

**CATASTROPHIC  
SPORTS INJURY RESEARCH**

**THIRTY-EIGHTH ANNUAL REPORT**

**FALL 1982 - SPRING 2020**

**From the  
National Center for Catastrophic Sport Injury Research  
At The University of North Carolina at Chapel Hill**

**Website: [nccsir.unc.edu](https://nccsir.unc.edu)**

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## INTRODUCTION

In 1931, the American Football Coaches Association (AFCA) initiated the First Annual Survey of Football Fatalities and this research has been conducted at the University of North Carolina at Chapel Hill since 1965. In 1977, the National Collegiate Athletic Association (NCAA) initiated a National Survey of Catastrophic Football Injuries, which is also conducted at the University of North Carolina. As a result of these research projects important contributions to the sport of football have been made. Most notable have been the 1976 rule changes making it illegal to make initial contact with the head and face while blocking and tackling, the National Operating Committee on Standards for Athletic Equipment (NOCSAE) football helmet standard, improved medical care for the participants, and better coaching techniques.

Due to the success of these two football projects the research was expanded to all sports for both men and women, and a National Center for Catastrophic Sports Injury Research (NCCSIR) was established in 1982. The decision to expand this research was based on the following factors:

1. Research based on reliable data is essential if progress is to be made in sports safety.
2. The paucity of information on injuries in all sports.
3. The rapid expansion and lack of injury information in women's sports.

In 1987, a joint endeavor was initiated with the Section on Sports Medicine of the American Association of Neurological Surgeons. The purpose of this collaboration was to enhance the collection of medical data. Dr. Robert C. Cantu, Chairman, Department of Surgery and Chief, Neurosurgery Service, Emerson Hospital, in Concord, MA, is the Medical Director of the NCCSIR and has been responsible for evaluating the medical data. Dr. Cantu is also a Past-President of the American College of Sports Medicine. The NCCSIR was directed for 30 years by Dr. Frederick Mueller. Dr. Mueller retired in the Spring of 2013 and the NCCSIR continues under new direction (Dr. Kucera). The NCCSIR has expanded to become a consortium of universities (University of North Carolina, Boston University, University of Washington, University of Connecticut, University of Colorado, University of Maryland) with expertise in head/neck, cardiac, and heat-related sports medicine (these three areas account for the overwhelming majority of catastrophic events).

**To learn more about NCCSIR please visit:** <http://nccsir.unc.edu/about/>

**To learn more about the Consortium please visit:** <http://nccsir.unc.edu/consortia-and-partners/>  
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## METHODS

### Outcome Definitions

For the purpose of this research the term catastrophic is defined as any severe injury incurred during participation in a school/college sponsored sport. Catastrophic is divided into the following three definitions:

1. **Fatality**
2. **Non-Fatal** - permanent severe functional disability.
3. **Serious** - no permanent functional disability but severe injury. An example would be fractured cervical vertebra with no paralysis.

Sports injuries are also considered traumatic (or direct) or exertional/medical (or indirect). The definition are as follows:

Traumatic injury (**direct**) - Those injuries that resulted directly from participation in the skills of the sport.

Exertional/medical (**indirect**) - Those events that were caused by systemic failure as a result of exertion while participating in a sport activity or by a complication that was secondary to a non-fatal injury.

Note: Beginning in 2014, NCCSIR also collects non sport-related events such as sudden cardiac arrest that occurred outside of sport activity (e.g., during sleep). These events were not included in the tables but are described in the Case Summary sections.

### Data Collection

Data were compiled with the assistance of coaches, athletic trainers, athletic directors, executive officers of state and national athletic organizations, online news reports, and professional associates of the researchers. Data collection would not have been possible without the support of the NCAA, the National Federation of State High School Associations (NFHS),

and the AFCA. Upon receiving information concerning a possible catastrophic sports injury, contact by telephone, email or personal letter and questionnaire was initiated with the injured player's athletic trainer, athletic director, or coach. Data collected included background information on the athlete (age, height, weight, experience, previous injury, etc.), accident information, immediate and post-accident medical care, type injury, and equipment involved. Autopsy reports are used when available. In order to improve overall capture of catastrophic sport injury and illness events, NCCSIR and the Consortium for Catastrophic Injury Monitoring in Sport developed an online portal where anyone can report a catastrophic event: <https://www.sportinjuryreport.org>. The portal was activated in January 2015.

### **Participation in Sport**

Athletes may complete in more than one sport season. Therefore, participation is presented in athlete-seasons. *Note that the majority of schools—high school and collegiate—cancelled their spring 2020 sport seasons due to COVID-19.*

Yearly participation estimates for high school athletes are obtained from NFHS participation reports (available online: <https://www.nfhs.org/ParticipationStatistics/ParticipationStatistics/>). *The NFHS did not collect sport participation data from its member states for academic year 2019/20. Therefore 2019/20 sport participation was imputed based on 2018/19 values.* NFHS high school annual athletic participation for 2018/19 included 7,652,585 athlete-seasons (3,240,756 female-seasons and 4,411,829 male-seasons). Yearly participation estimates for collegiate level athletes are obtained from the National Collegiate Athletic Association (NCAA) participation reports (accessed online: [https://ncaaorg.s3.amazonaws.com/research/sportpart/2018-19RES\\_SportsSponsorshipParticipationRatesReport.pdf](https://ncaaorg.s3.amazonaws.com/research/sportpart/2018-19RES_SportsSponsorshipParticipationRatesReport.pdf)). NCAA participation for 2019/20 in championship sports was 499,213 athlete-seasons. There were 282,411 male-seasons and 221,212 female-seasons. There were also 3,560 males in non-championship sports (archery, badminton, bowling, equestrian, rowing, rugby, sailing, and squash) and 2,830 females participating in emerging sports (archery, badminton, equestrian, rugby, squash, synchronized swimming, team handball, and triathlon).

During the entire 38 year period from the fall of 1982 through the spring of 2020, there were 243,915,722 (97,445,057 female and 146,470,665 male) high school participant-seasons in

the sports covered by this report and approximately 14,068,920 13,568,395 (5,651,768 female and 8,417,152 male) college participant-seasons (Table 12).

Not all high schools and colleges are members of the NFHS and NCAA. Complete data is not available for the non-member schools. Therefore, these participation numbers underestimate the total number of high school and collegiate participants in the United States.

## **Analysis**

Frequencies and incidence rates of catastrophic injury per 100,000 athlete-seasons were calculated over the entire 38-year period and stratified by level (high school and college) and sport. Incidence rates were stratified by traumatic injury (direct) versus exertional/medical (indirect) and by severity. **Note: if there were no events in the sport for a particular year, the year is excluded from the frequency Table. Rates with number of incidents less than 5 should be interpreted with caution.**

It is important to note that information is continually being updated due to the fact that catastrophic injury information may not always reach the NCCSIR in time to be included in the current final report. The report includes data that is reported to the NCCSIR by the NCAA, the NFHS, online reports, colleagues, coaches, and athletic trainers. There may be additional catastrophic injuries that are not reported to the NCCSIR. The authors acknowledge that not every catastrophic injury is included in this report.

## **RESULTS**

### **Current AY2019-2020 Summary**

From July 1, 2019 to June 30, 2020 there were a total of 76 catastrophic injuries/illnesses captured by NCCSIR among high school and college organized sport participants. Of these, 66 events were due to or occurred during sport-related activities (Table 11). There were also 10 catastrophic events that occurred during non-sport related activity (8 cardiac-related, 1 infectious illness, and 1 suspected cardiac): 2 collegiate and 8 high school level; 3 female and 7 males; 9 fatal and 1 nonfatal).



*Sport-related events:* The majority of the sport-related catastrophic events (n=66) were at the high school level (86.4%, n=57) and among males (87.9%, n=58). Member institutions for the 9 collegiate cases included NCAA, NAIA, and junior college. Overall, 28.8% of cases were fatal, 4.5% were nonfatal permanently disabling, 21.2% were serious with recovery, and 13.6% were unknown. Forty-eight percent (n=32) were due to traumatic injury (direct) causes and the majority occurred during competition or practice (42.4% each). The majority of events occurred to athletes participating in the following sports: football (54.5%), basketball (13.6%), track and field (9.1%), wrestling (6.1%), baseball (3.0%), ice hockey (3.0%), soccer (3.0%), and volleyball (3.0%). Areas of the body most commonly affected were heart (47.0%), spine (9.7%), and head/brain (15.2%). Sudden cardiac arrest (45.5%) was the most common type of event followed by spine injury (19.7%), brain trauma (12.1%), and other traumatic injuries (16.7%).

*Traumatic injury (direct) events:* 21.9% of traumatic injury (direct) events were fatal, 6.3% non-fatal permanently disabling, 43.8% serious with recovery, and 28.1% unknown. A greater proportion of traumatic injury (direct) events occurred in competition versus practice (68.8% versus 28.1%) and were due to contact with another player (50.0%), apparatus/object (3.1%), or ground/surface (15.6%). The most frequent activity was tackling/being tackled (28.1%) and a large proportion were unknown (18.8%). The highest proportion was to the spine (37.5%) and head/brain (31.3%) followed by other traumatic injury (25.0%). The majority occurred in football (71.9%) followed by track and field (15.6%), baseball (3.1%), gymnastics (3.1%), and ice hockey (3.1%). There were 5 athletes injured via pedestrian motor vehicle crash related to participation in athletics (e.g. runner struck by car). Four athletes were preparing for a practice run on the sidewalk when they were struck. One athlete was struck while running on the sidewalk. Four of the five athletes died and one athlete was disabled.

*Exertional/medical (indirect) events:* 35.3% of exertional/medical (indirect) events were fatal, 2.9% resulted in permanent disability, and 61.8% recovered. There were fewer fatal events in 2019/20 compared to 2018/19 (n=16 40% versus n=26 52%). The majority occurred during practice (55.9%) followed by competition (17.6%), conditioning sessions and weight training sessions (11.8%), and unaffiliated recreational activity (11.8%). The most frequent activity was conditioning (14.7%) and running (20.5%) and 20.6% were unknown. The majority were cardiac-related (88.2%) and heat-related (5.9%). There were fewer heat stroke events in 2019/20 compared to the previous years (8 in 2017/18 and 10 in 2018/19). Football (38.2%) and

basketball (23.5%) comprised the majority followed by wrestling (11.8%), and volleyball (5.9%).

### **Overall Summary**

During this 38-year period, there were 2,878 catastrophic sport-related injuries/illnesses at high school and college levels (Table 1 – excluding cheerleading, drill team, and rodeo there were 2,757). The majority were non-fatal (64%) and from traumatic or direct mechanisms (63%), and among high school participants (79%). The proportion of fatal (38% versus 34%) and traumatic injury (direct) (64% versus 59%) were not different by high school compared to college level.

The 66 sport-related catastrophic injuries and conditions captured in 2019/20 is lower than the previous two years (82 in 2018/19 and 87 in 2017/18) and a 19.5% decrease from 2018/19—potentially a result of spring sport season cancellations for many high schools and colleges in 2019/20 in response to COVID-19. *Note: see Discussion regarding the interpretation of this percentage difference.*

*Traumatic Injuries (Direct) by Sport:* For high school sports, football had the highest *number* of traumatic injury (direct) catastrophic events, followed by female cheerleading, baseball, wrestling, and male track and field (Table 4a). Accounting for the number of participants in the sport, male and female cheerleading, male gymnastics, football, and male ice hockey had the highest rates per 100,000 participant-seasons (Figure 2, Table 9a). When restricted to fatal events male gymnastics, football, male ice hockey, and female skiing had the highest rates per 100,000 participant-seasons (Figure 1). *Note: see Discussion and Recommendations page xx regarding the interpretation of the injury rates for cheerleading.*

For college sports, football had the highest *number* of traumatic injury (direct) catastrophic events, followed by female cheerleading, baseball, and male track and field (Table 5a). Accounting for the number of participants in the sport, male gymnastics, female skiing, football, male ice hockey, male skiing, female gymnastics, and female equestrian had the highest rates per 100,000 participant-seasons (Figure 4, Table 9b). Similar results were observed when restricted

to fatal events where female skiing, male skiing, equestrian, and female gymnastics had the highest rates per 100,000 participant-seasons (Figure 3).

*Exertional/Medical Conditions (Indirect) by Sport:* For high school sports, football had the highest *number* of exertional/medical (indirect) catastrophic events, followed by male basketball, male track and field, male soccer, and wrestling (Table 4b). Accounting for the number of participants in the sport, rowing, male basketball, football, male ice hockey, male lacrosse, and male water polo had the highest rates per 100,000 participant-seasons (Figure 2, Table 10a). When restricted to fatal events male basketball, football, male water polo, male lacrosse, and male ice hockey had the highest rates per 100,000 participant-seasons (Figure 1).

For college sports, football had the highest *number* of exertional/medical (indirect) catastrophic events, followed by male basketball, wrestling, baseball, male soccer, female basketball, and male swimming (Table 5b). Accounting for the number of participants in the sport, male basketball, male water polo, male skiing, football, male wrestling, male ice hockey, male swimming, and male rowing had the highest rates per 100,000 participants (Figure 4, Table 10b). When restricted to fatal events male basketball, male water polo, male skiing, football, male wrestling had the highest rates per 100,000 participants (Figure 3).

## **DISCUSSION**

The following strengths and limitations should be noted:

- Data have been collected by The National Center for Catastrophic Sport Injury Research for all high school and college sports since 1982 using consistent definitions and methodology over a 30+ year period. These data are provided annually to sport organizations (NCAA, NFHS, AFCA), researchers and the public. Sports medicine advisory committees, sport rules committees, and coaching committees review the reports and have used these data to inform and evaluate safety recommendations, medical care, and rule changes.
- Catastrophic events are primarily captured through publicly available media reports. Therefore, not all catastrophic events are captured. Particularly, for non-fatal

catastrophic events, which may not be reported in the media as comprehensively as fatalities. Under-reporting may also be due to outcome definitions used (e.g. timing of the event) and event locations (e.g. at home, personal conditioning). **In order to improve overall capture of these events, NCCSIR and the Consortium for Catastrophic Injury Monitoring in Sport have developed an online portal where anyone can report a catastrophic event: <https://www.sportinjuryreport.org>.** The online portal was activated in January 2015. Any observed changes in annual number of events may be attributed to these described improvements in data collection methods.

- Details surrounding catastrophic events that are only captured through publicly available media reports may not be completely accurate in the absence of the actual autopsy or medical reports.
- Incidence rates were calculated using participation estimates from NFHS and the NCAA in the rate denominator (Table 12). These participation estimates do not include schools that are not members of these two associations. Participation data were not available for these non-member schools. At present NFHS and NCAA are the only estimates available. Therefore, the participation numbers (rate denominator) in this report are underestimated, which results in an overestimate of the actual incidence rate. Likewise with cheerleading where participation data are not available for collegiate cheerleading and utilizing NFHS participation data for competitive spirit.
- Note: that the majority of schools—high school and collegiate—cancelled their spring 2020 sport seasons due to COVID-19. The NFHS did not collect participation data for their member states in 2019/20; therefore 2018/19 participation estimates were used to estimate 2019/20 participation. Participation has not varied substantially over the past 3-years (7,963,535 in 2016/17; 7,980,886 in 2017/18; and 7,937,491 in 2018/19), but there may be additional variability by individual sport that could impact sport-specific rates.
- It is important to note that catastrophic events are rare and statistical power for some strata comparisons are limited. Rates with number of incidents less than 5 should be interpreted with caution.

