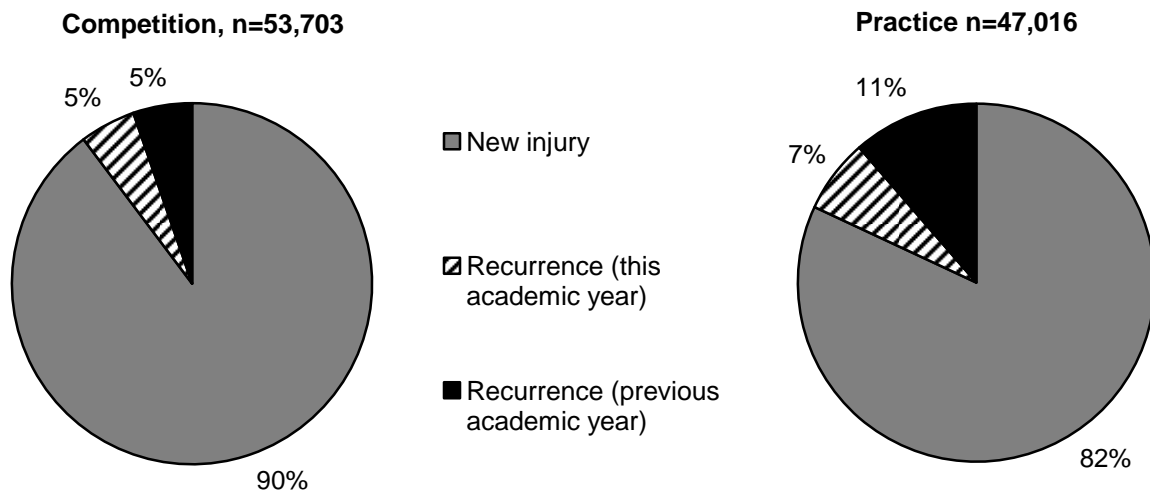


Table 8.6 Time during Season of Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|----------------|------------|
| Time in Season | | |
| Preseason | 21,876 | 21.3 |
| Regular season | 78,930 | 76.8 |
| Post season | 2,025 | 2.0 |
| Total | 102,832 | 100 |

Table 8.7 Competition-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------|---------------|------------|
| Time in Competition | | |
| Warm-ups | 376 | 0.7 |
| Beginning | 6,281 | 11.8 |
| Middle | 31,176 | 58.4 |
| End | 15,531 | 29.1 |
| Total | 53,365 | 100 |
| Competition Location | | |
| Home | 27,199 | 50.6 |
| Away | 24,672 | 45.9 |
| Neutral site | 1,833 | 3.4 |
| Total | 53,703 | 100 |
| Injury Related to Foul Play | | |
| Yes | 8,031 | 15.2 |
| No | 44,869 | 84.8 |
| Total | 52,900 | 100 |
| Court Location | | |
| Inside lane (offense) | 8,500 | 16.6 |
| Inside lane (defense) | 12,066 | 23.6 |
| Between 3 pt arc and lane (offense) | 8,590 | 16.8 |
| Between 3 pt arc and lane (defense) | 5,015 | 9.8 |
| Outside 3 point arc (offense) | 7,665 | 15.0 |
| Outside 3 point arc (defense) | 5,859 | 11.5 |
| Out of bounds | 1,419 | 2.8 |
| Off the court | 1,956 | 3.8 |
| Total | 51,069 | 100 |

Table 8.8 Practice-Related Variables for Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|---------------|------------|
| Time in Practice | | |
| First 1/2 hour | 10,738 | 22.8 |
| Second 1/2 hour | 10,832 | 23.0 |
| Third 1/2 hour | 13,584 | 28.8 |
| Fourth 1/2 hour | 11,008 | 23.4 |
| >2 hours into practice | 916 | 2.0 |
| Total | 47,078 | 100 |
| Number of Practices | | |
| Single session | 48,907 | 100 |
| Total | 48,907 | 100 |
| Practice Type | | |
| Noncontact skills practice | 15,470 | 31.6 |
| Noncontact partial numbers scrimmage | 112 | 0.2 |
| Noncontact full scrimmage | 1,057 | 2.2 |
| Partial contact skills practice | 3,910 | 8.0 |
| Partial contact partial numbers scrimmage | 1,761 | 3.6 |
| Partial contact full scrimmage | 3,452 | 7.1 |
| Full contact skills practice | 9,644 | 19.7 |
| Full contact partial numbers scrimmage | 1,816 | 3.7 |
| Full contact full scrimmage | 9,085 | 18.6 |
| Other | 2,599 | 5.3 |
| Total | 48,907 | 100 |

Figure 8.4 Player Position of Girls' Basketball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

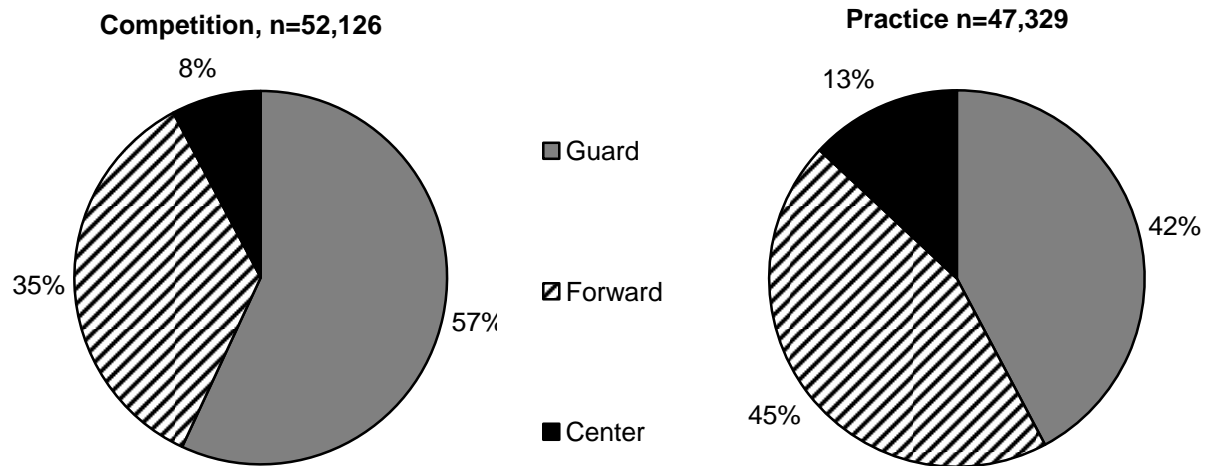
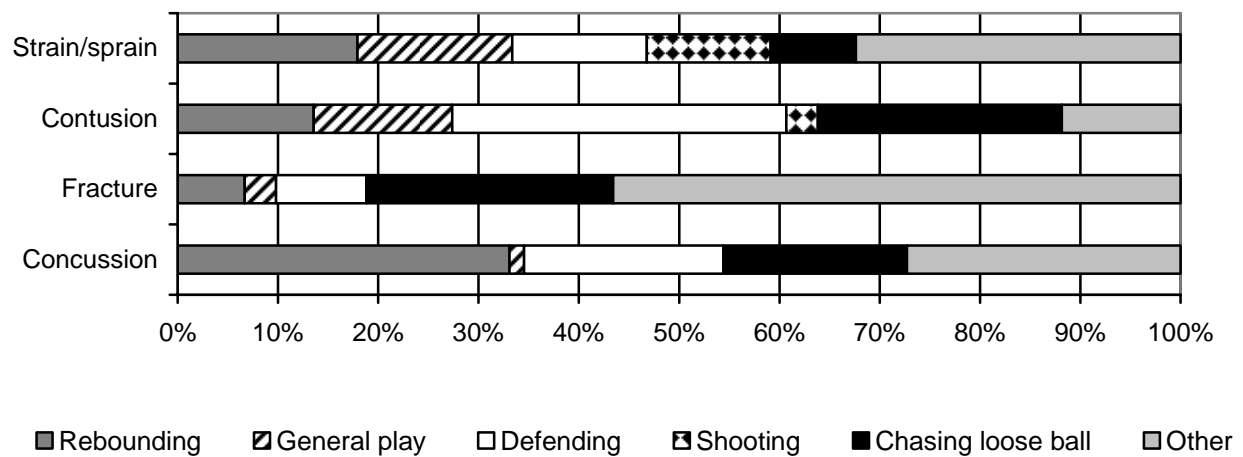


Figure 8.5 Activity Resulting in Girls' Basketball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



IX. Wrestling Injury Epidemiology

Table 9.1 Wrestling Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 392 | 156,094 | 2.51 | 101,139 |
| Competition | 155 | 40,841 | 3.80 | 38,750 |
| Practice | 237 | 115,253 | 2.06 | 62,389 |

Table 9.2 Demographic Characteristics of Injured Wrestlers, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|----------------------|
| Year in School | |
| Freshman | 29,192 (29.5%) |
| Sophomore | 28,725 (29.0%) |
| Junior | 20,094 (20.3%) |
| Senior | 20,854 (21.1%) |
| Total[†] | 98,866 (100%) |
| Age (years) | |
| Minimum | 13 |
| Maximum | 18 |
| Mean (St. Dev.) | 15.8 (1.2) |
| BMI | |
| Minimum | 16.0 |
| Maximum | 42.7 |
| Mean (St. Dev.) | 23.7 (4.5) |

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

[†]Throughout this chapter, totals and n's represent the total 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, 2006-07 School Year

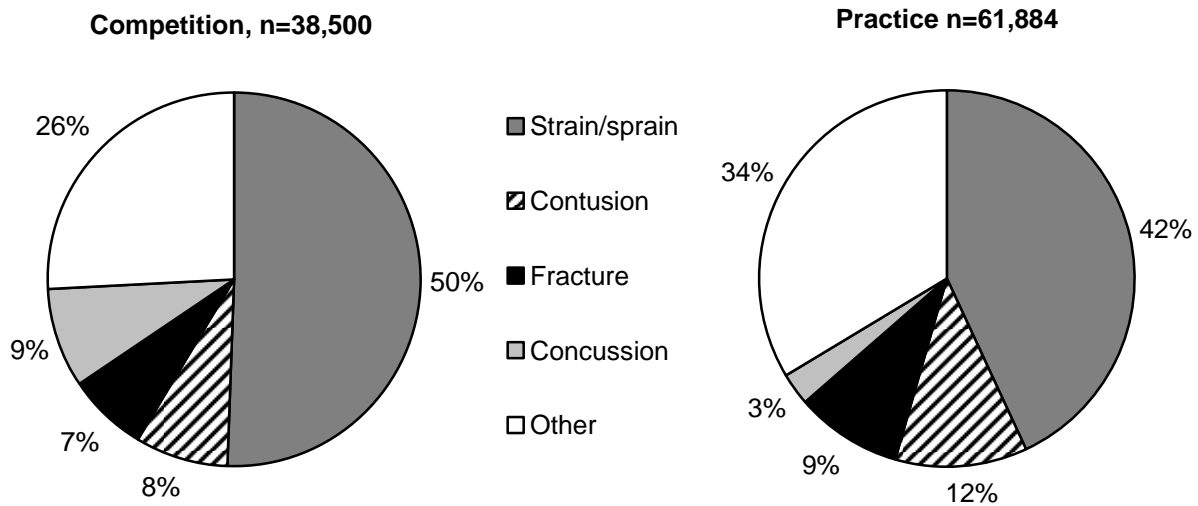


Table 9.3 Body Site of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|---------------|------------|---------------|------------|----------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 1,177 | 3.1 | 4,990 | 8.1 | 6,167 | 6.2 |
| Knee | 5,810 | 15.1 | 8,542 | 13.9 | 14,352 | 14.3 |
| Head/face | 5,573 | 14.5 | 5,156 | 8.4 | 10,729 | 10.7 |
| Hip/thigh/upper leg | 921 | 2.4 | 1,979 | 3.2 | 2,900 | 2.9 |
| Shoulder | 9,037 | 23.5 | 7,915 | 12.8 | 16,952 | 16.9 |
| Hand/wrist | 3,391 | 8.8 | 5,229 | 8.5 | 8,620 | 8.6 |
| Trunk | 3,615 | 9.4 | 5,622 | 9.1 | 9,237 | 9.2 |
| Lower leg | 863 | 2.2 | 1,850 | 3.0 | 2,713 | 2.7 |
| Foot | 351 | 0.9 | 2,375 | 3.9 | 2,726 | 2.7 |
| Arm/elbow | 4,353 | 11.3 | 8,828 | 14.3 | 13,181 | 13.2 |
| Neck | 1,336 | 3.5 | 4,588 | 7.4 | 5,924 | 5.9 |
| Other | 2,075 | 5.4 | 4,596 | 7.5 | 6,671 | 6.7 |
| Total | 38,500 | 100 | 61,669 | 100 | 100,169 | 100 |

