

**CATASTROPHIC  
SPORTS INJURY RESEARCH**

**THIRTY-EIGHTH ANNUAL REPORT**

**FALL 1982 - SPRING 2021**

**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 definitions 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/sports-resource-content/high-school-participation-survey-archive/>). *The NFHS did not collect sport participation data from its member states for academic years 2019/20 and 2020/21. Therefore 2019/20 sport participation was imputed based on 2018/19 values and 2020/21 sport participation was imputed based on 2021/22 values.* NFHS high school annual athletic participation for 2020/21 included 7,618,054 athlete-seasons (3,241,472 female-seasons and 4,376,582 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/2021RES\\_SportsSponsorshipParticipationRatesReport.pdf](https://ncaaorg.s3.amazonaws.com/research/sportpart/2021RES_SportsSponsorshipParticipationRatesReport.pdf)). NCAA participation for 2020/21 in championship sports was 491,255 athlete-seasons. There were 275,769 male-seasons and 215,486 female-seasons. There were also 3,219 males in non-championship sports (archery, badminton, bowling, equestrian, rowing, rugby, sailing, and squash) and 3,691 females participating in emerging sports (archery, badminton, equestrian, rugby, squash, synchronized swimming, team handball, and triathlon).

During the entire 39-year period from the fall of 1982 through the spring of 2021, there were 251,142,540 (100,494,323 female and 150,648,217 male) high school participant-seasons in the sports covered by this report and approximately 14,798,958 (5,946,147 female and 8,852,811 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 39-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 AY2020-2021 Summary

From July 1, 2020 to June 30, 2021 there were a total of 70 catastrophic injuries/illnesses captured by NCCSIR among high school and college organized sport participants. Of these, 60 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 (all cardiac-related; 5 collegiate and 5 high school level; 2 females and 8 males; 7 fatal and 3 nonfatal).

*Sport-related events:* The majority of the sport-related catastrophic events (n=60) were at the high school level (85%, n=51) and among males (85%, n=51). Member institutions for the 9 collegiate cases included 7 NCAA and 2 NAIA. Overall, 35.0% of cases were fatal, 3.3% were nonfatal permanently disabling, 51.7% were serious with recovery, and 10.0% were unknown. Sixty percent (n=36) were due to exertional/medical conditions (indirect) and 40% (n=24) were due to traumatic injury (direct) causes. The majority of events occurred during competition (43.3%) or practice (40.0%). The majority of events occurred to athletes participating in the following sports: football (36.7%), basketball (20.0%), cross country (10.0%), soccer (6.7%),



cheerleading (5.0%), and baseball (5.0%). Areas of the body most commonly affected were heart (48.4%), spine (15.1%), and head/brain (10.0%). Sudden cardiac arrest (46.7%) was the most common type of event followed by spine injury (15.1%), other traumatic injuries (11.7%), brain trauma (10.0%), and heat-related injuries (10.0%).

*Traumatic injury (direct) events:* 16.7% of traumatic injury (direct) events were fatal, 8.3% non-fatal permanently disabling, 50.0% serious with recovery, and 25.0% unknown. A greater proportion of traumatic injury (direct) events occurred in competition versus practice (70.8% versus 16.7%) and were due to contact with another player (41.7%), apparatus/object (12.5%), or ground/surface (25.0%). The most frequent activity was tackling/being tackled (25.0%) and a large proportion were unknown (25.0%). The highest proportion was to the spine (33.3%) followed by other traumatic injury (33.3%) and head/brain (25.0%). The majority occurred in football (45.8%) followed by cheerleading (12.5%), basketball (12.5%), baseball (8.3%), and rodeo (8.3%). There was 1 athlete injured via pedestrian motor vehicle crash related to participation in athletics (e.g. runner struck by car), compared to 5 athletes injured in 2019/20.

*Exertional/medical (indirect) events:* 47.2% of exertional/medical (indirect) events were fatal and 52.8% recovered. There were more fatal events in 2020/21 compared to 2019/20 (n=17 47.2% versus n=12 35.3%). The majority occurred during practice (55.6%) followed by competition (25.0%), conditioning sessions (11.1%), and unaffiliated recreational activity (5.6%). The most frequent activity was running (25.1%) and conditioning (11.1%), and 22.2% were unknown. The majority were cardiac-related (77.8%) and heat-related (16.7%). There were more heat stroke events in 2020/21 (n=6) compared to the previous year 2019/20 (n=2); however, the number in 2020/21 was less than years prior (8 in 2017/18 and 10 in 2018/19). Football (30.6%) and basketball (25.0%) comprised the majority followed by cross country (13.9%), and swimming (11.1%).

## **Overall Summary**

During this 39-year period, there were 2,958 catastrophic sport-related injuries/illnesses at high school and college levels (Table 1 – excluding cheerleading, drill team, and rodeo there were 2,833). 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 60 sport-related catastrophic injuries and conditions captured in 2020/21 is lower than the previous two years (70 in 2019/20 and 87 in 2018/19). The lower numbers in 2019/20 and 2020/21 may be a result of spring sport season cancellations for many high schools and colleges in 2019/20 and fall sport season cancellations for many high schools and colleges in 2020/21 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, football, male and female gymnastics, and male and female 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 13 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 and many cancelled or rescheduled their Fall 2020 sport seasons due to COVID-19. It is unclear what the impact of this is on catastrophic injuries and exertional/medical conditions.
- The NFHS did not collect participation data for their member states in 2019/20 or 2020/21; therefore 2018/19 participation estimates were used to estimate 2019/20 participation and 2021/22 participation estimates were used to estimate 2020/21 participation. Participation has not varied substantially over the past 3-years (7,963,535 in 2016/17; 7,980,886 in 2017/18; 7,937,491 in 2018/19); however, participation in 2021/22 was 7,618,054 down 4% compared to 2018/19. There may be additional variability by individual sport that could impact sport-specific rates in this report.
- 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. Best practices for management of exertional heat stroke emphasize reducing core temperature and minimizing the duration of hyperthermia as essential in reducing the risk of potential organ damage or death (i.e., "Cool First, Transport Second") (Casa et al. 2015).

