

**CATASTROPHIC
SPORTS INJURY RESEARCH**

THIRTY-FIFTH ANNUAL REPORT

FALL 1982 - SPRING 2017

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

Website: nccsir.unc.edu

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FINAL
September 27, 2018

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Report #: 2018-02



Acknowledgements:

We acknowledge the significant contributions of recently retired Frederick O. Mueller, Ph.D. who directed The National Center for Catastrophic Sport Injury Research (NCCSIR) from 1982 to 2013. Dr. Mueller's work during those 30 years has improved the safety of football for the participants and these impacts are demonstrated in the pages of this report.

We also acknowledge NCCSIR staff members Lily Wang, Catherine Wolff, and Sue Wolf, and members of the Consortium for Catastrophic Sport Injury Monitoring: Drs. Douglas Casa, Jonathan Drezner, Kevin Guskiewicz, Johna Register-Mihalik, Steve Marshall, Dawn Comstock, David Klossner, Tom Dompier, Zack Kerr, and Christine Collins.

We also thank all the athletes, families, coaches, athletic trainers, medical providers, school staff, state associations, researchers, journalists, and others who have participated in this research and have shared information with the NCCSIR.

Funding & Disclosures:

The National Center for Catastrophic Sport Injury Research is supported by the American Football Coaches Association (AFCA), the National Collegiate Athletic Association (NCAA), the National Federation of State High School Associations (NFHS), the National Athletic Trainers' Association (NATA), the American Medical Society for Sports Medicine (AMSSM), the National Operating Committee on Standards for Athletic Equipment (NOCSAE), and The University of North Carolina at Chapel Hill (UNC-CH).

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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/>

To access online reports please visit: <http://nccsir.unc.edu/reports/>

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/systemic (or indirect). The definition for direct and indirect is as follows:

Direct - Those injuries that resulted directly from participation in the skills of the sport.

Indirect - Those injuries 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 injuries 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

Yearly participation estimates for high school athletes are obtained from NFHS participation reports (available online: <https://www.nfhs.org/ParticipationStatistics/ParticipationStatistics/>). NFHS high school annual athletic participation for 2016/17 included approximately 7,667,749 athletes (4,425,348 males and 3,242,401 females). Yearly participation estimates for collegiate level athletes are obtained from the National Collegiate Athletic Association (NCAA) participation reports (accessed online: http://www.ncaa.org/sites/default/files/2016-17NCAA-0472_ParticipRatesReport-FINAL_20171120.pdf). NCAA participation for 2016/17 in championship sports was 491,930 athletes. There were 276,613 males and 215,317 females. There were also 3,403 males in non-championship sports (archery, badminton, bowling, equestrian, rowing, rugby, sailing, and squash) and 2,267 females participating in emerging sports (archery, badminton, equestrian, rugby, squash, synchronized swimming, team handball, and triathlon).

During the entire 35 year period from the fall of 1982 through the spring of 2017, there were 220,933,215 high school participant-seasons in the sports covered by this report and approximately 12,574,184 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 participants were calculated over the entire 35-year period and stratified by level (high school and college) and sport. Incidence rates were stratified by direct versus 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 AY2016-2017 Summary

From July 1, 2016 to June 30, 2017 there were a total of 86 catastrophic injuries/illnesses captured by NCCSIR among high school and college organized sport participants. Of these, 75 events were due to or occurred during sport-related activities (Table 11). There were also 11 catastrophic events that occurred during non-sport related activity. All were cardiac-related and are described in the Case Summaries.

Sport-related events: The majority of the sport-related catastrophic events (n=75) were at the high school level (75%, n=56). Member institutions for collegiate cases included NCAA, National Association of Intercollegiate Athletics (NAIA), and National Junior College Athletic Association (NJCAA). Overall 30.7% of cases were fatal, 10.7% were nonfatal, and 58.7% were serious with recovery. Thirty-four percent (n=26) were due to direct (traumatic injury) causes and over half occurred in competition (52.0%) followed by practice (20.0%). The majority of events occurred to athletes participating in the following sports: football (45.3%), basketball (18.7%), track and field (7%), wrestling (7%), baseball (4%), ice hockey (4%), and soccer (4%). Areas of the body most commonly affected were heart (54.7%) and head/brain (14.7%). Sudden

cardiac arrest (26.7%) was the most common types of events followed by other cardiac conditions (20.0%) and brain trauma (9.3%).

Direct events: 7.7% of direct events were fatal, 30.8% non-fatal, and 61.5% serious with recovery. A greater proportion of direct events occurred in competition versus practice (88.5% versus 7.7%). The highest proportion was to the head/brain (42.3%) and cervical spine (34.6%) followed by internal organs (15.4%), the heart (including commotio cordis) and lumbar/thoracic spine. (3.8% each). The majority occurred in football (73.1%).

Indirect events: 42.9% of indirect events were fatal and 57.1% were serious with recovery. A greater proportion of indirect events occurred in competition versus practice (32.7% versus 26.5%) and 22.4% occurred during conditioning and weight training sessions. The majority were cardiac-related (71.4%), followed by heat/exertional related and rhabdomyolysis (6.1% each). Football (31%) and basketball (29%) comprised the majority, followed by track and field (8.2%), baseball (6.1%), wrestling (6.1%), ice hockey (4.1%), lacrosse (4.1%), soccer (4.1%), and swimming (4.1%).

Overall Summary

During this 35-year period, there were 2,552 catastrophic sport-related injuries/illnesses at high school and college levels (Table 1 – excluding cheerleading, drill team, and rodeo there were 2,433). The majority were non-fatal (66%) and from traumatic or direct mechanisms (66%), and among high school participants (80%). The proportion of fatal (38% versus 35%) and direct (66% versus 64%) were not different by high school compared to college level.

The 75 sport-related catastrophic injuries and conditions captured in 2016/17 represents a 26% decrease from the previous year and the lowest number of catastrophic events captured since 2013/14 when 73 events were captured. The decrease was a result of a lower number of traumatic brain and cervical spine/spinal cord injuries in 2016/17. *Note: see limitations regarding the interpretation of this percentage increase.*

Direct by sport: For high school sports, football had the highest *number* of 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, cheerleading, male gymnastics, football, and ice hockey had the highest rates per 100,000 participants (Figure 2, Table 9a). Similar results were observed when restricted to fatal events (Figure 1).

For college sports, football had the highest *number* of 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, ice hockey, male skiing, equestrian and female gymnastics had the highest rates per 100,000 participants (Figure 4, Table 9b). Similar results were observed when restricted to fatal events (Figure 3).

Indirect by sport: For high school sports, football had the highest *number* of indirect catastrophic events, followed by male basketball, male track and field, wrestling, male soccer, baseball, and male cross country (Table 4b). Accounting for the number of participants in the sport, rowing, male basketball, football, male ice hockey, male water polo, and male lacrosse had the highest rates per 100,000 participants (Figure 2, Table 10a). Similar results were observed when restricted to fatal events (Figure 1).

For college sports, football had the highest *number* of indirect catastrophic events, followed by male basketball, female basketball, male soccer, male swimming and wrestling (Table 5b). Accounting for the number of participants in the sport, male basketball, male water polo, male skiing, male wrestling, football, and male ice hockey had the highest rates per 100,000 participants (Figure 4, Table 10b). Similar results were observed when restricted to fatal events (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.
- 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 and www.ncaa.org.
 - **An automated external defibrillator (AED) should be available and accessible onsite and 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 indirect cardiac related events has increased over the years and it is recommended that schools have an 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 & Cisllan, 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 heat illness: <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 with 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:** Updated guidelines for the care of the spinal cord injured athlete can be found at the NATA’s website: <http://www.nata.org/sites/default/files/Executive-Summary-Spine-Injury-updated.pdf>. The final guidelines “Appropriate Prehospital Management of the Spine-Injured Athlete” will be published in the Journal of Athletic Training when completed.

- See also Swartz et al. 2009 for information about cervical spinal injury management and prevention:
<http://www.nata.org/sites/default/files/AcuteMgmtOfCervicalSpineInjuredAthlete.pdf>

CASE SUMMARIES AY2016/17

**Compiled from available media reports (n=86 events captured by NCCSIR).*

COLLEGE/UNIVERSITY

College/University Baseball Indirect

A male college baseball player collapsed during a student award banquet from sudden cardiac arrest. He was immediately attended to by athletic trainers who used CPR and AED to revive him. He was transported by EMS to the hospital where he underwent surgery to have a pacemaker installed. A full recovery is expected.

College/University Basketball Indirect

A male 22 year old college basketball player collapsed after an outdoor conditioning session with the team. They had just completed stadium stairs. He was transported to the hospital where he later died. Cause of death was due to an enlarged heart. Unknown whether heat played a role.

A male 22 year old college senior basketball guard collapsed on the court during a routine timeout. He was immediately attended to by trainers and coaches. He was removed from the court on a stretcher and transported to the hospital. A full recovery is expected. Cause of collapse is currently unknown but is suspected to be cardiac related.

College/University Football Direct

A male collegiate 5th year senior linebacker sustained a helmet to helmet hit with a teammate during a game. He was transported off the field on a stretcher and taken to the hospital. He was diagnosed with an undisclosed neck injury. A full recovery is expected but he was advised by doctors to stop playing football.

A male 23 year old college senior defensive back was making a tackle during a game when his neck snapped back. He was unable to move on the field. He was immediately attended to by athletic trainers and EMS. He was appropriately rolled and transported to the hospital. He was diagnosed with a C4 neck injury. A full recovery is expected.

College/University Football Indirect

A male 20 year old collegiate freshman defensive lineman collapsed during practice. He was taken to the hospital where he later died. Cause of death was due to exertional sickling with secondary condition of hypertrophic cardiomyopathy.

A male collegiate junior football offensive lineman collapsed during a voluntary off season conditioning session. He was transported to the hospital with a body temperature of 105 degrees. He spent 2 days in a coma. A full recovery is expected.

A male college junior football outside linebacker collapsed while on the bench during a game. He was immediately attended to by athletic trainers, team physicians, and EMS. He was transported to the hospital where he was diagnosed with hypertrophic cardiomyopathy. He underwent surgery to have a defibrillator implanted. A full recovery is expected.

A male college senior football player completed a morning off season conditioning session. He complained of not feeling well at workouts later that evening. He was transported to the hospital with symptoms of rhabdomyolysis. He was released from the hospital and a full recovery is expected.

A male college freshman football player completed a morning off season conditioning session. He complained of not feeling well at workouts later that evening. He was transported to the hospital with symptoms of rhabdomyolysis. He was released from the hospital and a full recovery is expected.

A male college freshman football player completed a morning off season conditioning session. He complained of not feeling well at workouts later that evening. He was transported to the hospital with symptoms of rhabdomyolysis. He was released from the hospital and a full recovery is expected.