Table 9.4 Ten Most Common Wrestling Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| Diagnosis | Competition n=38,500 | | Practice n=61,669 | | Total n=100,169 | |
|-------------------------|-------------------------|------|----------------------|-----|--------------------|-----|
| | n | % | n | % | n | % |
| Shoulder strain/sprain | 6,078 | 15.8 | 3,508 | 5.7 | 9,585 | 9.6 |
| Arm/elbow other | 1,023 | 2.7 | 5,078 | 8.2 | 6,102 | 6.1 |
| Arm/elbow strain/sprain | 3,222 | 8.4 | 2,723 | 4.4 | 5,946 | 5.9 |
| Shoulder other | 2,502 | 6.5 | 3,439 | 5.6 | 5,941 | 5.9 |
| Ankle strain/sprain | 1,177 | 3.1 | 4,740 | 7.7 | 5,916 | 5.9 |
| Knee strain/sprain | 2,923 | 7.6 | 2,852 | 4.6 | 5,775 | 5.8 |
| Head/face concussion | 3,210 | 8.3 | 1,758 | 2.9 | 4,969 | 5.0 |
| Knee other | 1,481 | 3.9 | 3,054 | 5.0 | 4,535 | 4.5 |
| Trunk strain/sprain | 2,218 | 5.8 | 2,299 | 3.7 | 4,517 | 4.5 |
| Head/face other | 1,293 | 3.4 | 3,127 | 5.1 | 4,420 | 4.4 |

Figure 9.2 Time Loss of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

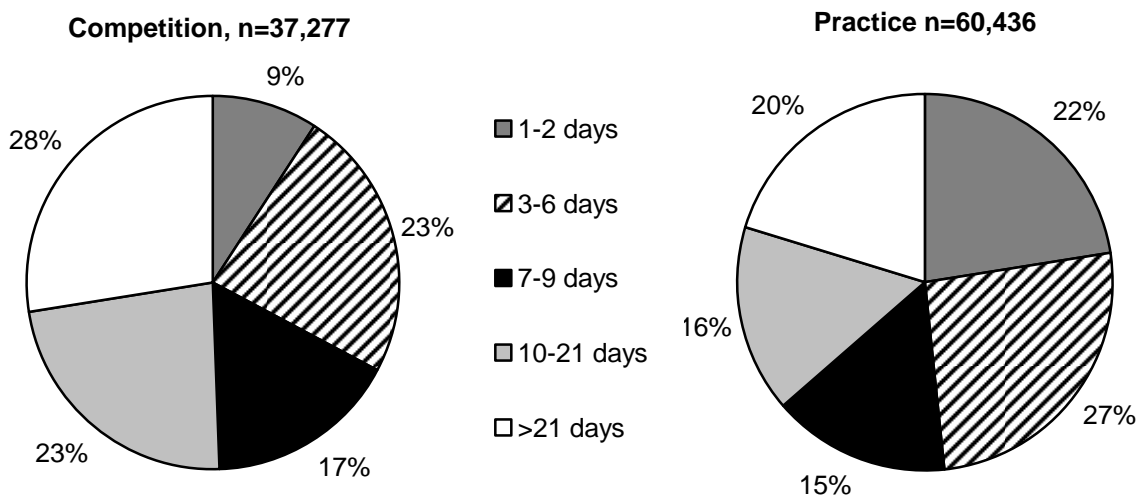


Table 9.5 Wrestling Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 3,353 | 9.1 | 2,728 | 4.6 | 6,081 | 6.3 |
| Did not require surgery | 33,499 | 90.9 | 56,864 | 95.4 | 90,363 | 93.7 |
| Total | 36,852 | 100 | 59,593 | 100 | 96,445 | 100 |

Figure 9.3 History of Wrestling Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

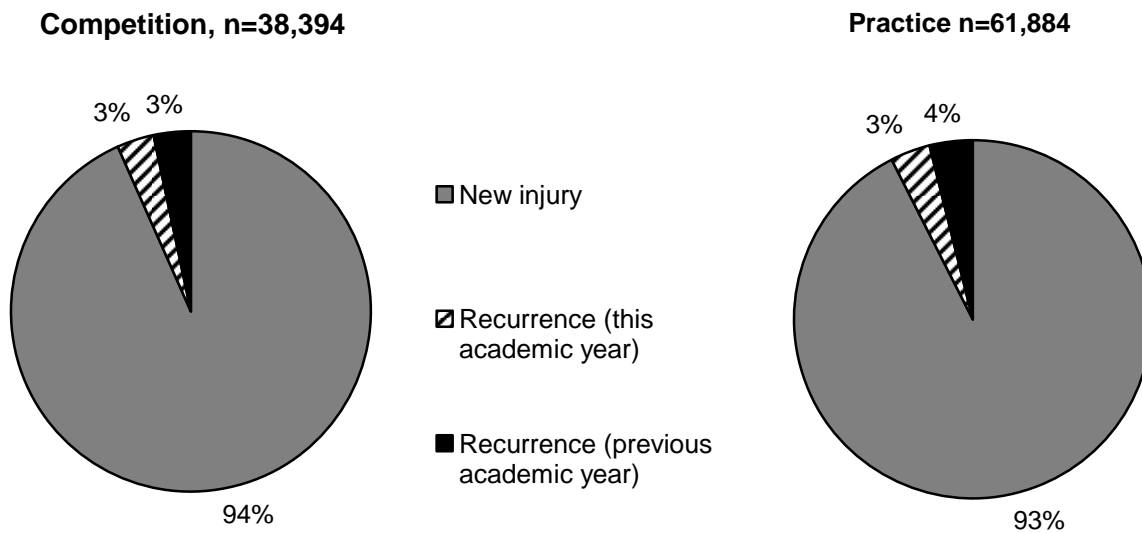


Table 9.6 Time during Season of Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|----------------|------------|
| Time in Season | | |
| Preseason | 18,548 | 18.4 |
| Regular season | 77,840 | 77.0 |
| Post season | 4,644 | 4.6 |
| Total | 101,032 | 100 |

Table 9.7 Competition-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

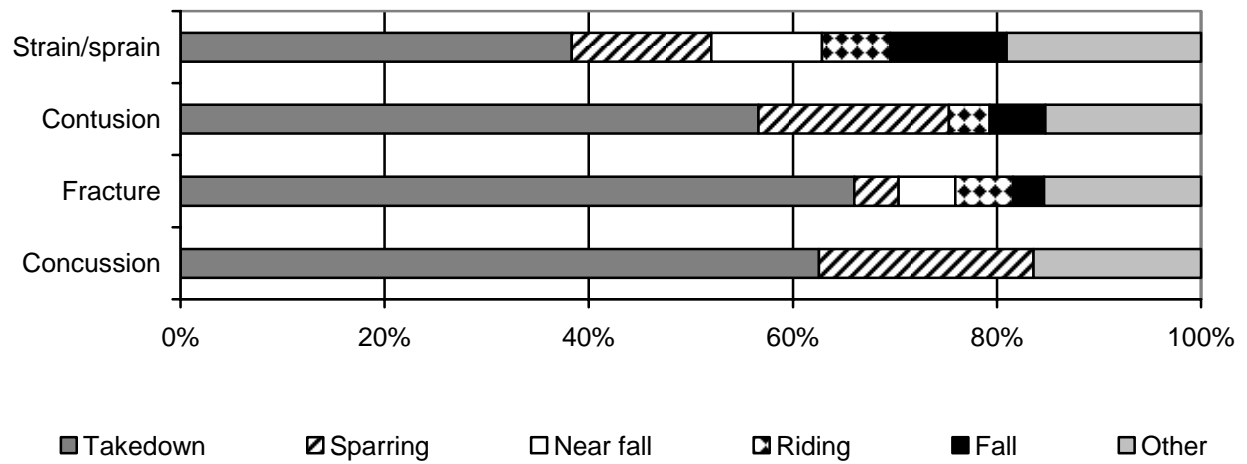
| | n | % |
|------------------------------------|---------------|------------|
| Time in Competition | | |
| Warm-ups | 515 | 1.4 |
| Beginning | 5,672 | 15.2 |
| Middle | 18,411 | 49.4 |
| End | 12,706 | 34.1 |
| Total | 37,304 | 100 |
| Competition Location | | |
| Home | 10,257 | 27.0 |
| Away | 25,129 | 66.0 |
| Neutral site | 2,663 | 7.0 |
| Total | 38,049 | 100 |
| Injury Related to Foul Play | | |
| Yes | 1,336 | 3.6 |
| No | 35,880 | 96.4 |
| Total | 37,216 | 100 |
| Mat Location* | | |
| Within circle | 90,044 | 91.6 |
| Out of bounds | 3,343 | 3.4 |
| Off mat | 4,920 | 5.0 |
| Total | 98,307 | 100 |

*ATCs were asked to provide the mat location for both competition- and practice-related wrestling injuries.

Table 9.8 Practice-Related Variables for Wrestling Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|---------------|------------|
| Time in Practice | | |
| First 1/2 hour | 8,512 | 14.4 |
| Second 1/2 hour | 16,855 | 28.6 |
| Third 1/2 hour | 19,852 | 33.6 |
| Fourth 1/2 hour | 12,929 | 21.9 |
| >2 hours into practice | 879 | 1.5 |
| Total | 59,027 | 100 |
| Number of Practices | | |
| Single session | 61,018 | 99.7 |
| Double session | 165 | 0.3 |
| Total | 61,182 | 100 |
| Practice Type | | |
| Noncontact skills practice | 1,083 | 1.8 |
| Noncontact partial numbers scrimmage | 5,215 | 8.4 |
| Noncontact full scrimmage | 165 | 0.3 |
| Partial contact skills practice | 464 | 0.8 |
| Partial contact partial numbers scrimmage | 37,286 | 60.2 |
| Partial contact full scrimmage | 715 | 1.2 |
| Full contact skills practice | 14,203 | 23.0 |
| Full contact partial numbers scrimmage | 2,753 | 4.4 |
| Full contact full scrimmage | 1,083 | 1.8 |
| Other | 5,215 | 8.4 |
| Total | 61,884 | 100 |

Figure 9.5 Activity Resulting in Wrestling Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



X. Baseball Injury Epidemiology

Table 10.1 Baseball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 203 | 162,931 | 1.25 | 60,296 |
| Competition | 117 | 58,141 | 2.01 | 33,494 |
| Practice | 86 | 104,790 | 0.82 | 26,802 |