- 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 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 updated best practice guidelines for prehospital care and management of athletes with suspected spine injuries: <https://meridian.allenpress.com/jat/article/55/6/563/438476/Consensus-Recommendations-on-the-Prehospital-Care>.
  - Video demonstrating the new NATA best practice guidelines for management of athletes with suspected spine injuries: <https://www.acep.org/by-medical-focus/sports-medicine/>
- 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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## 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	%
<b>1982-1983</b>	11	18.0%	50	82.0%	61	100.0%
<b>1983-1984</b>	13	21.0%	49	79.0%	62	100.0%
<b>1984-1985</b>	9	17.6%	42	82.4%	51	100.0%
<b>1985-1986</b>	16	27.6%	42	72.4%	58	100.0%
<b>1986-1987</b>	18	25.7%	52	74.3%	70	100.0%
<b>1987-1988</b>	15	17.9%	69	82.1%	84	100.0%
<b>1988-1989</b>	17	22.7%	58	77.3%	75	100.0%
<b>1989-1990</b>	11	14.5%	65	85.5%	76	100.0%
<b>1990-1991</b>	15	24.2%	47	75.8%	62	100.0%
<b>1991-1992</b>	11	23.4%	36	76.6%	47	100.0%
<b>1992-1993</b>	9	15.0%	51	85.0%	60	100.0%
<b>1993-1994</b>	11	16.7%	55	83.3%	66	100.0%
<b>1994-1995</b>	12	23.1%	40	76.9%	52	100.0%
<b>1995-1996</b>	8	15.4%	44	84.6%	52	100.0%
<b>1996-1997</b>	9	13.4%	58	86.6%	67	100.0%
<b>1997-1998</b>	15	20.0%	60	80.0%	75	100.0%
<b>1998-1999</b>	10	12.8%	68	87.2%	78	100.0%
<b>1999-2000</b>	9	12.7%	62	87.3%	71	100.0%
<b>2000-2001</b>	19	26.8%	52	73.2%	71	100.0%
<b>2001-2002</b>	14	17.3%	67	82.7%	81	100.0%
<b>2002-2003</b>	16	25.8%	46	74.2%	62	100.0%
<b>2003-2004</b>	18	24.3%	56	75.7%	74	100.0%
<b>2004-2005</b>	11	15.9%	58	84.1%	69	100.0%
<b>2005-2006</b>	12	21.4%	44	78.6%	56	100.0%
<b>2006-2007</b>	14	17.9%	64	82.1%	78	100.0%
<b>2007-2008</b>	15	18.3%	67	81.7%	82	100.0%
<b>2008-2009</b>	19	17.1%	92	82.9%	111	100.0%
<b>2009-2010</b>	28	28.0%	72	72.0%	100	100.0%
<b>2010-2011</b>	17	21.8%	61	78.2%	78	100.0%
<b>2011-2012</b>	24	27.0%	65	73.0%	89	100.0%
<b>2012-2013</b>	16	32.0%	34	68.0%	50	100.0%
<b>2013-2014</b>	18	21.7%	65	78.3%	83	100.0%
<b>2014-2015</b>	18	21.2%	67	78.8%	85	100.0%
<b>2015-2016</b>	20	18.9%	86	81.1%	106	100.0%
<b>2016-2017</b>	33	37.1%	56	62.9%	89	100.0%
<b>2017-2018</b>	24	27.0%	65	73.0%	89	100.0%
<b>2018-2019</b>	21	24.1%	66	75.9%	87	100.0%
<b>2019-2020</b>	10	14.3%	60	85.7%	70	100.0%
<b>2020-2021</b>	8	14.3%	48	85.7%	56	100.0%
<b>Total</b>	594	21.0%	2239	79.0%	2833	100.0%
<b>Total*</b>	630	21.3%	2328	78.7%	2958	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	22.8%	44	77.2%	57	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	13.7%	44	86.3%	51	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	26.7%	44	73.3%	60	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	23.8%	48	76.2%	63	100.0%
2016-2017	7	22.6%	24	77.4%	31	100.0%
2017-2018	8	20.0%	32	80.0%	40	100.0%
2018-2019	7	16.3%	36	83.7%	43	100.0%
2019-2020	4	11.1%	32	88.9%	36	100.0%
2020-2021	4	20.0%	16	80.0%	20	100.0%
<b>Total</b>	<b>335</b>	<b>19.2%</b>	<b>1411</b>	<b>80.8%</b>	<b>1746</b>	<b>100.0%</b>
<b>Total*</b>	<b>371</b>	<b>20.0%</b>	<b>1488</b>	<b>80.0%</b>	<b>1859</b>	<b>100.0%</b>

\*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	5	13.9%	31	86.1%	36	100.0%
2005-2006	5	20.8%	19	79.2%	24	100.0%
2006-2007	6	20.7%	23	79.3%	29	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	12	30.0%	28	70.0%	40	100.0%
2010-2011	6	22.2%	21	77.8%	27	100.0%
2011-2012	15	44.1%	19	55.9%	34	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	12	21.8%	43	78.2%	55	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	16	32.7%	33	67.3%	49	100.0%
2018-2019	14	31.8%	30	68.2%	44	100.0%
2019-2020	6	17.6%	28	82.4%	34	100.0%
2020-2021	4	11.1%	32	88.9%	36	100.0%
<b>Total</b>	259	23.8%	828	76.2%	1087	100.0%
<b>Total*</b>	259	23.6%	840	76.4%	1099	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 2020/21**

		Serious		Non-fatal		Fatal		Unknown		All	
		N	%	N	N	%	N	N	%	N	%
<b>Baseball</b>	<b>Male</b>	30	42.3%	21	29.6%	17	23.9%	3	4.2%	71	100.0%
<b>Basketball</b>	<b>Female</b>	4	57.1%	3	42.9%	0	0	0	0	7	100.0%
	<b>Male</b>	12	66.7%	4	22.2%	1	5.6%	1	5.6%	18	100.0%
<b>Cheerleading</b>	<b>Female</b>	44	58.7%	24	32.0%	1	1.3%	6	8.0%	75	100.0%
	<b>Male</b>	1	50.0%	1	50.0%	0	0	0	0	2	100.0%
<b>Cross</b>	<b>Female</b>	0	0	1	33.3%	2	66.7%	0	0	3	100.0%
<b>Country</b>	<b>Male</b>	0	0	2	50.0%	2	50.0%	0	0	4	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>	425	41.2%	423	41.0%	143	13.9%	41	4.0%	1032	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	37.5%	14	43.8%	4	12.5%	2	6.3%	32	100.0%
<b>Lacrosse</b>	<b>Female</b>	2	66.7%	0	0	0	0	1	33.3%	3	100.0%
	<b>Male</b>	13	54.2%	7	29.2%	2	8.3%	2	8.3%	24	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>	2	28.6%	5	71.4%	0	0	0	0	7	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>	15	25.0%	17	28.3%	23	38.3%	5	8.3%	60	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>	27	38.0%	40	56.3%	3	4.2%	1	1.4%	71	100.0%

**Table 4b: Number of Exertional/medical (indirect) catastrophic conditions by severity by sport: High school all years combined 1982/83 to 2020/21**

		Serious		Non-fatal		Fatal		Unknown		All	
		N	%	N	%	N	%	N	%	N	%
Baseball	Male	8	28.6%	0	0	20	71.4%	0	0	28	100.0%
Basketball	Female	4	18.2%	0	0	18	81.8%	0	0	22	100.0%
	Male	44	23.7%	0	0	141	75.8%	1	0.5%	186	100.0%
Cheerleading	Female	4	33.3%	0	0	8	66.7%	0	0	12	100.0%
Cross Country	Female	5	31.3%	0	0	11	68.8%	0	0	16	100.0%
	Male	7	23.3%	0	0	23	76.7%	0	0	30	100.0%
	Unknown	0	0	0	0	0	0	1	100.0%	1	100.0%
Dance	Female	0	0	0	0	1	100.0%	0	0	1	100.0%
Field Hockey	Female	1	33.3%	0	0	2	66.7%	0	0	3	100.0%
Football	Male	56	17.4%	3	0.9%	260	81.0%	2	0.6%	321	100.0%
Ice Hockey	Male	3	37.5%	0	0	5	62.5%	0	0	8	100.0%
Lacrosse	Female	0	0	0	0	1	100.0%	0	0	1	100.0%
	Male	2	16.7%	0	0	10	83.3%	0	0	12	100.0%
Other	Female	0	0	0	0	1	100.0%	0	0	1	100.0%
Rowing	Male	1	100.0%	0	0	0	0	0	0	1	100.0%
Running/ Jogging	Female	0	0	0	0	1	100.0%	0	0	1	100.0%
	Male	1	100.0%	0	0	0	0	0	0	1	100.0%
Soccer	Female	3	23.1%	0	0	10	76.9%	0	0	13	100.0%
	Male	11	23.9%	1	2.2%	32	69.6%	2	4.3%	46	100.0%
Softball	Female	0	0	0	0	1	100.0%	0	0	1	100.0%
Swimming	Female	2	16.7%	0	0	9	75.0%	1	8.3%	12	100.0%
	Male	1	12.5%	0	0	7	87.5%	0	0	8	100.0%
Tennis	Female	0	0	0	0	2	100.0%	0	0	2	100.0%
	Male	1	20.0%	0	0	4	80.0%	0	0	5	100.0%
Track and Field	Female	0	0	1	12.5%	7	87.5%	0	0	8	100.0%
	Male	10	20.4%	0	0	39	79.6%	0	0	49	100.0%
Volleyball	Female	3	50.0%	0	0	3	50.0%	0	0	6	100.0%
Water Polo	Female	1	50.0%	0	0	1	50.0%	0	0	2	100.0%
	Male	0	0	0	0	3	100.0%	0	0	3	100.0%
Wrestling	Male	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 2020/21**