## RECOMMENDATIONS

1. Each athlete should have a complete physical examination with a medical history and an annual health history update.
2. All personnel involved with training athletes should emphasize proper, gradual, and sport-specific physical conditioning.
3. Every school should strive to have a certified athletic trainer.
4. Each school should have a written emergency action plan (EAP) in place, all personnel should have copies, and procedures should be reviewed and practiced annually.
  - The Centers for Disease Control and Prevention (CDC) has guidelines and templates for these plans (<http://www.cdc.gov/niosh/docs/2004-101/emrgact/emrgact1.html>).
  - NCAA and the NFHS have guidelines for these plans at the following websites: [www.nfhs.org](http://www.nfhs.org) and [www.ncaa.org](http://www.ncaa.org).
  - **An automated external defibrillator (AED) should be available and accessible onsite and medical and coaching staff should be trained in the use.**
5. There should be an emphasis on employing well trained athletic personnel, providing excellent facilities, and securing the safest and best equipment available.
6. There should be strict enforcement of game rules and administrative regulations to protect the health of the athlete and reduce the risk of catastrophic injury. Coaches and school officials must support the game officials in their rulings during the sporting event.
7. Coaches should be educated on and have the ability to teach the proper fundamental skills of the specific sport. Specific to football, the proper fundamentals of blocking and tackling should be emphasized to help reduce head and neck injuries, especially with keeping the head out of blocking and tackling.
8. Weight loss in wrestling to make weight for a match can be dangerous and cause serious injury or death. Coaches should be aware of safety precautions and rules associated with this practice.
9. There should be continued surveillance and safety research in athletics (rules, facilities, equipment, medical care and procedures).
10. **Sudden cardiac arrest:** The number of exertional/medical (indirect) cardiac related events has increased over the years and it is recommended that schools have and emergency action plan and automated external defibrillators (AED) available and

accessible on-site for emergency situations. Early detection and defibrillation is critical for survival (3-5 minutes recommended). (Casa et al. 2012)

- See also Drezner et al. 2007 for additional information about sudden cardiac arrest preparedness and management: <http://www.nata.org/sites/default/files/sudden-cardiac-arrest-consensus-statement.pdf>

11. **Heat-illness:** All personnel associated with sport participation should be cognizant of the safety measures related to physical activity in hot weather. Heat stroke and heat exhaustion are prevented by careful control of various factors in the conditioning program of the athlete.

- The NATA has a heat illness position statement on their web site (<https://www.nata.org/news-publications/pressroom/statements/position>) with recommendations for prevention: Casa et al. 2015 (<http://natajournals.org/doi/pdf/10.4085/1062-6050-50.9.07>) and Casa & Cislan, 2009 (<http://natajournals.org/doi/pdf/10.4085/1062-6050-44.3.332>)
- Coaches, athletic trainers, and players should refer to the multiple published best practices by the NATA, American College of Sports Medicine (ACSM), NFHS, and NCAA on preventing and managing heat illness. Emergency action plans should be activated.
- Link to the NFHS Sport Medicine Advisory Committee Position Statements: <https://www.nfhs.org/sports-resource-content/nfhs-sports-medicine-position-statements-and-guidelines/>
- Link to handout from the NATA on Heat Illness: <http://www.nfhs.org/media/1015650/2015-nata-heat-illness-handout.pdf>
- Link to handout from the Kory Stringer Institute on exertional heat stroke prevention: <https://ksi.uconn.edu/wp-content/uploads/sites/1222/2018/01/Preventing-Surviving-EHS-September-2017.pdf>

12. **Head Trauma:** When a player has shown signs or symptoms of head trauma (such as a change in the athlete's behavior, thinking, or physical functioning), the player should receive immediate medical attention from an appropriate medical provider and should not be allowed to return to practice or game that day. The athlete should not be allowed to return to practice or game without an evaluation by an appropriate medical provider.

- All athletes and athletic personnel should follow the state, NFHS, and NCAA policies related to concussion and return to play. See the following CDC resource for a list of states and their concussion policies: <https://www.cdc.gov/headsup/policy/index.html>
- For the most up to date information on concussion management please see the updated Consensus Statement on Concussion in Sport: The 5th International Conference on Concussion in Sport held in Berlin, October 2016 (McCrory et al. 2017 available at <http://bjsm.bmj.com/content/51/11/838>).
- Some cases associated with brain trauma reported that players complained of symptoms or had a previous concussion prior to their deaths. The team physician, athletic trainer, or coach should ensure players understand signs and symptoms of concussion and brain trauma. Players should also be encouraged to inform the team physician, athletic trainer, or coach if they are experiencing any of the signs or symptoms of brain trauma outlined by the CDC.
- HEADS UP ON CONCUSSION IN SPORTS:  
Information for Parents, Coaches, and School & Sports Professionals. Available at: <http://www.cdc.gov/headsup/highschoolsports/index.html>

The NFHS Sport Medicine Advisory Committee has developed guidelines for concussion management in sports: <http://www.nfhs.org/media/1014737/suggested-guidelines-for-management-of-a-concussion-in-sports-october-2013-2.pdf>

The NCAA has created several rules to help manage concussion injuries. The NCAA has created a set of best practices that are available in the Sports Medicine Handbook which may be found at: <http://www.ncaapublications.com/>

Every NCAA member school is required to have a concussion-management plan that:

- Requires student-athletes to receive information about the signs and symptoms of concussions. They also are required to sign a waiver that says they are responsible for reporting injuries to the medical staff.
- Mandates that institutions provide a process for removing a student-athlete from play/participation if they exhibit signs of a concussion. Student-athletes exhibiting signs of a concussions must be evaluated by a medical staff member with experience in the evaluation and management of concussions before they return to play.
- Prohibits a student-athlete with concussion symptoms from returning to play on the same day of the activity.

- Requires student-athletes diagnosed with a concussion be cleared by a physician before they are permitted to return.

13. **Spinal injuries:** Early recognition, prompt medical evaluation and management of cervical cord and spine injuries is critical for preventing permanent disability and death. Certified athletic trainers are trained to recognize and manage these injuries and whenever possible should be present for all football practices and games. Best practices recommendations for pre-hospital spine injury emergency management in football were updated in 2020 (Courson et al. 2020). For the most up to date information on management and prevention of these injuries see the following websites:

- National Athletic Trainers Association: <https://www.nata.org/practice-patient-care/health-issues/spine-injury>
- The Spine Injury in Sport Group is comprised of 25 medical bodies and sport organizations and published best practice guidelines for prehospital care and management of football players with suspected spine injuries: <https://meridian.allenpress.com/jat/article/55/6/545/438481/Best-Practices-and-Current-Care-Concepts-in>.
- Kory Stringer Institute: <https://ksi.uconn.edu/emergency-conditions/cervical-spine-injury/>

14. **Internal Organ Injuries:** Like cervical cord and spinal injuries, early recognition and prompt medical evaluation and treatment of internal organ injuries is critical for ensuring the best possible outcome. Emergency action plans, access to certified athletic trainers, and on-site medical services for competitions constitute best practices for these injuries. A better understanding of the activities and mechanisms associated with these injuries and use of protective gear worn is needed for prevention. Wearing protective gear (e.g., padded belt or shirt) that extends beyond the bottom of the shoulder pads to cover the torso may protect internal organs from direct contact.

15. **Lightning-Related Injuries:** Lightning-related injuries can happen during severe weather. In 2018, there were 20 documented lightning-related deaths and 82 nonfatal injuries among the general population in the United States (Insurance Information Institute, n.d.; National Weather Service, 2019). July and August have the highest risk for lightning strike-related injury. A majority of lightning-related deaths are associated with outdoor recreation (Thomson & Howard, 2013). An athlete struck by lightning may



suffer traumatic injuries and sudden cardiac arrest. Prevention measures include monitoring weather conditions and moving to a designated safe location until the threat has passed. This is not only important for athletes, but also for spectators.

16. **Cheerleading Injuries:** The NFHS sponsors competitive spirit and cheerleading participation is estimated from NFHS estimates for competitive spirit. Many high school and colleges have cheerleading programs that are not sponsored by either the NFHS or NCAA. Sport Market Analytics operated by SBnet (<http://www.sportsmarketanalytics.com>) estimates there were 612,680 cheerleaders ages 13-17 participating at least 50 times per year in 2018 compared to NFHS competitive spirit participation of 165,296 in 2018/19. This represents a 3 fold difference in participation estimates and results in higher high school level rates for cheerleading in this report. Cheerleading is not a sponsored sport for NCAA collegiate athletes; however, there is an estimated 144,160 cheerleaders age 18-24 participating at least 50 times per year in 2018. Accurate denominators for competitive cheerleading at the high school and college level are needed. Previous research indicates that fliers comprise the 70% of catastrophic injuries at the high school and collegiate level (Yau et al. 2018). Rule changes in basket toss in 2006/07 resulted in 4-fold reduction in basket toss injuries. Continued surveillance is important for ensuring the continued safety of cheerleading.

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## CASE SUMMARIES AY2019/20

*\*Compiled from available media reports (n=66 events captured by NCCSIR).*

### COLLEGE/UNIVERSITY

#### *Basketball Exertional/medical (indirect)*

A 21-year old collegiate basketball player collapsed on the court during the first game of the season, seven minutes into the game. The athlete reportedly lost vision and asked for a substitute on the court. Trainers from the opposing team used an AED to revive him. Doctors gave him an internal defibrillator while the medical team monitors his condition. He is no longer playing basketball.

#### *Field Hockey Exertional/medical (indirect)*

A female 18 year old collegiate field hockey athlete suffered from a heat stroke during practice. The athlete experienced central nervous system dysfunction and was immediately submerged in a cold water tub. The athlete was transported to a hospital by EMS. Current prognosis is unknown.

#### *Football Traumatic injury (direct)*

A male college football linebacker suffered a neck injury during a game. The injury occurred when the athlete went across the middle and hit the opposing tight end. Athletic training staff attended to him for several minutes until he was taken off the field on a stretcher by EMS. He had surgery to repair a fractured cervical vertebrae the next day. He is expected to make a full recovery.

A male college senior football defensive player suffered a spine fracture during the summer before his senior year. He kept playing and during the fall training camp, he developed spinal stenosis. He played through the season, despite having severe pain. While practicing for the final bowl game, he felt a pop in his back with a tingling sensation in his legs. The athlete was rushed to a nearby hospital. The physician recommended that he not continue playing football.

#### *Football Exertional/medical (indirect)*

A male 23 year old college football player collapsed during non-contact drills at practice. He was attended to by athletic training staff and EMS immediately. CPR was initiated then the athlete was transported to a hospital where he later died. The cause of death was acute aortic dissection.

A male 22 year old collegiate football player suffered sudden cardiac arrest while he was sprinting during an off-season workout. The strength and conditioning coach and athletic trainer worked together to use the AED and call 911. He was taken to the hospital and placed in a medically-induced coma. He was diagnosed with an enlarged heart and had an internal defibrillator placed. He woke up from the coma, is responding to commands, and recovering well.

*Gymnastics Traumatic injury (direct)*

A female 20 year old collegiate gymnast was training on the uneven bars and suffered a spinal cord injury. She was taken to a hospital where she later died from her injuries.

*Swimming Exertional/medical (indirect)*

A male 21 year old collegiate swimmer went into sudden cardiac arrest just after finishing freestyle sprints during swim practice. He did not feel well and tried to pull himself out of the water but couldn't. He slipped beneath the surface of the water. A swimmer next to him pulled him above water and the coaches rushed to help. The coach performed CPR and a teammate ran to get the athletic trainer and AED. The athletic trainer administered a shock with the AED and the athlete's heart began beating again. The coaches resumed CPR until EMS arrived to take him to the hospital. He was then airlifted to another hospital. The athlete had a history of aortic stenosis. Surgery was performed to correct the cardiac defect. He is expected to make a full recovery and possibly return to swimming.

*Track and Field Traumatic injury (direct)*

A male collegiate track and field decathlete collapsed while doing an individual workout on the track. A bystander noticed that the athlete was face down on the track unconscious and called 911 then proceeded to perform CPR while waiting for EMS. The athlete was bleeding from his nose and there was foam coming from his mouth. Another bystander showed up to help. EMS arrived, administered several shocks with the AED, and gave the athlete some medication until he responded. He was transported to a hospital, placed in a medically-induced coma, and kept in the ICU for 9 days. After months of slow recovery, the athlete's parents sought out several alternative forms of treatment including therapies such as hyperbaric oxygen therapy. The athlete is now able to carry on basic conversations and engage in brief aerobic activity.

## **HIGH SCHOOL**

*Baseball Traumatic injury (direct)*

A male freshman baseball player playing center field was fielding a ball when he collided with the short-stop. The head of the shortstop hit the athlete in the chest. The athlete tried to stand up following the hit, but he fell back to the ground and fell unconscious. The athletic trainer on site responded immediately and two bystanders assisted with CPR. The athletic trainer administered a shock with the AED. After another round of CPR was performed following the shock, the athlete regained a pulse and began breathing. The athlete was transported to the hospital and has been discharged after a full recovery. After a series of tests, physicians have found nothing wrong with the athlete's heart. The cause of collapse was commotio cordis.

*Baseball Exertional/medical (indirect)*

A 17 year old high school baseball player collapsed during team try-outs. The coach performed CPR and called 911. He was transferred to the hospital where he underwent surgery. The athlete went into cardiac arrest several times during practice and has no previous medical history. The athlete ultimately recovered and was released from the hospital. Cause of the sudden cardiac arrest was determined to be arrhythmogenic right ventricular cardiomyopathy.

*Basketball Traumatic injury (direct)*

A 16-year-old male high school basketball player attempted a dunk in a game. The athlete slipped when landing and landed on his head and neck. The athlete immediately had a seizure and was taken to a hospital. He suffered a skull fracture and brain bleed. Athlete was in the ICU but is now out. The athlete has made a full recovery and returned to play.

*Basketball Exertional/medical (indirect)*

A 16 year old female basketball player collapsed during a conditioning session. The conditioning session was outdoors at the school. The athlete was noticeably struggling throughout the workout. She collapsed after walking up stairs during the conditioning session and was unresponsive, but breathing. She was transported to a hospital by EMS where her rectal temperature was 101.7. She eventually went into cardiac arrest again and CPR was initiated. Cause of death was hyperthermia and rhabdomyolysis during physical exertion with high ambient temperature.