A male 18 year old college freshman football player collapsed during a conditioning session. He was transported to the hospital where he later died. Cause of death is pending autopsy but is suspected to be heat related.

College/University Football Not sport-related

A male 20 year old college sophomore football player suffered a medical emergency while in his dorm room after a morning working session. His roommate called 911 and EMS attempted to revive him. Cause of death is due to sudden cardiac arrest from congenital heart defect and an enlarged heart.

A male 21 year old college junior football defensive lineman was found dead at his home. Cause of death is pending autopsy but is suspected to be cardiac related.

College/University Ice Hockey Indirect

A male 18 year old college freshman hockey player finished a game when he complained to his mother that he was having chest pain and his lungs were burning. She took him to the ER where he was told he had suffered sudden cardiac arrest. He was transported to another hospital. Long term prognosis is unknown but a heart transplant or bypass surgery may be required.

College/University Rugby Direct

A male 20 year old college sophomore rugby player was competing in the national championship game when he was injured during a maul. He appeared to land on the ground awkwardly and was unable to move after that. He was immediately attended to by medical personnel before being transported to the hospital. He was diagnosed with a spinal cord injury that left him permanently paralyzed from the waist down and with partial paralysis from the chest down and limited arm mobility. He is currently undergoing rehabilitation.

College/University Swimming Indirect

A female 22 year old collegiate senior swimmer suffered a medical emergency during practice. She was pulled from the pool by teammates who started CPR and used an AED. She was transported to the hospital where she later died. Cause of death is unknown but is suspected to be cardiac related.

College/University Track and Field Indirect

A male collegiate freshman track and field athlete collapsed at a track meet. He was attended to by coaches and athletic trainers, who started CPR. An AED was used to revive him before EMS arrived and transported him to the hospital. He was diagnosed with cardiac arrhythmia and a full recovery is expected.

A male 19 year old college sophomore high jumper collapsed during track and field practice due to sudden cardiac arrest. He was attended to by a football athletic trainer who used an AED to revive him before EMS transported him to the hospital. He underwent surgery to have a defibrillator implanted. A full recovery is expected.

College/University Wrestling Direct

A male 18 year old collegiate freshman wrestler was participating in an off season workout with his teammates when he landed on his head during a scramble. He reported having pain and

numbness in his legs. He was immediately attended to by athletic trainers before EMS arrived. He was transported to the hospital where he was diagnosed with several cervical fractures. He underwent surgery and inpatient rehabilitation. He has limited use of his arms and legs.

College/University Wrestling Indirect

A male 22 year old college wrestler collapsed after a personal conditioning session in the school gym. He was attended to by an athletic trainer before being transported to the hospital. He later died. Cause of death is unknown but is suspected to be cardiac related.

HIGH SCHOOL

High School Baseball Indirect

A male 17 year old high school senior baseball player was participating in an intramural basketball game when he collapsed. He was immediately attended to by first responders before being transported to the hospital. Cause of death was due to sudden cardiac arrest caused by cardiac arrhythmia.

A male 15 year old high school freshman baseball player collapsed during practice. CPR and AED were used to revive him. He was transported to the hospital where he spent over a month in critical care. Cause of collapsed was due to sudden cardiac arrest. A long but full recovery is expected.

High School Baseball Not sport-related

A male 16 year old high school senior baseball player went to go take a shower at home when he was found unresponsive. He was transported to the hospital where he died 2 days later. Cause of death was due to cardiac arrhythmia.

High School Basketball Indirect

A male 15 year old high school sophomore basketball player collapsed as he was getting ready for practice. He was immediately attended to by the athletic trainer and a nurse. He was transported to the hospital where he later died. Cause of death was due to complications of sickle cell trait.

A male 16 year old high school junior basketball player collapsed during practice. He was immediately attended to by coaches, who started CPR and got the AED, in which 1 shock was advised. He was transported to the hospital where a full recovery is expected. Cause of collapse was due to sudden cardiac arrest.

A male 16 year old high school junior varsity basketball player collapsed during a game. He was immediately attended to by opponent's athletic trainer, who began CPR and used an AED to revive him. He was transported to the hospital where he was diagnosed with hypertrophic cardiomyopathy. A full recovery is expected but he is no longer allowed to participate in sports.

A male 16 year old high school sophomore basketball player collapsed during basketball practice from sudden cardiac arrest. He was immediately attended to by athletic trainers who administered CPR and used an AED to revive him. A full recovery is expected.

A male 14 year old high school freshman junior varsity basketball player collapsed during a game. He was immediately attended to by first responders who used an AED to revive him. He was transported to the hospital where he underwent surgery for hypertrophic cardiomyopathy. A full recovery is expected.

A male 15 year old high school sophomore was trying out for the club basketball team when he collapsed. He was transported to the hospital where he later died. Cause of death was due to hypertrophic cardiomyopathy.

A male 15 year old high school basketball player complained of feeling lightheaded during an open gym session. He went to see the athletic trainer before collapsing. The athletic trainer administered CPR and used an AED before EMS arrived. He was transported to the hospital where he later died. Cause of death was due to cardiomyopathy.

A male 15 year old high school freshman basketball player collapsed while playing baseball. He later died from an aortic dissection.

A female 16 year old high school sophomore basketball player was competing in a club (AAU) game when she collapsed on the sideline. She was taken to the hospital where she later died. Cause of death is pending autopsy but is suspected to be cardiac related. She had previously had issues with fainting and breathing difficulty but had been cleared by a physician to return to play.

A male 14 year old high school freshman junior varsity basketball player was removed from the game by a referee for looking pale and shaky. He was attended to by the opposing team's athletic trainer. CPR and an AED were used to revive him before he was transported to the hospital. He underwent surgery for an undiagnosed heart condition. A full recovery is expected.

A male high school senior basketball player collapsed during practice. He was immediately attended to by coaches who started CPR until EMS arrived. An AED was used to revive him. He was transported to the hospital where he was diagnosed with hypertrophic cardiomyopathy. He underwent surgery to have a defibrillator implanted. A full recovery is expected.

A female 16 year old high school basketball player collapsed during a conditioning drill during practice from sudden cardiac arrest. She was immediately attended to by coaches who used an AED to try and revive her. She was revived by EMS before being transported to the hospital. Cause of cardiac arrest is unknown but a full recovery is expected.

High School Basketball Not sport-related

A male 15 year old high school sophomore basketball player sustained a medical emergency and died at home. Cause of death was due to congenital heart defect. He had previously participated in a basketball practice a few hours earlier.

A male 15 year old high school sophomore basketball player went to go take a shower after practice when his mother found him unresponsive on the floor. Cause of death is pending autopsy but is suspected to be cardiac related.

A male 17 year old high school junior basketball player collapsed during class due to sudden cardiac arrest. He was immediately attended to by the teacher, who began CPR until EMS arrived. He was transported to the hospital where he underwent surgery to have a defibrillator implanted. A full recovery is expected.

High School Cheerleading Direct

A female 14 year old high school cheerleader was participating in practice when they were working on a stunt. The flyer was lifted into the air unevenly during the routine and landed on her neck and back, resulting in a head injury. Long term prognosis is unknown.

High School Cross Country Indirect

A male 18 year old high school senior cross country runner collapsed after completing a race. He was transported to the hospital where he later died. Cause of death was due to cardiac dysrhythmia due to genetic cardiomyopathy.

High School Football Direct

A male high school senior football quarterback sustained a hard hit during a game. He complained of having difficulty breathing but continued to play. He was eventually pulled out and taken to the hospital. He was diagnosed with a punctured lung and a fractured rib. A full recovery is expected.

A male 17 year old high school football defensive lineman was making a tackle during a game when his head hit the ground. He walked off the field before he collapsed on the sideline. He was immediately attended to before being transported to the hospital. He underwent emergency brain surgery. He is slowly regaining functioning and recovery will include a stay in a rehabilitation center. Long term prognosis is unknown.

A male 17 year old high school senior wide receiver complained of headaches and was vomiting on the bus ride after a game. He became unresponsive and was airlifted to the hospital. He underwent surgery for a brain bleed and bruised lung. A full recovery is expected.

A male 17 year old high school junior football fullback and linebacker sustained an injury while attempting to catch a pass during kickoff return. He walked off the field and was taken to the hospital. He was later released. He died 2 days later from peritonitis as a result of a lacerated bowel.

A male 18 year old high school senior football defensive end made a tackle. He walked off the field and collapsed unconscious. He was transported to the hospital where he underwent surgery for a traumatic brain injury. A full recovery is expected.

A male high school junior fullback and linebacker was tackled by two opponent players after catching a pass during a game. He was immediately attended to by first responders before being airlifted to the hospital. He was diagnosed with a subdural hematoma. A full recovery is expected.

A male 17 year old high school junior football safety was blindsided while being tackled during a game. He was immediately attended to by the athletic trainer. He was transported to the hospital and diagnosed with a ruptured spleen, bruised lung, and fractured rib. A full recovery is expected.

A male high school senior junior varsity football player walked off the field and was complaining of a headache during a game. He was attended to by the athletic trainer, who began administering concussion protocol when he lost consciousness. He was transported to the hospital and found to have a pre-existing brain bleed from an unknown previous event. He is still in a medically induced coma. Long term prognosis is unknown.

A male 17 year old high school senior football quarterback and safety was catching the ball during a game when he was hit by two opponents. He immediately complained of severe neck pain and walked off the field. Shortly after, he lost feeling on his right side. He was attended to by the athletic trainer before being transported to the hospital. He underwent numerous tests but doctors were unable to find a specific cause for his spinal cord injury. After undergoing intensive therapy at the hospital and at home, he has regained feeling and hopes to walk soon. A long but full recovery is expected.

A male 16 year old high school sophomore junior varsity football player sustained an incomplete spinal cord injury while being tackled during a game. A full recovery is expected.

A male high school freshman football player sustained a traumatic brain injury during a game. He was transported to the hospital where he underwent surgery and is currently in a coma. Long term prognosis is unknown.

A male high school senior football player sustained a head injury during a game. He was transported to the hospital where he underwent surgery. A full recovery is expected.

A male 15 year old high school sophomore junior varsity football player's facemask hit the ground during a play. He walked off the field and complained of a headache to the trainer. He then collapsed and had a seizure. He was transported to the hospital where he later died. Cause of death was a result of a closed traumatic brain injury.

A male high school senior football quarterback was tackled during a game. He was taken to the hospital hours later and was diagnosed with a punctured lung. A full recovery is expected.

A male 17 year old high school football defensive back was tackled during a playoff game but did not anticipate the tackle. He had fractured his C5 vertebrae and was unable to feel anything. He was transported to the hospital where he underwent surgery. Long term prognosis is unknown at this time.