		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>Female</b>	1	100.0%	0	0	0	0	0	0	1	100.0%
	<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>	153	68.3%	53	23.7%	17	7.6%	1	0.4%	224	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>	2	28.6%	1	14.3%	4	57.1%	0	0	7	100.0%
<b>Rodeo</b>	<b>Male</b>	0	0	0	0	3	100.0%	0	0	3	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>	4	66.7%	2	33.3%	0	0	0	0	6	100.0%
	<b>Male</b>	2	66.7%	1	33.3%	0	0	0	0	3	100.0%
<b>Softball</b>	<b>Female</b>	4	80.0%	0	0	0	0	1	20.0%	5	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 2020/21**

		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>	19	31.1%	42	68.9%	0	0	61	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>	<b>Female</b>	1	100.0%	0	0	0	0	1	100.0%
<b>Football</b>	<b>Male</b>	23	24.0%	72	75.0%	1	1.0%	96	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>	1	33.3%	2	66.7%	0	0	3	100.0%
<b>Rowing</b>	<b>Male</b>	0	0	2	100.0%	0	0	2	100.0%
<b>Skiing</b>	<b>Male</b>	0	0	1	100.0%	0	0	1	100.0%
<b>Soccer</b>	<b>Female</b>	1	25.0%	3	75.0%	0	0	4	100.0%
	<b>Male</b>	3	33.3%	6	66.7%	0	0	9	100.0%
<b>Swimming</b>	<b>Female</b>	1	25.0%	3	75.0%	0	0	4	100.0%
	<b>Male</b>	1	10.0%	9	90.0%	0	0	10	100.0%
<b>Tennis</b>	<b>Female</b>	0	0	1	100.0%	0	0	1	100.0%
	<b>Male</b>	0	0	1	100.0%	0	0	1	100.0%
<b>Track and Field</b>	<b>Female</b>	1	100.0%	0	0	0	0	1	100.0%
	<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	36.4%	7	63.6%	0	0	11	100.0%

**Table 6a: Number of catastrophic traumatic injuries (direct) and exertional/medical conditions (indirect) 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	12	0.23	12	0.23
1987-1988	17	0.33	25	0.48	27	0.52
1988-1989	21	0.40	20	0.39	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	22	0.40	15	0.27	16	0.29
1994-1995	13	0.23	14	0.25	13	0.23
1995-1996	19	0.32	13	0.22	9	0.15
1996-1997	25	0.41	16	0.26	14	0.23
1997-1998	24	0.38	23	0.37	12	0.19
1998-1999	31	0.48	13	0.20	23	0.36
1999-2000	33	0.51	16	0.25	12	0.19
2000-2001	26	0.39	15	0.23	11	0.17
2001-2002	28	0.43	19	0.29	17	0.26
2002-2003	21	0.31	11	0.16	13	0.19
2003-2004	17	0.25	23	0.34	15	0.22
2004-2005	34	0.50	15	0.22	7	0.10
2005-2006	21	0.30	12	0.17	11	0.16
2006-2007	21	0.29	23	0.32	20	0.28
2007-2008	23	0.32	15	0.21	29	0.40
2008-2009	28	0.38	31	0.42	33	0.45
2009-2010	24	0.32	22	0.30	26	0.35
2010-2011	24	0.32	16	0.22	21	0.28
2011-2012	22	0.30	24	0.32	19	0.26
2012-2013	21	0.28	6	0.08	6	0.08
2013-2014	25	0.34	9	0.12	27	0.37
2014-2015	24	0.32	7	0.09	34	0.45
2015-2016	27	0.36	10	0.13	45	0.59
2016-2017	16	0.21	5	0.07	32	0.42
2017-2018	14	0.18	9	0.12	38	0.49
2018-2019	16	0.21	6	0.08	32	0.42
2019-2020	17	0.22	3	0.04	30	0.39
2020-2021	18	0.25	1	0.01	23	0.32

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**

	Fatal		Non-fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
1982-1983	7	2.92	3	1.25	1	0.42
1983-1984	5	1.95	2	0.78	6	2.34
1984-1985	1	0.37	3	1.11	5	1.85
1985-1986	4	1.39	4	1.39	8	2.77
1986-1987	5	1.72	2	0.69	11	3.78
1987-1988	7	2.52	1	0.36	7	2.52
1988-1989	4	1.51	4	1.51	9	3.39
1989-1990	4	1.49	2	0.74	4	1.49
1990-1991	5	1.89	6	2.27	4	1.51
1991-1992	5	1.82	1	0.36	5	1.82
1992-1993	3	1.07	0	0	6	2.14
1993-1994	7	2.46	0	0	4	1.41
1994-1995	3	1.02	3	1.02	6	2.05
1995-1996	2	0.67	4	1.35	2	0.67
1996-1997	3	0.89	5	1.49	1	0.30
1997-1998	9	2.72	1	0.30	5	1.51
1998-1999	2	0.61	3	0.91	5	1.52
1999-2000	2	0.56	2	0.56	5	1.40
2000-2001	7	2.01	4	1.15	8	2.29
2001-2002	10	2.70	1	0.27	3	0.81
2002-2003	6	1.65	3	0.82	7	1.92
2003-2004	9	2.41	4	1.07	5	1.34
2004-2005	5	1.33	2	0.53	4	1.06
2005-2006	5	1.30	4	1.04	2	0.52
2006-2007	6	1.52	1	0.25	7	1.77
2007-2008	5	1.24	1	0.25	9	2.22
2008-2009	5	1.21	1	0.24	13	3.14
2009-2010	14	3.31	2	0.47	12	2.84
2010-2011	4	0.93	9	2.08	3	0.69
2011-2012	10	2.24	0	0	14	3.14
2012-2013	7	1.54	3	0.66	5	1.10
2013-2014	6	1.29	0	0	12	2.58
2014-2015	4	0.84	1	0.21	13	2.74
2015-2016	3	0.62	3	0.62	13	2.68
2016-2017	5	1.03	2	0.41	26	5.34
2017-2018	5	1.02	1	0.20	18	3.66
2018-2019	10	2.02	2	0.40	8	1.62
2019-2020	2	0.40	0	0	8	1.60
2020-2021	2	0.40	0	0	6	1.19

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**

	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	12	0.23	11	0.21
1987-1988	5	0.10	25	0.48	27	0.52
1988-1989	8	0.15	20	0.39	16	0.31
1989-1990	5	0.10	26	0.50	14	0.27
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	15	0.27	16	0.29
1994-1995	2	0.04	14	0.25	13	0.23
1995-1996	4	0.07	13	0.22	9	0.15
1996-1997	11	0.18	16	0.26	14	0.23
1997-1998	8	0.13	23	0.37	12	0.19
1998-1999	8	0.13	13	0.20	23	0.36
1999-2000	7	0.11	16	0.25	10	0.16
2000-2001	4	0.06	15	0.23	11	0.17
2001-2002	9	0.14	19	0.29	17	0.26
2002-2003	3	0.04	11	0.16	13	0.19
2003-2004	3	0.04	23	0.34	15	0.22
2004-2005	5	0.07	15	0.22	6	0.09
2005-2006	4	0.06	12	0.17	9	0.13
2006-2007	2	0.03	22	0.31	17	0.24
2007-2008	2	0.03	15	0.21	28	0.39
2008-2009	10	0.14	31	0.42	29	0.40
2009-2010	2	0.03	21	0.28	21	0.28
2010-2011	6	0.08	16	0.22	18	0.24
2011-2012	4	0.05	24	0.32	18	0.24
2012-2013	4	0.05	5	0.07	4	0.05
2013-2014	8	0.11	9	0.12	13	0.18
2014-2015	6	0.08	6	0.08	10	0.13
2015-2016	8	0.11	10	0.13	27	0.36
2016-2017	2	0.03	5	0.07	15	0.20
2017-2018	3	0.04	9	0.12	16	0.21
2018-2019	3	0.04	6	0.08	15	0.20
2019-2020	6	0.08	2	0.03	14	0.18
2020-2021	3	0.04	1	0.01	6	0.08