A male high school basketball player was jumping rope on the first day of basketball practice when he felt dizzy and collapsed. A coach from another sport started CPR on the court. The athletic trainer administered an AED shock, which restarted the athlete's heart. Paramedics arrived after about 20 minutes, at which time the athlete was conscious and speaking. The athlete will get an implantable cardioverter defibrillator in his chest.

A male high school freshman basketball player collapsed during a practice while running wind sprints on the court. CPR was performed until EMS arrived on the scene, but attempts to revive the athlete were unsuccessful and he died. Cause of death was related to cardiomegaly and a cardiac arrhythmia.

A male 17 year old high school basketball player collapsed during practice and stopped breathing. The school athletic trainer performed chest compressions and applied the AED on the athlete then officers showed up to continue chest compressions and rescue breaths. Advanced Life Support arrived on the scene and delivered one shock through the AED that restored the athlete's pulse and respiration. EMS then transported him to the hospital. The athlete is recovering.

A male high school basketball player collapsed during half-time of a game then stopped breathing. He was caught by two teammates when he collapsed. The basketball coach sent for the team physician, a nurse, and a parent from the stands. The team physician started CPR in the locker room and was assisted by a police officer and a coach. Two coaches retrieved the AED and the athlete was shocked three times with the device. Two parents, who were medical professionals, administered the device. Within 15 minutes of the collapse, an ambulance arrived and transported him to a hospital. He was diagnosed with hypertrophic cardiomyopathy and will have an internal defibrillator placed.

A male high school basketball player collapsed at practice due to cardiac syncope. After undergoing testing at the hospital, he was diagnosed with hypertrophic cardiomyopathy. He returned to play football 7 months later.

A 17 year old high school junior male varsity basketball and baseball player was playing pickup basketball at home when he suddenly began experiencing tachycardia and collapsed. The athlete's father immediately began CPR and activated EMS. Upon prompt arrival, EMS used High-Performance CPR technology and an AED. The athlete was taken to the hospital, has since recovered, and plans to return to playing varsity basketball this upcoming season.

*Football Traumatic injury (direct)*

A male high school football quarterback collapsed in the locker room about 20 minutes after the end of a football game. The event that is suspected to have caused the injury was a collision with another player after scoring a touchdown. The athlete's head hit the ground. Prior to his collapse, he complained of feeling ill in the locker room and was attended to by a coach and an athletic trainer. EMS, who was at the game and had not left yet, transported that athlete to the hospital where he underwent surgery to relieve a brain bleed. The athlete is expected to make a full recovery.

A male football player was injured during a game. He was hit in the chest by an opponent's helmet. The athlete was taken to a hospital will have surgery to remove the blood behind the sternum caused by the contact. The athlete has recovered and continues to play sports.

A male 15 year old high school football player was left paralyzed from the shoulders down after tackling a quarterback during a junior varsity football game and injuring two cervical vertebrae. He was rushed to the emergency room by EMS. The athlete is undergoing rehabilitation. He is paralyzed from the shoulders down but has feeling in his arms and legs.

A male 14 year old football player suffered a severe spinal injury after colliding with another player during a game. The athlete was taken to a hospital and released by the next day.

A male 16 year old high school football player suffered an injury to his head during a game. The back of the athlete's head made contact with the ground after making a tackle. After hitting the ground, he sat up on his knees and said that his head hurt before falling face-first onto the ground. He was unconscious following the hit and transported to a hospital by EMS. He had too much swelling around his brain to operate. He died three days later. Cause of death was blunt head trauma and subdural hemorrhage.

A male 17 year-old high school football player was unable to stand following a tackle. He was attended to by EMS and transported to a hospital. He suffered a severe brain bleed due to a preexisting condition. Cause of death was brain arteriovenous malformation rupture.

A male high school football player collapsed in the parking lot following a game. He was attended to by EMS and transported to a hospital. He underwent neurosurgery and was put into a medically induced coma. The athlete has returned home and is undergoing rehabilitation.

A male 19 year old high school football safety suffered a cervical spine burst fracture while making a tackle in a game. As he went in for the tackle, his head collided with the knee of the opposing player. The athlete was attended to by EMS and taken off the field on a stretcher. He was air lifted to a nearby hospital. He is in intensive rehabilitation therapy making physical improvements, but is not yet able to walk.

A male high school football player collapsed on the sideline after suffering a head injury during a game. He was transported by ambulance to a hospital and underwent emergency surgery. He was later airlifted to another hospital. After being in a coma for four days, the athlete awoke and began showing improvements through in-patient rehab by responding to some commands. The athlete underwent extensive rehabilitation and has since experienced a full neurological recovery.

A male high school sophomore football player was going through a routine hitting drill at practice when he started walking toward the team's athletic trainer and vomiting. The athletic trainer called his mother as soon as this happened and asked her to take him to the hospital. About 10 minutes later, EMS was at the field and the athlete was comatose and seizing on the ground. Paramedics cut off his clothes on the field before transporting him to a hospital. An MRI showed that he had a brain bleed that started a day earlier. At practice the day before, he had a headache after practice that was gone by the next morning. At the hospital, the athlete received emergency surgery to remove part of his skull and fix the brain bleed. He woke up from his medically-induced coma after 2 days and remained in the hospital for 30 days. He had a second surgery to reattach the skull a few days later. He has since returned to school, can fully speak, and has full function of his basic motor skills, including running.

A male high school football quarterback suffered a head injury during a game. During the game, the athlete complained of a headache before collapsing on the sideline. In the play prior to his collapse, he handed the ball off to a running back, was bumped by a defender, then walked the length of the field to hand the ball off for a 2-point conversion. He was rushed to the hospital where he underwent surgery to drain the bleeding from his skull and to relieve pressure. He was then placed in a medically-induced coma and spent 5 months in the hospital. The athlete has returned home to continue therapies and has made some progress, able to now stand up on his own.

A male 17-year old high school football player suffered a traumatic brain injury after a helmet-to-helmet hit during a game. He lay motionless on the football field until paramedics rushed to help him. He was transported to the hospital and had surgery due to brain hemorrhage. Current prognosis is unknown.

A male 15-year old high school football player suffered a spinal injury late in the third quarter of a game. He was transported via helicopter to the hospital where he regained movement in his extremities. According to the coach, the injury occurred on an "unlucky" hit. He continues to have left-sided weakness as well as problems with regulating his blood pressure.

A male sophomore football player was backing up to block for a kickoff when his helmet collided with an opposing player's helmet. After that hit, his head endured another hit to the thigh pad of a teammate who was also blocking. The player immediately fell to the ground and did not have feeling below his neck. He also experienced a sharp pain through his spine and skull. The athletic trainer stabilized his cervical spine while waiting for paramedics to take the athlete to the hospital. He was able to move his fingers and toes in the ambulance. He was transferred to a trauma hospital before being sent home in a neck brace the next day. He has been cleared to start practicing with the school basketball team.

A male high school football player was injured during a pre-season scrimmage when he leaped up to catch a pass and fell, hitting his back then his head on the ground. He felt dizzy, sat out on the sideline, where he passed out and hit his head on the ground again. The coach and athletic trainer applied ice to the athlete, believing he had a heat stroke. The athlete's sister called EMS who took him to the hospital. He underwent emergency surgery to address brain hemorrhaging. The athlete woke up the next day and has made a full recovery.

A male high school football player was injured during practice and complained of losing feeling in his arm as well as spinal discomfort. He was transported to a trauma hospital by EMS. He is expected to make a full recovery.

A male 18 year old high school football wide receiver was injured in a playoff game. After catching a pass, he collided with a defender while crashing his helmet into the turf. He lay motionless for several minutes surrounded by his coaches, the athletic trainers, and other players until an ambulance drove onto the field and transported him to a hospital. He eventually became unresponsive in the hospital. He was diagnosed with a concussion and spinal cord contusion that caused temporary paralysis and a body shutdown. The doctors theorized that the severity stemmed from his spinal cord being too narrow in relation to his body. He was able to walk with assistance after 5 days in the hospital and was discharged after 7 days. He began playing basketball for the high school a few months later. He has also committed to playing college football next year.

A high school football player went to a chiropractor for back pain and was told that he had a dislocated vertebrae that would heal on its own. A few weeks later he played in a football game and was injured, causing more severe spine pain. The next day, he was seen by a physician who diagnosed him with two fractured cervical vertebrae. He was told that he would not play contact sports again, however, he is training to return next season and is hopeful.

A high school senior football player was injured during a 7-on-7 drill at practice. The athlete went up for a ball when another player ran into him with his knee, rupturing his liver. The athlete returned to play about four months later.

A male high school football player was hit in the ribs with an opposing player's helmet while making a tackle. He fell to the ground, rolling on the field and having trouble breathing. A nurse from the stands came down to attend to the athlete with the coaches. He was moved into an ambulance and given an IV and medication until a helicopter could arrive and transport him to a hospital where he was admitted and stayed overnight. He suffered from bruised organs and a fractured rib and was expected to make a full recovery and return to football the following season.

A male high school junior football linebacker took a hit in a game where he experienced neck pain and numbness in his right side. The athlete went to the ER after the game and was told it was a neck sprain and that he would recover in a few weeks. He began physical therapy but was still in pain. The athlete played a full game in a neck brace two weeks after the initial hit but was still experiencing pain so he went to the doctor again. They did an x-ray, revealing a clay shoveler's fracture, so the doctors ordered an MRI, which revealed a fractured vertebra and two dislocated vertebrae and was called to the hospital for emergency surgery. The athlete has made a full recovery and works as a student assistant for his university's football team.

#### *Football Exertional/medical (indirect)*

A male 15 year old high school football athlete collapsed and suffered sudden cardiac arrest during a conditioning drill. He was immediately attended to by a coach that activated administered CPR and AED shock. The athlete was taken to a hospital nearby where he was later airlifted to another hospital. He is in stable condition but no other prognosis is known.



A male 15 year old high school football player collapsed during conditioning at an indoor practice while running bleachers. The coaches noticed him struggling to finish the drill and he took multiple doses from his inhaler, but he continued to get worse. The assistant athletic trainer was brought to the scene and called for EMS. The athlete lost consciousness and became unresponsive within about 15 minutes of the start of the asthma attack. EMS began life CPR and advanced life support then transported him to the hospital. He was pronounced dead later that night at the hospital. Cause of death was cardiac arrest and asthma attack according to the Coroner report.

A male high school football player collapsed during a game. He was attended to immediately by EMTs who were stationed at the game, then taken to the hospital. The athlete later died. Cause of death is pending autopsy.

A male 16 year old high school defensive-tackle suffered sudden cardiac arrest while running with his family playing tag in a parking lot. He collapsed to his knees and his brother caught him. His brother immediately called EMS. He was pronounced dead in an ambulance. Cause of death was cardiomegaly.

A male high school football athlete collapsed and suffered sudden cardiac arrest following a game. He was immediately attended to by team doctors and athletic trainers. CPR was provided on the field and an AED was retrieved. The athlete was transported by EMS to a hospital. He was released from the hospital and returned to football.

A 15 year old male high school football player collapsed during a football game. He collapsed on the field, got up and began to jog to the sideline and collapsed again. EMS were called to the scene and performed CPR. The athlete was transported by EMS to a hospital where he later died. The cause of death was due to arrhythmogenic right ventricular cardiomyopathy. The athlete had heart surgery several years ago to correct a congenital heart defect.

A 14 year old high school football player was found unresponsive at the bottom of the high school's pool. The football team had been giving access to the pool after football practice. Coaches and lifeguards were both present. Athletic trainers performed CPR on the athlete and administered an AED before he was taken to the hospital. Cause of death was due to drowning and other contributing factors are pending autopsy.

A male 18 year old high-school football athlete fell to the ground during a light practice. He had just finished a play and was standing on the sideline when he stumbled. The coach asked if he was okay and he said yes before collapsing to the ground and having a seizure-like episode. The athletic trainer arrived shortly after the collapse and found the athlete unresponsive with no pulse. The coach removed the athlete's equipment and the athletic trainer administered one shock with the AED and 2 rounds of CPR before EMS arrived. EMS intubated the athlete and took him to the hospital. He was placed in a medically induced coma for 24 hours, had an internal defibrillator placed, and made a full recovery.

A 17 year old male high school sophomore football defensive back collapsed on the field at the beginning of practice after running a route. An athletic trainer immediately responded providing CPR and using an AED to shock the athlete four or five times. EMS quickly arrived and took the athlete to the hospital where he had an internal defibrillator implanted. The athlete underwent a series of tests which ultimately revealed the cause of the collapse: arrhythmogenic right ventricular cardiomyopathy from the PKP2 mutation. The athlete's mother and sister were also diagnosed with the mutation. The athlete is unable to return to competitive team sports but has since picked up weightlifting.

A male 17-year-old high school senior football athlete collapsed during practice while doing wind sprints and suffered cardiac arrest. He was revived through CPR and two shocks from the AED, administered by two football coaches. He was transported to the hospital via EMS. He later underwent open-heart surgery where doctors removed heart tissue and repositioned the artery. The athlete is now at home and undergoing rehabilitation.

A male 17 year old football athlete went into cardiac arrest while running sprints to train for the upcoming high school football season. His father and two neighbors performed CPR until EMS arrived. EMS shocked the athlete 7 times and transported him to the hospital where he spent 8 days recovering. months later he received an ICD and is on a beta blocker. He did suffer mild traumatic brain damage and had to undergo weeks of therapy. The athlete has since fully recovered.

*Ice Hockey Traumatic injury (direct)*

A male 17-year old high school hockey player's neck and back collided with the boards during a game, which left him motionless on the ice. Immediately, he could not feel his legs or move them. He was rushed to a hospital and had surgery to repair a fractured and dislocated cervical spine. He is recovering in the hospital, has regained mobility and is working on fine motor skills. He will have a second neck surgery soon.

*Ice Hockey Exertional/medical (indirect)*

A male 15-year old high school sophomore hockey athlete collapsed during hockey practice. The head certified athletic trainer was on-site and quickly provided 2 rounds of CPR before using the AED. The athlete was shocked and revived on the court. He was rushed to the hospital via EMS and an ICD was ultimately implanted. No conclusive diagnosis has been reached, though CPVT is suspected to have been at play.

*Soccer Exertional/medical (indirect)*

A male high school soccer player collapsed and died at practice. There was an athletic trainer on duty at the time and an AED nearby, however it was not retrieved. EMS arrived 12 minutes after the collapse and applied their AED then transported the athlete to the hospital where he died. Cause of death is pending autopsy but suspected to be cardiac related.

*Swimming Exertional/medical (indirect)*

A female 14 year old high school swimmer was found dead under the pool cover about 20 minutes after swimming practice.

*Track and Field Traumatic injury (direct)*

A male 16-year old cross country and track and field athlete was running for practice on the sidewalk when he was hit by a truck. He was transported to a hospital where he died from his injuries two days later.

An 18 year old male high school track and field runner was hit by a car while preparing for a run on the sidewalk near the high school. He later died in the hospital 12 days later.

A 17 year old female track and field runner was preparing for a run on the sidewalk when she was hit by a vehicle. She died at the scene.