A male high school senior football linebacker sustained a head injury during a playoff game. He was transported to the hospital where he underwent surgery to relieve swelling in his brain. Long term prognosis is unknown as he was still in critical condition.

A male 17 year old high school junior wide receiver sustained a helmet to helmet hit while being tackled during a game. He was immediately attended to by athletic trainers and coaches, who found that he was unable to move. He was transported to the hospital where he was diagnosed with a spinal cord contusion. He spent time at a rehabilitation hospital re-learning how to walk. A full recovery is expected.

High School Football Indirect

A male 14 year old high school sophomore football player collapsed during conditioning drills at practice. He was immediately attended to by athletic trainers and coaches. CPR and an AED were utilized. He was transported to the hospital where he later died. Cause of death was due to cardiac arrhythmia.

A male 17 year old high school junior football defensive tackle came off the field during a game and collapsed. He was immediately attended to by athletic trainers and EMS. He was transported to the hospital where he later died. Cause of death was due to a congenital heart defect.

A male 17 year old high school senior football offensive and defensive lineman collapsed during a game from sudden cardiac arrest. He was immediately attended to by the opponent team's athletic trainer, who began CPR. He was transported to the hospital. A full recovery is expected.

A male 16 year old high school junior football player collapsed during gym class. He was immediately attended to by school staff who started CPR and used an AED to revive him. He was transported to the hospital, where a full recovery is expected. Cause of collapse was due to sudden cardiac arrest.

A male high school football player collapsed on the football field due to sudden cardiac arrest. He was immediately attended to by athletic trainers who began CPR and used an AED to revive him. A full recovery is expected.

A male 15 year old high school freshman football player was pulled from the field by the coach when he began looking pale. EMS were called and they transported him to the hospital where he later died. Cause of death was due to environmental hyperthermia.

A male 15 year old high school junior varsity football player collapsed during lunch after completing 4 pull ups for a pull up challenge. He was immediately attended to by school staff who began CPR and used an AED until EMS transported him to the hospital. He underwent surgery to have a defibrillator implanted. A full recovery is expected but he is no longer allowed to play football.

A male 16 year old high school junior football player collapsed during an off season conditioning session. He was immediately attended to by coaches before being transported to the hospital. He was diagnosed with heat stroke and his body temperature reached 107 degrees. He died about a week later from his injuries.

High School Football Not sport-related

A male 18 year old high school senior football player died in his sleep at home. Cause of death was due to cardiomegaly.

A male 16 year old high school football player collapsed during a school pep rally due to sudden cardiac arrest. He was immediately attended to by bystanders who started CPR and used an AED to revive him. He was transported to the hospital and a full recovery is expected.

High School Ice Hockey Direct

A male 17 year old high school junior ice hockey defenseman got tangled up with another player when he hit the boards head first. He was unable to move or get up from the play. He was immediately attended to by coaches before EMS transported him to the hospital. He was diagnosed with a fractured C6 vertebrae and is paralyzed from the neck down.

High School Ice Hockey Indirect

A male 17 year old high school junior ice hockey player complained of difficulty breathing during practice. EMS was called and he was transported to the hospital where he later died. Cause of death is pending autopsy but is suspected to be cardiac related.

High School Ice Hockey Not sport-related

A male 16 year old high school hockey player collapsed while at home. His father performed CPR until EMS arrived. AED delivered two shocks before he was transported to the hospital. He was diagnosed with cardiomyopathy and underwent surgery to have a defibrillation device inserted into his heart. A full recovery is expected.

High School Lacrosse Indirect

A male 17 year old high school lacrosse player was participating in a lacrosse camp when he collapsed. He was immediately attended to by an athletic trainer who started CPR while 911 was called. An AED was used to revive him before he was transported to the hospital. He underwent surgery to have a defibrillator implanted. Cause of collapsed is suspected to be cardiac related and a full recovery is expected.

A female 15 year old high school freshman junior varsity lacrosse player complained of not feeling well during a game. She was taken to the sideline where she collapsed. She was transported to the hospital where she later died. Cause of death is pending autopsy but is suspected to be cardiac related.

High School Soccer Direct

A male 16 year old high school sophomore junior varsity soccer player was hit in the chest by an errant ball. He immediately collapsed and was attended to by his mother (who is also a doctor).

She began CPR until an AED arrived and was used to revive him. He was transported to the hospital and a full recovery is expected. Cause of collapsed was due to commotio cordis.

High School Soccer Indirect

A male high school soccer player collapsed during a game. He was immediately attended to by the opposing team's athletic trainer. CPR and an AED were used to revive him. He was transported to the hospital. Cause of collapse was due to sudden cardiac arrest.

A male high school soccer player collapsed during a conditioning session. Coaches, the athletic director, and an athletic trainer immediately began CPR and used an AED to revive him. He was transported to the hospital and a full recovery is expected. Cause of collapse was due to sudden cardiac arrest.

High School Soccer Not sport-related

A female 15 year old high school sophomore soccer player died at home. Cause of death was due to sudden cardiac arrest.

High School Softball Not sport-related

A female 17 year old high school senior softball player sustained sudden cardiac arrest while at home. She was transported to the hospital where she underwent surgery to correct a congenital heart defect. She died due to surgical complications.

High School Swimming Indirect

A male 17 year old high school senior swimmer suffered a medical emergency during a swim meet. He was transported to the hospital where he later died. Cause of death was due to hypertrophic cardiomyopathy.

High School Tennis Indirect

A female 16 year old high school sophomore tennis player collapsed during an indoor conditioning session. She was immediately attended to by coaches/staff who administered CPR and used an AED. She was transported via helicopter to the hospital where she underwent surgery to have a defibrillator implanted. She was scheduled for a valve correction surgery but died unexpectedly. Cause of death was due to complications of a congenital heart defect.

High School Track and Field Direct

A female high school sophomore pole vaulter went up for a jump but stalled midair. She meant to land on the mat but hit her head on the way down. She underwent surgery for a head injury. A full recovery is expected.

High School Track and Field Indirect

A male high school sophomore track and field athlete collapsed during practice. He was immediately attended to by coaches who administered CPR until EMS arrived. He was transported to the hospital where he underwent surgery for Wolff Parkinson White Syndrome. A full recovery is expected.

A male 17 year old high school sophomore track athlete collapsed at the end of practice. An AED was used to revive him. He was transported to the hospital. Cause of collapse was cardiac related. A full recovery is expected.

High School Wrestling Direct

A male 16 year old high school wrestler was competing in a match when he was taken down by an illegal move. His face hit the ground and he became unconscious. When he regained consciousness, he complained of pain in his cervical spine and numbness/tingling in his extremities. He was transported by EMS for further evaluation. A full recovery is expected.

High School Wrestling Indirect

A male 16 year old high school junior wrestler collapsed in the locker room as he was getting ready for practice. He was immediately attended to by coaches before EMS arrived. He was transported to the hospital where he later died. Cause of death was due to hypertrophic cardiomyopathy.

A male high school junior wrestler was competing in a match when he lost consciousness after pinning his opponent. He was immediately attended to by opponent's athletic trainer and coaches. CPR and an AED were both utilized to revive him from sudden cardiac arrest. He was transported to the hospital. A full recovery is expected.

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Table 1: Number of All catastrophic injuries/illnesses by year: All sports combined, all levels (high school and college)

	College		High school		All	
	N	%	N	%	N	%
1982-1983	10	16.70%	50	83.30%	60	100.00%
1983-1984	13	21.00%	49	79.00%	62	100.00%
1984-1985	9	17.60%	42	82.40%	51	100.00%
1985-1986	16	28.10%	41	71.90%	57	100.00%
1986-1987	18	25.70%	52	74.30%	70	100.00%
1987-1988	15	17.90%	69	82.10%	84	100.00%
1988-1989	17	23.00%	57	77.00%	74	100.00%
1989-1990	10	13.30%	65	86.70%	75	100.00%
1990-1991	14	23.00%	47	77.00%	61	100.00%
1991-1992	11	23.40%	36	76.60%	47	100.00%
1992-1993	10	16.40%	51	83.60%	61	100.00%
1993-1994	11	17.50%	52	82.50%	63	100.00%
1994-1995	12	24.50%	37	75.50%	49	100.00%
1995-1996	8	15.70%	43	84.30%	51	100.00%
1996-1997	9	13.60%	57	86.40%	66	100.00%
1997-1998	15	20.00%	60	80.00%	75	100.00%
1998-1999	10	12.80%	68	87.20%	78	100.00%
1999-2000	9	12.90%	61	87.10%	70	100.00%
2000-2001	17	24.60%	52	75.40%	69	100.00%
2001-2002	14	17.30%	67	82.70%	81	100.00%
2002-2003	16	25.80%	46	74.20%	62	100.00%
2003-2004	18	24.30%	56	75.70%	74	100.00%
2004-2005	9	13.80%	56	86.20%	65	100.00%
2005-2006	12	21.80%	43	78.20%	55	100.00%
2006-2007	13	17.60%	61	82.40%	74	100.00%
2007-2008	15	18.50%	66	81.50%	81	100.00%
2008-2009	17	15.70%	91	84.30%	108	100.00%
2009-2010	27	28.10%	69	71.90%	96	100.00%
2010-2011	15	20.50%	58	79.50%	73	100.00%
2011-2012	15	19.50%	62	80.50%	77	100.00%
2012-2013	12	30.00%	28	70.00%	40	100.00%
2013-2014	16	22.50%	55	77.50%	71	100.00%
2014-2015	17	21.30%	63	78.80%	80	100.00%
2015-2016	18	18.20%	81	81.80%	99	100.00%
2016-2017	19	25.70%	55	74.30%	74	100.00%
Total	487	20.02%	1946	79.98%	2433	100.00%
Total*	522	20.45%	2030	79.55%	2552	100.00%

*Includes Cheerleading, Drill Team, Rodeo

Table 2: Number of Direct catastrophic injuries/illnesses by year: All sports combined, all levels (high school and college)