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**

	Fatal		Non-fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
1982-1983	1	0.42	3	1.25	1	0.42
1983-1984	0	0	2	0.78	6	2.34
1984-1985	1	0.37	3	1.11	5	1.85
1985-1986	3	1.04	4	1.39	8	2.77
1986-1987	1	0.34	2	0.69	11	3.78
1987-1988	0	0	1	0.36	7	2.52
1988-1989	0	0	4	1.51	9	3.39
1989-1990	1	0.37	2	0.74	4	1.49
1990-1991	1	0.38	6	2.27	4	1.51
1991-1992	1	0.36	1	0.36	4	1.45
1992-1993	1	0.36	0	0	6	2.14
1993-1994	2	0.70	0	0	4	1.41
1994-1995	0	0	3	1.02	6	2.05
1995-1996	0	0	4	1.35	2	0.67
1996-1997	1	0.30	5	1.49	1	0.30
1997-1998	1	0.30	1	0.30	4	1.21
1998-1999	2	0.61	3	0.91	5	1.52
1999-2000	2	0.56	2	0.56	5	1.40
2000-2001	2	0.57	4	1.15	8	2.29
2001-2002	1	0.27	1	0.27	3	0.81
2002-2003	1	0.27	3	0.82	6	1.65
2003-2004	3	0.80	4	1.07	5	1.34
2004-2005	1	0.27	2	0.53	3	0.80
2005-2006	0	0	4	1.04	2	0.52
2006-2007	0	0	1	0.25	7	1.77
2007-2008	0	0	1	0.25	8	1.98
2008-2009	0	0	1	0.24	9	2.18
2009-2010	4	0.95	2	0.47	10	2.37
2010-2011	0	0	9	2.08	2	0.46
2011-2012	2	0.45	0	0	7	1.57
2012-2013	0	0	3	0.66	4	0.88
2013-2014	1	0.22	0	0	2	0.43
2014-2015	0	0	1	0.21	5	1.05
2015-2016	0	0	3	0.62	11	2.27
2016-2017	0	0	2	0.41	5	1.03
2017-2018	2	0.41	1	0.20	5	1.02
2018-2019	0	0	2	0.40	4	0.81
2019-2020	1	0.20	0	0	3	0.60
2020-2021	0	0	0	0	4	0.79

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**

	Fatal		Non-fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000	N	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	1	0.02
1989-1990	19	0.37	0	0	1	0.02
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	17	0.31	0	0	0	0
1994-1995	11	0.19	0	0	0	0
1995-1996	15	0.25	0	0	0	0
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	2	0.03
2000-2001	22	0.33	0	0	0	0
2001-2002	19	0.29	0	0	0	0
2002-2003	18	0.27	0	0	0	0
2003-2004	14	0.21	0	0	0	0
2004-2005	29	0.42	0	0	1	0.01
2005-2006	17	0.24	0	0	2	0.03
2006-2007	19	0.27	1	0.01	3	0.04
2007-2008	21	0.29	0	0	1	0.01
2008-2009	18	0.25	0	0	4	0.05
2009-2010	22	0.30	1	0.01	5	0.07
2010-2011	18	0.24	0	0	3	0.04
2011-2012	18	0.24	0	0	1	0.01
2012-2013	17	0.23	1	0.01	2	0.03
2013-2014	17	0.23	0	0	14	0.19
2014-2015	18	0.24	1	0.01	24	0.32
2015-2016	19	0.25	0	0	18	0.24
2016-2017	14	0.18	0	0	17	0.22
2017-2018	11	0.14	0	0	22	0.29
2018-2019	13	0.17	0	0	17	0.22
2019-2020	11	0.14	1	0.01	16	0.21
2020-2021	15	0.21	0	0	17	0.24

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**

	Fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000
1982-1983	6	2.50	0	0
1983-1984	5	1.95	0	0
1985-1986	1	0.35	0	0
1986-1987	4	1.38	0	0
1987-1988	7	2.52	0	0
1988-1989	4	1.51	0	0
1989-1990	3	1.11	0	0
1990-1991	4	1.51	0	0
1991-1992	4	1.45	1	0.36
1992-1993	2	0.71	0	0
1993-1994	5	1.76	0	0
1994-1995	3	1.02	0	0
1995-1996	2	0.67	0	0
1996-1997	2	0.60	0	0
1997-1998	8	2.41	1	0.30
2000-2001	5	1.43	0	0
2001-2002	9	2.43	0	0
2002-2003	5	1.37	1	0.27
2003-2004	6	1.60	0	0
2004-2005	4	1.06	1	0.27
2005-2006	5	1.30	0	0
2006-2007	6	1.52	0	0
2007-2008	5	1.24	1	0.25
2008-2009	5	1.21	4	0.97
2009-2010	10	2.37	2	0.47
2010-2011	4	0.93	1	0.23
2011-2012	8	1.80	7	1.57
2012-2013	7	1.54	1	0.22
2013-2014	5	1.08	10	2.15
2014-2015	4	0.84	8	1.69
2015-2016	3	0.62	2	0.41
2016-2017	5	1.03	21	4.31
2017-2018	3	0.61	13	2.64
2018-2019	10	2.02	4	0.81
2019-2020	1	0.20	5	1.00
2020-2021	2	0.40	2	0.40

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 2020/21**

		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>	17	0.10	21	0.12	30	0.17
<b>Basketball</b>	<b>Female</b>	0	0	3	0.02	4	0.02
	<b>Male</b>	1	0.00	4	0.02	12	0.06
<b>Cheerleading</b>	<b>Female</b>	1	0.04	24	0.86	44	1.57
	<b>Male</b>	0	0	1	1.43	1	1.43
<b>Cross Country</b>	<b>Female</b>	2	0.03	1	0.02	0	0
	<b>Male</b>	2	0.03	2	0.03	0	0
<b>Field Hockey</b>	<b>Female</b>	0	0	1	0.04	0	0
<b>Football</b>	<b>Male</b>	143	0.37	423	1.08	425	1.08
<b>Golf</b>	<b>Male</b>	0	0	0	0	1	0.02
<b>Gymnastics</b>	<b>Female</b>	0	0	7	0.80	4	0.46
	<b>Male</b>	1	0.81	2	1.62	1	0.81
<b>Ice Hockey</b>	<b>Female</b>	0	0	1	0.52	2	1.04
	<b>Male</b>	4	0.34	14	1.18	12	1.01
<b>Lacrosse</b>	<b>Female</b>	0	0	0	0	2	0.12
	<b>Male</b>	2	0.09	7	0.32	13	0.59
<b>Skiing</b>	<b>Female</b>	1	0.31	0	0	0	0
<b>Soccer</b>	<b>Female</b>	2	0.02	1	0.01	6	0.06
	<b>Male</b>	7	0.05	2	0.02	7	0.05
<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	2	0.04
	<b>Male</b>	1	0.02	6	0.15	3	0.07
<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	15	0.07
<b>Volleyball</b>	<b>Male</b>	0	0	1	0.07	0	0
<b>Wrestling</b>	<b>Male</b>	3	0.03	40	0.42	27	0.28

Note: Rates with number of incidents less than 5 should be interpreted with caution. High school cheerleading participation is estimated from NFHS competitive spirit participation and many schools have cheerleading programs that are not sponsored by NFHS. Therefore, high school cheerleading participation is an underestimate leading to an overestimate in the rate.



**Table 9b: Rate of Traumatic (direct) catastrophic injuries by level and severity by sport:  
College 1982/83 to 2020/21**

		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>	3	0.29	7	0.67	9	0.87
<b>Basketball</b>	<b>Female</b>	0	0	0	0	1	0.19
	<b>Male</b>	1	0.17	1	0.17	9	1.49
<b>Equestrian</b>	<b>Female</b>	1	3.59	0	0	0	0
<b>Field Hockey</b>	<b>Female</b>	0	0	0	0	2	0.94
<b>Football</b>	<b>Male</b>	17	0.74	53	2.31	153	6.68
<b>Gymnastics</b>	<b>Female</b>	1	1.70	2	3.39	0	0
	<b>Male</b>	0	0	1	4.84	2	9.69
<b>Ice Hockey</b>	<b>Female</b>	0	0	0	0	1	2.23
	<b>Male</b>	0	0	5	3.27	7	4.58
<b>Lacrosse</b>	<b>Female</b>	0	0	2	0.86	0	0
	<b>Male</b>	4	1.30	1	0.32	2	0.65
<b>Rowing</b>	<b>Male</b>	1	1.18	0	0	0	0
<b>Skiing</b>	<b>Female</b>	1	5.26	1	5.26	0	0
	<b>Male</b>	1	4.28	0	0	0	0
<b>Soccer</b>	<b>Female</b>	0	0	2	0.31	4	0.62
	<b>Male</b>	0	0	1	0.14	2	0.28
<b>Softball</b>	<b>Female</b>	0	0	0	0	4	0.71
<b>Swimming</b>	<b>Male</b>	0	0	1	0.31	0	0
<b>Track and Field</b>	<b>Female</b>	0	0	1	0.07	1	0.07
	<b>Male</b>	6	0.38	6	0.38	6	0.38
<b>Wrestling</b>	<b>Male</b>	0	0	2	0.74	1	0.37

Note: Rates with number of incidents less than 5 should be interpreted with caution. Cheerleading is not a sponsored sport for NCAA collegiate athletes, therefore rates not provided.

