

**CATASTROPHIC
SPORTS INJURY RESEARCH**

THIRTY-SECOND ANNUAL REPORT

FALL 1982 - SPRING 2014

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

Website: nccsir.unc.edu

Prepared by:
Kristen L. Kucera, MSPH, Ph.D., ATC
Rebecca Yau, MPH
Leah Cox Thomas, MS, CRC, LRT/CTRS
Catherine Wolff, MS
University of North Carolina
Chapel Hill, NC 27514

Robert C. Cantu, MD
Medical Director, National Center for Catastrophic Sport Injury Research
Emerson Hospital
Concord, MA 01742

FINAL
November 13, 2015

DO NOT DISTRIBUTE
Report #: 2015-02



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 over the past 30 years has improved the safety of football for the participants and these impacts are demonstrated in the pages of this football report.

We also acknowledge NCCSIR staff members Leah Cox Thomas, Catherine Wolff, Rebecca Yau, 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, and Zack Kerr.

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).

All rights reserved. This material may not be published, broadcast, rewritten or redistributed in whole or part without express written permission. Contact the National Center for Catastrophic Sport Injury Research for all questions regarding this report at nccsir@unc.edu.

TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Methods	
Outcome Definitions	2
Data Collection	2
Participation Data	3
Analysis	3
Results	
Current year summary – AY2013-2014	4
Overall summary	5
Discussion	6
Recommendations	7
Case Summaries for AY2013-2014	10
References	20

LIST OF TABLES

	<u>Page</u>
Table 1: Number of All catastrophic injuries/illnesses by year: All sports combined, all levels (high school and college)	21
Table 2: Number of Direct catastrophic injuries/illnesses by year: All sports combined, all levels (high school and college)	22
Table 3: Number of Indirect catastrophic injuries/illnesses by year: All sports combined, all levels (high school and college)	23
Table 4a: Number of Direct catastrophic injuries/illnesses by severity by sport: High school all years combined	24
Table 4b: Number of Indirect catastrophic injuries/illnesses by severity by sport: High school all years combined	25
Table 5a: Number of Direct catastrophic injuries/illnesses by severity by sport: College all years combined	26
Table 5b: Number of Indirect catastrophic injuries/illnesses by severity by sport: College all years combined	27
Table 6a: Number of Catastrophic injuries/illnesses by Severity by year: High school	28
Table 6b: Number of Catastrophic injuries/illnesses by Severity by year: College	29
Table 7a: Rate of direct catastrophic injuries/illnesses by severity by year: High school	30
Table 7b: Rate of direct catastrophic injuries/illnesses by severity by year: College	31
Table 8a: Rate of indirect catastrophic injuries/illnesses by severity by year: High School	32
Table 8b: Rate of indirect catastrophic injuries/illnesses by severity by year: College	33
Table 9a: Rate of Direct catastrophic injuries/illnesses by level and severity by sport: High school	34
Table 9b: Rate of Direct catastrophic injuries/illnesses by level and severity by sport: College	35

Table 10a: Rate of Indirect catastrophic injuries/illnesses by level and severity by sport: High school	36
Table 10b: Rate of Indirect catastrophic injuries/illnesses by level and severity by sport: College	37
Table 11: Characteristics of all catastrophic injuries/illnesses AY 2013/14	38
Table 12: Number of All catastrophic events by level by severity by direct or indirect	40

Note: Tables I-IX are located in a separate Appendix document.

LIST OF FIGURES

	<u>Page</u>
Figure 1: Rates of fatal catastrophic direct and indirect injuries/illnesses by sport-gender among high school participants, 1982/83-2013/14	41
Figure 2: Rates of all catastrophic direct and indirect injuries/illnesses by sport-gender among high school participants, 1982/83-2013/14	42
Figure 3: Rates of fatal catastrophic direct and indirect injuries/illnesses by sport-gender among Collegiate participants, 1982/83-2013/14	43
Figure 4: Rates of all catastrophic direct and indirect injuries/illnesses by sport-gender among Collegiate participants, 1982/83-2013/14	44

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 has been directed for the past 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) 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.

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.

Participation in Sport

Yearly participation estimates for high school athletes are obtained from NFHS participation reports (available online: <http://www.nfhs.org/ParticipationStatics/ParticipationStatics.aspx/>). NFHS high school annual athletic participation for 2013/14 included approximately 7,179,619 athletes (4,166,666 males and 3,012,953 females). Yearly participation estimates for collegiate level athletes are obtained from the National Collegiate Athletic Association (NCAA) participation reports (accessed online: <http://www.ncaapublications.com/productdownloads/PR1314.pdf>). NCAA participation for 2013/14 in championship sports was 472,625 athletes. There were 267,604 males and 205,021 females. There were also 3,451 males in non-championship sports (archery, badminton, bowling, equestrian, rowing, rugby, sailing, and squash) and 2,793 females participating in emerging sports (archery, badminton, equestrian, rugby, sand volleyball, squash, synchronized swimming, and team handball).

During the entire 32 year period from the fall of 1982 through the spring of 2014, there were 196,313,671 high school athletes participating in the sports covered by this report and approximately 11,110,501 college participants (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 32-year period and stratified by level (high school and college) and sport. Incidence rates were stratified by direct versus indirect and by severity. Precision of incident rate estimates expressed by 95% confidence intervals are included in appendix tables.

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 AY2013-2014 Summary

From July 1, 2013 to June 30, 2014 there were a total of 80 catastrophic injuries/illnesses at the high school and college level captured by NCCSIR (Table 11). The majority were at the high school level (78%). Member institutions for collegiate cases included NCAA, NAIA, and NJCAA. Overall 41% of cases were fatal, 4% were nonfatal, and 55% were serious with recovery. Half were due to direct (traumatic injury) causes and almost half occurred in competition (48%) followed by practice (41%). The majority of events occurred to athletes participating in the following sports: football (53%), basketball (18%), wrestling (8%), cross country (6%), and soccer (4%). Areas of the body most commonly effected were heart (43%), head (19%), and neck (19%). Sudden cardiac arrest was the most common type of event (30%) followed by brain trauma (16.3%), fractures (11.3%), and heat-related illness (11.3%).

Direct events: 29% of direct events were fatal, 9% non-fatal, and 63% serious with recovery. A greater proportion of direct events occurred in competition versus practice (70% versus 23%). The majority were to the cervical spine (43%) and head/brain (40%). The majority occurred in football.

Indirect events: 51.5% of indirect events were fatal and 49% were serious with recovery. A greater proportion of indirect events occurred in practice versus competition (56% versus 31%). The majority were cardiac-related (73%) and heat/exertional related (22%). Basketball comprised the majority (31%), followed by football (24%), cross country (11%), and wrestling (11%).