	College		High school		All	
	N	%	N	%	N	%
1982-1983	4	10.30%	35	89.70%	39	100.00%
1983-1984	8	19.00%	34	81.00%	42	100.00%
1984-1985	9	22.50%	31	77.50%	40	100.00%
1985-1986	15	30.60%	34	69.40%	49	100.00%
1986-1987	14	26.90%	38	73.10%	52	100.00%
1987-1988	8	12.30%	57	87.70%	65	100.00%
1988-1989	13	22.80%	44	77.20%	57	100.00%
1989-1990	8	14.80%	46	85.20%	54	100.00%
1990-1991	10	26.30%	28	73.70%	38	100.00%
1991-1992	6	17.60%	28	82.40%	34	100.00%
1992-1993	8	20.00%	32	80.00%	40	100.00%
1993-1994	6	14.30%	36	85.70%	42	100.00%
1994-1995	9	25.00%	27	75.00%	36	100.00%
1995-1996	6	18.80%	26	81.30%	32	100.00%
1996-1997	7	14.00%	43	86.00%	50	100.00%
1997-1998	6	12.00%	44	88.00%	50	100.00%
1998-1999	10	18.20%	45	81.80%	55	100.00%
1999-2000	9	20.50%	35	79.50%	44	100.00%
2000-2001	12	28.60%	30	71.40%	42	100.00%
2001-2002	5	9.60%	47	90.40%	52	100.00%
2002-2003	10	26.30%	28	73.70%	38	100.00%
2003-2004	12	22.20%	42	77.80%	54	100.00%
2004-2005	5	15.60%	27	84.40%	32	100.00%
2005-2006	7	21.90%	25	78.10%	32	100.00%
2006-2007	7	14.60%	41	85.40%	48	100.00%
2007-2008	9	17.00%	44	83.00%	53	100.00%
2008-2009	10	12.20%	72	87.80%	82	100.00%
2009-2010	16	27.60%	42	72.40%	58	100.00%
2010-2011	9	19.10%	38	80.90%	47	100.00%
2011-2012	8	15.40%	44	84.60%	52	100.00%
2012-2013	5	29.40%	12	70.60%	17	100.00%
2013-2014	2	6.50%	29	93.50%	31	100.00%
2014-2015	6	20.00%	24	80.00%	30	100.00%
2015-2016	14	23.70%	45	76.30%	59	100.00%
2016-2017	4	16.00%	21	84.00%	25	10.00%
Total	297	18.91%	1274	81.09%	1571	100.00%
Total*	332	19.77%	1347	80.23%	1679	100.00%

*Includes Cheerleading, Drill Team, Rodeo

Table 3: Number of Indirect catastrophic injuries/illnesses by year: All sports combined, all levels (high school and college)

	College		High school		All	
	N	%	N	%	N	%
1982-1983	6	28.60%	15	71.40%	21	100.00%
1983-1984	5	25.00%	15	75.00%	20	100.00%
1984-1985	0	0	11	100.00%	11	100.00%
1985-1986	1	12.50%	7	87.50%	8	100.00%
1986-1987	4	22.20%	14	77.80%	18	100.00%
1987-1988	7	36.80%	12	63.20%	19	100.00%
1988-1989	4	23.50%	13	76.50%	17	100.00%
1989-1990	2	9.50%	19	90.50%	21	100.00%
1990-1991	4	17.40%	19	82.60%	23	100.00%
1991-1992	5	38.50%	8	61.50%	13	100.00%
1992-1993	2	9.50%	19	90.50%	21	100.00%
1993-1994	5	23.80%	16	76.20%	21	100.00%
1994-1995	3	23.10%	10	76.90%	13	100.00%
1995-1996	2	10.50%	17	89.50%	19	100.00%
1996-1997	2	12.50%	14	87.50%	16	100.00%
1997-1998	9	36.00%	16	64.00%	25	100.00%
1998-1999	0	0	23	100.00%	23	100.00%
1999-2000	0	0	26	100.00%	26	100.00%
2000-2001	5	18.50%	22	81.50%	27	100.00%
2001-2002	9	31.00%	20	69.00%	29	100.00%
2002-2003	6	25.00%	18	75.00%	24	100.00%
2003-2004	6	30.00%	14	70.00%	20	100.00%
2004-2005	4	12.10%	29	87.90%	33	100.00%
2005-2006	5	21.70%	18	78.30%	23	100.00%
2006-2007	6	23.10%	20	76.90%	26	100.00%
2007-2008	6	21.40%	22	78.60%	28	100.00%
2008-2009	7	26.90%	19	73.10%	26	100.00%
2009-2010	11	28.90%	27	71.10%	38	100.00%
2010-2011	6	23.10%	20	76.90%	26	100.00%
2011-2012	7	28.00%	18	72.00%	25	100.00%
2012-2013	7	30.40%	16	69.60%	23	100.00%
2013-2014	14	35.00%	26	65.00%	40	100.00%
2014-2015	11	22.00%	39	78.00%	50	100.00%
2015-2016	4	10.00%	36	90.00%	40	100.00%
2016-2017	15	30.60%	34	69.40%	49	100.00%
Total	190	22.04%	672	77.96%	862	100.00%
Total*	190	21.76%	683	78.24%	873	100.00%

*Includes Cheerleading, Drill Team, Rodeo

Table 4a: Number of Direct catastrophic injuries/illnesses by severity by sport: High school all years combined

		Serious		Non-fatal		Fatal		All	
		N	%	N	%	N	%	N	%
Baseball	Male	23	35.90%	26	40.60%	15	23.40%	64	100.00%
Basketball	Female	3	50.00%	3	50.00%	0	0	6	100.00%
	Male	8	53.30%	6	40.00%	1	6.70%	15	100.00%
Cheerleading	Female	42	59.20%	28	39.40%	1	1.40%	71	100.00%
	Male	1	50.00%	1	50.00%	0	0	2	100.00%
Cross Country	Female	0	0	0	0	1	100.00%	1	100.00%
	Male	0	0	1	50.00%	1	50.00%	2	100.00%
Field Hockey	Female	0	0	3	100.00%	0	0	3	100.00%
Football	Male	391	41.50%	416	44.20%	135	14.30%	942	100.00%
Golf	Male	0	0	1	100.00%	0	0	1	100.00%
Gymnastics	Female	3	30.00%	7	70.00%	0	0	10	100.00%
	Male	1	25.00%	2	50.00%	1	25.00%	4	100.00%
Ice Hockey	Female	2	66.70%	1	33.30%	0	0	3	100.00%
	Male	7	25.90%	16	59.30%	4	14.80%	27	100.00%
Lacrosse	Female	2	66.70%	1	33.30%	0	0	3	100.00%
	Male	6	35.30%	9	52.90%	2	11.80%	17	100.00%
Skiing	Female	0	0	0	0	1	100.00%	1	100.00%
Soccer	Female	5	71.40%	1	14.30%	1	14.30%	7	100.00%
	Male	7	41.20%	3	17.60%	7	41.20%	17	100.00%
Softball	Female	6	85.70%	1	14.30%	0	0	7	100.00%
Swimming	Female	1	16.70%	5	83.30%	0	0	6	100.00%
	Male	3	30.00%	6	60.00%	1	10.00%	10	100.00%
Track and Field	Female	7	70.00%	2	20.00%	1	10.00%	10	100.00%
	Male	12	22.60%	20	37.70%	21	39.60%	53	100.00%
Wrestling	Male	22	34.40%	40	62.50%	2	3.10%	64	100.00%

Table 4b: Number of Indirect catastrophic injuries/illnesses by severity by sport: High school all years combined

		Serious		Non-fatal		Fatal		All	
		N	%	N	%	N	%	N	%
Baseball	Male	5	20.00%	0	0	20	80.00%	25	100.00%
Basketball	Female	2	10.00%	0	0	18	90.00%	20	100.00%
	Male	21	14.40%	1	0.70%	124	84.90%	146	100.00%
Cheerleading	Female	1	10.00%	1	10.00%	8	80.00%	10	100.00%
Cross Country	Female	3	21.40%	1	7.10%	10	71.40%	14	100.00%
	Male	2	8.30%	1	4.20%	21	87.50%	24	100.00%
	Unknown	1	100.00%	0	0	0	0	1	100.00%
Drill Team	Female	0	0	0	0	1	100.00%	1	100.00%
Field Hockey	Female	0	0	0	0	2	100.00%	2	100.00%
Football	Male	28	10.50%	2	0.70%	237	88.80%	267	100.00%
Ice Hockey	Male	2	28.60%	0	0	5	71.40%	7	100.00%
Lacrosse	Female	0	0	0	0	1	100.00%	1	100.00%
	Male	1	11.10%	0	0	8	88.90%	9	100.00%
Rowing	Male	1	100.00%	0	0	0	0	1	100.00%
Soccer	Female	1	10.00%	1	10.00%	8	80.00%	10	100.00%
	Male	5	14.70%	2	5.90%	27	79.40%	34	100.00%
Softball	Female	0	0	0	0	1	100.00%	1	100.00%
Swimming	Female	2	20.00%	1	10.00%	7	70.00%	10	100.00%
	Male	0	0	0	0	6	100.00%	6	100.00%
Tennis	Female	0	0	0	0	1	100.00%	1	100.00%
	Male	0	0	0	0	4	100.00%	4	100.00%
Track and Field	Female	0	0	1	14.30%	6	85.70%	7	100.00%
	Male	4	10.00%	0	0	36	90.00%	40	100.00%
Volleyball	Female	1	33.30%	1	33.30%	1	33.30%	3	100.00%
Water Polo	Female	0	0	0	0	1	100.00%	1	100.00%
	Male	0	0	0	0	3	100.00%	3	100.00%
Wrestling	Male	5	14.30%	1	2.90%	29	82.90%	35	100.00%

Table 5a: Number of Direct catastrophic injuries/illnesses by severity by sport: College all years combined

		Serious		Non-fatal		Fatal		All	
		N	%	N	%	N	%	N	%
Baseball	Male	7	35.00%	10	50.00%	3	15.00%	20	100.00%
Basketball	Male	8	80.00%	1	10.00%	1	10.00%	10	100.00%
Cheerleading	Female	13	46.40%	14	50.00%	1	3.60%	28	100.00%
	Male	3	60.00%	2	40.00%	0	0	5	100.00%
Equestrian	Female	0	0	0	0	1	100.00%	1	100.00%
Field Hockey	Female	2	66.70%	1	33.30%	0	0	3	100.00%
Football	Male	143	70.40%	47	23.20%	13	6.40%	203	100.00%
Gymnastics	Female	0	0	2	100.00%	0	0	2	100.00%
	Male	2	66.70%	1	33.30%	0	0	3	100.00%
	Unknown	0	0	1	100.00%	0	0	1	100.00%
Ice Hockey	Female	1	100.00%	0	0	0	0	1	100.00%
	Male	7	58.30%	5	41.70%	0	0	12	100.00%
Lacrosse	Female	0	0	2	100.00%	0	0	2	100.00%
	Male	1	16.70%	1	16.70%	4	66.70%	6	100.00%
Rodeo	Male	0	0	0	0	2	100.00%	2	100.00%
Rowing	Male	0	0	0	0	1	100.00%	1	100.00%
Rugby	Male	1	33.30%	2	66.70%	0	0	3	100.00%
Skiing	Female	0	0	1	50.00%	1	50.00%	2	100.00%
	Male	0	0	0	0	1	100.00%	1	100.00%
Soccer	Female	0	0	2	100.00%	0	0	2	100.00%
	Male	2	66.70%	1	33.30%	0	0	3	100.00%
Softball	Female	2	100.00%	0	0	0	0	2	100.00%
Swimming	Male	0	0	1	100.00%	0	0	1	100.00%
Track and Field	Female	0	0	1	100.00%	0	0	1	100.00%
	Male	2	14.30%	6	42.90%	6	42.90%	14	100.00%
Wrestling	Male	0	0	3	100.00%	0	0	3	100.00%