**Table 10a: Exertional/medical (indirect) catastrophic conditions by level and severity: High school 1982/83 to 2020/21**

		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	0.11	0	0	8	0.05
<b>Basketball</b>	<b>Female</b>	18	0.11	0	0	4	0.02
	<b>Male</b>	141	0.68	0	0	44	0.21
<b>Cheerleading</b>	<b>Female</b>	8	0.29	0	0	4	0.14
<b>Cross Country</b>	<b>Female</b>	11	0.18	0	0	5	0.08
	<b>Male</b>	23	0.31	0	0	7	0.09
<b>Field Hockey</b>	<b>Female</b>	2	0.09	0	0	1	0.04
<b>Football</b>	<b>Male</b>	260	0.66	3	0.01	56	0.14
<b>Ice Hockey</b>	<b>Male</b>	5	0.42	0	0	3	0.25
<b>Lacrosse</b>	<b>Female</b>	1	0.06	0	0	0	0
	<b>Male</b>	10	0.45	0	0	2	0.09
<b>Rowing</b>	<b>Male</b>	0	0	0	0	1	1.57
<b>Soccer</b>	<b>Female</b>	10	0.10	0	0	3	0.03
	<b>Male</b>	32	0.25	1	0.01	11	0.09
<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	0.17	0	0	1	0.02
<b>Tennis</b>	<b>Female</b>	2	0.03	0	0	0	0
	<b>Male</b>	4	0.07	0	0	1	0.02
<b>Track and Field</b>	<b>Female</b>	7	0.04	1	0.01	0	0
	<b>Male</b>	39	0.18	0	0	10	0.05
<b>Volleyball</b>	<b>Female</b>	3	0.02	0	0	3	0.02
<b>Water Polo</b>	<b>Female</b>	1	0.23	0	0	1	0.23
	<b>Male</b>	3	0.51	0	0	0	0
<b>Wrestling</b>	<b>Male</b>	31	0.32	0	0	8	0.08

Note: Rates with number of incidents less than 5 should be interpreted with caution. High school cheerleading participation is estimated from NFHS competitive spirit participation and many schools have cheerleading programs that are not sponsored by NFHS. Therefore, high school cheerleading participation is an underestimate leading to an overestimate in the rate.

**Table 10b: Exertional/medical (indirect) catastrophic conditions by level and severity:  
College 1982/83 to 2020/21**

		Fatal		Serious	
		N	Rate per 100,000	N	Rate per 100,000
Baseball	Male	7	0.67	2	0.19
Basketball	Female	5	0.94	3	0.56
	Male	42	6.93	19	3.14
Cross Country	Female	1	0.23	0	0
	Male	2	0.44	2	0.44
Field Hockey	Female	0	0	1	0.47
Football	Male	72	3.14	23	1.00
Gymnastics	Female	1	1.70	0	0
Ice Hockey	Male	1	0.65	3	1.96
Lacrosse	Female	0	0	6	2.58
	Male	2	0.65	1	0.32
Rowing	Male	2	2.37	0	0
Skiing	Male	1	4.28	0	0
Soccer	Female	3	0.47	1	0.16
	Male	6	0.84	3	0.42
Swimming	Female	3	0.77	1	0.26
	Male	9	2.78	1	0.31
Tennis	Female	1	0.32	0	0
	Male	1	0.33	0	0
Track and Field	Female	0	0	1	0.07
	Male	2	0.13	4	0.25
Volleyball	Female	2	0.39	10	1.97
Water Polo	Male	2	5.17	0	0
Wrestling	Male	7	2.61	4	1.49

Note: Rates with number of incidents less than 5 should be interpreted with caution. Cheerleading is not a sponsored sport for NCAA collegiate athletes, therefore rates not provided.

**Table 11: Characteristics of all sport-related catastrophic traumatic injuries (direct) and exertional/medical conditions (indirect) during AY 2020-2021**

	Direct		Indirect		All	
	N	%	N	%	N	%
<b>Total</b>	24	100.0%	36	100.0%	60	100.0%
<b>Sport Level</b>						
Collegiate/University	5	20.8%	4	11.1%	9	15.0%
High School Sponsored	19	79.2%	32	88.9%	51	85.0%
<b>Severity</b>						
Serious	12	50.0%	19	52.8%	31	51.7%
Non-fatal	2	8.3%	0	0	2	3.3%
Fatal	4	16.7%	17	47.2%	21	35.0%
Unknown	6	25.0%	0	0	6	10.0%
<b>Sex</b>						
Female	5	20.8%	4	11.1%	9	15.0%
Male	19	79.2%	32	88.9%	51	85.0%
<b>Month</b>						
Jul-Aug	1	4.2%	8	22.2%	9	15.0%
Sep-Oct	9	37.5%	8	22.2%	17	28.3%
Nov-Dec	4	16.7%	5	13.9%	9	15.0%
Jan-Feb	2	8.3%	6	16.7%	8	13.3%
Mar-Apr	6	25.0%	5	13.9%	11	18.3%
May-Jun	2	8.3%	4	11.1%	6	10.0%
<b>Sport</b>						
Baseball	2	8.3%	1	2.8%	3	5.0%
Basketball	3	12.5%	9	25.0%	12	20.0%
Cheerleading	3	12.5%	0	0	3	5.0%
Cross Country	1	4.2%	5	13.9%	6	10.0%
Football	11	45.8%	11	30.6%	22	36.7%
Ice Hockey	1	4.2%	0	0	1	1.7%
Lacrosse	2	8.3%	0	0	2	3.3%
Rodeo	1	4.2%	0	0	1	1.7%
Soccer	0	0	4	11.1%	4	6.7%
Swimming	0	0	1	2.8%	1	1.7%
Tennis	0	0	1	2.8%	1	1.7%
Track and Field	0	0	2	5.6%	2	3.3%
Volleyball	0	0	1	2.8%	1	1.7%
Wrestling	0	0	1	2.8%	1	1.7%
<b>Sponsored activity</b>						
Official school or team related ATHLETIC activity (e.g. official practice, team strength/fitness training or competition)	24	100.0%	34	94.4%	58	96.7%
Personal athletic activity (e.g. individual strength/fitness or practice, non-team related)	0	0	2	5.6%	2	3.3%
<b>Location</b>						
Competitive Venue (e.g. arena, stadium, track, field)	20	83.3%	23	63.9%	43	71.7%
Other	2	8.3%	1	2.8%	3	5.0%
Other Private Property	0	0	1	2.8%	1	1.7%
Public Park	0	0	2	5.6%	2	3.3%
School Athletic Facility (practice fields, weight rooms and other non-competitive venues)	1	4.2%	6	16.7%	7	11.7%
School Campus (non-athletic facility)	1	4.2%	3	8.3%	4	6.7%