A 16 year old female track and field runner was at practice preparing for a run on the sidewalk when she was hit by a vehicle. She was taken to the hospital via EMS and died the next morning.

A male high school track and field athlete was at practice preparing for a run on the sidewalk when he was hit by a vehicle. Students that witnessed the crash administered first aid and CPR. He was transported to the hospital and in critical condition. He was treated for very serious injuries, including bruised lungs, damaged ligaments, and broken bones. He is still recovering in extensive therapies and walks with a walker. He is hoping to run again one day.

#### *Volleyball Exertional/medical (indirect)*

A female 15 year old high school volleyball player collapsed after running warm-up laps during practice. She had a history of asthma. She collapsed after telling her coaches she didn't feel well and attempting to use her inhaler. She became unresponsive a few minutes after collapsing and her coaches immediately performed CPR. An AED was applied but it did not advise a shock. Her pulse was restored with CPR and she was transported to the hospital via EMS. She died at the hospital two days later. The cause of death was cardiac dysrhythmia due to multiple congenital heart defects.

A female high school volleyball player collapsed during a workout while performing push-ups at home. Her mother and sister were able to perform CPR quickly and call 911. EMS arrived after 9 minutes and were able to revive her heart after 23 minutes. At the hospital, she underwent 3 surgeries and was placed in a medically-induced coma. She now has an internal defibrillator placed and is recovering very well in the ICU.

#### *Wrestling Exertional/medical (indirect)*

A male 16 year old high school wrestler was walking laps to warm up during the first wrestling practice of the high school season when he collapsed due to sudden cardiac arrest. He was resuscitated at the school, but later died at the hospital.

A male 17 year old high school wrestler collapsed just after he was pinned during a match. CPR was initiated quickly and an AED was quickly brought over and applied. However, the AED advised no shock, and after around 3.5 minutes of CPR, a heart rhythm was detected and he regained consciousness. He was taken out on a stretcher and was brought to a hospital via EMS. He recovered in the hospital and was diagnosed with AV-nodal reentrant tachycardia.

A male 17 year old high school junior varsity wrestler collapsed during practice while lightly rolling around with a teammate. Three coaches quickly administered CPR while a teacher ran to get the AED. The athlete was revived in the gym with a pulse and shallow breathing, but was still unconscious. He was taken to the hospital by EMS and then air lifted to another, where he was ultimately diagnosed with Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT). The athlete recovered and is currently taking oral medication and has an implantable cardioverter-defibrillator (ICD).

A high school wrestler collapsed during practice. The coach performed CPR. He was transported by ambulance to a hospital and was diagnosed with catecholaminergic polymorphic ventricular tachycardia (CPVT).

## **TABLES AND FIGURES**

**Table 1: Number of All catastrophic traumatic injuries (direct) and exertional/medical conditions (indirect) by year: All sports combined, all levels (high school and college)**

	Collegiate/		High School		All	
	N	%	N	%	N	%
1982-1983	11	18.0%	50	82.0%	61	100.0%
1983-1984	13	21.0%	49	79.0%	62	100.0%
1984-1985	9	17.6%	42	82.4%	51	100.0%
1985-1986	16	27.6%	42	72.4%	58	100.0%
1986-1987	18	25.7%	52	74.3%	70	100.0%
1987-1988	15	17.9%	69	82.1%	84	100.0%
1988-1989	17	23.0%	57	77.0%	74	100.0%
1989-1990	11	14.5%	65	85.5%	76	100.0%
1990-1991	15	24.2%	47	75.8%	62	100.0%
1991-1992	11	23.4%	36	76.6%	47	100.0%
1992-1993	9	15.0%	51	85.0%	60	100.0%
1993-1994	11	16.7%	55	83.3%	66	100.0%
1994-1995	12	23.1%	40	76.9%	52	100.0%
1995-1996	8	15.4%	44	84.6%	52	100.0%
1996-1997	9	13.6%	57	86.4%	66	100.0%
1997-1998	15	20.0%	60	80.0%	75	100.0%
1998-1999	10	12.8%	68	87.2%	78	100.0%
1999-2000	9	12.7%	62	87.3%	71	100.0%
2000-2001	19	26.8%	52	73.2%	71	100.0%
2001-2002	14	17.3%	67	82.7%	81	100.0%
2002-2003	16	25.8%	46	74.2%	62	100.0%
2003-2004	18	24.3%	56	75.7%	74	100.0%
2004-2005	10	14.7%	58	85.3%	68	100.0%
2005-2006	12	21.8%	43	78.2%	55	100.0%
2006-2007	14	18.2%	63	81.8%	77	100.0%
2007-2008	15	18.3%	67	81.7%	82	100.0%
2008-2009	19	17.1%	92	82.9%	111	100.0%
2009-2010	27	27.6%	71	72.4%	98	100.0%
2010-2011	17	21.8%	61	78.2%	78	100.0%
2011-2012	24	27.3%	64	72.7%	88	100.0%
2012-2013	16	32.0%	34	68.0%	50	100.0%
2013-2014	18	21.7%	65	78.3%	83	100.0%
2014-2015	17	20.5%	66	79.5%	83	100.0%
2015-2016	20	18.7%	87	81.3%	107	100.0%
2016-2017	33	37.1%	56	62.9%	89	100.0%
2017-2018	24	27.6%	63	72.4%	87	100.0%
2018-2019	18	22.0%	64	78.0%	82	100.0%
2019-2020	9	13.6%	57	86.4%	66	100.0%
<b>Total</b>	579	21.0%	2178	79.0%	2757	100.0%
<b>Total*</b>	614	21.3%	2264	78.7%	2878	100.0%

\*Includes Cheerleading, Drill Team, Rodeo

**Table 2: Number of Traumatic (direct) catastrophic injuries by year: All sports combined, all levels (high school and college)**

	Collegiate/		High School		All	
	N	%	N	%	N	%
1982-1983	5	12.5%	35	87.5%	40	100.0%
1983-1984	8	19.0%	34	81.0%	42	100.0%
1984-1985	9	22.5%	31	77.5%	40	100.0%
1985-1986	15	30.6%	34	69.4%	49	100.0%
1986-1987	14	26.9%	38	73.1%	52	100.0%
1987-1988	8	12.3%	57	87.7%	65	100.0%
1988-1989	13	23.2%	43	76.8%	56	100.0%
1989-1990	7	13.5%	45	86.5%	52	100.0%
1990-1991	11	28.2%	28	71.8%	39	100.0%
1991-1992	6	17.6%	28	82.4%	34	100.0%
1992-1993	7	17.9%	32	82.1%	39	100.0%
1993-1994	6	13.6%	38	86.4%	44	100.0%
1994-1995	9	23.7%	29	76.3%	38	100.0%
1995-1996	6	17.6%	28	82.4%	34	100.0%
1996-1997	7	14.0%	43	86.0%	50	100.0%
1997-1998	6	12.0%	44	88.0%	50	100.0%
1998-1999	10	18.2%	45	81.8%	55	100.0%
1999-2000	9	20.9%	34	79.1%	43	100.0%
2000-2001	14	31.8%	30	68.2%	44	100.0%
2001-2002	5	9.6%	47	90.4%	52	100.0%
2002-2003	10	26.3%	28	73.7%	38	100.0%
2003-2004	12	22.2%	42	77.8%	54	100.0%
2004-2005	6	18.2%	27	81.8%	33	100.0%
2005-2006	7	21.9%	25	78.1%	32	100.0%
2006-2007	8	16.3%	41	83.7%	49	100.0%
2007-2008	9	16.7%	45	83.3%	54	100.0%
2008-2009	10	12.5%	70	87.5%	80	100.0%
2009-2010	16	27.1%	43	72.9%	59	100.0%
2010-2011	11	21.6%	40	78.4%	51	100.0%
2011-2012	9	16.4%	46	83.6%	55	100.0%
2012-2013	8	36.4%	14	63.6%	22	100.0%
2013-2014	3	8.6%	32	91.4%	35	100.0%
2014-2015	6	20.0%	24	80.0%	30	100.0%
2015-2016	15	23.4%	49	76.6%	64	100.0%
2016-2017	7	22.6%	24	77.4%	31	100.0%
2017-2018	9	22.5%	31	77.5%	40	100.0%
2018-2019	5	12.8%	34	87.2%	39	100.0%
2019-2020	3	9.4%	29	90.6%	32	100.0%
<b>Total</b>	319	19.1%	1350	80.9%	1669	100.0%
<b>Total*</b>	364	19.9%	1461	80.1%	1825	100.0%

\*Includes Cheerleading, Drill Team, Rodeo

**Table 3: Number of Exertional/medical (indirect) catastrophic conditions by year: All sports combined, all levels (high school and college)**

	Collegiate/		High School		All	
	N	%	N	%	N	%
1982-1983	6	28.6%	15	71.4%	21	100.0%
1983-1984	5	25.0%	15	75.0%	20	100.0%
1984-1985	0	0	11	100.0%	11	100.0%
1985-1986	1	11.1%	8	88.9%	9	100.0%
1986-1987	4	22.2%	14	77.8%	18	100.0%
1987-1988	7	36.8%	12	63.2%	19	100.0%
1988-1989	4	22.2%	14	77.8%	18	100.0%
1989-1990	4	16.7%	20	83.3%	24	100.0%
1990-1991	4	17.4%	19	82.6%	23	100.0%
1991-1992	5	38.5%	8	61.5%	13	100.0%
1992-1993	2	9.5%	19	90.5%	21	100.0%
1993-1994	5	22.7%	17	77.3%	22	100.0%
1994-1995	3	21.4%	11	78.6%	14	100.0%
1995-1996	2	11.1%	16	88.9%	18	100.0%
1996-1997	2	12.5%	14	87.5%	16	100.0%
1997-1998	9	36.0%	16	64.0%	25	100.0%
1998-1999	0	0	23	100.0%	23	100.0%
1999-2000	0	0	28	100.0%	28	100.0%
2000-2001	5	18.5%	22	81.5%	27	100.0%
2001-2002	9	31.0%	20	69.0%	29	100.0%
2002-2003	6	25.0%	18	75.0%	24	100.0%
2003-2004	6	30.0%	14	70.0%	20	100.0%
2004-2005	4	11.4%	31	88.6%	35	100.0%
2005-2006	5	21.7%	18	78.3%	23	100.0%
2006-2007	6	21.4%	22	78.6%	28	100.0%
2007-2008	6	21.4%	22	78.6%	28	100.0%
2008-2009	9	29.0%	22	71.0%	31	100.0%
2009-2010	11	28.2%	28	71.8%	39	100.0%
2010-2011	6	22.2%	21	77.8%	27	100.0%
2011-2012	15	45.5%	18	54.5%	33	100.0%
2012-2013	8	28.6%	20	71.4%	28	100.0%
2013-2014	15	31.3%	33	68.8%	48	100.0%
2014-2015	11	20.8%	42	79.2%	53	100.0%
2015-2016	5	11.6%	38	88.4%	43	100.0%
2016-2017	26	44.8%	32	55.2%	58	100.0%
2017-2018	15	31.9%	32	68.1%	47	100.0%
2018-2019	13	30.2%	30	69.8%	43	100.0%
2019-2020	6	17.6%	28	82.4%	34	100.0%
<b>Total</b>	250	24.0%	791	76.0%	1041	100.0%
<b>Total*</b>	250	23.7%	803	76.3%	1053	100.0%

\*Includes Cheerleading, Drill Team, Rodeo

**Table 4a: Number of Traumatic (direct) catastrophic injuries by severity by sport: High school all years combined 1982/83 to 2019/20**

		Serious		Non-fatal		Fatal		Unknown		All	
		N	%	N	%	N	%	N	%	N	%
<b>Baseball</b>	<b>Male</b>	30	44.1%	21	30.9%	15	22.1%	2	2.9%	68	100.0%
<b>Basketball</b>	<b>Female</b>	3	50.0%	3	50.0%	0	0	0	0	6	100.0%
	<b>Male</b>	11	64.7%	4	23.5%	1	5.9%	1	5.9%	17	100.0%
<b>Cheerleading</b>	<b>Female</b>	42	58.3%	23	31.9%	1	1.4%	6	8.3%	72	100.0%
	<b>Male</b>	1	50.0%	1	50.0%	0	0	0	0	2	100.0%
<b>Cross Country</b>	<b>Female</b>	0	0	0	0	2	100.0%	0	0	2	100.0%
	<b>Male</b>	0	0	2	66.7%	1	33.3%	0	0	3	100.0%
<b>Field Hockey</b>	<b>Female</b>	0	0	1	33.3%	0	0	2	66.7%	3	100.0%
<b>Football</b>	<b>Male</b>	430	42.1%	421	41.2%	142	13.9%	29	2.8%	1022	100.0%
<b>Golf</b>	<b>Male</b>	1	100.0%	0	0	0	0	0	0	1	100.0%
<b>Gymnastics</b>	<b>Female</b>	4	36.4%	7	63.6%	0	0	0	0	11	100.0%
	<b>Male</b>	1	25.0%	2	50.0%	1	25.0%	0	0	4	100.0%
<b>Ice Hockey</b>	<b>Female</b>	2	66.7%	1	33.3%	0	0	0	0	3	100.0%
	<b>Male</b>	12	38.7%	14	45.2%	4	12.9%	1	3.2%	31	100.0%
<b>Lacrosse</b>	<b>Female</b>	2	66.7%	0	0	0	0	1	33.3%	3	100.0%
	<b>Male</b>	11	50.0%	7	31.8%	2	9.1%	2	9.1%	22	100.0%
<b>Skiing</b>	<b>Female</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
<b>Soccer</b>	<b>Female</b>	6	66.7%	1	11.1%	2	22.2%	0	0	9	100.0%
	<b>Male</b>	7	41.2%	2	11.8%	7	41.2%	1	5.9%	17	100.0%
<b>Softball</b>	<b>Female</b>	6	85.7%	1	14.3%	0	0	0	0	7	100.0%
<b>Swimming</b>	<b>Female</b>	1	16.7%	5	83.3%	0	0	0	0	6	100.0%
	<b>Male</b>	3	30.0%	6	60.0%	1	10.0%	0	0	10	100.0%
<b>Track and Field</b>	<b>Female</b>	7	58.3%	2	16.7%	3	25.0%	0	0	12	100.0%
	<b>Male</b>	17	27.9%	17	27.9%	23	37.7%	4	6.6%	61	100.0%
<b>Volleyball</b>	<b>Male</b>	0	0	1	100.0%	0	0	0	0	1	100.0%
<b>Wrestling</b>	<b>Male</b>	24	35.8%	39	58.2%	3	4.5%	1	1.5%	67	100.0%



**Table 4b: Number of Exertional/medical (indirect) catastrophic conditions by severity by sport: High school all years combined 1982/83 to 2019/20**