Overall Summary

During this 32-year period, there were 2,273 catastrophic sport-related injuries/illnesses at high school and college levels (Table 1 – excluding cheerleading, drill team, and rodeo there were 2,163). The majority were not fatal (61%) and from traumatic or direct mechanisms (68%), and among high school participants (80%) (Tables 2 and 3). The proportion of fatal (40% versus 39%) and direct (68% versus 66%) were not different by high school compared to college level.

Direct by sport: For high school sports, football had the highest *number* of direct catastrophic events, followed by female cheerleading, wrestling, baseball, and 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, equestrian and male 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 men's basketball, track and field, wrestling, male soccer, male cross country, and baseball (Table 4b). Accounting for the number of participants in the sport, wrestling, football, male basketball, male lacrosse, male water polo, and female cheer 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, wrestling, female basketball, and male soccer (Table 5b). Accounting for the number of participants in the sport, male basketball, male water polo, male wrestling, football,

and male rowing had the highest rates per 100,000 participants (Figure 4, 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: [www.https://sportinjuryreport.org](https://sportinjuryreport.org).**
- 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 was 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 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 automatic electronic defibrillator (AED) should be available 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 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 with recommendations for prevention (<http://www.nata.org/sites/default/files/attr-44-03-332.pdf>). (Casa & Cisllan, 2009)
- 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 SMAC Position Statements: <http://www.nfhs.org/sports-resource-content/smac-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: <http://ksi.uconn.edu/wp-content/uploads/sites/1222/2015/03/Preventing-Surviving-EHS.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: <http://www.cdc.gov/concussion/policies.html>.
- For the most up to date information on concussion management please see the updated Consensus Statement on Concussion in Sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012 (McCrory et al. 2013).
- 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/concussion/headsup/>

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. A free download for 2013-2014 may be found at: <http://www.ncaapublications.com/p-4328-2013-14-ncaa-sports-medicine-handbook.aspx>

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 AY2013-2014

**Compiled from available media reports (n=80).*

HIGH SCHOOL

High school Sport=Baseball Indirect

A male 15 year old high school freshman baseball player collapsed during practice and died shortly after from aortic stenosis, a congenital heart condition.

A male 16 year old high school sophomore baseball player collapsed during a pre-game batting session. First responders began CPR immediately. He was transported to the hospital. Cause of collapse was due to sudden cardiac arrest. A full recovery is expected.

High school Sport=Basketball Indirect

A male 15 year old sophomore high school basketball player collapsed while playing pickup basketball. Coaches performed CPR till EMS arrived. He was transported to the hospital but later died. Official cause of death was cardiac arrest due to an enlarged heart.

A male 18 year-old high school senior basketball forward was on his way to the gym when he collapsed in the school cafeteria after completing a mile run for practice. He was taken to the hospital where he was found to have a collapsed lung and heart distress. He died two days later. Cause of death is unknown.

A male high school sophomore basketball player collapsed during basketball practice due to cardiac arrest. Teammates in the sports medicine program were present when he collapsed and immediately began CPR. Athlete was revived due to the combination of CPR and AED. He had suffered another milder cardiac event the previous year. A full recovery is expected.

A male high school junior basketball player collapsed while playing pickup basketball. He was transported to the hospital but later died. Cause of death is pending.

A male 15 year old freshman high school basketball forward collapsed during an amateur athletic union all-star basketball game. He had been previously diagnosed with a heart murmur but was cleared to play. Long term prognosis is unknown.

A male 16 year-old high school basketball player collapsed during an early morning practice. CPR was administered until he was transported to the hospital. Long term prognosis is unknown.

A female high school senior basketball point guard collapsed as she was leaving the court and heading towards the bench. She was revived with an AED before being transported to the hospital. She was diagnosed with sudden cardiac arrest.

A male 17 year-old high school basketball player collapsed after basketball practice. An athletic trainer attended to him until EMS arrived. He was taken to the hospital but later died. Cause of death was due to natural heart-related issues.

A male 15 year-old high school freshman basketball player was sitting on the bench during a game when he collapsed. First responders administered CPR and an AED was used before he was transported to the hospital. Cause of collapse is thought to be cardiac in nature. Long term prognosis is unknown.

A male 15 year-old high school freshman basketball player was on the bench during a game when he stood up and collapsed. He was air-lifted to the hospital but died shortly after. Doctors believe heart issues caused his death.

A male 16 year old high school junior basketball player collapsed during a sponsored summer league game. An assistant coach began CPR until EMS arrived. He was transported to the hospital and released with a defibrillator and his left arm in a sling. A full recovery is expected.

High school Sport= Cheerleading Indirect

A female 15 year-old high school sophomore cheerleader collapsed at cheerleading practice after becoming short of breath. She was taken to the hospital but later died. Cause of death is unknown.

High school Sport=Cross Country Indirect

A female 14 year old high school freshman cross country athlete reported feeling dizzy and collapsed towards end of a practice run. Coaches were alerted and called EMS but she died at the hospital. Cause of death was due to an anomalous coronary circulation which was undetected in a routine physical examination performed three days before her death.

A female 17 year old high school cross country runner fell ill while running at practice. She was transported to the field house where athletic trainers cooled her in cooling tub and called EMS. She was transported to hospital as precaution. A full recovery is expected.

A female high school cross country runner collapsed due to heat stroke while finishing a race. She was evaluated by a doctor, packed in ice and wet towels, and transported by EMS to the hospital. Her core temperature at the hospital was 104. She was treated and released from the hospital. A full recovery is expected.

A high school junior cross country athlete was found unresponsive at cross country meet. Emergency care was given on-site and the athlete was transferred to the hospital. Long term prognosis is unknown.

High school Sport=Football Direct

A male 16 year old high school junior football corner back collapsed after making a routine tackle during a scrimmage. Coaches responded and called EMS. He was transported to the hospital where he later died. Cause of death was due to a fractured C3 vertebrae.

A male 16 year old high school junior varsity football player collapsed on the sidelines during a scrimmage. The athletic trainer and coaches attended to the injured player prior to the arrival of EMS. A CT scan showed trauma to the right side of the head and swelling and bleeding in the brain. Surgery was performed but the athlete later died. Cause of death is pending autopsy.

A male 15 year old high school football running back was injured during a tackle on kickoff return. The athletic trainer examined him and thought it was a cracked rib. His pain increased and his parents took him to the hospital. Injuries included a ruptured spleen, lacerated kidney, and punctured lung. A full recovery is expected.

A male high school senior football running back and linebacker suffered a head injury while making a tackle during a game. The athlete had surgery to remove a blood clot and reduce swelling in the brain. A full recovery is expected but long term symptoms include memory problems and seizures.