Table 10.2 Demographic Characteristics of Injured Baseball Athletes, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|----------------------|
| Year in School | |
| Freshman | 10,330 (17.2%) |
| Sophomore | 15,914 (26.6%) |
| Junior | 15,652 (26.1%) |
| Senior | 17,999 (30.0%) |
| Total[†] | 59,894 (100%) |
| Age (years) | |
| Minimum | 14 |
| Maximum | 18 |
| Mean (St. Dev.) | 16.3 (1.2) |
| BMI | |
| Minimum | 17.4 |
| Maximum | 34.9 |
| Mean (St. Dev.) | 24.0 (3.2) |

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

[†]Throughout this chapter, totals and n's represent the total 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, 2006-07 School Year

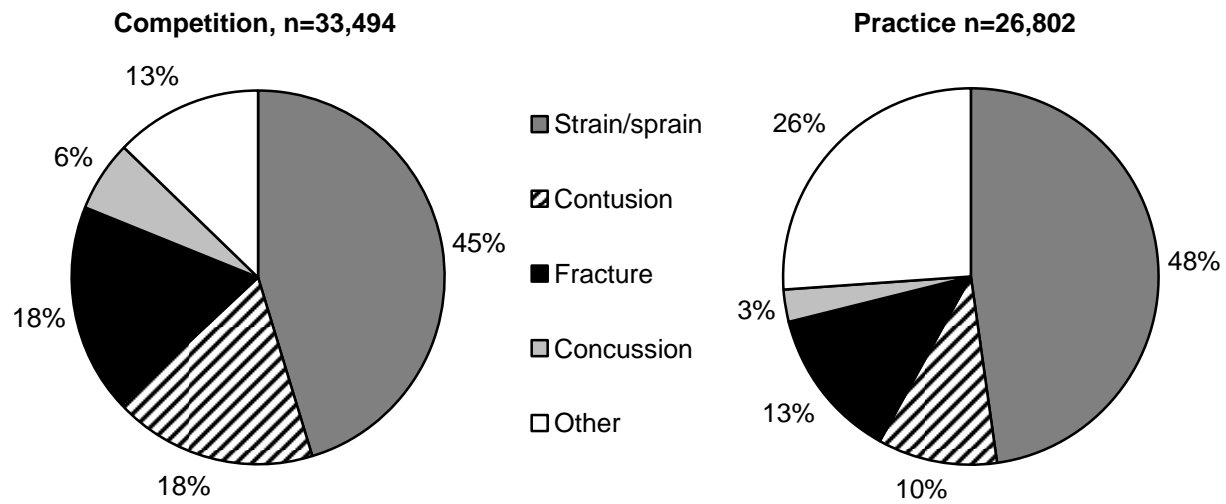


Table 10.3 Body Site of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 5,871 | 17.5 | 4,563 | 17.0 | 10,434 | 17.3 |
| Knee | 3,539 | 10.6 | 1,969 | 7.4 | 5,508 | 9.1 |
| Head/face | 6,245 | 18.7 | 4,441 | 16.6 | 10,686 | 17.7 |
| Hip/thigh/upper leg | 2,094 | 6.3 | 3,210 | 12.0 | 5,304 | 8.8 |
| Shoulder | 4,069 | 12.2 | 5,001 | 18.7 | 9,070 | 15.0 |
| Hand/wrist | 3,883 | 11.6 | 2,935 | 11.0 | 6,818 | 11.3 |
| Trunk | 2,141 | 6.4 | 907 | 3.4 | 3,048 | 5.1 |
| Lower leg | 269 | 0.8 | 253 | 0.9 | 522 | 0.9 |
| Foot | 951 | 2.8 | 280 | 1.1 | 1,231 | 2.0 |
| Arm/elbow | 2,260 | 6.8 | 3,243 | 12.1 | 5,503 | 9.1 |
| Neck | 521 | 1.6 | 0 | 0 | 521 | 0.9 |
| Other | 1,652 | 4.9 | 0 | 0 | 1,652 | 2.7 |
| Total | 33,494 | 100 | 26,802 | 100 | 60,296 | 100 |

Table 10.4 Ten Most Common Baseball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| Diagnosis | Competition n=33,493 | | Practice n=26,802 | | Total n=87,098 | |
|-----------------------------------|-------------------------|------|----------------------|------|-------------------|------|
| | n | % | n | % | n | % |
| Ankle strain/sprain | 4,938 | 14.7 | 3,641 | 13.6 | 8,578 | 14.2 |
| Hip/thigh/upper leg strain/sprain | 2,094 | 6.3 | 3,099 | 11.6 | 5,193 | 8.6 |
| Shoulder strain/sprain | 2,181 | 6.5 | 2,340 | 8.7 | 4,521 | 7.5 |
| Shoulder other | 1,755 | 5.2 | 2,661 | 9.9 | 4,416 | 7.3 |
| Arm/elbow strain/sprain | 1,868 | 5.6 | 1,879 | 7.0 | 3,747 | 6.2 |
| Hand/wrist fracture | 1,892 | 5.7 | 1,419 | 5.3 | 3,312 | 5.5 |
| Head/face other | 1,159 | 3.5 | 1,871 | 7.0 | 3,030 | 5.0 |
| Head/face concussion | 1,982 | 5.9 | 765 | 2.9 | 2,747 | 4.6 |
| Knee strain/sprain | 1,672 | 5.0 | 960 | 3.6 | 2,632 | 4.4 |
| Head/face contusion | 1,185 | 3.5 | 1,419 | 5.3 | 2,604 | 4.3 |

Figure 10.2 Time Loss of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

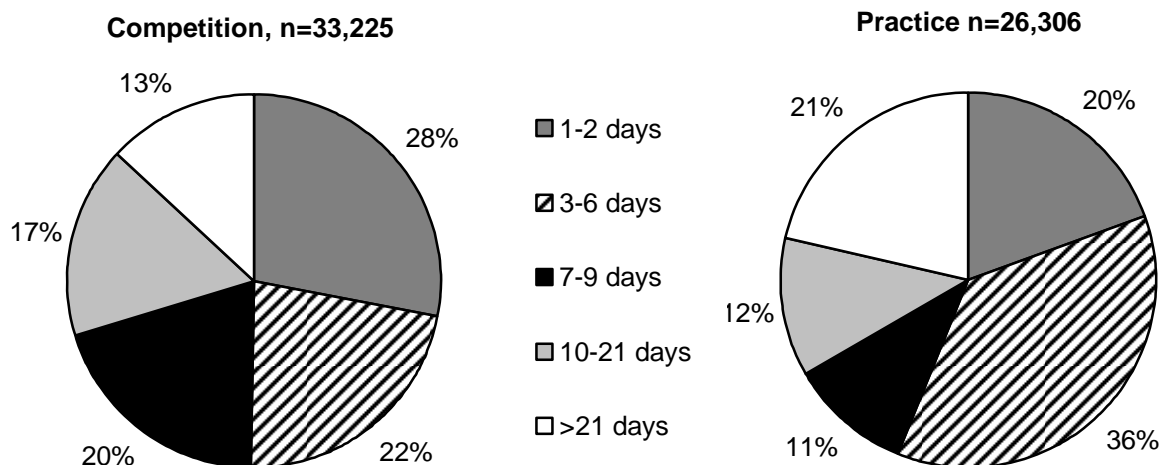


Table 10.5 Baseball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 2,491 | 7.6 | 1,963 | 7.4 | 4,454 | 7.5 |
| Did not require surgery | 30,062 | 92.4 | 24,481 | 92.6 | 54,543 | 92.5 |
| Total | 32,553 | 100 | 26,444 | 100 | 58,997 | 100 |

Figure 10.3 History of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

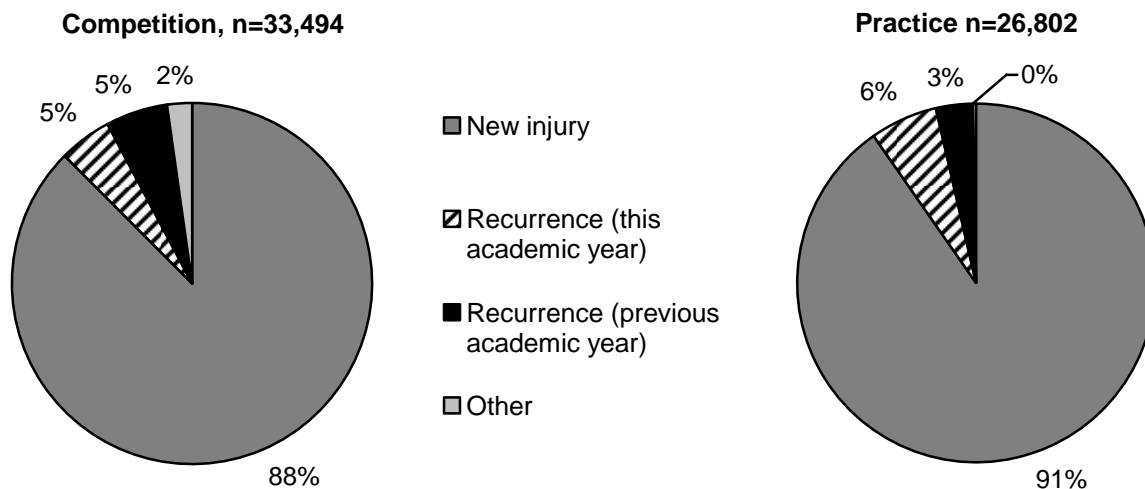


Table 10.6 Time during Season of Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|---------------|------------|
| Time in Season | | |
| Preseason | 13,889 | 23.0 |
| Regular season | 44,883 | 74.4 |
| Post season | 1,523 | 2.5 |
| Total | 60,296 | 100 |

Table 10.7 Competition-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|------------------------------------|---------------|------------|
| Time in Competition | | |
| Warm-ups | 1,660 | 5.0 |
| Beginning | 6,849 | 20.7 |
| Middle | 19,137 | 57.8 |
| End | 5,461 | 16.5 |
| Total | 33,106 | 100 |
| Competition Location | | |
| Home | 21,169 | 62.7 |
| Away | 10,988 | 32.5 |
| Neutral site | 1,617 | 4.8 |
| Total | 33,774 | 100 |
| Injury Related to Foul Play | | |
| Yes | 1,429 | 4.4 |
| No | 31,303 | 95.6 |
| Total | 32,732 | 100 |
| Field Location | | |
| Home plate | 6,681 | 20.1 |
| First base | 3,096 | 9.3 |
| Second base | 6,779 | 20.4 |
| Third base | 4,028 | 12.1 |
| Infield | 664 | 2.0 |
| Pitchers mound | 3,643 | 11.0 |
| Outfield | 6,661 | 20.1 |
| Foul territory | 1,150 | 3.5 |
| Other | 485 | 1.5 |
| Total | 33,187 | 100 |

Table 10.8 Practice-Related Variables for Baseball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|---------------|------------|
| Time in Practice | | |
| First 1/2 hour | 7,371 | 28.4 |
| Second 1/2 hour | 7,272 | 28.1 |
| Third 1/2 hour | 7,788 | 30.0 |
| Fourth 1/2 hour | 2,714 | 10.5 |
| >2 hours into practice | 770 | 3.0 |
| Total | 25,915 | 100 |
| Number of Practices | | |
| Single session | 26,691 | 100 |
| Total | 26,691 | 100 |
| Practice Type | | |
| Noncontact skills practice | 18,146 | 67.7 |
| Noncontact partial numbers scrimmage | 252 | 0.9 |
| Noncontact full scrimmage | 385 | 1.4 |
| Partial contact skills practice | 1,508 | 5.6 |
| Partial contact partial numbers scrimmage | 3,856 | 14.4 |
| Partial contact full scrimmage | 729 | 2.7 |
| Full contact skills practice | 870 | 3.2 |
| Full contact partial numbers scrimmage | 1,055 | 3.9 |
| Full contact full scrimmage | 18,146 | 67.7 |
| Other | 252 | 0.9 |
| Total | 26,802 | 100 |