		Serious		Non-fatal		Fatal		Unknown		All	
		N	%	N	%	N	%	N	%	N	%
<b>Baseball</b>	<b>Male</b>	7	25.9%	0	0	20	74.1%	0	0	27	100.0%
<b>Basketball</b>	<b>Female</b>	2	10.0%	0	0	18	90.0%	0	0	20	100.0%
	<b>Male</b>	37	21.0%	0	0	138	78.4%	1	0.6%	176	100.0%
<b>Cheerleading</b>	<b>Female</b>	4	33.3%	0	0	8	66.7%	0	0	12	100.0%
<b>Cross Country</b>	<b>Female</b>	4	26.7%	0	0	11	73.3%	0	0	15	100.0%
	<b>Male</b>	5	19.2%	0	0	21	80.8%	0	0	26	100.0%
	<b>Unknown</b>	0	0	0	0	0	0	1	100.0%	1	100.0%
<b>Dance</b>	<b>Female</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
<b>Field Hockey</b>	<b>Female</b>	0	0	0	0	2	100.0%	0	0	2	100.0%
<b>Football</b>	<b>Male</b>	54	17.4%	3	1.0%	251	81.0%	2	0.6%	310	100.0%
<b>Ice Hockey</b>	<b>Male</b>	3	37.5%	0	0	5	62.5%	0	0	8	100.0%
<b>Lacrosse</b>	<b>Female</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
	<b>Male</b>	2	16.7%	0	0	10	83.3%	0	0	12	100.0%
<b>Other</b>	<b>Female</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
<b>Rowing</b>	<b>Male</b>	1	100.0%	0	0	0	0	0	0	1	100.0%
<b>Running/Jogging</b>	<b>Female</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
	<b>Male</b>	1	100.0%	0	0	0	0	0	0	1	100.0%
<b>Soccer</b>	<b>Female</b>	3	21.4%	0	0	11	78.6%	0	0	14	100.0%
	<b>Male</b>	8	19.0%	1	2.4%	31	73.8%	2	4.8%	42	100.0%
<b>Softball</b>	<b>Female</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
<b>Swimming</b>	<b>Female</b>	2	16.7%	0	0	9	75.0%	1	8.3%	12	100.0%
	<b>Male</b>	1	12.5%	0	0	7	87.5%	0	0	8	100.0%
<b>Tennis</b>	<b>Female</b>	0	0	0	0	2	100.0%	0	0	2	100.0%
	<b>Male</b>	0	0	0	0	4	100.0%	0	0	4	100.0%
<b>Track and Field</b>	<b>Female</b>	0	0	1	12.5%	7	87.5%	0	0	8	100.0%
	<b>Male</b>	9	19.1%	0	0	38	80.9%	0	0	47	100.0%
<b>Volleyball</b>	<b>Female</b>	3	60.0%	0	0	2	40.0%	0	0	5	100.0%
<b>Water Polo</b>	<b>Female</b>	1	50.0%	0	0	1	50.0%	0	0	2	100.0%
	<b>Male</b>	0	0	0	0	3	100.0%	0	0	3	100.0%
<b>Wrestling</b>	<b>Male</b>	8	20.0%	0	0	31	77.5%	1	2.5%	40	100.0%

**Table 5a: Number of Traumatic (direct) catastrophic injuries by severity by sport: College all years combined 1982/83 to 2019/20**

		Serious		Non-fatal		Fatal		Unknown		All	
		N	%	N	%	N	%	N	%	N	%
<b>Baseball</b>	<b>Male</b>	9	45.0%	7	35.0%	3	15.0%	1	5.0%	20	100.0%
<b>Basketball</b>	<b>Male</b>	9	81.8%	1	9.1%	1	9.1%	0	0	11	100.0%
<b>Cheerleading</b>	<b>Female</b>	13	46.4%	13	46.4%	1	3.6%	1	3.6%	28	100.0%
	<b>Male</b>	3	60.0%	2	40.0%	0	0	0	0	5	100.0%
<b>Equestrian</b>	<b>Female</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
<b>Field Hockey</b>	<b>Female</b>	2	66.7%	0	0	0	0	1	33.3%	3	100.0%
<b>Football</b>	<b>Male</b>	151	68.6%	52	23.6%	17	7.7%	0	0	220	100.0%
<b>Gymnastics</b>	<b>Female</b>	0	0	2	66.7%	1	33.3%	0	0	3	100.0%
	<b>Male</b>	2	66.7%	1	33.3%	0	0	0	0	3	100.0%
	<b>Unknown</b>	0	0	1	100.0%	0	0	0	0	1	100.0%
<b>Ice Hockey</b>	<b>Female</b>	1	100.0%	0	0	0	0	0	0	1	100.0%
	<b>Male</b>	7	58.3%	5	41.7%	0	0	0	0	12	100.0%
<b>Lacrosse</b>	<b>Female</b>	0	0	2	100.0%	0	0	0	0	2	100.0%
	<b>Male</b>	3	37.5%	1	12.5%	4	50.0%	0	0	8	100.0%
<b>Rodeo</b>	<b>Male</b>	0	0	0	0	2	100.0%	0	0	2	100.0%
<b>Rowing</b>	<b>Male</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
<b>Rugby</b>	<b>Male</b>	1	25.0%	3	75.0%	0	0	0	0	4	100.0%
<b>Skiing</b>	<b>Female</b>	0	0	1	50.0%	1	50.0%	0	0	2	100.0%
	<b>Male</b>	0	0	0	0	1	100.0%	0	0	1	100.0%
<b>Soccer</b>	<b>Female</b>	2	40.0%	2	40.0%	0	0	1	20.0%	5	100.0%
	<b>Male</b>	2	66.7%	1	33.3%	0	0	0	0	3	100.0%
<b>Softball</b>	<b>Female</b>	3	75.0%	0	0	0	0	1	25.0%	4	100.0%
<b>Swimming</b>	<b>Male</b>	0	0	1	100.0%	0	0	0	0	1	100.0%
<b>Track and Field</b>	<b>Female</b>	1	50.0%	1	50.0%	0	0	0	0	2	100.0%
	<b>Male</b>	6	33.3%	6	33.3%	6	33.3%	0	0	18	100.0%
<b>Wrestling</b>	<b>Male</b>	1	33.3%	2	66.7%	0	0	0	0	3	100.0%

**Table 5b: Number of Exertional/medical (indirect) catastrophic conditions by severity by sport: College all years combined 1982/83 to 2019/20**

		Serious		Fatal		Unknown		All	
		N	%	N	%	N	%	N	%
<b>Baseball</b>	<b>Male</b>	2	20.0%	7	70.0%	1	10.0%	10	100.0%
<b>Basketball</b>	<b>Female</b>	3	37.5%	5	62.5%	0	0	8	100.0%
	<b>Male</b>	18	31.0%	40	69.0%	0	0	58	100.0%
<b>Cross Country</b>	<b>Female</b>	0	0	1	100.0%	0	0	1	100.0%
	<b>Male</b>	2	50.0%	2	50.0%	0	0	4	100.0%
<b>Field Hockey</b>		1	100.0%	0	0	0	0	1	100.0%
<b>Football</b>	<b>Male</b>	21	22.6%	71	76.3%	1	1.1%	93	100.0%
<b>Gymnastics</b>	<b>Female</b>	0	0	1	100.0%	0	0	1	100.0%
<b>Ice Hockey</b>	<b>Male</b>	3	75.0%	1	25.0%	0	0	4	100.0%
<b>Lacrosse</b>	<b>Female</b>	6	100.0%	0	0	0	0	6	100.0%
	<b>Male</b>	0	0	2	100.0%	0	0	2	100.0%
<b>Other</b>	<b>Male</b>	0	0	2	100.0%	0	0	2	100.0%
<b>Rowing</b>	<b>Male</b>	0	0	1	100.0%	0	0	1	100.0%
<b>Skiing</b>	<b>Male</b>	1	25.0%	3	75.0%	0	0	4	100.0%
<b>Soccer</b>	<b>Female</b>	3	33.3%	6	66.7%	0	0	9	100.0%
	<b>Male</b>	1	25.0%	3	75.0%	0	0	4	100.0%
<b>Swimming</b>	<b>Female</b>	1	11.1%	8	88.9%	0	0	9	100.0%
	<b>Male</b>	0	0	1	100.0%	0	0	1	100.0%
<b>Tennis</b>	<b>Female</b>	0	0	1	100.0%	0	0	1	100.0%
	<b>Male</b>	1	100.0%	0	0	0	0	1	100.0%
<b>Track and Field</b>	<b>Male</b>	4	66.7%	2	33.3%	0	0	6	100.0%
<b>Volleyball</b>	<b>Female</b>	10	83.3%	2	16.7%	0	0	12	100.0%
<b>Water Polo</b>	<b>Male</b>	0	0	2	100.0%	0	0	2	100.0%
<b>Wrestling</b>	<b>Male</b>	4	40.0%	6	60.0%	0	0	10	100.0%

**Table 6a: Number of catastrophic traumatic injuries (direct) and exertional/medical conditions (indirect) by Severity by year: High school**

	<b>Fatal</b>		<b>Non-fatal</b>		<b>Serious</b>	
	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>
<b>1982-1983</b>	25	0.49	10	0.20	15	0.30
<b>1983-1984</b>	23	0.46	15	0.30	11	0.22
<b>1984-1985</b>	17	0.34	13	0.26	12	0.24
<b>1985-1986</b>	10	0.20	15	0.29	16	0.31
<b>1986-1987</b>	26	0.51	12	0.23	12	0.23
<b>1987-1988</b>	17	0.33	25	0.48	27	0.52
<b>1988-1989</b>	21	0.40	19	0.37	17	0.33
<b>1989-1990</b>	24	0.46	26	0.50	15	0.29
<b>1990-1991</b>	23	0.44	15	0.29	9	0.17
<b>1991-1992</b>	12	0.23	9	0.17	15	0.28
<b>1992-1993</b>	23	0.43	14	0.26	14	0.26
<b>1993-1994</b>	22	0.40	15	0.27	16	0.29
<b>1994-1995</b>	13	0.23	14	0.25	13	0.23
<b>1995-1996</b>	19	0.32	13	0.22	9	0.15
<b>1996-1997</b>	24	0.40	16	0.26	14	0.23
<b>1997-1998</b>	24	0.38	23	0.37	12	0.19
<b>1998-1999</b>	31	0.48	13	0.20	23	0.36
<b>1999-2000</b>	33	0.51	16	0.25	12	0.19
<b>2000-2001</b>	26	0.39	15	0.23	11	0.17
<b>2001-2002</b>	28	0.43	19	0.29	17	0.26
<b>2002-2003</b>	21	0.31	11	0.16	13	0.19
<b>2003-2004</b>	17	0.25	23	0.34	15	0.22
<b>2004-2005</b>	34	0.50	15	0.22	7	0.10
<b>2005-2006</b>	20	0.29	12	0.17	11	0.16
<b>2006-2007</b>	21	0.29	23	0.32	19	0.27
<b>2007-2008</b>	23	0.32	15	0.21	29	0.40
<b>2008-2009</b>	28	0.38	31	0.42	33	0.45
<b>2009-2010</b>	24	0.32	21	0.28	26	0.35
<b>2010-2011</b>	24	0.32	16	0.22	21	0.28
<b>2011-2012</b>	22	0.30	24	0.32	18	0.24
<b>2012-2013</b>	21	0.28	6	0.08	6	0.08
<b>2013-2014</b>	25	0.34	9	0.12	27	0.37
<b>2014-2015</b>	23	0.31	7	0.09	34	0.45
<b>2015-2016</b>	28	0.37	10	0.13	45	0.59
<b>2016-2017</b>	16	0.21	5	0.07	32	0.42
<b>2017-2018</b>	14	0.18	8	0.10	37	0.48
<b>2018-2019</b>	16	0.21	6	0.08	38	0.50
<b>2019-2020</b>	17	0.22	3	0.04	28	0.37

Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Table 6b: Number of catastrophic traumatic injuries (direct) and exertional/medical conditions (indirect) by Severity by year: College**

	<b>Fatal</b>		<b>Non-fatal</b>		<b>Serious</b>	
	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>
<b>1982-1983</b>	7	2.73	3	1.17	1	0.39
<b>1983-1984</b>	5	1.85	2	0.74	6	2.22
<b>1984-1985</b>	1	0.35	3	1.04	5	1.73
<b>1985-1986</b>	4	1.38	4	1.38	8	2.75
<b>1986-1987</b>	5	1.80	2	0.72	11	3.96
<b>1987-1988</b>	7	2.64	1	0.38	7	2.64
<b>1988-1989</b>	4	1.49	4	1.49	9	3.34
<b>1989-1990</b>	4	1.51	2	0.76	4	1.51
<b>1990-1991</b>	5	1.82	6	2.18	4	1.45
<b>1991-1992</b>	5	1.78	1	0.36	5	1.78
<b>1992-1993</b>	3	1.05	0	0	6	2.11
<b>1993-1994</b>	7	2.39	0	0	4	1.37
<b>1994-1995</b>	3	1.01	3	1.01	6	2.02
<b>1995-1996</b>	2	0.60	4	1.19	2	0.60
<b>1996-1997</b>	3	0.91	5	1.51	1	0.30
<b>1997-1998</b>	9	2.68	1	0.30	5	1.49
<b>1998-1999</b>	2	0.56	3	0.84	5	1.40
<b>1999-2000</b>	2	0.56	2	0.56	5	1.40
<b>2000-2001</b>	7	1.89	4	1.08	8	2.16
<b>2001-2002</b>	10	2.74	1	0.27	3	0.82
<b>2002-2003</b>	6	1.60	3	0.80	7	1.87
<b>2003-2004</b>	9	2.39	4	1.06	5	1.33
<b>2004-2005</b>	4	1.04	2	0.52	4	1.04
<b>2005-2006</b>	5	1.27	4	1.01	2	0.51
<b>2006-2007</b>	6	1.48	1	0.25	7	1.73
<b>2007-2008</b>	5	1.21	1	0.24	9	2.17
<b>2008-2009</b>	5	1.18	1	0.24	13	3.07
<b>2009-2010</b>	13	3.01	2	0.46	12	2.78
<b>2010-2011</b>	4	0.90	9	2.02	3	0.67
<b>2011-2012</b>	10	2.20	0	0	14	3.08
<b>2012-2013</b>	7	1.51	3	0.65	5	1.08
<b>2013-2014</b>	6	1.26	0	0	12	2.53
<b>2014-2015</b>	4	0.83	1	0.21	12	2.48
<b>2015-2016</b>	3	0.62	3	0.62	13	2.67
<b>2016-2017</b>	5	1.02	2	0.41	26	5.28
<b>2017-2018</b>	5	1.01	1	0.20	18	3.64
<b>2018-2019</b>	9	1.80	1	0.20	7	1.40
<b>2019-2020</b>	2	0.40	0	0	7	1.39

Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Table 7a: Rate of traumatic (direct) catastrophic injuries by severity by year: High school**