A male 16 year old high school sophomore football quarterback was running a normal play in practice when he was tackled. He lost feeling in his extremities and was diagnosed with a T1 spinal contusion. An athletic trainer and coaches called EMS. A full recovery is expected.

A male high school senior football quarterback sustained an injury during the 3rd quarter of a game. He was taken to the hospital before being airlifted to another hospital. He was diagnosed with a bruised spine but did not experience any paralysis. A full recovery is expected.

A male high school freshman football player was injured during a game while tackling on kickoff return. He was unable to move and was transported to the hospital. He was diagnosed with a fractured C3 and C4 vertebra, damaged neck tendons, and a hematoma. A full recovery is expected.

A male 16 year old high school junior football linebacker suffered a head injury during a football game. He continued to play before he collapsed. He was taken to a hospital where he had surgery to remove half of his skull to reduce pressure in his brain. Long term prognosis is unknown.

A male 16 year old football player was participating in team drills when he was hit by another player while being instructed not to respond. Reports indicate that he was experiencing symptoms of concussion but no treatment was sought. His parents transported him to the hospital after he returned home. He was diagnosed with a concussion and brain injury. He has been experiencing long-term symptoms post-injury.

A male high school junior football player was injured during a game. He was taken out of the game but then was sent back in by the coach. After the game; he was taken to the hospital and diagnosed with a concussion as well as spinal and brain stem injuries. A full recovery is expected.

A male 16 year old high school junior football running back suffered a head injury during a helmet to helmet collision during 3rd quarter of a game. He collapsed, was transported to the hospital, and died three days later. Cause of death is pending autopsy.

A male high school senior football running back and defensive back suffered a brain injury after tackling a ball carrier during a game. EMS, who happened to be there watching and were not scheduled to be covering the game, rushed him to the hospital. He underwent surgery to control brain bleeding. A full recovery is expected.

A male 18 year old high school senior football corner back suffered a neck injury when tackling an opponent in a game. He had difficulty walking but returned to play. Pain increased and the team doctor advised his family to take him to the hospital. Imaging revealed cervical (C5) fracture in addition to a healing cervical (C7) fracture from a previous injury. He underwent surgery and is regaining his ability to walk again and a full recovery is expected.

A male 17 year old high school senior football wide receiver was injured during the 4th quarter of a game. He walked off the field and collapsed on the sidelines. He was transported to the hospital where he had brain surgery to remove a blood clot. He died ten days later. Official cause of death pending autopsy.

A male 17 year old high school football player collapsed on the sidelines after sustaining several hits during a game. He had brain surgery to release pressure from a subdural hematoma. He was

in a coma for several months. He is currently at a rehabilitation hospital receiving daily therapy/treatment for his severe brain injury.

A male 16 year old junior high school football linebacker hit his head before practice started when diving for a pass. He was evaluated by an athletic trainer, but the athlete drove himself home when the trainer left to call his parents. His parents drove him to the hospital and he lost consciousness on the way there. He was diagnosed with a concussion, brain hematoma, and skull fracture. He underwent surgery, was placed in a medically induced coma, and was released from the hospital with a titanium plate in his head. Long term prognosis is unknown.

A male high school senior football player collided with a teammate during a game. He complained of head/neck pain before losing consciousness. He was evaluated by an athletic trainer and transported by EMS to the hospital. He was reported to be moving his hands and toes. Long term prognosis is unknown.

A male 15 year-old high school sophomore football player was making a tackle on the kick-off when he was injured. He was immediately attended to by an athletic trainer. He was transported to the hospital fully conscious but unable to move. He was diagnosed with a fractured C3 vertebra. He is expected to fully recover with long-term limited range of motion in his neck.

A male high school senior football wide receiver and defensive back was making a tackle when the opponent's knee hit his neck, causing his chin to hit his chest. He was airlifted to the hospital, where he was diagnosed with a bruised spinal cord and fractured C5 vertebrae. He underwent surgery and was released home with a brace. He has fully recovered with long-term nerve damage in his left leg.

A male 15 year old sophomore high school football middle linebacker collapsed during practice while going through team drills. He was transported by helicopter to the hospital where he later died. It is reported that he recently had sustained a concussion during a game, was cleared to play for the subsequent game, but collapsed between games. Official cause of death is pending autopsy.

A male 17 year old high school junior football wide receiver was injured in the 4th quarter of a playoff game. He was taken to the hospital and diagnosed with a brain injury. He died about two weeks later. Cause of death is pending autopsy.

A male high school junior football wide receiver tripped during the first quarter of a game while trying to make a block. He hit a teammate which resulted in a fractured C4 vertebra. An athletic trainer stabilized his head before he was transported to the hospital. He was conscious and alert during the entire event. He underwent surgery and ten days post-injury he was able to move his arms.

A male 17 year old high school senior football running back caught a pass and was tackled. He hit his head on the ground but got back up and played two more plays before collapsing on the field. He was conscious when the ambulance arrived but was declared critical on the way to the hospital. He died two days later from traumatic brain injury.

A male 17 year-old high school senior football running back passed out on the sidelines during the 3rd quarter of a game. He complained of a headache that worsened as the game progressed and as he sustained hits. He was evaluated by an athletic trainer and removed from the game. He was transported to the hospital where he was found to have a blood clot in his brain. Reports indicate that he had been knocked unconscious during a game two week prior but was cleared for play by a medical professional. Long term prognosis is unknown.

A male 16 year-old high school junior football linebacker attempted to make a tackle during a game when an opposing player landed on his head. He was motionless on the field and diagnosed with neck and spinal cord trauma. He had surgery to repair displaced vertebra but was paralyzed from the neck down. He entered a rehabilitation facility and progresses daily.

A male high school junior football quarterback sustained a hit from an opponent to his head. He walked off the field and complained of dizziness. He was attended to by an athletic trainer before being transported to the hospital. He was diagnosed with a fractured C3 vertebrae, ruptured disc, and torn spinal ligaments. He underwent surgery and a full recovery is expected.

A male high school junior football player appeared to make a normal tackle during a playoff game when he was thought to have suffered a pinched nerve or "stinger." When he failed to get up on his own, EMS transported him to the hospital where he was diagnosed with a fractured and dislocated vertebra in his neck. He experienced complications during surgery when a blood clot caused several strokes. Part of his skull had to be removed to reduce brain swelling. Long term symptoms include slowed speech, balance issues, and peripheral vision problems.

High school Sport=Football Indirect

A male 16 year old high school junior football defensive end reported shortness of breath before collapsing after practice. He was transported to the hospital and later died of cardiac arrest. Reports confirmed a history of sickle cell trait. Official cause of death pending autopsy.

A male 14 year old high school freshman football player collapsed at practice after warm-ups. First responders began CPR and EMS transported him to the hospital where he later died. It was reported that he had mitral valve prolapse and was being seen by a doctor.