Table 5b: Number of Indirect catastrophic injuries/illnesses by severity by sport: College all years combined

		Serious		Non-fatal		Fatal		All	
		N	%	N	%	N	%	N	%
Baseball	Male	1	14.30%	1	14.30%	5	71.40%	7	100.00%
Basketball	Female	3	37.50%	0	0	5	62.50%	8	100.00%
	Male	10	20.40%	3	6.10%	36	73.50%	49	100.00%
Cross Country	Female	0	0	0	0	1	100.00%	1	100.00%
	Male	0	0	0	0	2	100.00%	2	100.00%
Football	Male	8	11.80%	0	0	60	88.20%	68	100.00%
Gymnastics	Female	0	0	0	0	1	100.00%	1	100.00%
Ice Hockey	Male	2	50.00%	1	25.00%	1	25.00%	4	100.00%
Lacrosse	Male	0	0	0	0	2	100.00%	2	100.00%
Rowing	Male	0	0	0	0	2	100.00%	2	100.00%
Skiing	Male	0	0	0	0	1	100.00%	1	100.00%
Soccer	Female	1	25.00%	0	0	3	75.00%	4	100.00%
	Male	0	0	2	25.00%	6	75.00%	8	100.00%
Swimming	Female	1	25.00%	0	0	3	75.00%	4	100.00%
	Male	0	0	0	0	7	100.00%	7	100.00%
Tennis	Female	0	0	0	0	1	100.00%	1	100.00%
	Male	0	0	0	0	1	100.00%	1	100.00%
Track and Field	Male	3	60.00%	0	0	2	40.00%	5	100.00%
Volleyball	Female	3	60.00%	0	0	2	40.00%	5	100.00%
Water Polo	Male	0	0	0	0	2	100.00%	2	100.00%
Wrestling	Male	2	25.00%	0	0	6	75.00%	8	100.00%

Table 6a: Number of Catastrophic injuries/illnesses by Severity by year: High school

	Fatal		Non-fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
1982-1983	25	0.49	10	0.20	15	0.30
1983-1984	23	0.46	15	0.30	11	0.22
1984-1985	17	0.34	13	0.26	12	0.24
1985-1986	10	0.20	15	0.29	16	0.31
1986-1987	26	0.51	14	0.27	12	0.23
1987-1988	17	0.33	25	0.48	27	0.52
1988-1989	21	0.40	19	0.37	17	0.33
1989-1990	24	0.46	26	0.50	15	0.29
1990-1991	23	0.44	15	0.29	9	0.17
1991-1992	12	0.23	9	0.17	15	0.28
1992-1993	23	0.43	14	0.26	14	0.26
1993-1994	21	0.38	16	0.29	15	0.27
1994-1995	12	0.21	13	0.23	12	0.21
1995-1996	19	0.32	16	0.27	8	0.13
1996-1997	24	0.40	20	0.33	13	0.21
1997-1998	24	0.38	24	0.38	12	0.19
1998-1999	31	0.48	14	0.22	23	0.36
1999-2000	33	0.51	17	0.26	11	0.17
2000-2001	26	0.39	16	0.24	10	0.15
2001-2002	28	0.43	22	0.34	17	0.26
2002-2003	21	0.31	13	0.19	12	0.18
2003-2004	17	0.25	24	0.36	15	0.22
2004-2005	33	0.48	17	0.25	6	0.09
2005-2006	20	0.29	15	0.21	8	0.11
2006-2007	21	0.29	24	0.34	16	0.22
2007-2008	23	0.32	16	0.22	27	0.37
2008-2009	28	0.38	32	0.44	31	0.42
2009-2010	24	0.32	19	0.26	26	0.35
2010-2011	22	0.30	18	0.24	18	0.24
2011-2012	22	0.30	23	0.31	17	0.23
2012-2013	16	0.21	7	0.09	5	0.07
2013-2014	19	0.26	10	0.14	26	0.36
2014-2015	22	0.29	11	0.15	29	0.38
2015-2016	25	0.33	15	0.20	41	0.54
2016-2017	18	0.23	5	0.07	32	0.42

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

Table 6b: Number of Catastrophic injuries/illnesses by Severity by year: College

	Fatal		Non-fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
1982-1983	6	2.34	3	1.17	1	0.39
1983-1984	5	1.85	2	0.74	6	2.22
1984-1985	1	0.35	3	1.04	5	1.73
1985-1986	4	1.38	4	1.38	8	2.75
1986-1987	5	1.80	2	0.72	11	3.96
1987-1988	7	2.64	1	0.38	7	2.64
1988-1989	4	1.49	4	1.49	9	3.34
1989-1990	3	1.14	2	0.76	5	1.89
1990-1991	5	1.82	6	2.18	3	1.09
1991-1992	5	1.78	2	0.71	4	1.43
1992-1993	3	1.05	0	0	7	2.46
1993-1994	7	2.39	0	0	4	1.37
1994-1995	3	1.01	3	1.01	6	2.02
1995-1996	2	0.60	4	1.19	2	0.60
1996-1997	3	0.91	5	1.51	1	0.30
1997-1998	9	2.68	2	0.59	4	1.19
1998-1999	2	0.56	3	0.84	5	1.40
1999-2000	2	0.56	2	0.56	5	1.40
2000-2001	7	1.89	5	1.35	5	1.35
2001-2002	10	2.74	1	0.27	3	0.82
2002-2003	6	1.60	4	1.07	6	1.60
2003-2004	9	2.39	4	1.06	5	1.33
2004-2005	4	1.04	3	0.78	2	0.52
2005-2006	5	1.27	5	1.27	2	0.51
2006-2007	6	1.48	1	0.25	6	1.48
2007-2008	5	1.21	2	0.48	8	1.93
2008-2009	5	1.18	2	0.47	10	2.37
2009-2010	13	3.01	2	0.46	12	2.78
2010-2011	4	0.90	8	1.80	3	0.67
2011-2012	7	1.54	0	0	8	1.76
2012-2013	6	1.29	3	0.65	3	0.65
2013-2014	6	1.26	0	0	10	2.11
2014-2015	4	0.83	1	0.21	12	2.48
2015-2016	2	0.41	4	0.82	12	2.46
2016-2017	5	1.02	2	0.41	12	2.44

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

Table 7a: Rate of direct catastrophic injuries/illnesses by severity by year: High school

	Fatal		Non-fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
1982-1983	10	0.20	10	0.20	15	0.30
1983-1984	8	0.16	15	0.30	11	0.22
1984-1985	6	0.12	13	0.26	12	0.24
1985-1986	3	0.06	15	0.29	16	0.31
1986-1987	13	0.25	14	0.27	11	0.21
1987-1988	5	0.10	25	0.48	27	0.52
1988-1989	8	0.15	19	0.37	17	0.33
1989-1990	5	0.10	26	0.5	15	0.29
1990-1991	4	0.08	15	0.29	9	0.17
1991-1992	4	0.08	9	0.17	15	0.28
1992-1993	4	0.08	14	0.26	14	0.26
1993-1994	5	0.09	16	0.29	15	0.27
1994-1995	2	0.04	13	0.23	12	0.21
1995-1996	4	0.07	15	0.25	7	0.12
1996-1997	10	0.16	20	0.33	13	0.21
1997-1998	8	0.13	24	0.38	12	0.19
1998-1999	8	0.13	14	0.22	23	0.36
1999-2000	7	0.11	17	0.26	11	0.17
2000-2001	4	0.06	16	0.24	10	0.15
2001-2002	9	0.14	21	0.32	17	0.26
2002-2003	3	0.04	13	0.19	12	0.18
2003-2004	3	0.04	24	0.36	15	0.22
2004-2005	5	0.07	16	0.23	6	0.09
2005-2006	4	0.06	14	0.20	7	0.10
2006-2007	2	0.03	23	0.32	16	0.22
2007-2008	2	0.03	16	0.22	26	0.36
2008-2009	10	0.14	31	0.42	31	0.42
2009-2010	2	0.03	18	0.24	22	0.30
2010-2011	5	0.07	17	0.23	16	0.22
2011-2012	4	0.05	23	0.31	17	0.23
2012-2013	3	0.04	5	0.07	4	0.05
2013-2014	8	0.11	9	0.12	12	0.16
2014-2015	6	0.08	10	0.13	7	0.09
2015-2016	8	0.11	15	0.20	22	0.29
2016-2017	2	0.03	5	0.07	14	0.18

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

Table 7b: Rate of direct catastrophic injuries/illnesses by severity by year: College

	Fatal		Non-fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
1982-1983	0	0	3	1.17	1	0.39
1983-1984	0	0	2	0.74	6	2.22
1984-1985	1	0.35	3	1.04	5	1.73
1985-1986	3	1.03	4	1.38	8	2.75
1986-1987	1	0.36	2	0.72	11	3.96
1987-1988	0	0	1	0.38	7	2.64
1988-1989	0	0	4	1.49	9	3.34
1989-1990	1	0.38	2	0.76	5	1.89
1990-1991	1	0.36	6	2.18	3	1.09
1991-1992	1	0.36	1	0.36	4	1.43
1992-1993	1	0.35	0	0	7	2.46
1993-1994	2	0.68	0	0	4	1.37
1994-1995	0	0	3	1.01	6	2.02
1995-1996	0	0	4	1.19	2	0.60
1996-1997	1	0.30	5	1.51	1	0.30
1997-1998	1	0.30	1	0.30	4	1.19
1998-1999	2	0.56	3	0.84	5	1.40
1999-2000	2	0.56	2	0.56	5	1.40
2000-2001	2	0.54	5	1.35	5	1.35
2001-2002	1	0.27	1	0.27	3	0.82
2002-2003	1	0.27	3	0.80	6	1.60
2003-2004	3	0.80	4	1.06	5	1.33
2004-2005	1	0.26	2	0.52	2	0.52
2005-2006	0	0	5	1.27	2	0.51
2006-2007	0	0	1	0.25	6	1.48
2007-2008	0	0	1	0.24	8	1.93
2008-2009	0	0	1	0.24	9	2.13
2009-2010	4	0.93	2	0.46	10	2.32
2010-2011	0	0	7	1.57	2	0.45
2011-2012	1	0.22	0	0	7	1.54
2012-2013	0	0	3	0.65	2	0.43
2013-2014	1	0.21	0	0	1	0.21
2014-2015	0	0	1	0.21	5	1.03
2015-2016	0	0	4	0.82	10	2.05
2016-2017	0	0	2	0.41	2	0.41