	<b>Fatal</b>		<b>Non-fatal</b>		<b>Serious</b>	
	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>
<b>1982-1983</b>	10	0.20	10	0.20	15	0.30
<b>1983-1984</b>	8	0.16	15	0.30	11	0.22
<b>1984-1985</b>	6	0.12	13	0.26	12	0.24
<b>1985-1986</b>	3	0.06	15	0.29	16	0.31
<b>1986-1987</b>	13	0.25	12	0.23	11	0.21
<b>1987-1988</b>	5	0.10	25	0.48	27	0.52
<b>1988-1989</b>	8	0.15	19	0.37	16	0.31
<b>1989-1990</b>	5	0.10	26	0.50	14	0.27
<b>1990-1991</b>	4	0.08	15	0.29	9	0.17
<b>1991-1992</b>	4	0.08	9	0.17	15	0.28
<b>1992-1993</b>	4	0.08	14	0.26	14	0.26
<b>1993-1994</b>	5	0.09	15	0.27	16	0.29
<b>1994-1995</b>	2	0.04	14	0.25	13	0.23
<b>1995-1996</b>	4	0.07	13	0.22	9	0.15
<b>1996-1997</b>	10	0.16	16	0.26	14	0.23
<b>1997-1998</b>	8	0.13	23	0.37	12	0.19
<b>1998-1999</b>	8	0.13	13	0.20	23	0.36
<b>1999-2000</b>	7	0.11	16	0.25	10	0.16
<b>2000-2001</b>	4	0.06	15	0.23	11	0.17
<b>2001-2002</b>	9	0.14	19	0.29	17	0.26
<b>2002-2003</b>	3	0.04	11	0.16	13	0.19
<b>2003-2004</b>	3	0.04	23	0.34	15	0.22
<b>2004-2005</b>	5	0.07	15	0.22	6	0.09
<b>2005-2006</b>	4	0.06	12	0.17	9	0.13
<b>2006-2007</b>	2	0.03	22	0.31	17	0.24
<b>2007-2008</b>	2	0.03	15	0.21	28	0.39
<b>2008-2009</b>	10	0.14	31	0.42	29	0.40
<b>2009-2010</b>	2	0.03	20	0.27	21	0.28
<b>2010-2011</b>	6	0.08	16	0.22	18	0.24
<b>2011-2012</b>	4	0.05	24	0.32	18	0.24
<b>2012-2013</b>	4	0.05	5	0.07	4	0.05
<b>2013-2014</b>	8	0.11	9	0.12	13	0.18
<b>2014-2015</b>	6	0.08	6	0.08	10	0.13
<b>2015-2016</b>	8	0.11	10	0.13	28	0.37
<b>2016-2017</b>	2	0.03	5	0.07	15	0.20
<b>2017-2018</b>	3	0.04	8	0.10	16	0.21
<b>2018-2019</b>	3	0.04	6	0.08	21	0.27
<b>2019-2020</b>	6	0.08	2	0.03	12	0.16

Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Table 7b: Rate of traumatic (direct) catastrophic injuries by severity by year: College**

	<b>Fatal</b>		<b>Non-fatal</b>		<b>Serious</b>	
	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>
<b>1982-1983</b>	1	0.39	3	1.17	1	0.39
<b>1983-1984</b>	0	0	2	0.74	6	2.22
<b>1984-1985</b>	1	0.35	3	1.04	5	1.73
<b>1985-1986</b>	3	1.03	4	1.38	8	2.75
<b>1986-1987</b>	1	0.36	2	0.72	11	3.96
<b>1987-1988</b>	0	0	1	0.38	7	2.64
<b>1988-1989</b>	0	0	4	1.49	9	3.34
<b>1989-1990</b>	1	0.38	2	0.76	4	1.51
<b>1990-1991</b>	1	0.36	6	2.18	4	1.45
<b>1991-1992</b>	1	0.36	1	0.36	4	1.43
<b>1992-1993</b>	1	0.35	0	0	6	2.11
<b>1993-1994</b>	2	0.68	0	0	4	1.37
<b>1994-1995</b>	0	0	3	1.01	6	2.02
<b>1995-1996</b>	0	0	4	1.19	2	0.60
<b>1996-1997</b>	1	0.30	5	1.51	1	0.30
<b>1997-1998</b>	1	0.30	1	0.30	4	1.19
<b>1998-1999</b>	2	0.56	3	0.84	5	1.40
<b>1999-2000</b>	2	0.56	2	0.56	5	1.40
<b>2000-2001</b>	2	0.54	4	1.08	8	2.16
<b>2001-2002</b>	1	0.27	1	0.27	3	0.82
<b>2002-2003</b>	1	0.27	3	0.80	6	1.60
<b>2003-2004</b>	3	0.80	4	1.06	5	1.33
<b>2004-2005</b>	1	0.26	2	0.52	3	0.78
<b>2005-2006</b>	0	0	4	1.01	2	0.51
<b>2006-2007</b>	0	0	1	0.25	7	1.73
<b>2007-2008</b>	0	0	1	0.24	8	1.93
<b>2008-2009</b>	0	0	1	0.24	9	2.13
<b>2009-2010</b>	4	0.93	2	0.46	10	2.32
<b>2010-2011</b>	0	0	9	2.02	2	0.45
<b>2011-2012</b>	2	0.44	0	0	7	1.54
<b>2012-2013</b>	0	0	3	0.65	4	0.86
<b>2013-2014</b>	1	0.21	0	0	2	0.42
<b>2014-2015</b>	0	0	1	0.21	5	1.03
<b>2015-2016</b>	0	0	3	0.62	11	2.26
<b>2016-2017</b>	0	0	2	0.41	5	1.02
<b>2017-2018</b>	2	0.40	1	0.20	6	1.21
<b>2018-2019</b>	0	0	1	0.20	3	0.60
<b>2019-2020</b>	1	0.20	0	0	2	0.40

Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Table 8a: Rate of exertional/medical (indirect) catastrophic conditions by severity by year:  
High School**

	<b>Fatal</b>		<b>Non-fatal</b>		<b>Serious</b>	
	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>
<b>1982-1983</b>	15	0.30	0	0	0	0
<b>1983-1984</b>	15	0.30	0	0	0	0
<b>1984-1985</b>	11	0.22	0	0	0	0
<b>1985-1986</b>	7	0.14	0	0	0	0
<b>1986-1987</b>	13	0.25	0	0	1	0.02
<b>1987-1988</b>	12	0.23	0	0	0	0
<b>1988-1989</b>	13	0.25	0	0	1	0.02
<b>1989-1990</b>	19	0.37	0	0	1	0.02
<b>1990-1991</b>	19	0.36	0	0	0	0
<b>1991-1992</b>	8	0.15	0	0	0	0
<b>1992-1993</b>	19	0.36	0	0	0	0
<b>1993-1994</b>	17	0.31	0	0	0	0
<b>1994-1995</b>	11	0.19	0	0	0	0
<b>1995-1996</b>	15	0.25	0	0	0	0
<b>1996-1997</b>	14	0.23	0	0	0	0
<b>1997-1998</b>	16	0.26	0	0	0	0
<b>1998-1999</b>	23	0.36	0	0	0	0
<b>1999-2000</b>	26	0.40	0	0	2	0.03
<b>2000-2001</b>	22	0.33	0	0	0	0
<b>2001-2002</b>	19	0.29	0	0	0	0
<b>2002-2003</b>	18	0.27	0	0	0	0
<b>2003-2004</b>	14	0.21	0	0	0	0
<b>2004-2005</b>	29	0.42	0	0	1	0.01
<b>2005-2006</b>	16	0.23	0	0	2	0.03
<b>2006-2007</b>	19	0.27	1	0.01	2	0.03
<b>2007-2008</b>	21	0.29	0	0	1	0.01
<b>2008-2009</b>	18	0.25	0	0	4	0.05
<b>2009-2010</b>	22	0.30	1	0.01	5	0.07
<b>2010-2011</b>	18	0.24	0	0	3	0.04
<b>2011-2012</b>	18	0.24	0	0	0	0
<b>2012-2013</b>	17	0.23	1	0.01	2	0.03
<b>2013-2014</b>	17	0.23	0	0	14	0.19
<b>2014-2015</b>	17	0.23	1	0.01	24	0.32
<b>2015-2016</b>	20	0.26	0	0	17	0.22
<b>2016-2017</b>	14	0.18	0	0	17	0.22
<b>2017-2018</b>	11	0.14	0	0	21	0.27
<b>2018-2019</b>	13	0.17	0	0	17	0.22
<b>2019-2020</b>	11	0.14	1	0.01	16	0.21

Note: Rates with number of incidents less than 5 should be interpreted with caution.



**Table 8b: Rate of exertional/medical (indirect) catastrophic conditions by severity by year:  
College**

	<b>Fatal</b>		<b>Serious</b>	
	<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>
<b>1982-1983</b>	6	2.34	0	0
<b>1983-1984</b>	5	1.85	0	0
<b>1985-1986</b>	1	0.34	0	0
<b>1986-1987</b>	4	1.44	0	0
<b>1987-1988</b>	7	2.64	0	0
<b>1988-1989</b>	4	1.49	0	0
<b>1989-1990</b>	3	1.14	0	0
<b>1990-1991</b>	4	1.45	0	0
<b>1991-1992</b>	4	1.43	1	0.36
<b>1992-1993</b>	2	0.70	0	0
<b>1993-1994</b>	5	1.71	0	0
<b>1994-1995</b>	3	1.01	0	0
<b>1995-1996</b>	2	0.60	0	0
<b>1996-1997</b>	2	0.60	0	0
<b>1997-1998</b>	8	2.38	1	0.30
<b>2000-2001</b>	5	1.35	0	0
<b>2001-2002</b>	9	2.47	0	0
<b>2002-2003</b>	5	1.34	1	0.27
<b>2003-2004</b>	6	1.59	0	0
<b>2004-2005</b>	3	0.78	1	0.26
<b>2005-2006</b>	5	1.27	0	0
<b>2006-2007</b>	6	1.48	0	0
<b>2007-2008</b>	5	1.21	1	0.24
<b>2008-2009</b>	5	1.18	4	0.95
<b>2009-2010</b>	9	2.08	2	0.46
<b>2010-2011</b>	4	0.90	1	0.22
<b>2011-2012</b>	8	1.76	7	1.54
<b>2012-2013</b>	7	1.51	1	0.22
<b>2013-2014</b>	5	1.05	10	2.11
<b>2014-2015</b>	4	0.83	7	1.45
<b>2015-2016</b>	3	0.62	2	0.41
<b>2016-2017</b>	5	1.02	21	4.27
<b>2017-2018</b>	3	0.61	12	2.42
<b>2018-2019</b>	9	1.80	4	0.80
<b>2019-2020</b>	1	0.20	5	0.99

Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Table 9a: Rate of Traumatic (direct) catastrophic injuries by level and severity by sport:  
High school 1982/83 to 2019/20**

		Fatal		Non-fatal		Serious	
		N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
<b>Baseball</b>	<b>Male</b>	15	0.09	21	0.12	30	0.18
<b>Basketball</b>	<b>Female</b>	0	0	3	0.02	3	0.02
	<b>Male</b>	1	0.00	4	0.02	11	0.05
<b>Cheerleading</b>	<b>Female</b>	1	0.04	23	0.86	42	1.58
	<b>Male</b>	0	0	1	1.51	1	1.51
<b>Cross Country</b>	<b>Female</b>	2	0.03	0	0	0	0
	<b>Male</b>	1	0.01	2	0.03	0	0
<b>Field Hockey</b>	<b>Female</b>	0	0	1	0.05	0	0
<b>Football</b>	<b>Male</b>	142	0.37	421	1.10	430	1.13
<b>Golf</b>	<b>Male</b>	0	0	0	0	1	0.02
<b>Gymnastics</b>	<b>Female</b>	0	0	7	0.81	4	0.46
	<b>Male</b>	1	0.82	2	1.63	1	0.82
<b>Ice Hockey</b>	<b>Female</b>	0	0	1	0.55	2	1.09
	<b>Male</b>	4	0.35	14	1.22	12	1.04
<b>Lacrosse</b>	<b>Female</b>	0	0	0	0	2	0.13
	<b>Male</b>	2	0.09	7	0.33	11	0.52
<b>Skiing</b>	<b>Female</b>	1	0.32	0	0	0	0
<b>Soccer</b>	<b>Female</b>	2	0.02	1	0.01	6	0.06
	<b>Male</b>	7	0.06	2	0.02	7	0.06
<b>Softball</b>	<b>Female</b>	0	0	1	0.01	6	0.05
<b>Swimming</b>	<b>Female</b>	0	0	5	0.10	1	0.02
	<b>Male</b>	1	0.03	6	0.15	3	0.08
<b>Track and Field</b>	<b>Female</b>	3	0.02	2	0.01	7	0.04
	<b>Male</b>	23	0.11	17	0.08	17	0.08
<b>Volleyball</b>	<b>Male</b>	0	0	1	0.07	0	0
<b>Wrestling</b>	<b>Male</b>	3	0.03	39	0.42	24	0.26

Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Table 9b: Rate of Traumatic (direct) catastrophic injuries by level and severity by sport:  
College 1982/83 to 2019/20**

		Fatal		Non-fatal		Serious	
		N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
Baseball	Male	3	0.29	7	0.68	9	0.88
Basketball	Male	1	0.17	1	0.17	9	1.51
Cheerleading*	Female	1	0	13	0	13	0
	Male	0	0	2	0	3	0
Equestrian	Female	1	3.50	0	0	0	0
Field Hockey	Female	0	0	0	0	2	0.97
Football	Male	17	0.75	52	2.31	151	6.71
Gymnastics	Female	1	1.76	2	3.51	0	0
	Male	0	0	1	5.18	2	10.37
Ice Hockey	Female	0	0	0	0	1	2.25
	Male	0	0	5	3.35	7	4.69
Lacrosse	Female	0	0	2	0.87	0	0
	Male	4	1.32	1	0.33	3	0.99
Rowing	Male	1	1.21	0	0	0	0
Rugby		0	0	3	1829.27	1	609.76
Skiing	Female	1	5.36	1	5.36	0	0
	Male	1	4.44	0	0	0	0
Soccer	Female	0	0	2	0.31	2	0.31
	Male	0	0	1	0.14	2	0.28
Softball	Female	0	0	0	0	3	0.54
Swimming	Male	0	0	1	0.32	0	0
Track and Field	Female	0	0	1	0.07	1	0.07
	Male	6	0.38	6	0.38	6	0.38
Wrestling	Male	0	0	2	0.77	1	0.38

Note: Rates with number of incidents less than 5 should be interpreted with caution.