A male high school junior football running back fell ill at practice. EMS transported him to the hospital where he was diagnosed with dehydration and released. A full recovery is expected.

A male 17 year old high school junior football linebacker collapsed on the track after running laps during football practice. Coaches responded and CPR was administered until EMS arrived. He was rushed to the hospital where he died of cardiac arrest. Cause of death was due to ventricular cardiomyopathy.

A male 17 year old high school senior football wide receiver suffered a stroke after scoring on a touchdown pass in a game. He was treated by two athletic trainers and a physician. EMS was

called and he was taken to the hospital where a blood clot was found during surgery. He died one day later. Official cause of death is pending autopsy.

A male 15 year-old high school freshman junior varsity football player collapsed during a game. CPR was administered and an AED was available. He was transported to the hospital before being airlifted to another hospital. Cause of collapse is suspected to be cardiac in origin. Long term prognosis is unknown.

A male 16 year old high school junior football running back collapsed after running a touchdown in a junior varsity game. EMS transported him to the hospital where he died two days later. Official cause of death was determined to be due to sudden cardiac arrest. He had been previously diagnosed with hypertrophic cardiomyopathy.

A male 14 year old high school freshman football lineman collapsed during a pickup basketball game. CPR was administered and he was taken to the hospital. He died the next day. Cause of death is pending autopsy.

High school Sport=Ice Hockey Direct

A male 17 year-old high school senior ice hockey forward was checked from behind into a wall and he smashed head first into the boards. He was airlifted to the hospital where he was diagnosed with a fractured C5 vertebra. He underwent surgery. Long term prognosis is unknown.

High school Sport=Soccer Direct

A female 17 year-old high school junior soccer player was playing soccer during a private co-ed practice when she collided with a male player. The male player's head hit her chest. She immediately collapsed. She was transported to the hospital but died shortly after. Cause of death was ruled as accidental due to blunt force trauma.

High school Sport=Soccer Indirect

A male 15 year old high school sophomore soccer player collapsed at practice during drills due to heat exhaustion. Water was poured on him and he was transported by EMS to the hospital. Long term prognosis is unknown.

A male high school soccer midfielder collapsed on the field during a game. First responders and athletic trainers administered CPR and utilized an AED. He was transported to the hospital and placed in a medically induced coma for two days. He was diagnosed with sudden cardiac arrest. A full recovery is expected.

High school Sport=Swimming Indirect

A female 16-year old sophomore high school student collapsed after crossing the finish line of a half marathon. First responders attempted to revive the athlete. She was transported to the hospital where she later died. Cause of death is suspected to be due to sudden cardiac arrest.

High school Sport=Track and Field Indirect

A male 16 year-old high school sophomore track and field athlete collapsed during practice. He was taken to the hospital where he later died. Cause of death is unknown.

High school Sport=Wrestling Direct

A male 15 year-old high school freshman wrestler injured his neck when he was shooting for his opponent with his head down. He underwent emergency surgery to fuse his C6 and C7 vertebrae. He is on his way to a full recovery.

High school Sport=Wrestling Indirect

A male 15 year-old high school wrestler collapsed after wrestling practice. The principal administered CPR until EMS arrived. An AED was used and he was transported to the hospital. He was diagnosed with hypertrophic cardiomyopathy and underwent surgery. A full recovery is expected.

A male 17 year old high school sophomore wrestler collapsed as he was walking back to the bench after a match. CPR was administered. He had a pulse and was breathing when he was taken to the hospital. Long term prognosis is unknown.

High school, club tournament Sport=Basketball Indirect

A male 16 year old high school freshman basketball player was competing in a club tournament when he collapsed as he went for a layup. An ER doctor and a nurse from the stands performed CPR until EMS arrived. They requested an AED but one was not available. He was revived but died at the hospital three days later. Cause of death was due to ventricular arrhythmia.

COLLEGIATE

College Sport=Basketball Indirect

A male college freshman basketball point guard collapsed during practice and was transported by EMS to the hospital. He underwent surgery to have a defibrillator implanted. A full recovery is expected but he has not been cleared to resume sport activity.

A female college basketball player was completing a drill during practice when she complained of difficulty breathing and sharp chest pains. She collapsed and was taken to the hospital. She was diagnosed with respiratory arrest due to pneumonia and bronchitis that caused cardiac arrest. She had pre-existing sports/weather induced asthma and severe allergies. A full recovery is expected.

A male college sophomore basketball player collapsed on the bench during a game. He lost consciousness and went into cardiac arrest. First responders administered CPR and used an AED. He was transported to the hospital and had a defibrillator implanted in his chest. A full recovery is expected.

College Sport=Cross Country Indirect

A female 20 year old college junior cross country runner competing in a race suffered a grand mal seizure near the finish line. She was taken to the hospital and died five days later. She had been diagnosed with juvenile myoclonic epilepsy in the sixth grade and an irregular heartbeat five years ago. She had a pacemaker implanted and continued to compete until the fatal incident.

College Sport=Football Direct

A male college football player was injured at practice during a storm from lightning that had struck a tree near the edge of the structure he was under. He was transported to the hospital, treated, and released back to practice but did not participate in that session. A full recovery is expected.

A male college freshman football safety sustained a neck injury during a game. He was able to walk off the field but later complained of numbness in his hands. He was taken to the hospital and underwent surgery for a neck contusion. A full recovery is expected with limited return to play.

A male 19 year old college freshman football running back collapsed during practice. He was airlifted to the hospital and underwent surgery to relieve pressure and swelling in his brain. He was placed in a medically induced coma but died three days later. Cause of head injury is unknown.

A male college sophomore football player injured his neck during the first week of practice. He initially thought it was a neck spasm and continued to practice. During the first game, he sustained a concussion that resulted in loss of consciousness and further aggravated his neck. He finished the season. After the season ended, he saw a doctor and was diagnosed with a ruptured disc, a protruding disc, and spinal cord damage. He underwent surgery. A full recovery is expected but he has been unable to return to football.

College Sport=Football Indirect

A male 21 year old college junior football guard collapsed at practice from heat stroke. He was placed in a cooling tub within minutes of collapse but was pulled out a few minutes later upon ambulance arrival. He underwent 14 surgeries, a stroke, and a liver transplant. A full recovery is expected.

A male 21 year old college football defensive end collapsed during a training run. CPR was administered and he was transported to the hospital where he later died. No official cause of death has been released.

A male college freshman was practicing during a morning off-season workout when he collapsed. He was transported to the hospital. He was released home one month after collapsing. Cause was due to heat exhaustion. A full recovery is expected.