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

Table 8a: Rate of indirect catastrophic injuries/illnesses by severity by year: High School

	N	Fatal Rate per 100,000	N	Non-fatal Rate per 100,000	N	Serious Rate per 100,000
1982-1983	15	0.30	0	0	0	0
1983-1984	15	0.30	0	0	0	0
1984-1985	11	0.22	0	0	0	0
1985-1986	7	0.14	0	0	0	0
1986-1987	13	0.25	0	0	1	0.02
1987-1988	12	0.23	0	0	0	0
1988-1989	13	0.25	0	0	0	0
1989-1990	19	0.37	0	0	0	0
1990-1991	19	0.36	0	0	0	0
1991-1992	8	0.15	0	0	0	0
1992-1993	19	0.36	0	0	0	0
1993-1994	16	0.29	0	0	0	0
1994-1995	10	0.18	0	0	0	0
1995-1996	15	0.25	1	0.02	1	0.02
1996-1997	14	0.23	0	0	0	0
1997-1998	16	0.26	0	0	0	0
1998-1999	23	0.36	0	0	0	0
1999-2000	26	0.40	0	0	0	0
2000-2001	22	0.33	0	0	0	0
2001-2002	19	0.29	1	0.02	0	0
2002-2003	18	0.27	0	0	0	0
2003-2004	14	0.21	0	0	0	0
2004-2005	28	0.41	1	0.01	0	0
2005-2006	16	0.23	1	0.01	1	0.01
2006-2007	19	0.27	1	0.01	0	0
2007-2008	21	0.29	0	0	1	0.01
2008-2009	18	0.25	1	0.01	0	0
2009-2010	22	0.30	1	0.01	4	0.05
2010-2011	17	0.23	1	0.01	2	0.03
2011-2012	18	0.24	0	0	0	0
2012-2013	13	0.17	2	0.03	1	0.01
2013-2014	11	0.15	1	0.01	14	0.19
2014-2015	16	0.21	1	0.01	22	0.29
2015-2016	17	0.22	0	0	19	0.25
2016-2017	16	0.21	0	0	18	0.23

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

Table 8b: Rate of indirect catastrophic injuries/illnesses by severity by year: College

	N	Fatal Rate per 100,000	N	Non-fatal Rate per 100,000	N	Serious Rate per 100,000
1982-1983	6	2.34	0	0	0	0
1983-1984	5	1.85	0	0	0	0
1985-1986	1	0.34	0	0	0	0
1986-1987	4	1.44	0	0	0	0
1987-1988	7	2.64	0	0	0	0
1988-1989	4	1.49	0	0	0	0
1989-1990	2	0.76	0	0	0	0
1990-1991	4	1.45	0	0	0	0
1991-1992	4	1.43	1	0.36	0	0
1992-1993	2	0.70	0	0	0	0
1993-1994	5	1.71	0	0	0	0
1994-1995	3	1.01	0	0	0	0
1995-1996	2	0.60	0	0	0	0
1996-1997	2	0.60	0	0	0	0
1997-1998	8	2.38	1	0.30	0	0
2000-2001	5	1.35	0	0	0	0
2001-2002	9	2.47	0	0	0	0
2002-2003	5	1.34	1	0.27	0	0
2003-2004	6	1.59	0	0	0	0
2004-2005	3	0.78	1	0.26	0	0
2005-2006	5	1.27	0	0	0	0
2006-2007	6	1.48	0	0	0	0
2007-2008	5	1.21	1	0.24	0	0
2008-2009	5	1.18	1	0.24	1	0.24
2009-2010	9	2.08	0	0	2	0.46
2010-2011	4	0.90	1	0.22	1	0.22
2011-2012	6	1.32	0	0	1	0.22
2012-2013	6	1.29	0	0	1	0.22
2013-2014	5	1.05	0	0	9	1.90
2014-2015	4	0.83	0	0	7	1.45
2015-2016	2	0.41	0	0	2	0.41
2016-2017	5	1.02	0	0	10	2.03

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

**Table 9a: Rate of Direct catastrophic injuries/illnesses by level and severity by sport:
High school**

		Fatal		Non-fatal		Serious	
		N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
Baseball	Male	15	0.10	26	0.17	23	0.15
Basketball	Female	0	0	3	0.02	3	0.02
	Male	1	0.01	6	0.03	8	0.04
Cheerleading	Female	1	0.05	28	1.29	42	1.93
	Male	0	0	1	1.83	1	1.83
Cross	Female	1	0.02	0	0	0	0
Country	Male	1	0.02	1	0.02	0	0
Field Hockey	Female	0	0	3	0.15	0	0
Football	Male	135	0.38	416	1.19	391	1.11
Golf	Male	0	0	1	0.02	0	0
Gymnastics	Female	0	0	7	0.87	3	0.37
	Male	1	0.85	2	1.70	1	0.85
Ice Hockey	Female	0	0	1	0.65	2	1.30
	Male	4	0.38	16	1.53	7	0.67
Lacrosse	Female	0	0	1	0.08	2	0.15
	Male	2	0.11	9	0.51	6	0.34
Skiing	Female	1	0.34	0	0	0	0
Soccer	Female	1	0.01	1	0.01	5	0.06
	Male	7	0.06	3	0.03	7	0.06
Softball	Female	0	0	1	0.01	6	0.05
Swimming	Female	0	0	5	0.11	1	0.02
	Male	1	0.03	6	0.17	3	0.09
Track and Field	Female	1	0.01	2	0.01	7	0.04
	Male	21	0.11	20	0.10	12	0.06
Wrestling	Male	2	0.02	40	0.46	22	0.26

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

**Table 9b: Rate of Direct catastrophic injuries/illnesses by level and severity by sport:
College**

		Fatal		Non-fatal		Serious	
		N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
Baseball	Male	3	0.33	10	1.09	7	0.77
Basketball	Male	1	0.19	1	0.19	8	1.49
Equestrian	Female	1	4.10	0	0	0	0
Field Hockey	Female	0	0	1	0.53	2	1.06
Football	Male	13	0.64	47	2.31	143	7.04
Gymnastics	Female	0	0	2	3.83	0	0
	Male	0	0	1	5.47	2	10.94
Ice Hockey	Female	0	0	0	0	1	2.70
	Male	0	0	5	3.67	7	5.13
Lacrosse	Female	0	0	2	1.04	0	0
	Male	4	1.54	1	0.38	1	0.38
Rowing	Male	1	1.32	0	0	0	0
Skiing	Female	1	5.72	1	5.72	0	0
	Male	1	4.71	0	0	0	0
Soccer	Female	0	0	2	0.36	0	0
	Male	0	0	1	0.16	2	0.31
Softball	Female	0	0	0	0	2	0.40
Swimming	Male	0	0	1	0.35	0	0
Track and Field	Female	0	0	1	0.08	0	0
	Male	6	0.43	6	0.43	2	0.14
Wrestling	Male	0	0	3	1.26	0	0

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

Table 10a: Indirect catastrophic events by level and severity: High school

		Fatal		Non-fatal		Serious	
		N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
Baseball	Male	20	0.13	0	0	5	0.03
Basketball	Female	18	0.12	0	0	2	0.01
	Male	124	0.66	1	0.01	21	0.11
Cheerleading	Female	8	0.37	1	0.05	1	0.05
Cross Country	Female	10	0.18	1	0.02	3	0.06
	Male	21	0.33	1	0.02	2	0.03
Field Hockey	Female	2	0.10	0	0	0	0
Football	Male	237	0.68	2	0.01	28	0.08
Ice Hockey	Male	5	0.48	0	0	2	0.19
Lacrosse	Female	1	0.08	0	0	0	0
	Male	8	0.45	0	0	1	0.06
Rowing	Male	0	0	0	0	1	1.87
Soccer	Female	8	0.09	1	0.01	1	0.01
	Male	27	0.25	2	0.02	5	0.05
Softball	Female	1	0.01	0	0	0	0
Swimming	Female	7	0.16	1	0.02	2	0.05
	Male	6	0.17	0	0	0	0
Tennis	Female	1	0.02	0	0	0	0
	Male	4	0.08	0	0	0	0
Track and Field	Female	6	0.04	1	0.01	0	0
	Male	36	0.19	0	0	4	0.02
Volleyball	Female	1	0.01	1	0.01	1	0.01
Water Polo	Female	1	0.28	0	0	0	0
	Male	3	0.60	0	0	0	0
Wrestling	Male	29	0.34	1	0.01	5	0.06

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

Table 10b: Indirect catastrophic events by level and severity: College

		Fatal		Non-fatal		Serious	
		N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
Baseball	Male	5	0.55	1	0.11	1	0.11
Basketball	Female	5	1.05	0	0	3	0.63
	Male	36	6.69	3	0.56	10	1.86
Cross Country	Female	1	0.26	0	0	0	0
	Male	2	0.50	0	0	0	0
Football	Male	60	2.95	0	0	8	0.39
Gymnastics	Female	1	1.91	0	0	0	0
Ice Hockey	Male	1	0.73	1	0.73	2	1.47
Lacrosse	Male	2	0.77	0	0	0	0
Rowing	Male	2	2.65	0	0	0	0
Skiing	Male	1	4.71	0	0	0	0
Soccer	Female	3	0.54	0	0	1	0.18
	Male	6	0.93	2	0.31	0	0
Swimming	Female	3	0.87	0	0	1	0.29
	Male	7	2.44	0	0	0	0
Tennis	Female	1	0.35	0	0	0	0
	Male	1	0.37	0	0	0	0
Track and Field	Male	2	0.14	0	0	3	0.21
Volleyball	Female	2	0.45	0	0	3	0.67
Water Polo	Male	2	5.80	0	0	0	0
Wrestling	Male	6	2.52	0	0	2	0.84

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

Table 11: Characteristics of all sport-related catastrophic events during AY 2016-2017