	Direct		Indirect		All	
	N	%	N	%	N	%
<b>Event Type</b>						
Competition/Game	17	70.8%	9	25.0%	26	43.3%
Conditioning Session	0	0	4	11.1%	4	6.7%
Other	2	8.3%	1	2.8%	3	5.0%
Practice	4	16.7%	20	55.6%	24	40.0%
Scrimmage	1	4.2%	0	0	1	1.7%
Unaffiliated Recreational Activity	0	0	2	5.6%	2	3.3%
<b>Player action</b>						
5,000 m/3mi	0	0	1	2.8%	1	1.7%
Being tackled	1	4.2%	1	2.8%	2	3.3%
Blocking	1	4.2%	0	0	1	1.7%
Blocking shot	1	4.2%	0	0	1	1.7%
Bull Riding	1	4.2%	0	0	1	1.7%
Conditioning (land)	0	0	4	11.1%	4	6.7%
Defending	0	0	1	2.8%	1	1.7%
Fielding	1	4.2%	0	0	1	1.7%
Fitness - Other	0	0	2	5.6%	2	3.3%
General play	2	8.3%	1	2.8%	3	5.0%
Other	3	12.5%	7	19.4%	10	16.7%
Pitching	1	4.2%	0	0	1	1.7%
Running	0	0	6	16.7%	6	10.0%
Running (middle/long distance)	1	4.2%	2	5.6%	3	5.0%
Running (sprints)	0	0	1	2.8%	1	1.7%
Shooting	1	4.2%	1	2.8%	2	3.3%
Swim - freestyle	0	0	1	2.8%	1	1.7%
Tackling	5	20.8%	0	0	5	8.3%
Unknown	6	25.0%	8	22.2%	14	23.3%
<b>Basic Mechanism</b>						
Contact with Another Player	10	41.7%	1	2.8%	11	18.3%
Contact with Apparatus or Object	3	12.5%	0	0	3	5.0%
Contact with Ground/Surface	6	25.0%	0	0	6	10.0%
Environmental (e.g., lightning strike)	0	0	6	16.7%	6	10.0%
Infection or Illness	0	0	29	80.6%	29	48.3%
Other	2	8.3%	0	0	2	3.3%
Unknown	3	12.5%	0	0	3	5.0%
<b>Major Injury Category</b>						
Environmental, other	0	0	1	2.8%	1	1.7%
Head Injury	6	25.0%	0	0	6	10.0%
Heat-related injury	0	0	6	16.7%	6	10.0%
Hit in the Chest	1	4.2%	0	0	1	1.7%
Other	0	0	1	2.8%	1	1.7%
Other Traumatic Injury	8	33.3%	0	0	8	13.3%
Spinal Cord Injury	8	33.3%	0	0	8	13.3%
Sudden Cardiac Arrest	0	0	28	77.8%	28	46.7%
Unknown at this time	1	4.2%	0	0	1	1.7%
<b>Detailed Injury Category</b>						
Cardiac/Sudden Cardiac Arrest (not Commotio Cordis)	0	0	28	77.8%	28	46.7%
Commotio Cordis (external blunt chest wall impact resulting in Cardiac Arrest)	1	4.2%	0	0	1	1.7%
Complications of Sickle Cell Trait (e.g. Exertional Sickling)	0	0	1	2.8%	1	1.7%

	Direct		Indirect		All	
	N	%	N	%	N	%
Heat-Related Injury (e.g. Heatstroke)	0	0	6	16.7%	6	10.0%
Other	1	4.2%	0	0	1	1.7%
Other Accident (Defined as an Unintentional Injury Not Directly or Indirectly related to Participation in Athletics)	1	4.2%	0	0	1	1.7%
Other Traumatic Injury (e.g. Ruptured Spleen)	7	29.2%	0	0	7	11.7%
Spinal Cord Injury with a Fracture	1	4.2%	0	0	1	1.7%
Spinal Cord Injury without Spine Fracture	7	29.2%	0	0	7	11.7%
Spine Fracture	1	4.2%	0	0	1	1.7%
Traumatic Brain Injury (e.g. subdural hematoma)	6	25.0%	0	0	6	10.0%
<b>Injury Outcome</b>						
Fatality/Sudden Death	4	16.7%	17	47.2%	21	35.0%
Non-trauma Survivor (e.g. sudden cardiac arrest, heat stroke, exertional sickling)	0	0	19	52.8%	19	31.7%
Trauma-related Non-Fatality - Disability unknown/uncertain	6	25.0%	0	0	6	10.0%
Trauma-related Non-Fatality with Permanent Disability	2	8.3%	0	0	2	3.3%
Trauma-related Non-Fatality with Temporary Disability (full recovery expected or confirmed)	12	50.0%	0	0	12	20.0%

**Table 12. Participation numbers, 1982/83 to 2020/21**

	High School <sup>1</sup>		College <sup>2</sup>	
	Female	Male	Female	Male
<b>Baseball</b>	38,497	17,590,668	-	1,039,660
<b>Basketball</b>	16,540,749	20,838,410	534,467	605,990
<b>Cheerleading<sup>3</sup></b>	2,801,911	69,956	-	-
<b>Cross Country</b>	6,263,446	7,429,036	442,336	449,706
<b>Equestrian<sup>4</sup></b>	29,311	7,518	27,843	1,158
<b>Field Hockey</b>	2,224,298	5,906	213,014	-
<b>Football</b>	42,335	39,175,327	-	2,291,986
<b>Golf</b>	2,152,614	5,599,293	122,047	299,824
<b>Gymnastics</b>	878,552	123,411	58,953	20,644
<b>Ice Hockey</b>	191,931	1,184,682	44,895	152,881
<b>Lacrosse</b>	1,689,876	2,221,466	232,709	308,004
<b>Rowing<sup>4</sup></b>	71,239	63,686	188,695	84,541
<b>Skiing</b>	319,777	381,185	19,020	23,388
<b>Soccer</b>	10,076,746	12,731,321	645,152	714,338
<b>Softball</b>	13,010,211	61,238	563,962	-
<b>Swimming/Diving</b>	5,068,441	4,050,058	390,044	323,471
<b>Tennis</b>	6,164,676	5,674,656	316,832	302,598
<b>Track and Field<sup>5</sup></b>	17,810,642	21,839,270	1,391,725	1,595,249
<b>Volleyball<sup>6</sup></b>	14,451,880	1,435,890	506,985	48,198
<b>Water Polo</b>	444,324	589,178	26,240	38,709
<b>Wrestling</b>	222,867	9,576,062	141	268,465
<b>Total</b>	<b>100,494,323</b>	<b>150,648,217</b>	<b>5,725,060</b>	<b>8,568,810</b>
<b>Grant Total</b>		<b>251,142,540</b>		<b>14,293,870</b>

<sup>1</sup>NFHS available online: [https://www.nfhs.org/media/5989280/2021-22\\_participation\\_survey.pdf](https://www.nfhs.org/media/5989280/2021-22_participation_survey.pdf)

<sup>2</sup>NCAA accessed online:

[https://ncaaorg.s3.amazonaws.com/research/sportpart/2021RES\\_SportsSponsorshipParticipationRatesReport.pdf](https://ncaaorg.s3.amazonaws.com/research/sportpart/2021RES_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.