College Sport=Rodeo Direct

A male 20 year college sophomore rodeo athlete was killed during practice after a bull stepped directly on his chest. The athlete was wearing all proper safety gear, including a chest protector and mouth guard, at the time of the incident. Cause of death is pending.

College Sport=Skiing Cross Country Indirect

A male 20 year-old college junior cross country skier collapsed during a ski competition. He was climbing uphill on a 25 kilometer course (15.5 mile race). Resuscitation attempts failed and the athlete died on the scene. Cause of death was due to cardiac arrest.

College Sport=Volleyball Indirect

A female college freshman volleyball player collapsed during practice after suffering an irregular heartbeat. She was revived with an AED by the athletic trainer. She underwent surgery to have a defibrillator implanted. A full recovery is expected.

College Sport=Water polo Indirect

A male 19-year old college sophomore swimmer was completing his own training when other swimmers noticed him at the bottom of the pool. Lifeguards pulled him out and administered CPR until EMS arrived. He was taken to the hospital and pronounced dead. Witnesses indicate that he was in the middle of a drill where he held his breath while swimming the length of the pool underwater. Cause of death was deemed accidental drowning with hyperventilation.

College Sport=Wrestling Indirect

A male college freshman wrestler collapsed during practice after the second outdoor run in two days. He was hospitalized for heat complications. A full recovery is expected.

A male 20 year old college sophomore wrestler collapsed during practice after the second outdoor run in two days. He was hospitalized for heat complications and died of organ failure four days later.

A male college freshman wrestler collapsed during practice after the second outdoor run in two days. He was hospitalized for heat complications. A full recovery is expected.

REFERENCES

- Casa, D., & Csillan, D. (2009). Preseason heat-acclimatization guidelines for secondary school athletics. *Journal of Athletic Training*, 44(3), 332-333. doi: 10.4085/1062-6050-44.3.332
- Casa, D., Guskiewicz, K., Anderson, S., Courson, R., Heck, J., Jimenez, C., et al. (2012). National athletic trainers' association position statement: preventing sudden death in sports. *Journal of Athletic Training* 47(1), 96-118.
- Drezner, J. A., Courson, R. W., Roberts, W. O., Mosesso, V. N., Link, M. S., & Maron, B. J. (2007). Inter-Association Task Force Recommendations on Emergency Preparedness and Management of Sudden Cardiac Arrest in High School and College Athletic Programs: A Consensus Statement. *Journal of Athletic Training*, 42(1), 143–158.
- McCrory, P., W.H. Meeuwisse, M. Aubry, et al. (2013). Consensus statement on concussion in sport: the 4th International Conference on Concussion in Sport held in Zurich, November 2012. *British Journal of Sports Medicine*, 47:5 250-258.
- Swartz, E. E., Boden, B. P., Courson, R. W., Decoster, L. C., Horodyski, M., Norkus, S. A., Rehnberg, R. S., Waninger, K. N. (2009). National Athletic Trainers' Association Position Statement: Acute Management of the Cervical Spine–Injured Athlete. *Journal of Athletic Training*, 44(3), 306–331.

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	16.7%	50	83.3%	60	100.0%
1983-1984	13	21.0%	49	79.0%	62	100.0%
1984-1985	9	17.6%	42	82.4%	51	100.0%
1985-1986	16	28.1%	41	71.9%	57	100.0%
1986-1987	18	25.7%	52	74.3%	70	100.0%
1987-1988	15	17.9%	69	82.1%	84	100.0%
1988-1989	17	23.0%	57	77.0%	74	100.0%
1989-1990	10	13.3%	65	86.7%	75	100.0%
1990-1991	14	23.0%	47	77.0%	61	100.0%
1991-1992	11	23.4%	36	76.6%	47	100.0%
1992-1993	10	15.9%	53	84.1%	63	100.0%
1993-1994	11	17.2%	53	82.8%	64	100.0%
1994-1995	12	24.5%	37	75.5%	49	100.0%
1995-1996	8	15.7%	43	84.3%	51	100.0%
1996-1997	9	13.6%	57	86.4%	66	100.0%
1997-1998	15	20.0%	60	80.0%	75	100.0%
1998-1999	10	12.8%	68	87.2%	78	100.0%
1999-2000	9	12.9%	61	87.1%	70	100.0%
2000-2001	17	24.6%	52	75.4%	69	100.0%
2001-2002	14	17.3%	67	82.7%	81	100.0%
2002-2003	16	25.4%	47	74.6%	63	100.0%
2003-2004	18	24.3%	56	75.7%	74	100.0%
2004-2005	9	14.1%	55	85.9%	64	100.0%
2005-2006	12	21.8%	43	78.2%	55	100.0%
2006-2007	13	17.6%	61	82.4%	74	100.0%
2007-2008	15	18.5%	66	81.5%	81	100.0%
2008-2009	17	15.7%	91	84.3%	108	100.0%
2009-2010	27	28.1%	69	71.9%	96	100.0%
2010-2011	15	20.5%	58	79.5%	73	100.0%
2011-2012	15	19.2%	63	80.8%	78	100.0%
2012-2013	12	30.8%	27	69.2%	39	100.0%
2013-2014	17	21.8%	61	78.2%	78	100.0%
Total	434	19.8%	1756	80.2%	2190	100.0%
Total*	468	20.3%	1837	79.7%	2305	100.0%

*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	10.3%	35	89.7%	39	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	8	14.8%	46	85.2%	54	100.0%
1990-1991	10	26.3%	28	73.7%	38	100.0%
1991-1992	6	17.6%	28	82.4%	34	100.0%
1992-1993	8	19.0%	34	81.0%	42	100.0%
1993-1994	6	14.0%	37	86.0%	43	100.0%
1994-1995	9	25.0%	27	75.0%	36	100.0%
1995-1996	6	18.8%	26	81.3%	32	100.0%
1996-1997	7	14.0%	43	86.0%	50	100.0%
1997-1998	6	12.0%	44	88.0%	50	100.0%
1998-1999	10	18.2%	45	81.8%	55	100.0%
1999-2000	9	20.5%	35	79.5%	44	100.0%
2000-2001	12	28.6%	30	71.4%	42	100.0%
2001-2002	5	9.6%	47	90.4%	52	100.0%
2002-2003	10	25.6%	29	74.4%	39	100.0%
2003-2004	12	22.2%	42	77.8%	54	100.0%
2004-2005	5	15.6%	27	84.4%	32	100.0%
2005-2006	7	21.9%	25	78.1%	32	100.0%
2006-2007	7	14.6%	41	85.4%	48	100.0%
2007-2008	9	17.0%	44	83.0%	53	100.0%
2008-2009	10	12.2%	72	87.8%	82	100.0%
2009-2010	16	27.6%	42	72.4%	58	100.0%
2010-2011	9	19.1%	38	80.9%	47	100.0%
2011-2012	8	15.1%	45	84.9%	53	100.0%
2012-2013	5	29.4%	12	70.6%	17	100.0%
2013-2014	4	11.8%	30	88.2%	34	100.0%
Total	275	18.8%	1190	81.3%	1465	100.0%
Total*	309	19.7%	1261	80.3%	1570	100.0%