\*Unable to compute, Number of collegiate cheerleaders unknown

**Table 10a: Exertional/medical (indirect) catastrophic conditions by level and severity: High school 1982/83 to 2019/20**

		Fatal		Non-fatal		Serious	
		N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
<b>Baseball</b>	<b>Male</b>	20	0.12	0	0	7	0.04
<b>Basketball</b>	<b>Female</b>	18	0.11	0	0	2	0.01
	<b>Male</b>	138	0.68	0	0	37	0.18
<b>Cheerleading</b>	<b>Female</b>	8	0.30	0	0	4	0.15
<b>Cross Country</b>	<b>Female</b>	11	0.18	0	0	4	0.07
	<b>Male</b>	21	0.29	0	0	5	0.07
<b>Field Hockey</b>	<b>Female</b>	2	0.09	0	0	0	0
<b>Football</b>	<b>Male</b>	251	0.66	3	0.01	54	0.14
<b>Ice Hockey</b>	<b>Male</b>	5	0.43	0	0	3	0.26
<b>Lacrosse</b>	<b>Female</b>	1	0.06	0	0	0	0
	<b>Male</b>	10	0.47	0	0	2	0.09
<b>Rowing</b>	<b>Male</b>	0	0	0	0	1	1.63
<b>Soccer</b>	<b>Female</b>	11	0.11	0	0	3	0.03
	<b>Male</b>	31	0.25	1	0.01	8	0.07
<b>Softball</b>	<b>Female</b>	1	0.01	0	0	0	0
<b>Swimming</b>	<b>Female</b>	9	0.18	0	0	2	0.04
	<b>Male</b>	7	0.18	0	0	1	0.03
<b>Tennis</b>	<b>Female</b>	2	0.03	0	0	0	0
	<b>Male</b>	4	0.07	0	0	0	0
<b>Track and Field</b>	<b>Female</b>	7	0.04	1	0.01	0	0
	<b>Male</b>	38	0.18	0	0	9	0.04
<b>Volleyball</b>	<b>Female</b>	2	0.01	0	0	3	0.02
<b>Water Polo</b>	<b>Female</b>	1	0.23	0	0	1	0.23
	<b>Male</b>	3	0.53	0	0	0	0
<b>Wrestling</b>	<b>Male</b>	31	0.33	0	0	8	0.09

Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Table 10b: Exertional/medical (indirect) catastrophic conditions by level and severity:  
College 1982/83 to 2019/20**

		<b>Fatal</b>		<b>Serious</b>	
		<b>N</b>	<b>Rate per 100,000</b>	<b>N</b>	<b>Rate per 100,000</b>
<b>Baseball</b>	<b>Male</b>	7	0.68	2	0.20
<b>Basketball</b>	<b>Female</b>	5	0.95	3	0.57
	<b>Male</b>	40	6.73	18	3.03
<b>Cross Country</b>	<b>Female</b>	1	0.23	0	0
	<b>Male</b>	2	0.45	2	0.45
<b>Field Hockey</b>		0	0	1	0.48
<b>Football</b>	<b>Male</b>	71	3.15	21	0.93
<b>Gymnastics</b>	<b>Female</b>	1	1.76	0	0
<b>Ice Hockey</b>	<b>Male</b>	1	0.67	3	2.01
<b>Lacrosse</b>	<b>Female</b>	0	0	6	2.61
	<b>Male</b>	2	0.66	0	0
<b>Rowing</b>	<b>Male</b>	2	2.42	0	0
<b>Skiing</b>	<b>Male</b>	1	4.44	0	0
<b>Soccer</b>	<b>Female</b>	3	0.47	1	0.16
	<b>Male</b>	6	0.84	3	0.42
<b>Swimming</b>	<b>Female</b>	3	0.78	1	0.26
	<b>Male</b>	8	2.53	1	0.32
<b>Tennis</b>	<b>Female</b>	1	0.32	0	0
	<b>Male</b>	1	0.34	0	0
<b>Track and Field</b>	<b>Female</b>	0	0	1	0.07
	<b>Male</b>	2	0.13	4	0.26
<b>Volleyball</b>	<b>Female</b>	2	0.40	10	2.00
<b>Water Polo</b>	<b>Male</b>	2	5.31	0	0
<b>Wrestling</b>	<b>Male</b>	6	2.31	4	1.54

Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Table 11: Characteristics of all sport-related catastrophic traumatic injuries (direct) and exertional/medical conditions (indirect) during AY 2019-2020**

	Traumatic injury (Direct)		Exertional/Medical (Indirect)		All	
	N	%	N	%	N	%
<b>Total</b>	32	100.0%	34	100.0%	66	100.0%
<b>Sport Level</b>						
Collegiate/University	3	9.4%	6	17.6%	9	13.6%
High School Sponsored	29	90.6%	28	82.4%	57	86.4%
<b>College sponsorship</b>						
Not applicable	--	--	--	--	--	--
NCAA	0	0	2	33.3%	2	22.2%
Other	3	100%	4	66.7%	7	88.8%
<b>Severity</b>						
Serious	14	43.8%	21	61.8%	35	53.0%
Non-fatal	2	6.3%	1	2.9%	3	4.5%
Fatal	7	21.9%	12	35.3%	19	28.8%
Unknown	9	28.1%	0	0	9	13.6%
<b>Sex</b>						
Female	3	9.4%	5	14.7%	8	12.1%
Male	29	90.6%	29	85.3%	58	87.9%
<b>Month</b>						
Jul-Aug	8	25.0%	6	17.6%	14	21.2%
Sep-Oct	12	37.5%	8	23.5%	20	30.3%
Nov-Dec	5	15.6%	7	20.6%	12	18.2%
Jan-Feb	5	15.6%	7	20.6%	12	18.2%
Mar-Apr	2	6.3%	4	11.8%	6	9.1%
May-Jun	0	0	2	5.9%	2	3.0%
<b>Sport</b>						
Baseball	1	3.1%	1	2.9%	2	3.0%
Basketball	1	3.1%	8	23.5%	9	13.6%
Field Hockey	0	0	1	2.9%	1	1.5%
Football	23	71.9%	13	38.2%	36	54.5%
Gymnastics	1	3.1%	0	0	1	1.5%
Ice Hockey	1	3.1%	1	2.9%	2	3.0%
Soccer	0	0	1	2.9%	1	1.5%
Swimming	0	0	2	5.9%	2	3.0%
Track and Field	5	15.6%	1	2.9%	6	9.1%
Volleyball	0	0	2	5.9%	2	3.0%
Wrestling	0	0	4	11.8%	4	6.1%
<b>Sponsored activity</b>						
Official school or team related ATHLETIC activity	32	100.0%	29	85.3%	61	92.4%
Personal athletic activity	0	0	5	14.7%	5	7.6%
<b>Location</b>						
Athlete's Home	0	0	3	8.8%	3	4.5%

	Traumatic injury (Direct)		Exertional/Medical (Indirect)		All	
	N	%	N	%	N	%
Competitive Venue	24	75.0%	19	55.9%	43	65.2%
Other Private Property	1	3.1%	1	2.9%	2	3.0%
Public Park	4	12.5%	0	0	4	6.1%
School Athletic Facility	1	3.1%	10	29.4%	11	16.7%
School Campus (non-athletic facility)	2	6.3%	1	2.9%	3	4.5%
<b>Event Type</b>						
Competition/Game	22	68.8%	6	17.6%	28	42.4%
Conditioning Session	0	0	4	11.8%	4	6.1%
Other Team Activity	0	0	1	2.9%	1	1.5%
Practice	9	28.1%	19	55.9%	28	42.4%
Scrimmage	1	3.1%	0	0	1	1.5%
Strength/Weight Session	0	0	4	11.8%	4	6.1%
<b>Player action</b>						
Ball/puck handling	1	3.1%	0	0	1	1.5%
Being tackled	4	12.5%	0	0	4	6.1%
Blocking	3	9.4%	0	0	3	4.5%
Conditioning (land)	0	0	3	8.8%	3	4.5%
Conditioning (water)	0	0	2	5.9%	2	3.0%
Fielding	1	3.1%	0	0	1	1.5%
Fitness - Other	0	0	1	2.9%	1	1.5%
General play	1	3.1%	4	11.8%	5	7.6%
Other	6	18.8%	9	26.5%	15	22.7%
Passing	0	0	1	2.9%	1	1.5%
Rebounding	1	3.1%	0	0	1	1.5%
Receiving pass	2	6.3%	0	0	2	3.0%
Running	1	3.1%	6	17.6%	7	10.6%
Running (middle/long distance)	1	3.1%	1	2.9%	2	3.0%
Tackling	5	15.6%	0	0	5	7.6%
Unknown	6	18.8%	7	20.6%	13	19.7%
<b>Basic Mechanism</b>						
Contact with Another Player	16	50.0%	0	0	16	24.2%
Contact with Apparatus or Object	1	3.1%	0	0	1	1.5%
Contact with Ground/Surface	5	15.6%	0	0	5	7.6%
Environmental (e.g., lightning strike)	0	0	4	11.8%	4	6.1%
Infection or Illness	0	0	29	85.3%	29	43.9%
Other	5	15.6%	1	2.9%	6	9.1%
Unknown	5	15.6%	0	0	5	7.6%
<b>Major Injury Category</b>						
Head Injury	10	31.3%	0	0	10	15.2%
Heat-related injury	0	0	2	5.9%	2	3.0%

	Traumatic injury (Direct)		Exertional/Medical (Indirect)		All	
	N	%	N	%	N	%
Hit in the Chest	2	6.3%	0	0	2	3.0%
Other	0	0	2	5.9%	2	3.0%
Other Traumatic Injury	8	25.0%	0	0	8	12.1%
Spinal Cord Injury	12	37.5%	0	0	12	18.2%
Sudden Cardiac Arrest	0	0	30	88.2%	30	45.5%
<b>Detailed Injury Category</b>						
Cardiac/Sudden Cardiac Arrest (not Commotio Cordis)	1	3.1%	0	0	1	1.5%
Heat-Related Injury (e.g. Heatstroke)	0	0	2	5.9%	2	3.0%
Other	0	0	2	5.9%	2	3.0%
Pedestrian motor vehicle crash related to participation in athletics	5	15.6%	0	0	5	7.6%
Other Traumatic Injury (e.g. Ruptured Spleen)	5	15.6%	0	0	5	7.6%
Spinal Cord Injury with a Fracture	1	3.1%	0	0	1	1.5%
Spinal Cord Injury without Spine Fracture	8	25.0%	0	0	8	12.1%
Spine Fracture	4	12.5%	0	0	4	6.1%
Traumatic Brain Injury (e.g. subdural hematoma)	8	25.0%	0	0	8	12.1%
<b>Injury Outcome</b>						
Fatality/Sudden Death	7	21.9%	12	35.3%	19	28.8%
Non-trauma Survivor (e.g. sudden cardiac arrest, heat stroke, exertional sickling)	0	0	21	61.8%	21	31.8%
Trauma-related Non-Fatality - Disability unknown/uncertain	9	28.1%	0	0	9	13.6%
Trauma-related Non-Fatality with Permanent Disability	2	6.3%	1	2.9%	3	4.5%
Trauma-related Non-Fatality with Temporary Disability (full recovery expected or confirmed)	14	43.8%	0	0	14	21.2%



**Table 12. Participation numbers, 1982/83 to 2019/20**

	High School <sup>1</sup>		College <sup>2</sup>	
	Female	Male	Female	Male
<b>Baseball</b>	37,341	17,109,664	-	1,022,092
<b>Basketball</b>	16,170,283	20,316,794	524,899	594,525
<b>Cheerleading<sup>3</sup></b>	2,661,359	66,299	--	--
<b>Cross Country</b>	6,072,123	7,197,649	438,025	440,518
<b>Equestrian<sup>4</sup></b>	25,528	4,140	28,580	1,088
<b>Field Hockey</b>	2,168,469	5,644	207,173	--
<b>Football</b>	39,241	38,201,535	--	2,251,827
<b>Golf</b>	2,071,785	5,450,708	120,961	293,766
<b>Gymnastics</b>	862,320	122,400	56,917	19,291
<b>Ice Hockey</b>	182,992	1,151,529	44,501	149,266
<b>Lacrosse</b>	1,593,114	2,113,601	229,582	303,308
<b>Rowing<sup>4</sup></b>	69,137	61,199	187,476	82,504
<b>Skiing</b>	310,618	371,507	18,651	22,529
<b>Soccer</b>	9,701,973	12,294,856	642,934	718,257
<b>Softball</b>	12,663,708	59,195	555,739	--
<b>Swimming/Diving</b>	4,918,690	3,926,850	383,562	315,828
<b>Tennis</b>	5,988,491	5,528,798	310,290	295,489
<b>Track and Field<sup>5</sup></b>	17,292,836	21,204,692	1,376,298	1,561,777
<b>Volleyball<sup>6</sup></b>	13,997,727	1,369,403	499,856	47,230
<b>Water Polo</b>	426,109	570,014	26,226	37,679
<b>Wrestling</b>	191,213	9,344,188	98	260,178

<sup>1</sup>NFHS available online: <https://www.nfhs.org/ParticipationStatistics/ParticipationStatistics/>

<sup>2</sup>NCAA accessed online: [https://ncaaorg.s3.amazonaws.com/research/sportpart/2019-20RES\\_SportsSponsorshipParticipationRatesReport.pdf](https://ncaaorg.s3.amazonaws.com/research/sportpart/2019-20RES_SportsSponsorshipParticipationRatesReport.pdf)

<sup>3</sup>Cheerleading is not a sponsored sport for NCAA collegiate athletes. High school cheerleading participation is estimated from NFHS competitive spirit participation. Many schools have cheerleading programs that are not sponsored by NFHS. Therefore, high school cheerleading participation is an underestimate.

<sup>4</sup>Equestrian (male and female) and rowing (males) are non-championship NCAA collegiate sports.