	Direct		Indirect		All	
	N	%	N	%	N	%
Total	26	100.00%	49	100.00%	75	100.00%
Level						
College	4	15.40%	15	30.60%	19	25.30%
High school	22	84.60%	34	69.40%	56	74.70%
Severity						
Serious	16	61.50%	28	57.10%	44	58.70%
Non-fatal	8	30.80%	0	0	8	10.70%
Fatal	2	7.70%	21	42.90%	23	30.70%
Sex						
Female	2	7.70%	5	10.20%	7	9.30%
Male	24	92.30%	44	89.80%	68	90.70%
Month						
Jul-Aug	1	3.80%	6	12.20%	7	9.30%
Sep-Oct	17	65.40%	10	20.40%	27	36.00%
Nov-Dec	5	19.20%	5	10.20%	10	13.30%
Jan-Feb	1	3.80%	15	30.60%	16	21.30%
Mar-Apr	0	0	8	16.30%	8	10.70%
May-Jun	2	7.70%	5	10.20%	7	9.30%
Sponsored activity						
Official school or team athletic activity	26	100.00%	39	79.60%	65	86.70%
Official school or team non-athletic activity	0	0	1	2.00%	1	1.30%
Personal athletic activity	0	0	7	14.30%	7	9.30%
Unknown	0	0	2	4.10%	2	2.70%
Type of Activity						
Competition/Game	23	88.50%	16	32.70%	39	52.00%
Practice	2	7.70%	13	26.50%	15	20.00%
Conditioning Session	0	0	11	22.40%	11	14.70%
Other Team activity	1	3.80%	1	2.00%	2	2.70%
Non-athletic activity	0	0	1	2.00%	1	1.30%
Other	0	0	5	10.20%	5	6.70%
Unknown	0	0	2	4.10%	2	2.70%
Type of injury						
Bleed/hemorrhage	2	7.70%	0	0	2	2.70%
Blood clot	1	3.80%	0	0	1	1.30%
Cardiac arrest	0	0	20	40.80%	20	26.70%
Cardiac arrhythmia	0	0	3	6.10%	3	4.00%
Cardiomyopathy	0	0	10	20.40%	10	13.30%

Commotio cordis	1	3.80%	0	0	1	1.30%
Congenital heart	0	0	2	4.10%	2	2.70%
Contusion	5	19.20%	0	0	5	6.70%
Fracture	4	15.40%	0	0	4	5.30%
Heat stroke	0	0	3	6.10%	3	4.00%
Other	1	3.80%	1	2.00%	2	2.70%
Other trauma	4	15.40%	0	0	4	5.30%
Rhabdomyolysis	0	0	3	6.10%	3	4.00%
Sickle cell	0	0	2	4.10%	2	2.70%
Subdural hematoma	2	7.70%	0	0	2	2.70%
Traumatic brain injury, NS	5	19.20%	0	0	5	6.70%
Unknown	1	3.80%	5	10.20%	6	8.00%
Location						
Competitive Venue	22	84.60%	18	36.70%	40	53.30%
Other Private Property	0	0	1	2.00%	1	1.30%
School Athletic Facility	2	7.70%	26	53.10%	28	37.30%
School Campus	1	3.80%	3	6.10%	4	5.30%
In Transit	1	3.80%	0	0	1	1.30%
Unknown	0	0	1	2.00%	1	1.30%
Body part						
Head/brain	11	42.30%	0	0	11	14.70%
Neck	9	34.60%	0	0	9	12.00%
Heart	1	3.80%	40	81.60%	41	54.70%
Total body	0	0	9	18.40%	9	12.00%
Internal organ	4	15.40%	0	0	4	5.30%
Lumbar/Thoracic spine	1	3.80%	0	0	1	1.30%
Sport						
Baseball	0	0	3	6.10%	3	4.00%
Basketball	0	0	14	28.60%	14	18.70%
Cheerleading	1	3.80%	0	0	1	1.30%
Cross Country	0	0	1	2.00%	1	1.30%
Football	19	73.10%	15	30.60%	34	45.30%
Ice Hockey	1	3.80%	2	4.10%	3	4.00%
Lacrosse	0	0	2	4.10%	2	2.70%
Rugby	1	3.80%	0	0	1	1.30%
Soccer	1	3.80%	2	4.10%	3	4.00%
Swimming	0	0	2	4.10%	2	2.70%
Tennis	0	0	1	2.00%	1	1.30%
Track and Field	1	3.80%	4	8.20%	5	6.70%
Wrestling	2	7.70%	3	6.10%	5	6.70%

NS=not specified

Table 12. Participation numbers, 1982-1983 to 2016-2017

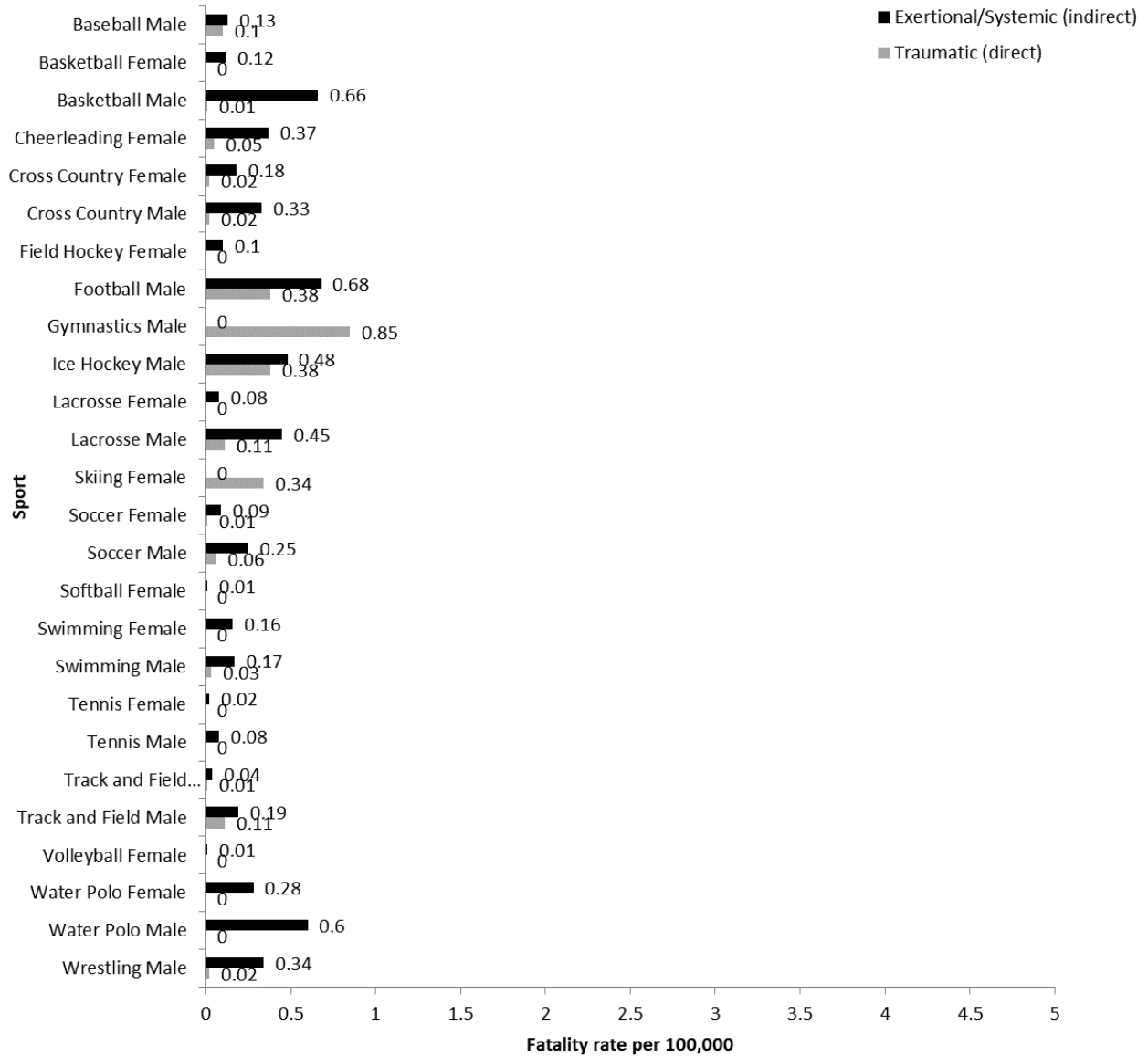
	High School ¹		College ²	
	Female	Male	Female	Male
Baseball	33,011	15,657,087	--	914,610
Basketball	14,959,742	18,683,883	475,267	538,077
Cheerleading	2,175,974	54,572	--	--
Cross Country	5,409,915	6,388,964	391,145	397,642
Equestrian	21,976	3,750	24,409	1,052
Field Hockey	1,986,965	4,747	188,832	--
Football	31,796	35,090,225	--	2,030,846
Golf	1,833,362	5,020,284	104,714	268,187
Gymnastics	806,137	117,525	52,286	18,282
Ice Hockey	154,083	1,045,903	37,039	136,391
Lacrosse	1,296,710	1,772,884	192,617	259,792
Rowing	61,647	53,490	165,611	75,578
Skiing	292,067	350,805	17,483	21,241
Soccer	8,523,281	10,920,340	558,503	642,187
Softball	11,551,676	53,188	494,585	--
Swimming	4,396,920	3,514,639	344,754	286,533
Tennis	5,418,851	5,052,019	284,490	272,081
Track and Field	15,613,642	19,154,033	1,201,783	1,396,894
Volleyball	12,645,528	1,181,301	445,513	40,357
Water Polo	361,585	502,563	22,576	34,488
Wrestling	132,403	8,603,742	--	238,339

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

²NCAA accessed online: http://www.ncaa.org/sites/default/files/2016-17NCAA-0472_ParticipRatesReport-FINAL_20171120.pdf