*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	28.6%	15	71.4%	21	100.0%
1983-1984	5	25.0%	15	75.0%	20	100.0%
1984-1985	0	0.0%	11	100.0%	11	100.0%
1985-1986	1	12.5%	7	87.5%	8	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	23.5%	13	76.5%	17	100.0%
1989-1990	2	9.5%	19	90.5%	21	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	23.8%	16	76.2%	21	100.0%
1994-1995	3	23.1%	10	76.9%	13	100.0%
1995-1996	2	10.5%	17	89.5%	19	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	0.0%	23	100.0%	23	100.0%
1999-2000	0	0.0%	26	100.0%	26	100.0%
2000-2001	5	18.5%	22	81.5%	27	100.0%
2001-2002	9	31.0%	20	69.0%	29	100.0%
2002-2003	6	25.0%	18	75.0%	24	100.0%
2003-2004	6	30.0%	14	70.0%	20	100.0%
2004-2005	4	12.5%	28	87.5%	32	100.0%
2005-2006	5	21.7%	18	78.3%	23	100.0%
2006-2007	6	23.1%	20	76.9%	26	100.0%
2007-2008	6	21.4%	22	78.6%	28	100.0%
2008-2009	7	26.9%	19	73.1%	26	100.0%
2009-2010	11	28.9%	27	71.1%	38	100.0%
2010-2011	6	23.1%	20	76.9%	26	100.0%
2011-2012	7	28.0%	18	72.0%	25	100.0%
2012-2013	7	31.8%	15	68.2%	22	100.0%
2013-2014	13	29.5%	31	70.5%	44	100.0%
Total	159	21.9%	566	78.1%	725	100.0%
Total*	159	21.6%	576	78.4%	735	100.0%

*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	29	46.8%	19	30.6%	14	22.6%	62	100.0%
Basketball	Male	9	64.3%	4	28.6%	1	7.1%	14	100.0%
	Female	3	50.0%	3	50.0%	0	0	6	100.0%
Cheerleading	Male	1	50.0%	1	50.0%	0	0	2	100.0%
	Female	41	63.1%	23	35.4%	1	1.5%	65	100.0%
Cross Country	Male	0	0	1	50.0%	1	50.0%	2	100.0%
Field Hockey	Female	0	0	1	100.0%	0	0	1	100.0%
Football	Male	365	42.5%	373	43.4%	121	14.1%	859	100.0%
Golf	Male	0	0	1	100.0%	0	0	1	100.0%
Gymnastics	Male	1	25.0%	2	50.0%	1	25.0%	4	100.0%
	Female	3	33.3%	6	66.7%	0	0	9	100.0%
Ice Hockey	Male	8	32.0%	13	52.0%	4	16.0%	25	100.0%
	Female	2	66.7%	1	33.3%	0	0	3	100.0%
Lacrosse	Male	7	50.0%	5	35.7%	2	14.3%	14	100.0%
	Female	2	100.0%	0	0	0	0	2	100.0%
Skiing	Female	0	0	0	0	1	100.0%	1	100.0%
Soccer	Male	6	40.0%	2	13.3%	7	46.7%	15	100.0%
	Female	4	57.1%	1	14.3%	2	28.6%	7	100.0%
Softball	Female	6	85.7%	1	14.3%	0	0	7	100.0%
Swimming	Male	3	33.3%	5	55.6%	1	11.1%	9	100.0%
	Female	1	16.7%	5	83.3%	0	0	6	100.0%
Track and Field	Male	13	25.5%	17	33.3%	21	41.2%	51	100.0%
	Female	6	66.7%	2	22.2%	1	11.1%	9	100.0%
Wrestling	Male	22	35.5%	38	61.3%	2	3.2%	62	100.0%

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	2	10.0%	0	0	18	90.0%	20	100.0%
Basketball	Male	7	5.7%	0	0	116	94.3%	123	100.0%
	Female	2	11.8%	0	0	15	88.2%	17	100.0%
Cheerleading	Female	1	11.1%	0	0	8	88.9%	9	100.0%
Cross	Male	2	9.1%	0	0	20	90.9%	22	100.0%
Country	Female	3	25.0%	0	0	9	75.0%	12	100.0%
Drill Team	Female	0	0	0	0	1	100.0%	1	100.0%
Field Hockey	Female	0	0	0	0	1	100.0%	1	100.0%
Football	Male	7	3.1%	0	0	220	96.9%	227	100.0%
Ice Hockey	Male	0	0	0	0	4	100.0%	4	100.0%
Lacrosse	Male	0	0	0	0	8	100.0%	8	100.0%
Soccer	Male	2	6.9%	1	3.4%	26	89.7%	29	100.0%
	Female	1	12.5%	0	0	7	87.5%	8	100.0%
Softball	Female	0	0	0	0	1	100.0%	1	100.0%
Swimming	Male	0	0	0	0	3	100.0%	3	100.0%
	Female	1	11.1%	0	0	8	88.9%	9	100.0%
Tennis	Male	0	0	0	0	4	100.0%	4	100.0%
Track and Field	Male	0	0	0	0	32	100.0%	32	100.0%
	Female	0	0	1	14.3%	6	85.7%	7	100.0%
Volleyball	Female	0	0	1	50.0%	1	50.0%	2	100.0%
Water Polo	Male	0	0	0	0	3	100.0%	3	100.0%
	Female	0	0	0	0	1	100.0%	1	100.0%
Wrestling	Male	3	10.0%	0	0	27	90.0%	30	100.0%