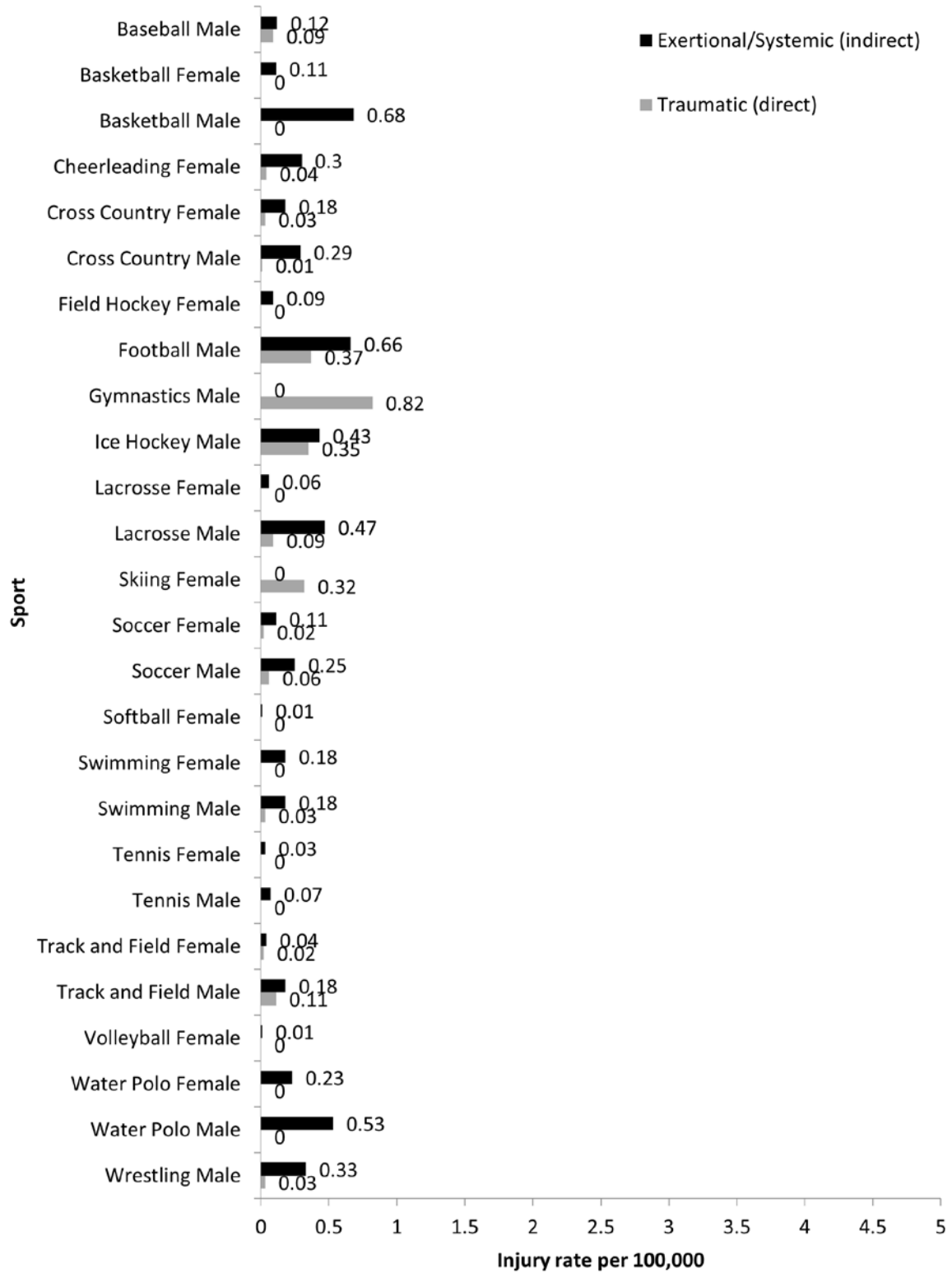
<sup>5</sup>Includes both indoor and outdoor track and field.

<sup>6</sup>Includes sand volleyball.

Note: Not all high schools and colleges are members of the NFHS and NCAA. Complete data are not available for the non-member schools. Therefore, these participation numbers underestimate the total number of high school and collegiate participants in the United States.

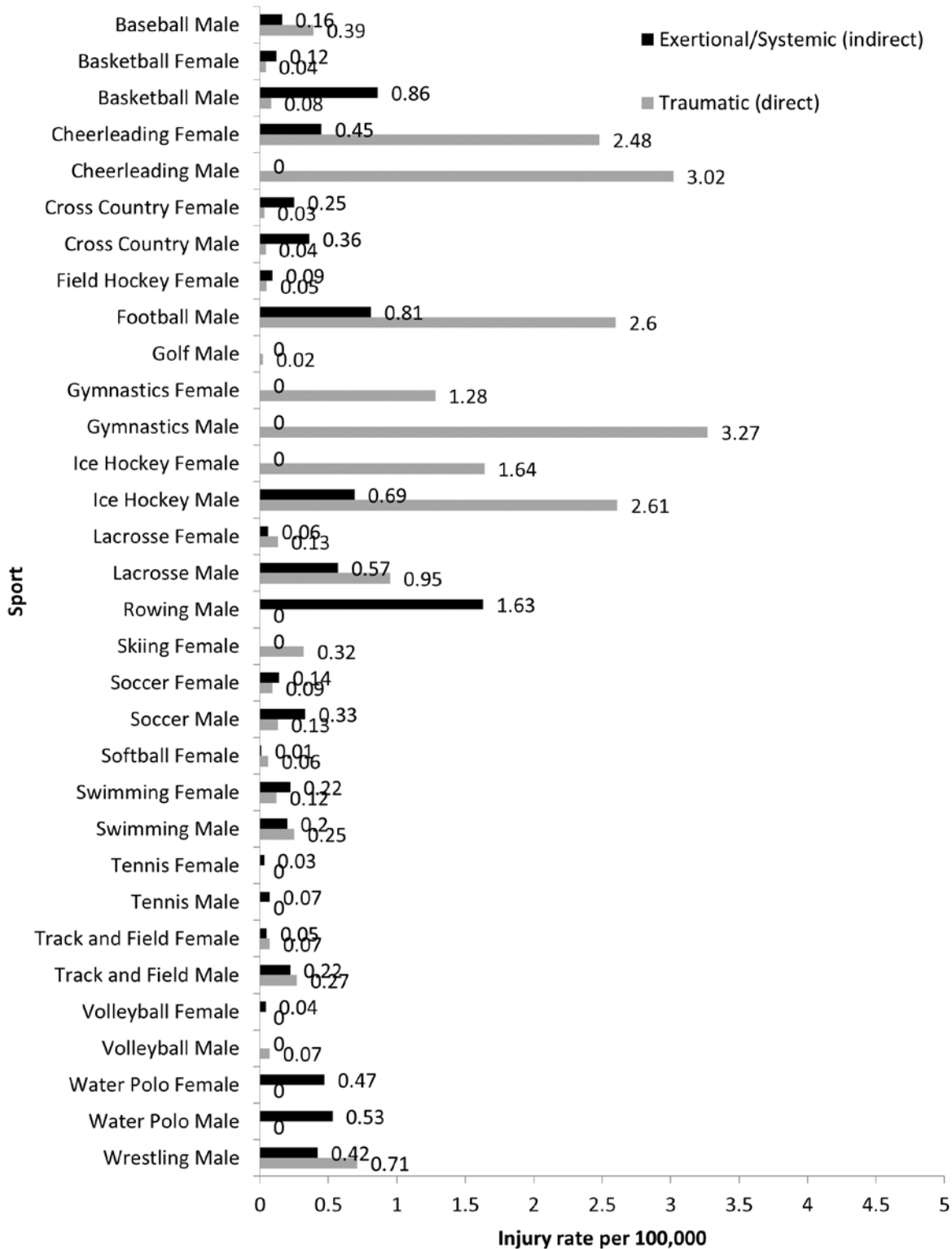
Note: the NFHS did not collect participation data from member states in 2019/20 due to COVID-10. Therefore participation from 2018/19 was used to estimate participation for 2019/20. In addition, all high school and collegiate spring sport seasons were cancelled in March of 2020 due to COVID-19 stay at home orders.

**Figure 1: Rates of fatal catastrophic traumatic injury (direct) and exertional/medical (indirect) conditions by sport-gender among high school participants, 1982/83-2019/20**



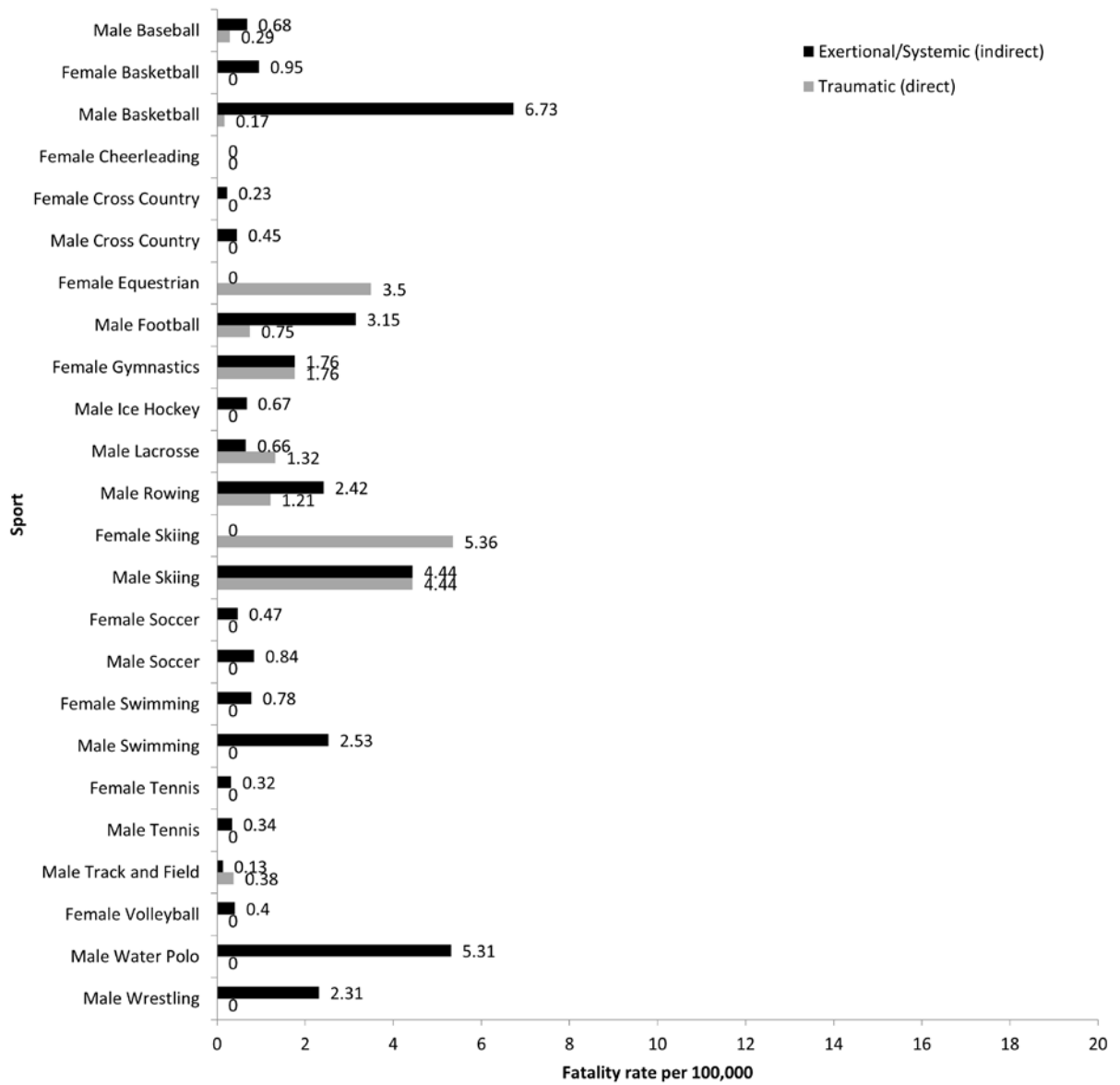
Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Figure 2: Rates of all catastrophic traumatic injury (direct) and exertional/medical (indirect) conditions by sport-gender among high school participants, 1982/83-2019/20**



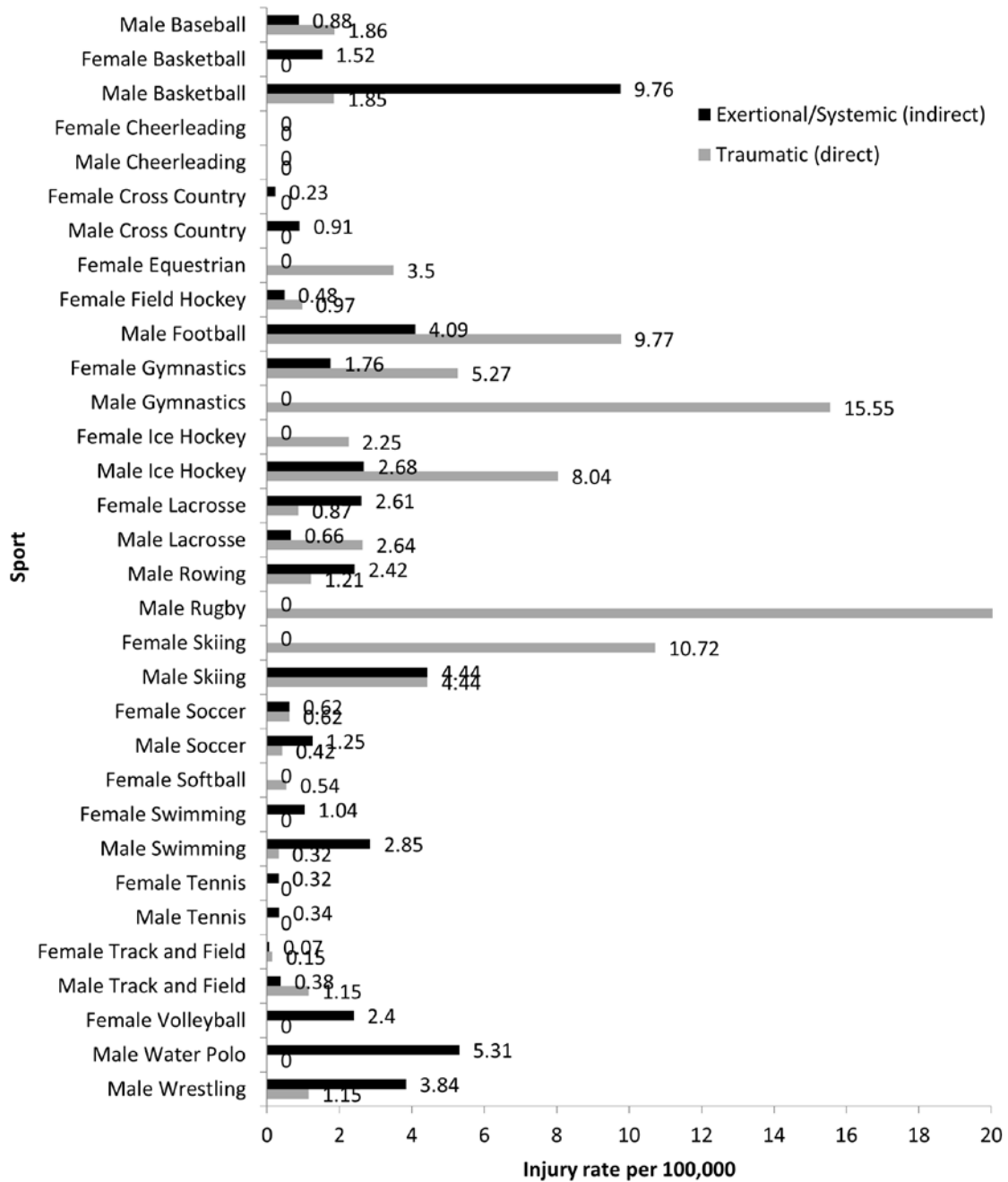
Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Figure 3: Rates of fatal catastrophic traumatic injury (direct) and exertional/medical (indirect) conditions by sport-gender among collegiate participants, 1982/83-2019/20**



Note: Rates with number of incidents less than 5 should be interpreted with caution.

**Figure 4: Rates of all catastrophic traumatic injury (direct) and exertional/medical (indirect) conditions by sport-gender among collegiate participants, 1982/83-2019/20**



Note: Rates with number of incidents less than 5 should be interpreted with caution.