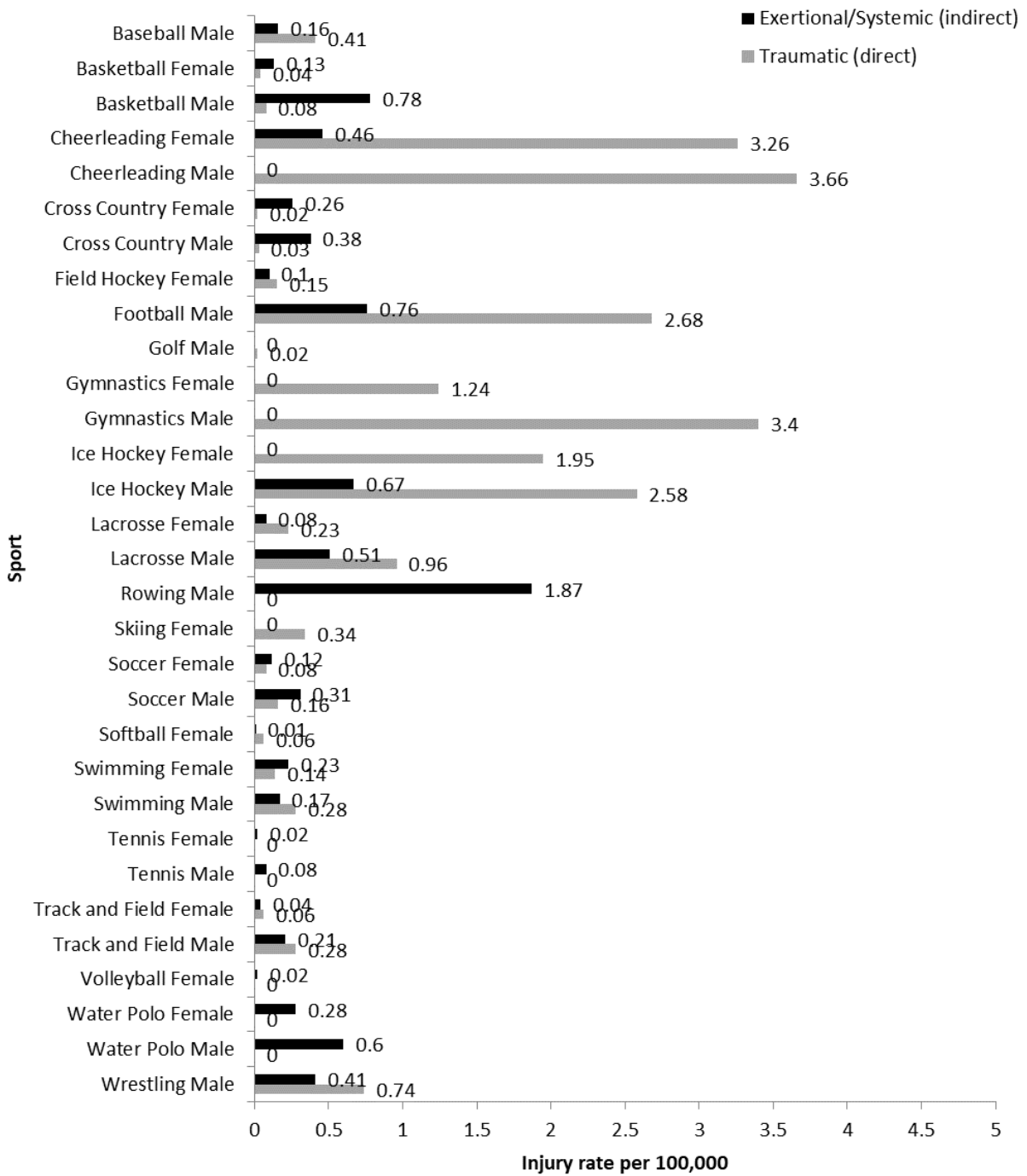
Note: Not all high schools and colleges are members of the NFHS and NCAA. Complete data are not available for the non-member schools. Therefore, these participation numbers underestimate the total number of high school and collegiate participants in the United States.

Figure 1: Rates of fatal catastrophic direct and indirect injuries/illnesses by sport-gender among high school participants, 1982/83-2016/17



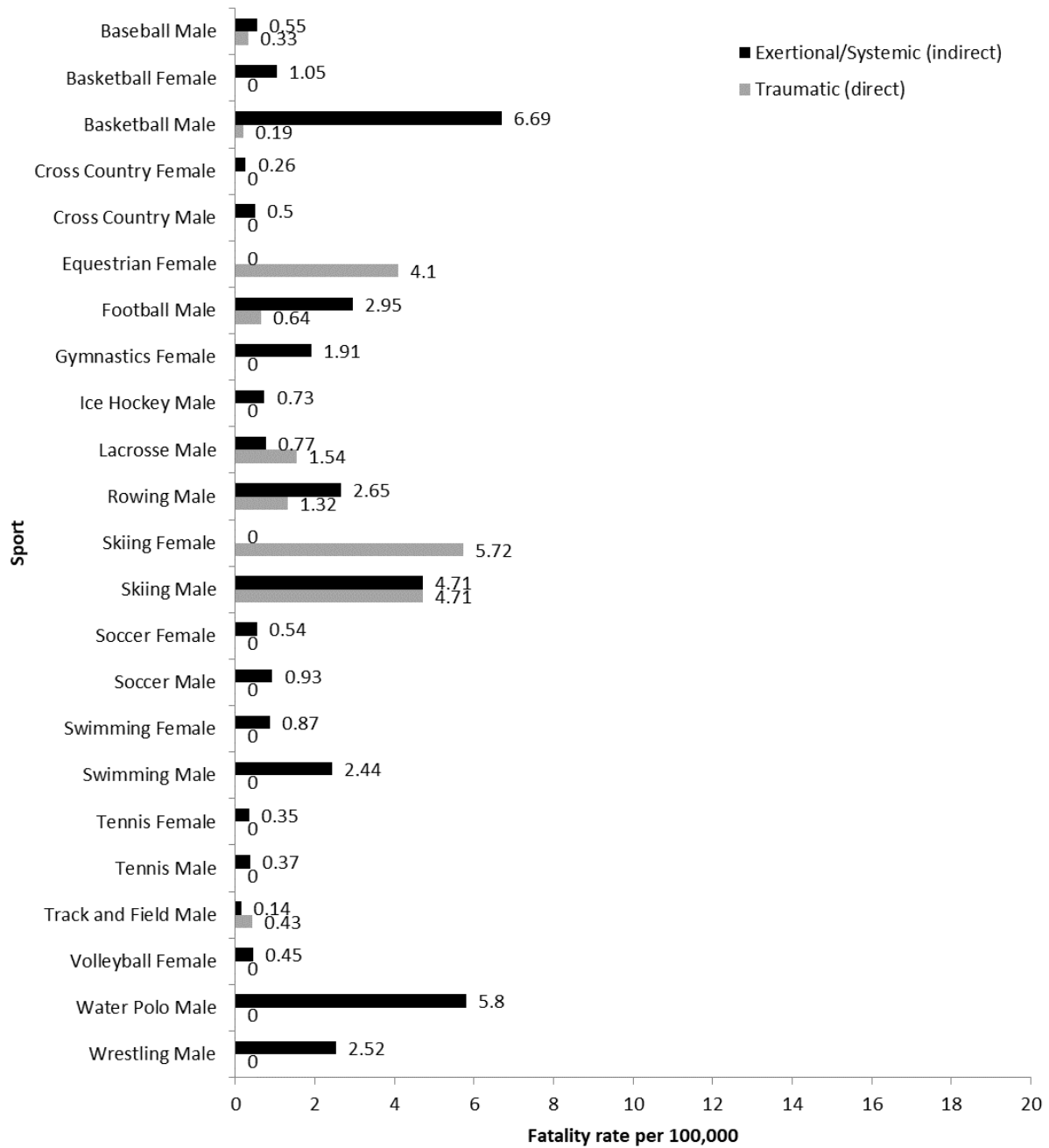
Note: Rates with number of incidents less than 5 should be interpreted with caution.

Figure 2: Rates of all catastrophic direct and indirect injuries/illnesses by sport-gender among high school participants, 1982/83-2016/17



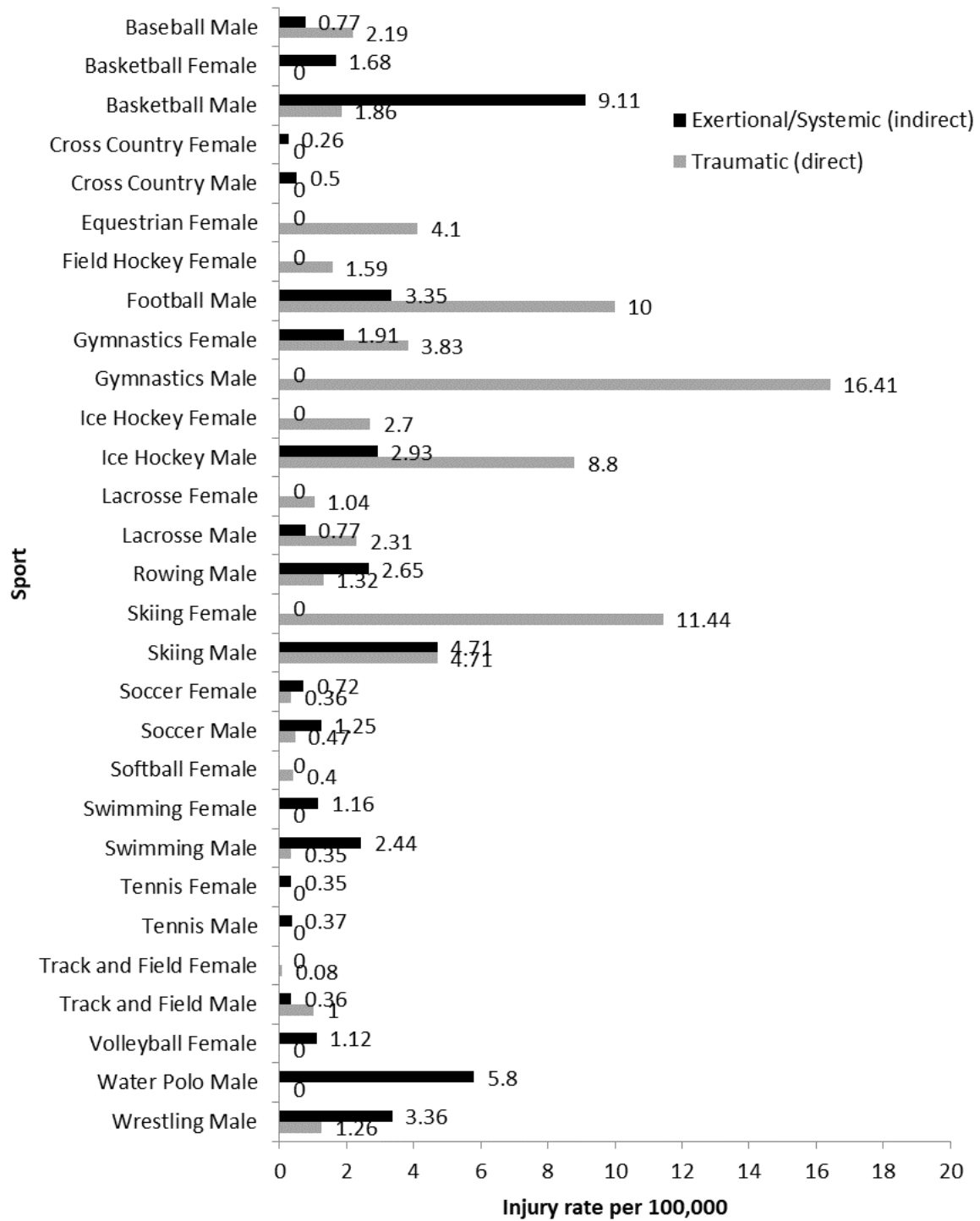
Note: Rates with number of incidents less than 5 should be interpreted with caution.

Figure 3: Rates of fatal catastrophic direct and indirect injuries/illnesses by sport-gender among collegiate participants, 1982/83-2016/17



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

Figure 4: Rates of all catastrophic direct and indirect injuries/illnesses by sport-gender among collegiate participants, 1982/83-2016/17



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