Figure 10.4 Player Position of Baseball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

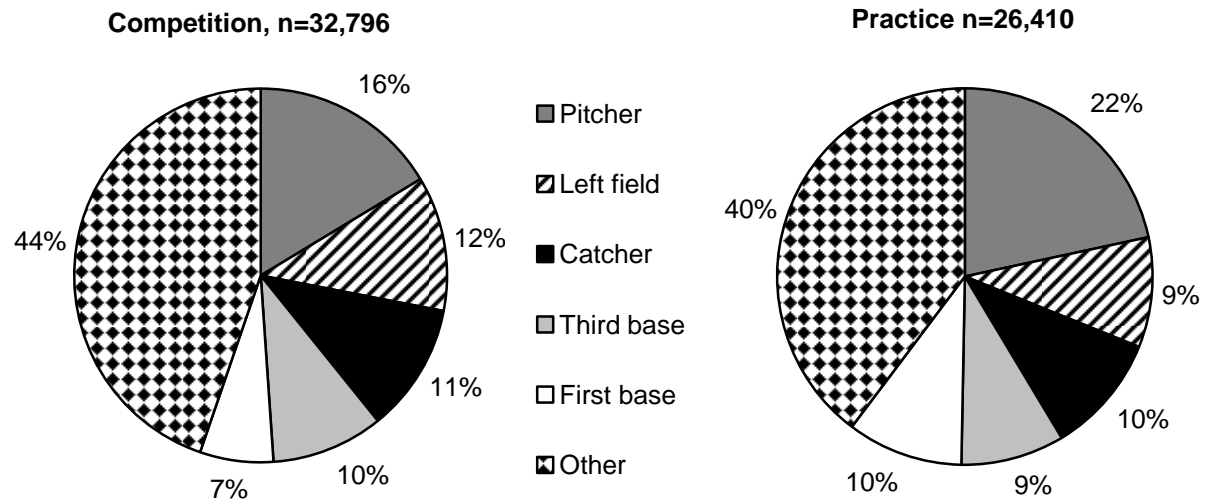
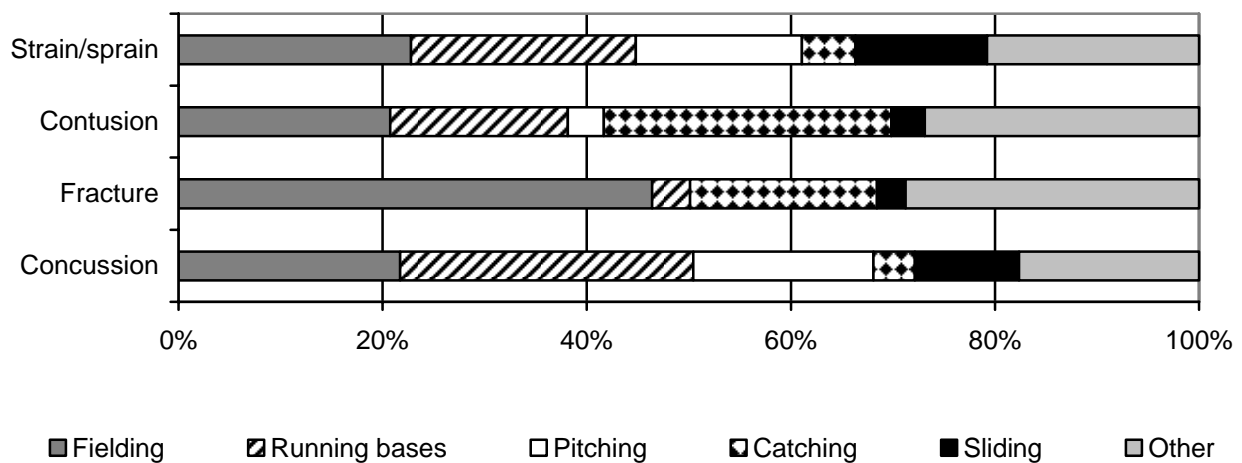


Figure 10.5 Activity Resulting in Baseball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



XI. Softball Injury Epidemiology

Table 11.1 Softball Injury Rates by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | # Injuries | # Exposures | Injury rate (per 1,000 athlete- exposures) | Nationally Estimated # Injuries |
|--------------|------------|----------------|--------------------------------------------------|---------------------------------------|
| Total | 133 | 119,554 | 1.11 | 54,411 |
| Competition | 83 | 42,329 | 1.96 | 32,191 |
| Practice | 50 | 77,225 | 0.65 | 22,220 |

Table 11.2 Demographic Characteristics of Injured Softball Athletes, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year*

| | |
|--------------------------|----------------------|
| Year in School | |
| Freshman | 13,144 (25.1%) |
| Sophomore | 13,252 (25.3%) |
| Junior | 15,140 (28.9%) |
| Senior | 10,828 (20.7%) |
| Total[†] | 52,363 (100%) |
| Age (years) | |
| Minimum | 13 |
| Maximum | 18 |
| Mean (St. Dev.) | 15.8 (1.3) |
| BMI | |
| Minimum | 15.3 |
| Maximum | 44.4 |
| Mean (St. Dev.) | 22.7 (4.6) |

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

[†]Throughout this chapter, totals and n's represent the total 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, 2006-07 School Year

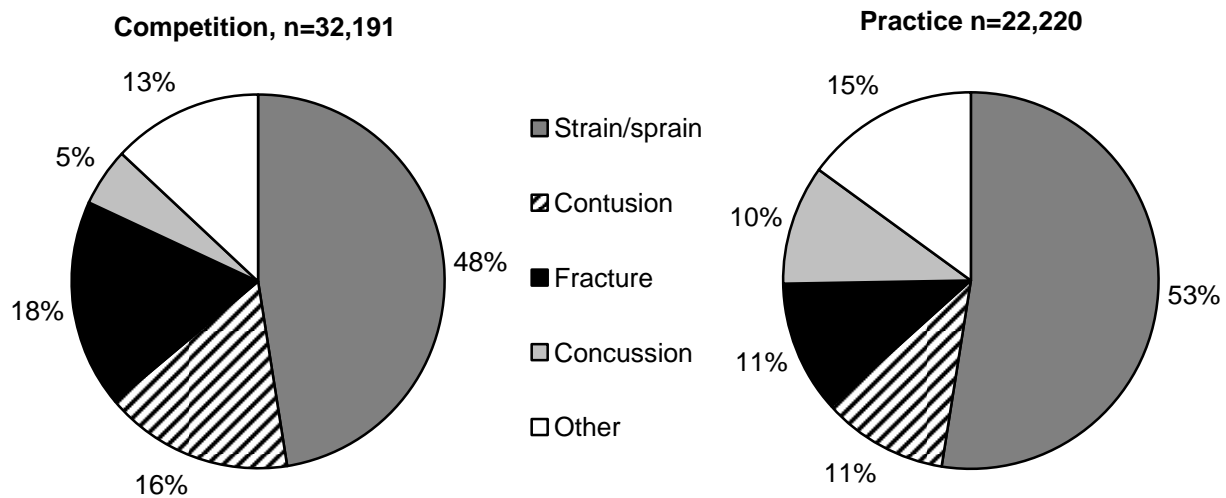


Table 11.3 Body Site of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|---------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Body Site | | | | | | |
| Ankle | 4,446 | 13.8 | 6,189 | 27.9 | 10,635 | 19.5 |
| Knee | 5,687 | 17.7 | 1,452 | 6.5 | 7,139 | 13.1 |
| Head/face | 6,208 | 19.3 | 4,455 | 20.1 | 10,663 | 19.6 |
| Hip/thigh/upper leg | 3,183 | 9.9 | 2,472 | 11.1 | 5,655 | 10.4 |
| Shoulder | 2,981 | 9.3 | 2,248 | 10.1 | 5,229 | 9.6 |
| Hand/wrist | 4,771 | 14.8 | 1,773 | 8.0 | 6,544 | 12.0 |
| Trunk | 2,629 | 8.2 | 0 | 0 | 2,629 | 4.8 |
| Lower leg | 801 | 2.5 | 0 | 0 | 801 | 1.5 |
| Foot | 212 | 0.7 | 716 | 3.2 | 928 | 1.7 |
| Arm/elbow | 0 | 0 | 1,648 | 7.4 | 1,648 | 3.0 |
| Neck | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 1,272 | 4.0 | 1,267 | 5.7 | 2,539 | 4.7 |
| Total | 32,191 | 100 | 22,220 | 100 | 54,411 | 100 |

Table 11.4 Ten Most Common Softball Injury Diagnoses by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| Diagnosis | Competition n=32,191 | | Practice n=22,220 | | Total n=54,411 | |
|-----------------------------------|-------------------------|------|----------------------|------|-------------------|------|
| | n | % | n | % | n | % |
| Ankle strain/sprain | 3,730 | 11.6 | 5,886 | 26.5 | 9,616 | 17.7 |
| Hip/thigh/upper leg strain/sprain | 2,925 | 9.1 | 2,472 | 11.1 | 5,397 | 9.9 |
| Head/face concussion | 1,667 | 5.2 | 2,290 | 10.3 | 3,957 | 7.3 |
| Hand/wrist fracture | 3,154 | 9.8 | 670 | 3.0 | 3,824 | 7.0 |
| Knee strain/sprain | 3,204 | 10.0 | 0 | 0 | 3,204 | 5.9 |
| Head/face contusion | 1,290 | 4.0 | 1,862 | 8.4 | 3,152 | 5.8 |
| Shoulder strain/sprain | 1,747 | 5.4 | 1,055 | 4.8 | 2,803 | 5.2 |
| Shoulder other | 1,233 | 3.8 | 1,193 | 5.4 | 2,426 | 4.5 |
| Head/face fracture | 2,110 | 6.6 | 303 | 1.4 | 2,414 | 4.4 |
| Trunk strain/sprain | 2,337 | 7.3 | 0 | 0 | 2,337 | 4.3 |

Figure 11.2 Time Loss of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

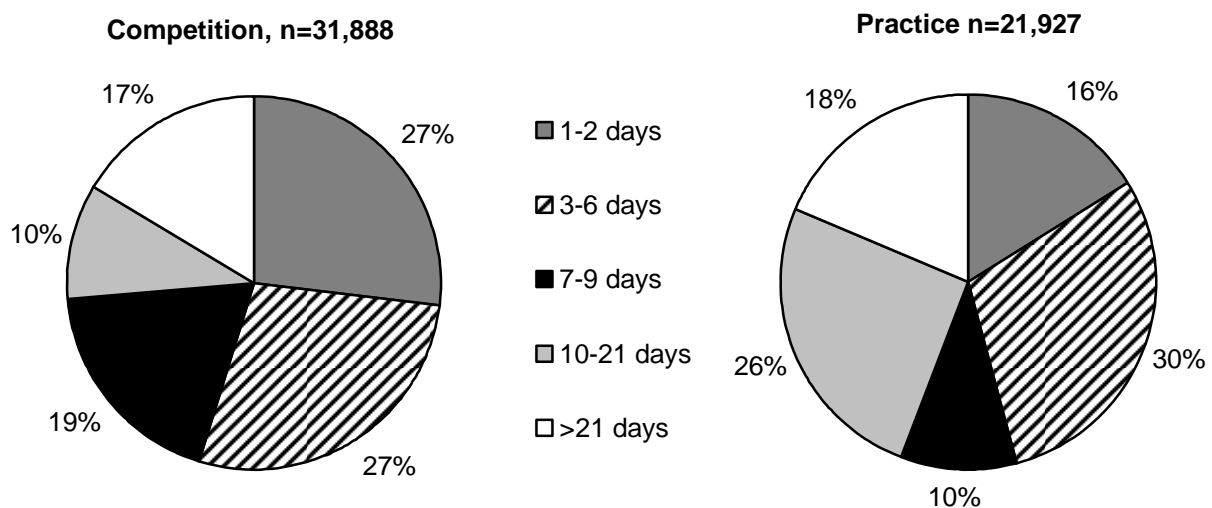


Table 11.5 Softball Injuries Requiring Surgery by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Competition | | Practice | | Overall | |
|-------------------------|---------------|------------|---------------|------------|---------------|------------|
| | n | % | n | % | n | % |
| Need for surgery | | | | | | |
| Required surgery | 2,408 | 7.6 | 0 | 0 | 2,408 | 4.5 |
| Did not require surgery | 29,177 | 92.4 | 21,917 | 100 | 51,094 | 95.5 |
| Total | 31,585 | 100 | 21,917 | 100 | 53,502 | 100 |