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	8	44.4%	7	38.9%	3	16.7%	18	100.0%
Basketball	Male	8	80.0%	1	10.0%	1	10.0%	10	100.0%
Cheerleading	Male	3	60.0%	2	40.0%	0	0	5	100.0%
	Female	13	48.1%	13	48.1%	1	3.7%	27	100.0%
Equestrian	Female	0	0	0	0	1	100.0%	1	100.0%
Field Hockey	Female	2	100.0%	0	0	0	0	2	100.0%
Football	Male	131	70.1%	43	23.0%	13	7.0%	187	100.0%
Gymnastics	Male	2	66.7%	1	33.3%	0	0	3	100.0%
	Female	0	0	2	100.0%	0	0	2	100.0%
Ice Hockey	Male	7	58.3%	5	41.7%	0	0	12	100.0%
	Female	1	100.0%	0	0	0	0	1	100.0%
Lacrosse	Male	1	16.7%	1	16.7%	4	66.7%	6	100.0%
	Female	0	0	2	100.0%	0	0	2	100.0%
Rodeo	Male	0	0	0	0	1	100.0%	1	100.0%
Rowing	Male	0	0	0	0	1	100.0%	1	100.0%
Rugby	Male	1	50.0%	1	50.0%	0	0	2	100.0%
Skiing	Male	0	0	0	0	1	100.0%	1	100.0%
	Female	0	0	1	50.0%	1	50.0%	2	100.0%
Soccer	Male	2	100.0%	0	0	0	0	2	100.0%
	Female	0	0	2	100.0%	0	0	2	100.0%
Softball	Female	1	100.0%	0	0	0	0	1	100.0%
Swimming	Male	0	0	1	100.0%	0	0	1	100.0%
Track and Field	Male	1	7.7%	6	46.2%	6	46.2%	13	100.0%
	Female	0	0	1	100.0%	0	0	1	100.0%
Wrestling	Male	0	0	2	100.0%	0	0	2	100.0%

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	0	0	1	20.0%	4	80.0%	5	100.0%
Basketball	Male	5	12.2%	1	2.4%	35	85.4%	41	100.0%
	Female	2	28.6%	0	0	5	71.4%	7	100.0%
Cross Country	Male	0	0	0	0	2	100.0%	2	100.0%
	Female	0	0	0	0	1	100.0%	1	100.0%
Football	Male	1	1.8%	0	0	55	98.2%	56	100.0%
Gymnastics	Female	0	0	0	0	1	100.0%	1	100.0%
Ice Hockey	Male	2	66.7%	0	0	1	33.3%	3	100.0%
Lacrosse	Male	0	0	0	0	2	100.0%	2	100.0%
Rowing	Male	0	0	0	0	2	100.0%	2	100.0%
Skiing	Male	0	0	0	0	1	100.0%	1	100.0%
Soccer	Male	1	14.3%	1	14.3%	5	71.4%	7	100.0%
	Female	0	0	0	0	3	100.0%	3	100.0%
Swimming	Male	0	0	0	0	7	100.0%	7	100.0%
	Female	1	33.3%	0	0	2	66.7%	3	100.0%
Tennis	Male	0	0	0	0	1	100.0%	1	100.0%
	Female	0	0	0	0	1	100.0%	1	100.0%
Track and Field	Male	0	0	0	0	2	100.0%	2	100.0%
Volleyball	Female	1	33.3%	0	0	2	66.7%	3	100.0%
Water Polo	Male	0	0	0	0	2	100.0%	2	100.0%
Wrestling	Male	2	28.6%	0	0	5	71.4%	7	100.0%

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	12	0.23	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	13	0.24	16	0.30
1993-1994	21	0.38	14	0.25	16	0.29
1994-1995	12	0.21	13	0.23	12	0.21
1995-1996	19	0.32	11	0.19	10	0.17
1996-1997	24	0.40	15	0.25	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	11	0.17
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	32	0.47	15	0.22	6	0.09
2005-2006	20	0.29	14	0.20	9	0.13
2006-2007	21	0.29	23	0.32	17	0.24
2007-2008	23	0.32	15	0.21	28	0.39
2008-2009	28	0.38	30	0.41	33	0.45
2009-2010	24	0.32	19	0.26	26	0.35
2010-2011	22	0.30	15	0.20	21	0.28
2011-2012	23	0.31	21	0.28	19	0.26
2012-2013	15	0.20	3	0.04	9	0.12
2013-2014	24	0.33	3	0.04	34	0.47

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	1	0.36	5	1.78
1992-1993	3	1.05	0	0.00	7	2.46
1993-1994	7	2.39	0	0.00	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	4	1.21	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	4	1.08	6	1.62
2001-2002	10	2.74	1	0.27	3	0.82
2002-2003	6	1.60	3	0.80	6	1.60
2003-2004	9	2.39	4	1.06	5	1.33
2004-2005	4	1.04	1	0.26	3	0.78
2005-2006	5	1.27	4	1.01	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	1	0.24	11	2.60
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	0.00	8	1.76
2012-2013	6	1.29	3	0.65	3	0.65
2013-2014	7	1.48	0	0.00	10	2.11

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	12	0.23	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	0.50	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	13	0.24	16	0.30
1993-1994	5	0.09	14	0.25	16	0.29
1994-1995	2	0.04	13	0.23	12	0.21
1995-1996	4	0.07	11	0.19	8	0.13
1996-1997	10	0.16	15	0.25	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	11	0.17
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	13	0.19	8	0.11
2006-2007	2	0.03	22	0.31	17	0.24
2007-2008	2	0.03	15	0.21	27	0.37
2008-2009	10	0.14	30	0.41	32	0.44
2009-2010	2	0.03	18	0.24	22	0.30
2010-2011	5	0.07	15	0.20	18	0.24
2011-2012	5	0.07	21	0.28	19	0.26
2012-2013	3	0.04	3	0.04	6	0.08
2013-2014	8	0.11	3	0.04	19	0.26

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	0.00	3	1.17	1	0.39
1983-1984	0	0.00	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	0.00	1	0.38	7	2.64
1988-1989	0	0.00	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	0.00	7	2.46
1993-1994	2	0.68	0	0.00	4	1.37
1994-1995	0	0.00	3	1.01	6	2.02
1995-1996	0	0.00	4	1.19	2	0.60
1996-1997	1	0.30	4	1.21	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	4	1.08	6	1.62
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	1	0.26	3	0.78
2005-2006	0	0.00	4	1.01	2	0.51
2006-2007	0	0.00	1	0.25	6	1.48
2007-2008	0	0.00	1	0.24	8	1.93
2008-2009	0	0.00	1	0.24	9	2.13
2009-2010	4	0.93	2	0.46	10	2.32
2010-2011	0	0.00	7	1.57	2	0.45
2011-2012	1	0.22	0	0.00	7	1.54
2012-2013	0	0.00	3	0.65	2	0.43
2013-2014	1	0.21	0	0.00	3	0.63