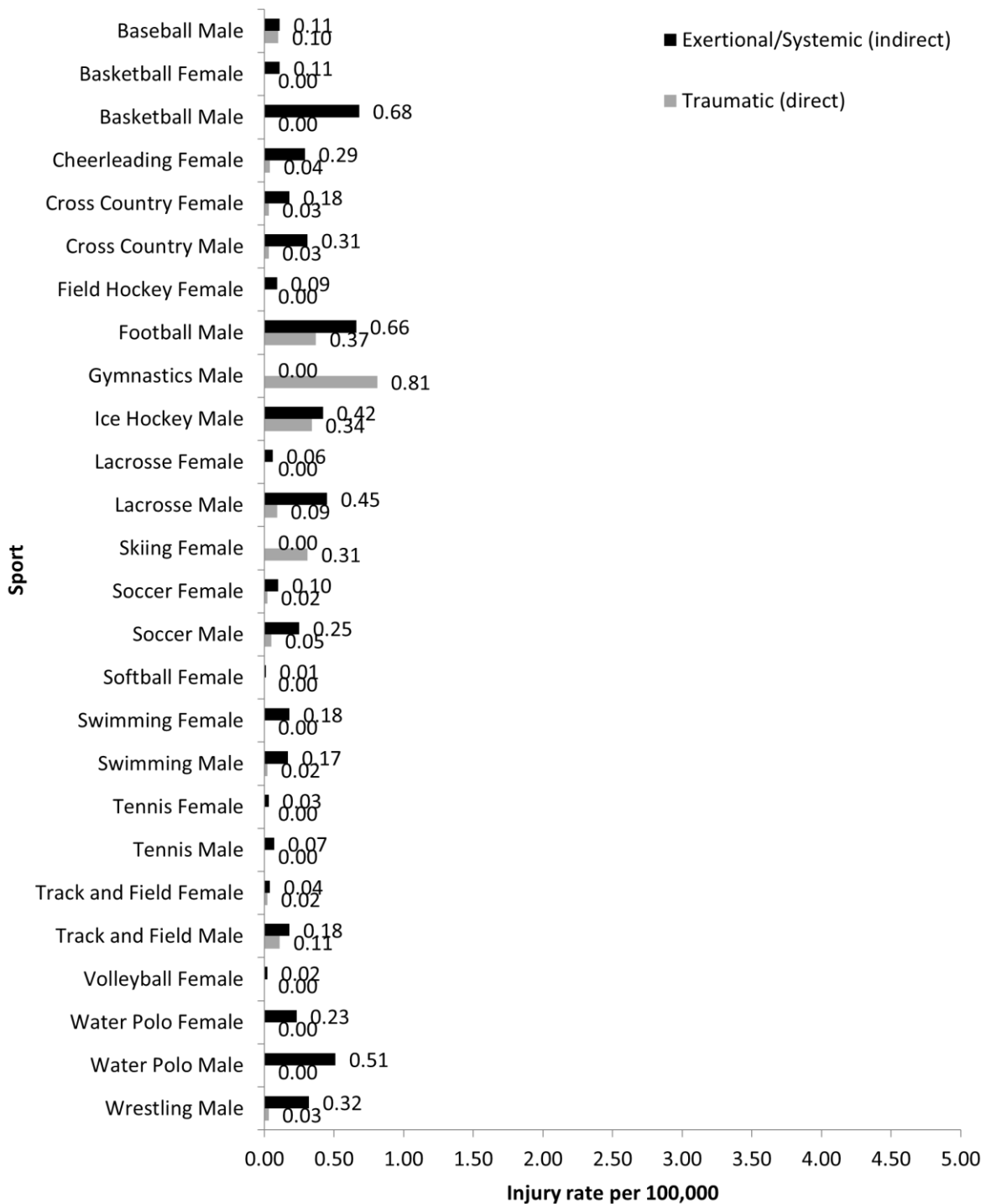
<sup>5</sup>Includes both indoor and outdoor track and field.

<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 and 2020/21 due to COVID-10. Therefore participation from 2018/19 was used to estimate participation for 2019/20 and participation from 2021/22 was used to estimate participation for 2020/21. In addition, all high school and collegiate spring 2020 sport seasons were cancelled in March of 2020 due to COVID-19 stay at home orders and many high school and collegiate fall 2020 sport seasons were cancelled or postponed.

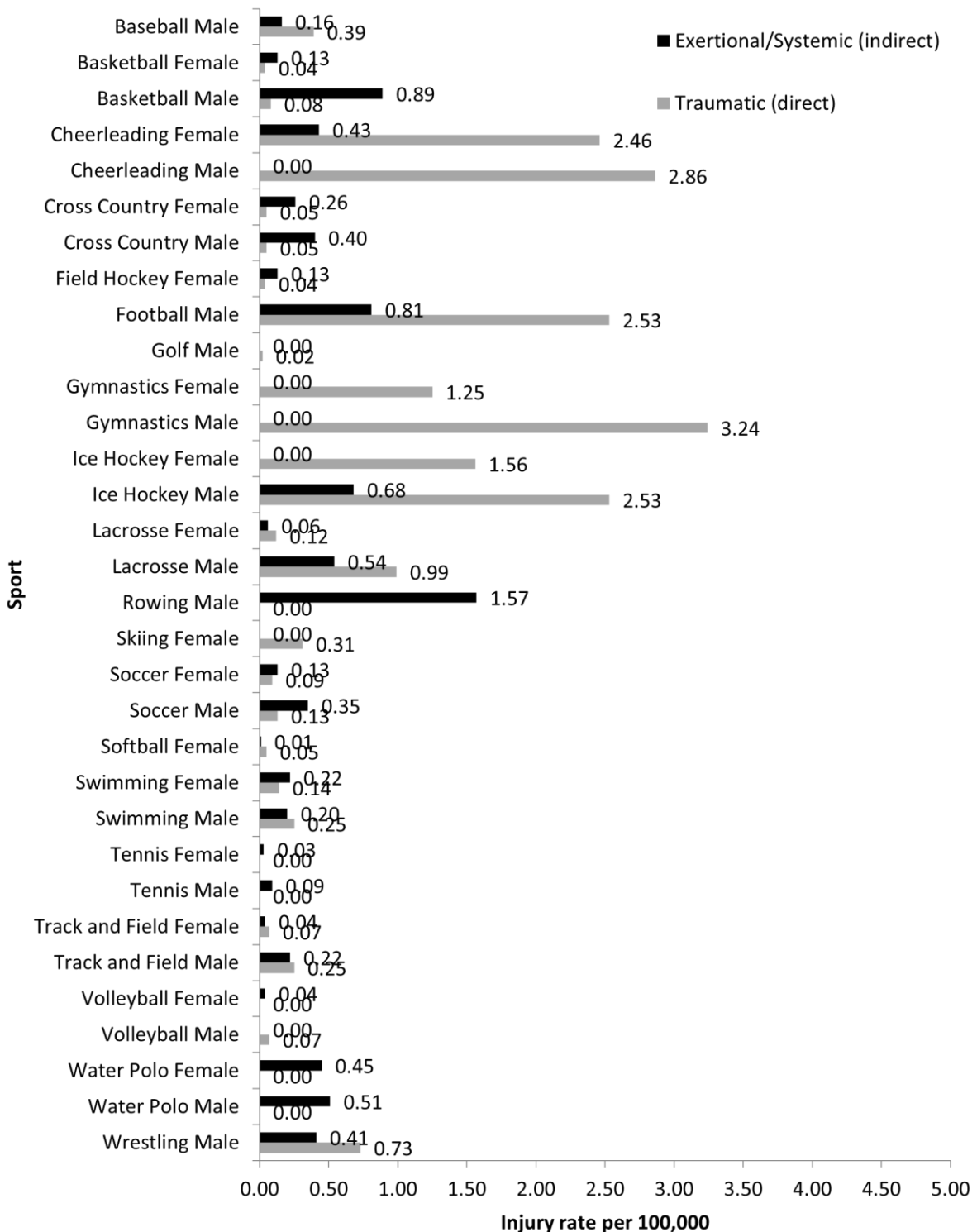
**Figure 1: Rates of fatal catastrophic traumatic injury (direct) and exertional/medical (indirect) conditions by sport-gender among high school participants, 1982/83-2020/21**



Note: Rates with number of incidents less than 5 should be interpreted with caution. High school cheerleading participation is estimated from NFHS competitive spirit participation and many schools have cheerleading programs that are not sponsored by NFHS. Therefore, high school cheerleading participation is an underestimate leading to an overestimate in the rate.