Figure 11.3 History of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

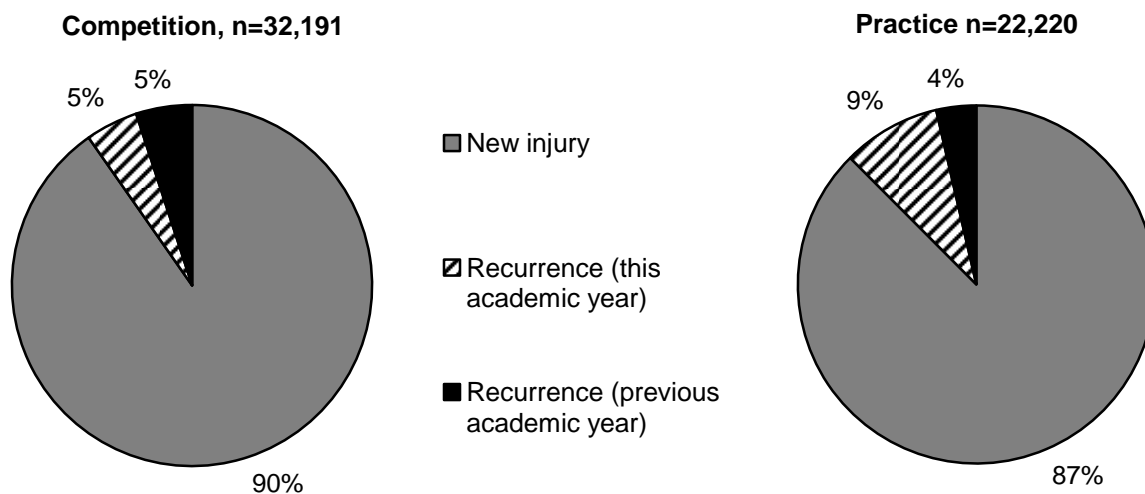


Table 11.6 Time during Season of Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-----------------------|---------------|------------|
| Time in Season | | |
| Preseason | 8,805 | 16.2 |
| Regular season | 42,076 | 77.3 |
| Post season | 3,530 | 6.5 |
| Total | 54,411 | 100 |

Table 11.7 Competition-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|------------------------------------|---------------|------------|
| Time in Competition | | |
| Warm-ups | 2,034 | 6.3 |
| Beginning | 5,870 | 18.2 |
| Middle | 19,687 | 61.2 |
| End | 4,601 | 14.3 |
| Total | 32,191 | 100 |
| Competition Location | | |
| Home | 13,944 | 43.3 |
| Away | 16,850 | 52.3 |
| Neutral site | 1,398 | 4.3 |
| Total | 32,191 | 100 |
| Injury Related to Foul Play | | |
| Yes | 0 | 0 |
| No | 32,083 | 100 |
| Total | 32,083 | 100 |
| Field Location | | |
| Home plate | 7,087 | 22.5 |
| First base | 2,088 | 6.6 |
| Second base | 6,128 | 19.4 |
| Third base | 3,550 | 11.2 |
| Infield | 2,429 | 7.7 |
| Pitchers mound | 5,539 | 17.5 |
| Outfield | 3,807 | 12.1 |
| Foul territory | 216 | 0.7 |
| Other | 716 | 2.3 |
| Total | 31,561 | 100 |

Table 11.8 Practice-Related Variables for Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | n | % |
|-------------------------------------------|---------------|------------|
| Time in Practice | | |
| First 1/2 hour | 5,498 | 26.1 |
| Second 1/2 hour | 3,946 | 18.7 |
| Third 1/2 hour | 5,402 | 25.6 |
| Fourth 1/2 hour | 5,528 | 26.2 |
| >2 hours into practice | 716 | 3.4 |
| Total | 21,090 | 100 |
| Number of Practices | | |
| Single session | 20,567 | 97.0 |
| Double session | 0 | 0 |
| Triple session | 631 | 3.0 |
| Total | 21,198 | 100 |
| Practice Type | | |
| Noncontact skills practice | 12,238 | 55.1 |
| Noncontact partial numbers scrimmage | 716 | 3.2 |
| Noncontact full scrimmage | 0 | 0 |
| Partial contact skills practice | 1,234 | 5.6 |
| Partial contact partial numbers scrimmage | 0 | 0 |
| Partial contact full scrimmage | 0 | 0 |
| Full contact skills practice | 3,912 | 17.6 |
| Full contact partial numbers scrimmage | 0 | 0 |
| Full contact full scrimmage | 607 | 2.7 |
| Other | 3,513 | 15.8 |
| Total | 22,220 | 100 |

Figure 11.4 Player Position of Softball Injuries by Type of Exposure, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

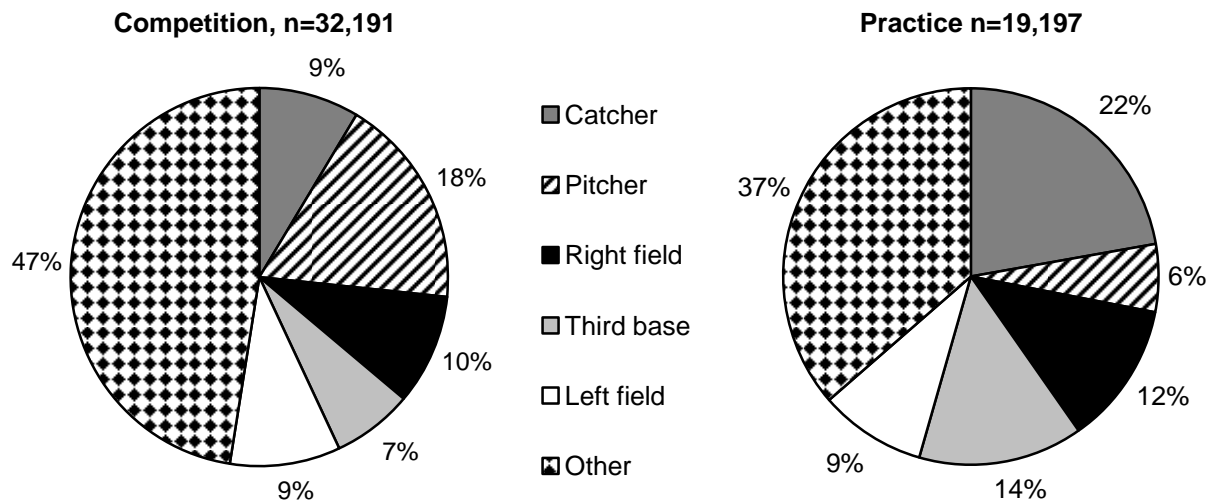
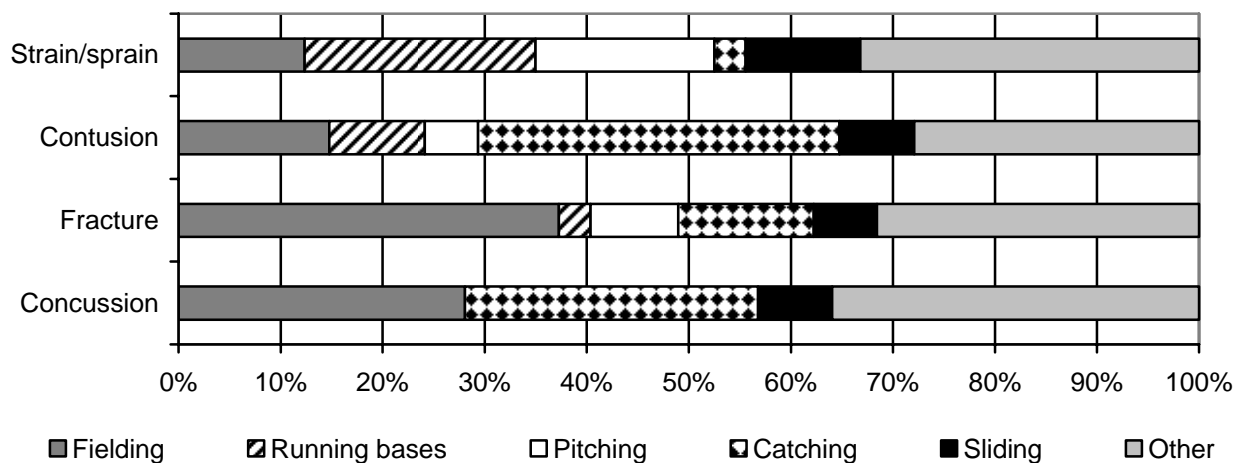


Figure 11.5 Activity Resulting in Softball Injuries by Injury Diagnosis, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year



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, 2006-07 School Year

| | Boys' soccer | Girls' soccer | RR (95% CI)* |
|----------------------------|--------------|---------------|--------------------------|
| Total | | | |
| # Injuries | 407 | 410 | |
| # Exposures | 179,519 | 163,378 | |
| Injury rate (per 1,000 AE) | 2.27 | 2.51 | 1.11 (0.97-1.27) |
| Competition | | | |
| # Injuries | 222 | 259 | |
| # Exposures | 51,564 | 47,676 | |
| Injury rate (per 1,000 AE) | 4.31 | 5.43 | 1.26 (1.06-1.51)† |
| Practice | | | |
| # Injuries | 185 | 151 | |
| # Exposures | 127,955 | 115,702 | |
| Injury rate (per 1,000 AE) | 1.45 | 1.31 | 1.11 (0.89-1.37) |

*Throughout this chapter, rate ratios (RR) compare the gender with a higher injury rate (bolded) to the gender with a lower injury rate

†Throughout this chapter, statistically significant RR are bolded

Table 12.2 Comparison of Body Sites of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' soccer | | Girls' soccer | | IPR (95% CI) |
|---------------------|----------------|-------------|----------------|-------------|---------------------------|
| | n | % | n | % | |
| Body Site | | | | | |
| Ankle | 34,632 | 20.2 | 45,019 | 19.5 | 1.04 (0.74-1.44) |
| Knee | 28,128 | 16.4 | 60,054 | 26.0 | 1.59 (1.13-2.24) † |
| Head/face | 23,942 | 14.0 | 28,941 | 12.5 | 1.12 (0.72-1.71) |
| Hip/thigh/upper leg | 27,682 | 16.1 | 32,211 | 14.0 | 1.15 (0.78-1.71) |
| Shoulder | 5,121 | 3.0 | 4,124 | 1.8 | 1.67 (0.46-6.07) |
| Hand/wrist | 8,916 | 5.2 | 6,093 | 2.6 | 2.00 (0.88-4.38) |
| Trunk | 6,213 | 3.6 | 9,325 | 4.0 | 1.11 (0.54-2.30) |
| Lower leg | 16,196 | 9.4 | 21,979 | 9.5 | 1.01 (0.62-1.67) |
| Foot | 11,417 | 6.7 | 15,154 | 6.6 | 1.02 (0.53-1.93) |
| Arm/elbow | 914 | 0.5 | 3,846 | 1.7 | 3.40 (0.44-22.3) |
| Neck | 1,465 | 0.9 | 535 | 0.2 | 4.50 (0.67-20.0) |
| Other | 6,931 | 4.0 | 3,488 | 1.5 | 2.67 (0.90-7.94) |
| Total | 171,555 | 100 | 230,769 | 100 | |

*Throughout this chapter, injury proportion ratios (IPR) compare the gender with a higher proportion (bolded) to the gender with the lower proportion

†Throughout this chapter, statistically significant IPR are bolded

Table 12.3 Comparison of Diagnoses of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' soccer | | Girls' soccer | | IPR (95% CI) |
|------------------|----------------|------------|----------------|------------|------------------|
| | n | % | n | % | |
| Diagnosis | | | | | |
| Strain/sprain | 69,575 | 40.5 | 126,726 | 54.9 | 1.36 (1.14-1.62) |
| Contusion | 31,733 | 18.5 | 28,783 | 12.5 | 1.48 (1.03-2.13) |
| Fracture | 16,756 | 9.7 | 13,326 | 5.8 | 1.69 (0.92-3.08) |
| Concussion | 15,355 | 8.9 | 21,570 | 9.3 | 1.05 (0.61-1.79) |
| Other | 38,455 | 22.4 | 40,364 | 17.5 | 1.23 (0.91-1.79) |
| Total | 171,874 | 100 | 230,769 | 100 | |

Table 12.4 Most Common Boys' and Girls' Soccer Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' Soccer n=171,555 | | Girls' Soccer n=230,769 | | IPR (95% CI) |
|-----------------------------------|---------------------------|------|----------------------------|------|------------------|
| | n | % | n | % | |
| Diagnosis | | | | | |
| Ankle strain/sprain | 25,512 | 14.9 | 40,666 | 17.6 | 1.19 (0.81-1.73) |
| Hip/thigh/upper leg strain/sprain | 20,036 | 11.7 | 27,184 | 11.8 | 1.01 (0.64-1.60) |
| Head/face concussion | 15,268 | 8.9 | 21,570 | 9.4 | 1.05 (0.61-1.81) |
| Knee other | 12,080 | 7.0 | 13,474 | 5.8 | 1.20 (0.62-2.34) |
| Knee strain/sprain | 11,247 | 6.6 | 35,470 | 15.4 | 2.35 (1.36-4.05) |

*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, 2006-07 School Year

| | Boys' soccer | | Girls' soccer | | IPR (95% CI) |
|------------------|----------------|------------|----------------|------------|------------------|
| | n | % | n | % | |
| Time Loss | | | | | |
| <1 Week | 97,993 | 58.5 | 125,089 | 55.8 | 1.05 (0.90-1.22) |
| 1-3 Weeks | 46,197 | 27.6 | 62,061 | 27.7 | 1.00 (0.76-1.32) |
| >3 Weeks | 23,355 | 13.9 | 36,839 | 16.4 | 1.18 (0.76-1.81) |
| Total | 167,545 | 100 | 223,990 | 100 | |

Table 12.6 Comparison of Mechanisms of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' soccer | | Girls' soccer | | IPR (95% CI) |
|--------------------------------|----------------|-------------|----------------|-------------|-------------------------|
| | n | % | n | % | |
| Mechanism | | | | | |
| Contact with another person | 78,939 | 46.2 | 81,969 | 35.6 | 1.29 (1.06-1.58) |
| No contact | 30,472 | 17.8 | 51,998 | 22.6 | 1.27 (0.92-1.76) |
| Contact with playing surface | 26,236 | 15.3 | 42,432 | 18.4 | 1.21 (0.81-1.79) |
| Overuse/chronic | 20,148 | 11.8 | 25,128 | 10.9 | 1.08 (0.67-1.72) |
| Contact with playing apparatus | 10,931 | 6.4 | 22,285 | 9.7 | 1.52 (0.84-2.75) |
| Illness | 1,416 | 0.8 | 2,594 | 1.1 | 1.36 (0.25-7.34) |
| Other | 2,817 | 1.6 | 3,940 | 1.7 | 1.04 (0.30-3.61) |
| Total | 170,960 | 100 | 230,346 | 100 | |

Table 12.7 Comparison of Activities of Boys' and Girls' Soccer Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' soccer | | Girls' soccer | | IPR (95% CI) |
|-------------------------|----------------|-------------|----------------|-------------|------------------|
| | n | % | n | % | |
| Activity | | | | | |
| General play | 38,129 | 22.4 | 61,215 | 26.9 | 1.20 (0.89-1.61) |
| Ball handling/dribbling | 22,573 | 13.3 | 30,568 | 13.4 | 1.01 (0.64-1.59) |
| Chasing loose ball | 18,342 | 10.8 | 30,787 | 13.5 | 1.25 (0.81-1.94) |
| Defending | 16,946 | 10.0 | 27,083 | 11.9 | 1.19 (0.73-1.95) |
| Heading ball | 12,653 | 7.4 | 10,077 | 4.4 | 1.69 (0.83-3.42) |
| Conditioning | 11,367 | 6.7 | 12,776 | 5.6 | 1.20 (0.66-2.16) |
| Goaltending | 9,713 | 5.7 | 9,948 | 4.4 | 1.31 (0.67-2.55) |
| Passing (foot) | 8,477 | 5.0 | 13,126 | 5.8 | 1.15 (0.59-2.24) |
| Other | 31,804 | 18.7 | 31,769 | 14.0 | 1.34 (0.90-2.00) |
| Total | 170,004 | 100 | 227,349 | 100 | |

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, 2006-07 School Year

| | Boys' basketball | Girls' basketball | RR (95% CI)* |
|----------------------------|------------------|-------------------|-------------------------------------|
| Total | | | |
| # Injuries | 359 | 358 | |
| # Exposures | 204,897 | 171,251 | |
| Injury rate (per 1,000 AE) | 1.75 | 2.09 | 1.19 (1.03-1.38)[†] |
| Competition | | | |
| # Injuries | 174 | 185 | |
| # Exposures | 60,561 | 51,358 | |
| Injury rate (per 1,000 AE) | 2.87 | 3.60 | 1.25 (1.02-1.54) |
| Practice | | | |
| # Injuries | 185 | 173 | |
| # Exposures | 144,336 | 119,893 | |
| Injury rate (per 1,000 AE) | 1.28 | 1.44 | 1.13 (0.92-1.39) |

Table 12.9 Comparison of Body Sites of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' basketball | | Girls' basketball | | IPR (95% CI) |
|---------------------|------------------|-------------|-------------------|-------------|-------------------------|
| | n | % | n | | |
| Body Site | | | | | |
| Ankle | 35,446 | 36.7 | 28,959 | 28.3 | 1.30 (1.01-1.68) |
| Knee | 11,267 | 11.7 | 20,915 | 20.4 | 1.74 (1.17-2.60) |
| Head/face | 13,156 | 13.6 | 13,164 | 12.9 | 1.05 (0.69-1.64) |
| Hip/thigh/upper leg | 7,260 | 7.5 | 8,761 | 8.6 | 1.15 (0.62-2.09) |
| Shoulder | 1,425 | 1.5 | 4,383 | 4.3 | 2.87 (1.09-7.67) |
| Hand/wrist | 7,408 | 7.7 | 9,080 | 8.9 | 1.16 (0.64-2.07) |
| Trunk | 8,352 | 8.6 | 4,732 | 4.6 | 1.87 (0.92-3.84) |
| Lower leg | 3,106 | 3.2 | 4,678 | 4.6 | 1.44 (0.65-3.10) |
| Foot | 3,907 | 4.0 | 2,050 | 2.0 | 2.00 (0.86-4.79) |
| Arm/elbow | 1,029 | 1.1 | 2,053 | 2.0 | 1.82 (0.53-6.65) |
| Neck | 726 | 0.8 | 1,028 | 1.0 | 1.25 (0.21-8.29) |
| Other | 3,588 | 3.7 | 2,518 | 2.5 | 1.48 (0.64-3.59) |
| Total | 96,670 | 100 | 102,321 | 100 | |

Table 12.10 Comparison of Diagnoses of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' basketball | | Girls' basketball | | IPR (95% CI) |
|------------------|------------------|-------------|-------------------|-------------|-------------------------|
| | n | % | n | % | |
| Diagnosis | | | | | |
| Strain/sprain | 56,329 | 58.4 | 54,361 | 53.1 | 1.10 (0.94-1.29) |
| Contusion | 8,458 | 8.8 | 8,437 | 8.2 | 1.07 (0.59-1.91) |
| Fracture | 10,763 | 11.2 | 7,352 | 7.2 | 1.56 (0.91-2.66) |
| Concussion | 4,452 | 4.6 | 7,552 | 7.4 | 1.60 (0.82-3.12) |
| Other | 16,424 | 17.0 | 24,620 | 24.1 | 1.41 (1.01-1.98) |
| Total | 96,426 | 100 | 102,322 | 100 | |

Table 12.11 Most Common Boys' and Girls' Basketball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' basketball n=96,427 | | Girls' basketball n=102,321 | | IPR (95% CI) |
|-----------------------------------|------------------------------|-------------|--------------------------------|-------------|-------------------------|
| | n | % | n | % | |
| Diagnosis | | | | | |
| Ankle strain/sprain | 34,689 | 36.0 | 27,509 | 26.9 | 1.34 (1.03-1.74) |
| Hip/thigh/upper leg strain/sprain | 5,421 | 5.6 | 6,275 | 6.1 | 1.09 (0.52-2.29) |
| Knee strain/sprain | 5,045 | 5.2 | 10,260 | 10.0 | 1.91 (1.03-3.54) |
| Head/face other | 4,864 | 5.0 | 4,218 | 4.1 | 1.23 (0.52-2.91) |
| Knee other | 4,766 | 4.9 | 7,897 | 7.7 | 1.56 (0.82-2.97) |
| Head/face concussion | 4,452 | 4.6 | 7,552 | 7.4 | 1.60 (0.82-3.12) |

*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, 2006-07 School Year

| | Boys' basketball | | Girls' basketball | | IPR (95% CI) |
|------------------|------------------|-------------|-------------------|-------------|-------------------------|
| | n | % | n | % | |
| Time Loss | | | | | |
| <1 Week | 52,875 | 56.4 | 49,944 | 50.0 | 1.13 (0.95-1.33) |
| 1-3 Weeks | 29,398 | 31.4 | 30,532 | 30.5 | 1.03 (0.79-1.32) |
| >3 Weeks | 11,399 | 12.2 | 19,491 | 19.5 | 1.60 (1.07-2.41) |
| Total | 93,672 | 100 | 99,967 | 100 | |

Table 12.13 Comparison of Mechanisms of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' basketball | | Girls' basketball | | IPR (95% CI) |
|--------------------------------|------------------|-------------|-------------------|-------------|-------------------------|
| | n | % | n | % | |
| Mechanism | | | | | |
| Contact with another person | 43,025 | 44.7 | 35,554 | 35.4 | 1.29 (1.04-1.60) |
| Contact with playing surface | 21,004 | 21.8 | 27,966 | 27.8 | 1.25 (0.92-1.70) |
| No contact | 17,963 | 18.7 | 20,596 | 20.5 | 1.08 (0.76-1.52) |
| Overuse/chronic | 5,373 | 5.6 | 7,160 | 7.1 | 1.25 (0.68-2.32) |
| Contact with playing apparatus | 4,967 | 5.2 | 5,156 | 5.1 | 1.02 (0.47-2.24) |
| Illness | 2,261 | 2.4 | 1,919 | 1.9 | 1.25 (0.35-4.46) |
| Other | 1,565 | 1.6 | 2,136 | 2.1 | 1.28 (0.42-3.87) |
| Total | 96,158 | 100 | 100,487 | 100 | |