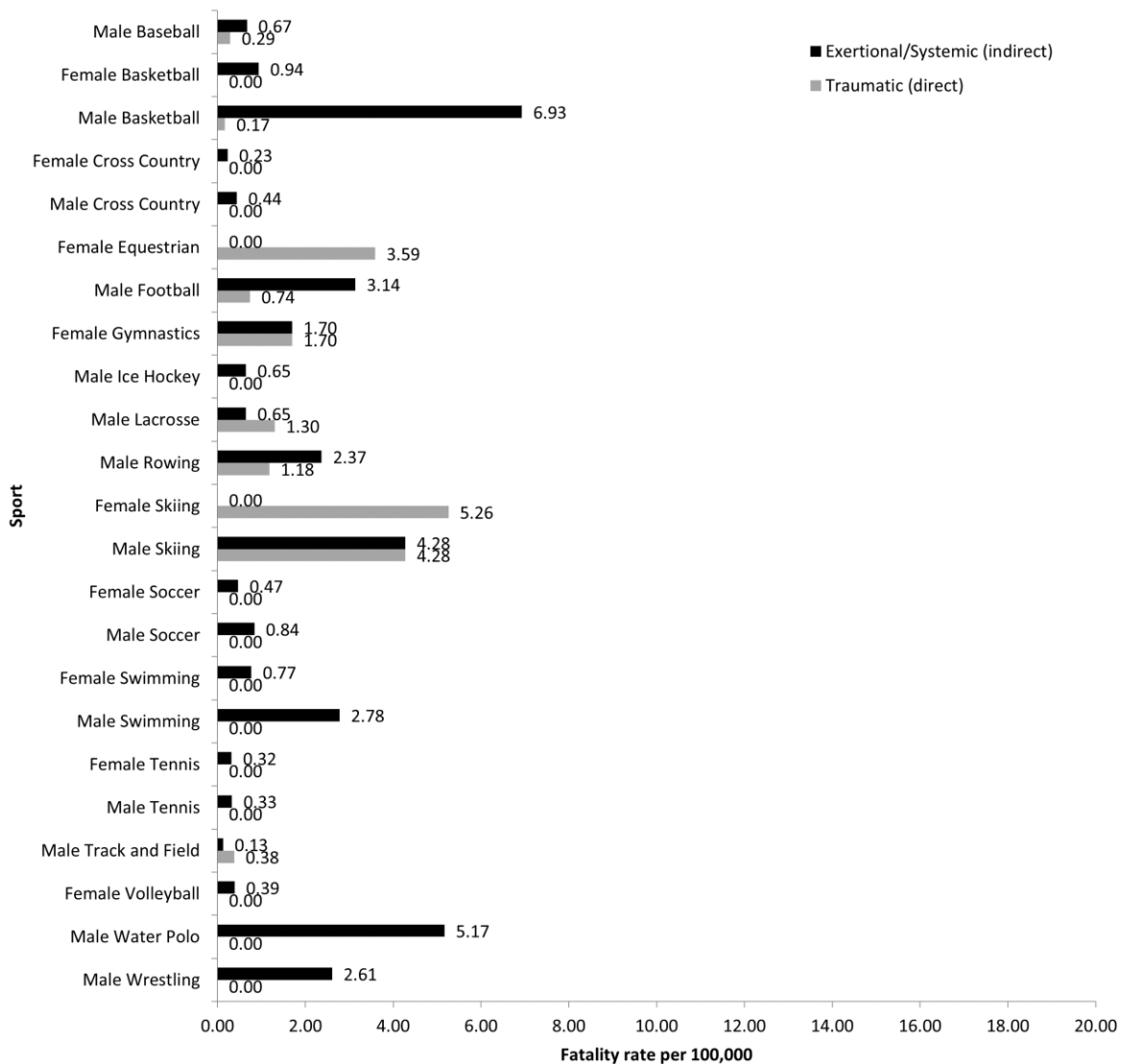


**Figure 2: Rates of all catastrophic traumatic injury (direct) and exertional/medical (indirect) conditions by sport-gender among high school participants, 1982/83-2020/21**



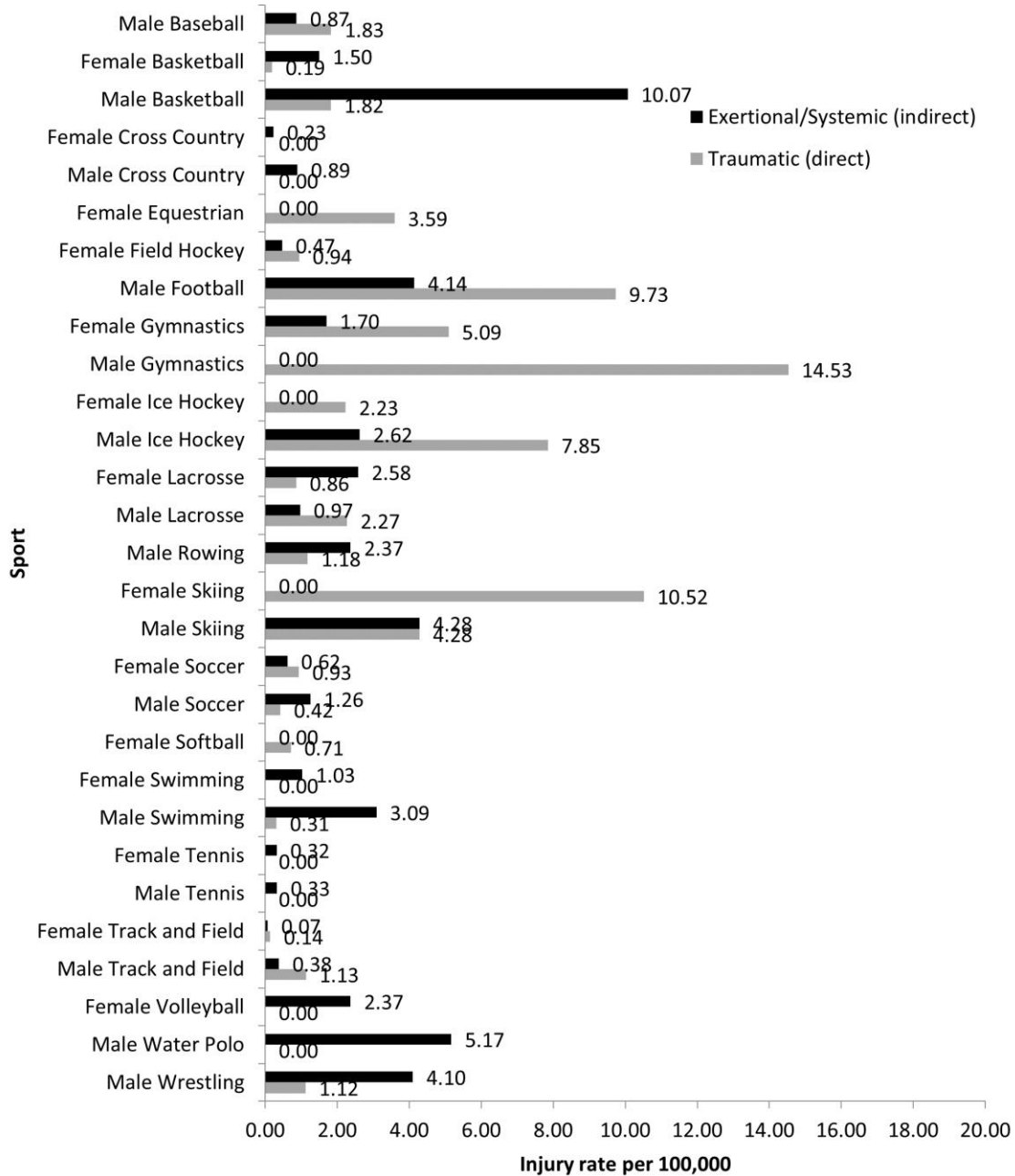
Note: Rates with number of incidents less than 5 should be interpreted with caution. High school cheerleading participation is estimated from NFHS competitive spirit participation and many schools have cheerleading programs that are not sponsored by NFHS. Therefore, high school cheerleading participation is an underestimate leading to an overestimate in the rate.

**Figure 3: Rates of fatal catastrophic traumatic injury (direct) and exertional/medical (indirect) conditions by sport-gender among collegiate participants, 1982/83-2020/21**



Note: Rates with number of incidents less than 5 should be interpreted with caution. Cheerleading is not a sponsored sport for NCAA collegiate athletes, therefore rates not provided.

**Figure 4: Rates of all catastrophic traumatic injury (direct) and exertional/medical (indirect) conditions by sport-gender among collegiate participants, 1982/83-2020/21**



Notes: Rates with number of incidents less than 5 should be interpreted with caution. Cheerleading is not a sponsored sport for NCAA collegiate athletes, therefore rates not provided.