Table 12.14 Comparison of Activities of Boys' and Girls' Basketball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' basketball | | Girls' basketball | | IPR (95% CI) |
|-------------------------|------------------|-------------|-------------------|-------------|-------------------------|
| | n | % | n | % | |
| Activity | | | | | |
| Rebounding | 30,258 | 31.7 | 18,327 | 18.3 | 1.76 (1.30-2.38) |
| General play | 15,796 | 16.6 | 15,870 | 15.9 | 1.06 (0.72-1.56) |
| Defending | 14,444 | 15.1 | 14,122 | 14.1 | 1.09 (0.72-1.65) |
| Shooting | 10,615 | 11.1 | 7,736 | 7.7 | 1.46 (0.79-2.69) |
| Chasing loose ball | 8,371 | 8.8 | 11,821 | 11.8 | 1.33 (0.82-2.16) |
| Ball handling/dribbling | 4,834 | 5.1 | 13,460 | 13.5 | 0.92 (0.86-0.97) |
| Receiving pass | 4,184 | 4.4 | 4,790 | 4.8 | 1.08 (0.48-2.41) |
| Conditioning | 4,068 | 4.3 | 10,272 | 10.3 | 2.37 (1.24-4.54) |
| Other | 2,802 | 2.9 | 3,615 | 3.6 | 1.21 (0.46-3.23) |
| Total | 95,372 | 100 | 100,013 | 100 | |

12.3 Boys' Baseball and Girls' Softball

Table 12.15 Comparison of Boys' Baseball and Girls' Softball Injury Rates, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' baseball | Girls' softball | RR (95% CI)* |
|----------------------------|----------------|-----------------|------------------|
| Total | | | |
| # Injuries | 203 | 133 | |
| # Exposures | 162,931 | 119,554 | |
| Injury rate (per 1,000 AE) | 1.25 | 1.11 | 1.12 (0.90-1.39) |
| Competition | | | |
| # Injuries | 117 | 83 | |
| # Exposures | 58,141 | 42,329 | |
| Injury rate (per 1,000 AE) | 2.01 | 1.96 | 1.03 (0.77-1.36) |
| Practice | | | |
| # Injuries | 86 | 50 | |
| # Exposures | 104,790 | 77,225 | |
| Injury rate (per 1,000 AE) | 0.82 | 0.65 | 1.27 (0.89-1.80) |

Table 12.16 Comparison of Body Sites of Boys' Baseball and Girls' Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' baseball | | Girls' softball | | IPR (95% CI) |
|---------------------|----------------|-------------|-----------------|-------------|------------------|
| | n | % | n | % | |
| Body Site | | | | | |
| Ankle | 10,434 | 17.3 | 10,635 | 19.5 | 1.13 (0.64-1.99) |
| Knee | 5,508 | 9.1 | 7,139 | 13.1 | 1.44 (0.72-2.85) |
| Head/face | 10,686 | 17.7 | 10,663 | 19.6 | 1.11 (0.64-1.90) |
| Hip/thigh/upper leg | 5,304 | 8.8 | 5,655 | 10.4 | 1.18 (0.50-2.79) |
| Shoulder | 9,070 | 15.0 | 5,229 | 9.6 | 1.57 (0.77-3.18) |
| Hand/wrist | 6,818 | 11.3 | 6,544 | 12.0 | 1.06 (0.56-2.01) |
| Trunk | 3,048 | 5.1 | 2,629 | 4.8 | 1.05 (0.30-3.60) |
| Lower leg | 522 | 0.9 | 801 | 1.5 | 1.70 (0.29-9.95) |
| Foot | 1,231 | 2.0 | 928 | 1.7 | 1.20 (0.20-7.31) |
| Arm/elbow | 5,503 | 9.1 | 1,648 | 3.0 | 3.01 (0.82-11.0) |
| Neck | 521 | 0.9 | 0 | 0 | N/A |
| Other | 1,652 | 2.7 | 2,539 | 4.7 | 1.70 (0.59-4.90) |
| Total | 60,296 | 100 | 54,411 | 100 | |

Table 12.17 Comparison of Diagnoses of Boys' Baseball and Girls' Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' baseball | | Girls' softball | | IPR (95% CI) |
|------------------|----------------|-------------|-----------------|-------------|-------------------|
| | n | % | n | % | |
| Diagnosis | | | | | |
| Strain/sprain | 27,973 | 46.4 | 26,985 | 49.6 | 1.07 (0.82-1.40) |
| Contusion | 8,711 | 14.4 | 7,666 | 14.1 | 1.02 (0.57-1.830) |
| Fracture | 9,586 | 15.9 | 8,313 | 15.3 | 1.04 (0.59-1.83) |
| Concussion | 2,747 | 4.6 | 3,957 | 7.3 | 1.60 (0.52-4.94) |
| Other | 11,278 | 18.7 | 7,491 | 13.8 | 1.36 (0.76-2.42) |
| Total | 60,296 | 100 | 54,411 | 100 | |

Table 12.18 Most Common Boys' Baseball and Girls' Softball Injury Diagnoses*, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' baseball n=60,295 | | Girls' softball n=54,411 | | IPR (95% CI) |
|-----------------------------------|----------------------------|------------|-----------------------------|-------------|------------------|
| | n | % | n | % | |
| Diagnosis | | | | | |
| Ankle strain/sprain | 8,578 | 14.2 | 9,616 | 17.7 | 1.24 (0.67-2.29) |
| Hip/thigh/upper leg strain/sprain | 5,193 | 8.6 | 5,397 | 9.9 | 1.15 (0.47-2.80) |
| Shoulder strain/sprain | 4,521 | 7.5 | 2,803 | 5.2 | 1.46 (0.52-4.06) |
| Shoulder other | 4,416 | 7.3 | 2,426 | 4.5 | 1.64 (0.58-4.69) |
| Arm/elbow strain/sprain | 3,747 | 6.2 | 1,432 | 2.6 | 2.36 (0.53-10.6) |
| Hand/wrist fracture | 3,312 | 5.5 | 3,824 | 7.0 | 1.28 (0.51-3.21) |
| Head/face other | 3,030 | 5.0 | 1,140 | 2.1 | 2.40 (0.54-10.7) |
| Head/face concussion | 2,747 | 4.6 | 3,957 | 7.3 | 1.60 (0.52-4.94) |
| Knee strain/sprain | 2,632 | 4.4 | 3,204 | 5.9 | 1.35 (0.47-3.87) |
| Head/face contusion | 2,604 | 4.3 | 3,152 | 5.8 | 1.60 (0.90-1.04) |

*Only includes diagnoses accounting for >5% of boys' baseball or girls' softball injuries

Table 12.19 Comparison of Time Loss of Boys' Baseball and Girls' Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' baseball | | Girls' softball | | IPR (95% CI) |
|-----------|----------------|------|-----------------|------|------------------|
| | n | % | n | % | |
| Time Loss | | | | | |
| <1 Week | 31,441 | 52.8 | 27,484 | 51.1 | 1.03 (0.80-1.33) |
| 1-3 Weeks | 18,187 | 30.6 | 17,013 | 31.6 | 1.03 (0.70-1.53) |
| >3 Weeks | 9,902 | 16.6 | 9,319 | 17.3 | 1.04 (0.61-1.79) |
| Total | 59,530 | 100 | 53,816 | 100 | |

Table 12.20 Comparison of Mechanisms of Boys' Baseball and Girls' Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' baseball | | Girls' softball | | IPR (95% CI) |
|-----------------------------------|----------------|------|-----------------|------|------------------|
| | n | % | n | % | |
| Mechanism | | | | | |
| Contact with playing apparatus | 19,488 | 32.6 | 16,107 | 30.2 | 1.09 (0.75-1.59) |
| No contact | 13,593 | 22.7 | 6,703 | 12.6 | 1.83 (0.96-3.50) |
| Contact with playing surface | 10,735 | 18.0 | 15,089 | 28.3 | 1.56 (0.96-2.51) |
| Overuse/chronic | 7,170 | 12.0 | 7,381 | 13.8 | 1.14 (0.57-2.28) |
| Contact with another person | 5,542 | 9.3 | 6,362 | 11.9 | 1.27 (0.61-2.65) |
| Contact with out of bounds object | 973 | 1.6 | 401 | 0.8 | 2.2 (0.35-13.8) |
| Other | 2,257 | 3.8 | 1,347 | 2.5 | 1.51 (0.30-7.51) |
| Total | 59,758 | 100 | 53,389 | 100 | |

Table 12.21 Comparison of Activities of Boys' Baseball and Girls' Softball Injuries, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Year

| | Boys' basketball | | Girls' basketball | | IPR (95% CI) |
|-------------------------|------------------|-------------|-------------------|-------------|------------------|
| | n | % | n | % | |
| Activity | | | | | |
| Fielding | 15,755 | 26.4 | 9,394 | 17.6 | 1.51 (0.92-2.49) |
| Running bases | 8,718 | 14.6 | 7,077 | 13.3 | 1.11 (0.58-2.13) |
| Pitching | 7,552 | 12.7 | 6,561 | 12.3 | 1.04 (0.49-2.19) |
| Catching | 7,430 | 12.5 | 6,005 | 11.2 | 1.12 (0.57-2.19) |
| Sliding | 5,195 | 8.7 | 5,545 | 10.4 | 1.18 (0.55-2.56) |
| Batting | 4,842 | 8.1 | 4,649 | 8.7 | 1.06 (0.46-2.49) |
| Throwing (not pitching) | 4,033 | 6.8 | 4,049 | 7.6 | 1.11 (0.44-2.78) |
| Other | 6,056 | 10.2 | 10,109 | 18.9 | 1.66 (0.56-4.90) |
| Total | 59,581 | 100 | 53,389 | 100 | |

XIII. Trends over Time

Table 13.1 Injury Rates by Sport, Type of Exposure, and Year, High School Sports-Related Injury Surveillance Study, US, 2005-07 School Years

| | 2005-06 | 2006-07 | RR (95% CI)* |
|-------------------------|---------|---------|--------------------------|
| Overall total | 2.51 | 2.59 | 1.03 (0.99-1.07) |
| Competition | 4.63 | 4.88 | 1.05 (1.00-1.12) |
| Practice | 1.69 | 1.75 | 1.04 (0.98-1.10) |
| Boys' football total | 4.36 | 4.45 | 1.02 (0.96-1.09) |
| Competition | 12.09 | 13.5 | 1.12 (1.03-1.22) |
| Practice | 2.54 | 2.68 | 1.05 (0.96-1.15) |
| Boys' soccer total | 2.43 | 2.27 | 0.93 (0.81-1.08) |
| Competition | 4.22 | 4.31 | 1.02 (0.84-1.23) |
| Practice | 1.58 | 1.45 | 0.92 (0.74-1.13) |
| Girls' soccer total | 2.36 | 2.51 | 1.06 (0.92-1.23) |
| Competition | 5.21 | 5.43 | 1.04 (0.87-1.25) |
| Practice | 1.10 | 1.31 | 1.19 (0.93-1.52) |
| Girls' volleyball total | 1.64 | 1.37 | 0.83 (0.69-1.01) |
| Competition | 1.92 | 1.40 | 0.73 (0.53-0.99)† |
| Practice | 1.48 | 1.36 | 0.91 (0.72-1.17) |
| Boys' basketball total | 1.89 | 1.75 | 0.93 (0.81-1.07) |
| Competition | 2.98 | 2.87 | 0.96 (0.78-1.18) |
| Practice | 1.46 | 1.28 | 0.88 (0.73-1.07) |
| Girls' basketball total | 2.01 | 2.09 | 1.04 (0.90-1.20) |
| Competition | 3.60 | 3.60 | 1.00 (0.82-1.22) |
| Practice | 1.37 | 1.44 | 1.05 (0.86-1.30) |
| Boys' wrestling total | 2.50 | 2.51 | 1.01 (0.88-1.15) |
| Competition | 3.93 | 3.80 | 0.97 (0.77-1.21) |
| Practice | 2.04 | 2.06 | 1.01 (0.85-1.20) |
| Boys' baseball total | 1.19 | 1.25 | 1.04 (0.86-1.27) |
| Competition | 1.77 | 2.01 | 1.14 (0.88-1.47) |
| Practice | 0.87 | 0.82 | 0.94 (0.70-1.25) |
| Girls' softball total | 1.13 | 1.11 | 0.98 (0.78-1.24) |
| Competition | 1.78 | 1.96 | 1.10 (0.81-1.50) |
| Practice | 0.79 | 0.65 | 0.82 (0.57-1.17) |

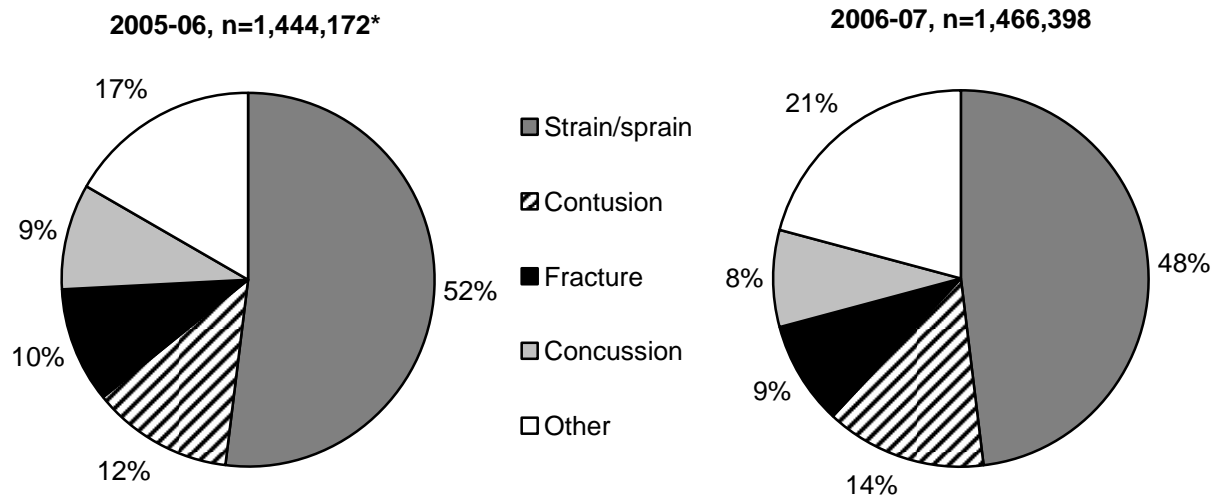
**Rate ratios (RR) compare 2006-07 with 2005-06

†Statistically significant RR 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, 2005-07 School Years

| | 2005-06 | 2006-07 |
|-------------------------|----------------|----------------|
| Overall total | 1,442,533 | 1,472,849 |
| Competition | 759,334 | 766,512 |
| Practice | 683,199 | 706,337 |
| Boys' football total | 516,150 | 574,367 |
| Competition | 280,919 | 292,316 |
| Practice | 235,231 | 282,051 |
| Boys' soccer total | 218,760 | 171,874 |
| Competition | 119,703 | 93,295 |
| Practice | 99,058 | 78,579 |
| Girls' soccer total | 185,770 | 230,769 |
| Competition | 122,803 | 149,231 |
| Practice | 62,967 | 81,538 |
| Girls' volleyball total | 81,813 | 80,493 |
| Competition | 32,677 | 27,423 |
| Practice | 49,136 | 53,069 |
| Boys' basketball total | 100,058 | 96,670 |
| Competition | 44,826 | 46,109 |
| Practice | 55,232 | 50,561 |
| Girls' basketball total | 103,566 | 102,831 |
| Competition | 53,812 | 53,703 |
| Practice | 49,753 | 49,128 |
| Boys' wrestling total | 105,542 | 101,139 |
| Competition | 36,259 | 38,750 |
| Practice | 69,283 | 62,389 |
| Boys' baseball total | 67,560 | 60,296 |
| Competition | 33,639 | 33,494 |
| Practice | 33,922 | 26,802 |
| Girls' softball total | 63,313 | 54,411 |
| Competition | 34,696 | 32,191 |
| Practice | 28,618 | 22,220 |

Figure 13.1 Injury Diagnosis by Year, High School Sports-Related Injury Surveillance Study, US, 2005-07 School Years



*Throughout this chapter, totals and 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 13.3 Body Site of Injury by Year, High School Sports-Related Injury Surveillance Study, US, 2005-07 School Years

| | 2005-06 | | 2006-07 | |
|---------------------|------------------|------------|------------------|------------|
| | n | % | n | % |
| Body Site | | | | |
| Ankle | 326,128 | 22.7 | 289,537 | 19.8 |
| Knee | 203,900 | 14.2 | 242,987 | 16.6 |
| Head/face | 176,763 | 12.3 | 182,062 | 12.4 |
| Hip/thigh/upper leg | 155,055 | 10.8 | 154,224 | 10.5 |
| Shoulder | 113,444 | 7.9 | 116,490 | 8.0 |
| Hand/wrist | 114,460 | 8.0 | 109,547 | 7.5 |
| Trunk | 88,616 | 6.2 | 98,062 | 6.7 |
| Lower leg | 65,744 | 4.6 | 76,173 | 5.2 |
| Foot | 57,554 | 4.0 | 58,183 | 4.0 |
| Arm/elbow | 58,133 | 4.1 | 56,830 | 3.9 |
| Neck | 30,880 | 2.2 | 28,521 | 1.9 |
| Other | 45,276 | 3.2 | 52,311 | 3.6 |
| Total | 1,435,954 | 100 | 1,464,926 | 100 |

Table 13.4 Most Common Injury Diagnoses by Year, High School Sports-Related Injury Surveillance Study, US, 2006-07 School Years

| | 2005-06 n=1,435,954 | | 2006-07 n=1,463,273 | |
|-----------------------------------|------------------------|------|------------------------|------|
| | n | % | n | % |
| Diagnosis | | | | |
| Ankle strain/sprain | 295,254 | 20.6 | 260,670 | 17.8 |
| Head/face concussion | 129,116 | 9.0 | 122,629 | 8.4 |
| Knee strain/sprain | 109,483 | 7.6 | 128,264 | 8.8 |
| Hip/thigh/upper leg strain/sprain | 113,476 | 7.9 | 111,971 | 7.7 |
| Knee other | 61,912 | 4.3 | 70,921 | 4.9 |
| Shoulder other | 44,190 | 3.1 | 53,823 | 3.7 |
| Hand/wrist fracture | 45,686 | 3.2 | 48,471 | 3.3 |
| Shoulder strain/sprain | 48,271 | 3.4 | 41,798 | 2.9 |
| Trunk strain/sprain | 40,745 | 2.8 | 40,008 | 2.7 |
| Hand/wrist strain/sprain | 43,842 | 3.1 | 36,007 | 2.5 |

Figure 13.2 Time Loss of Injuries by Year, High School Sports-Related Injury Surveillance Study, US, 2005-07 School Years

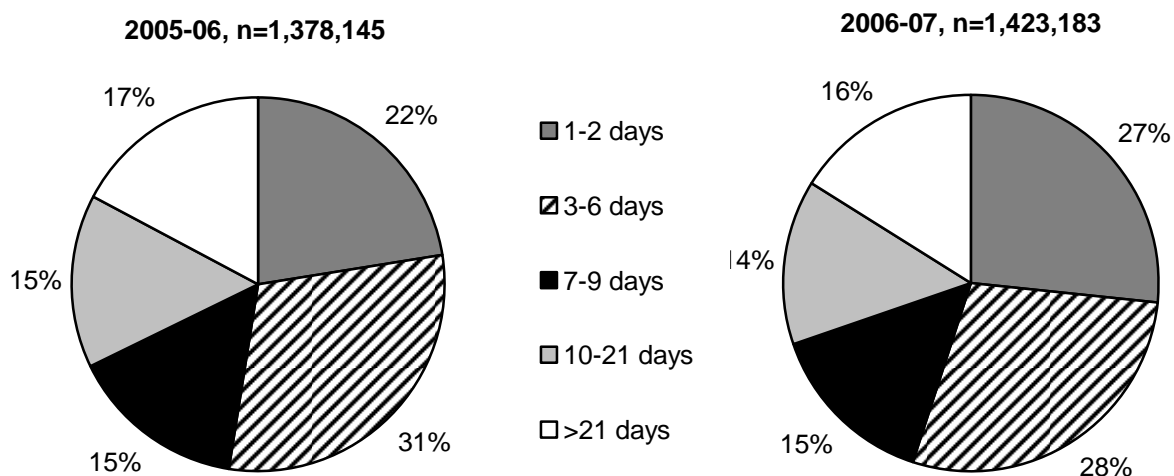


Table 13.5 Injuries Requiring Surgery by Year, High School Sports-Related Injury Surveillance Study, US, 2005-07 School Years

| | 2005-06 | | 2006-07 | |
|-------------------------|------------------|------------|------------------|------------|
| | n | % | n | % |
| Need for surgery | | | | |
| Required surgery | 75,271 | 5.3 | 91,126 | 6.4 |
| Did not require surgery | 1,353,802 | 94.7 | 1,337,834 | 93.6 |
| Total | 1,429,072 | 100 | 1,428,960 | 100 |

IX. Reporter Demographics & Compliance

Prior to the start of the 2006-07 High School RIO™ study, participating ATCs were asked to complete a short demographics survey. Three-quarters (77%) of participating high schools were public schools, with the remainder being private. Almost all (99%) participating ATCs provided services to athletes of their high school on 5 or more days each week. Over half (60%) of ATCs participating in High School RIO™ 2006-07 had participated in High School RIO™ during the 2005-06 school year.

During the 2006-07 school year, all 100 participating ATCs logged into High School RIO™ at least once to report injury data. Of these 100 ATCs, 86 (86%) completed a weekly exposure report for each week of the study. There were 9 ATCs (9%) that missed 1 or more weeks of reporting but remained in the study, and there were only 5 ATCs (5%) who dropped out of the study prematurely. The non-response rate of questions in the injury report was low, with most questions having a non-response rate of less than 2%. Questions asking about the injury (e.g., injury diagnosis, body site, etc.) had the highest response, while demographical questions (e.g., injured athlete's age, height, weight, etc.) had the most missing responses.

An online "End of Season" survey gave all participating ATCs the opportunity to provide feedback on their experiences with High School RIO™. This survey was completed by 52 ATCs (52%). Average reporting time burdens were 15.0 minutes for the weekly exposure report and 6.3 minutes for the injury report form. Using a 5 point Likert scale, RIO™ was overwhelmingly reported to be either very easy (76.5%) or somewhat easy (21.6%) to use (5 and 4 on the Likert scale, respectively), with ATCs being either very satisfied (74.5%) or somewhat satisfied (23.5%) with the study (5 and 4 on the Likert scale, respectively). Suggestions provided by ATCs, such as the addition or clarification of questions or answer choices, will be used to improve High School RIO™ for the 2007-08 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 High School RIOTM (Reporting Information Online) 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. Although the Ohio State University and the Center for Injury Research and Policy at Columbus Children's Hospital funded the second year of High School RIOTM, funds must immediately be found to continue this important, permanent high school 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.