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

	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	0.00	0	0.00
1983-1984	15	0.30	0	0.00	0	0.00
1984-1985	11	0.22	0	0.00	0	0.00
1985-1986	7	0.14	0	0.00	0	0.00
1986-1987	13	0.25	0	0.00	1	0.02
1987-1988	12	0.23	0	0.00	0	0.00
1988-1989	13	0.25	0	0.00	0	0.00
1989-1990	19	0.37	0	0.00	0	0.00
1990-1991	19	0.36	0	0.00	0	0.00
1991-1992	8	0.15	0	0.00	0	0.00
1992-1993	19	0.36	0	0.00	0	0.00
1993-1994	16	0.29	0	0.00	0	0.00
1994-1995	10	0.18	0	0.00	0	0.00
1995-1996	15	0.25	0	0.00	2	0.03
1996-1997	14	0.23	0	0.00	0	0.00
1997-1998	16	0.26	0	0.00	0	0.00
1998-1999	23	0.36	0	0.00	0	0.00
1999-2000	26	0.40	0	0.00	0	0.00
2000-2001	22	0.33	0	0.00	0	0.00
2001-2002	19	0.29	0	0.00	0	0.00
2002-2003	18	0.27	0	0.00	0	0.00
2003-2004	14	0.21	0	0.00	0	0.00
2004-2005	27	0.39	0	0.00	0	0.00
2005-2006	16	0.23	1	0.01	1	0.01
2006-2007	19	0.27	1	0.01	0	0.00
2007-2008	21	0.29	0	0.00	1	0.01
2008-2009	18	0.25	0	0.00	1	0.01
2009-2010	22	0.30	1	0.01	4	0.05
2010-2011	17	0.23	0	0.00	3	0.04
2011-2012	18	0.24	0	0.00	0	0.00
2012-2013	12	0.16	0	0.00	3	0.04
2013-2014	16	0.22	0	0.00	15	0.21

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

	Fatal		Non-fatal		Serious	
	N	Rate per 100,000	N	Rate per 100,000	N	Rate per 100,000
1982-1983	6	2.34	0	0.00	0	0.00
1983-1984	5	1.85	0	0.00	0	0.00
1985-1986	1	0.34	0	0.00	0	0.00
1986-1987	4	1.44	0	0.00	0	0.00
1987-1988	7	2.64	0	0.00	0	0.00
1988-1989	4	1.49	0	0.00	0	0.00
1989-1990	2	0.76	0	0.00	0	0.00
1990-1991	4	1.45	0	0.00	0	0.00
1991-1992	4	1.43	0	0.00	1	0.36
1992-1993	2	0.70	0	0.00	0	0.00
1993-1994	5	1.71	0	0.00	0	0.00
1994-1995	3	1.01	0	0.00	0	0.00
1995-1996	2	0.60	0	0.00	0	0.00
1996-1997	2	0.60	0	0.00	0	0.00
1997-1998	8	2.38	1	0.30	0	0.00
2000-2001	5	1.35	0	0.00	0	0.00
2001-2002	9	2.47	0	0.00	0	0.00
2002-2003	5	1.34	0	0.00	0	0.00
2003-2004	6	1.59	0	0.00	0	0.00
2004-2005	3	0.78	0	0.00	0	0.00
2005-2006	5	1.27	0	0.00	0	0.00
2006-2007	6	1.48	0	0.00	0	0.00
2007-2008	5	1.21	1	0.24	0	0.00
2008-2009	5	1.18	0	0.00	2	0.47
2009-2010	9	2.08	0	0.00	2	0.46
2010-2011	4	0.90	1	0.22	1	0.22
2011-2012	6	1.32	0	0.00	1	0.22
2012-2013	6	1.29	0	0.00	1	0.22
2013-2014	6	1.26	0	0.00	7	1.48

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	14	0.10	19	0.13	29	0.20
Basketball	Female	0	0.00	3	0.02	3	0.02
	Male	1	0.01	4	0.02	9	0.05
Cheerleading	Female	1	0.06	23	1.29	41	2.30
	Male	0	0.00	1	2.17	1	2.17
Cross Country	Male	1	0.02	1	0.02	0	0.00
Field Hockey	Female	0	0.00	1	0.06	0	0.00
Football	Male	121	0.38	373	1.17	365	1.15
Golf	Male	0	0.00	1	0.02	0	0.00
Gymnastics	Female	0	0.00	6	0.80	3	0.40
	Male	1	0.90	2	1.79	1	0.90
Ice Hockey	Female	0	0.00	1	0.80	2	1.59
	Male	4	0.43	13	1.38	8	0.85
Lacrosse	Female	0	0.00	0	0.00	2	0.19
	Male	2	0.14	5	0.35	7	0.49
Skiing	Female	1	0.38	0	0.00	0	0.00
Soccer	Female	2	0.03	1	0.01	4	0.05
	Male	7	0.07	2	0.02	6	0.06
Softball	Female	0	0.00	1	0.01	6	0.06
Swimming	Female	0	0.00	5	0.13	1	0.03
	Male	1	0.03	5	0.16	3	0.10
Track and Field	Female	1	0.01	2	0.01	6	0.04
	Male	21	0.12	17	0.10	13	0.08
Wrestling	Male	2	0.03	38	0.48	22	0.28

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	0.37	7	0.86	8	0.99
Basketball	Male	1	0.21	1	0.21	8	1.66
Equestrian	Female	1	4.94	0	0.00	0	0.00
Field Hockey	Female	0	0.00	0	0.00	2	1.17
Football	Male	13	0.72	43	2.37	131	7.23
Gymnastics	Female	0	0.00	2	4.19	0	0.00
	Male	0	0.00	1	5.77	2	11.55
Ice Hockey	Female	0	0.00	0	0.00	1	3.31
	Male	0	0.00	5	4.03	7	5.64
Lacrosse	Female	0	0.00	2	1.26	0	0.00
	Male	4	1.82	1	0.46	1	0.46
Rowing	Male	1	1.46	0	0.00	0	0.00
Skiing	Female	1	6.17	1	6.17	0	0.00
	Male	1	5.01	0	0.00	0	0.00
Soccer	Female	0	0.00	2	0.42	0	0.00
	Male	0	0.00	0	0.00	2	0.35
Softball	Female	0	0.00	0	0.00	1	0.23
Swimming	Male	0	0.00	1	0.39	0	0.00
Track and Field	Female	0	0.00	1	0.10	0	0.00
	Male	6	0.49	6	0.49	1	0.08
Wrestling	Male	0	0.00	2	0.92	0	0.00

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	18	0.13	0	0.00	2	0.01
Basketball	Female	15	0.11	0	0.00	2	0.01
	Male	116	0.68	0	0.00	7	0.04
Cheerleading	Female	8	0.45	0	0.00	1	0.06
Cross	Female	9	0.19	0	0.00	3	0.06
Country	Male	20	0.36	0	0.00	2	0.04
Field Hockey	Female	1	0.06	0	0.00	0	0.00
Football	Male	220	0.69	0	0.00	7	0.02
Ice Hockey	Male	4	0.43	0	0.00	0	0.00
Lacrosse	Male	8	0.55	0	0.00	0	0.00
Soccer	Female	7	0.09	0	0.00	1	0.01
	Male	26	0.27	1	0.01	2	0.02
Softball	Female	1	0.01	0	0.00	0	0.00
Swimming	Female	8	0.21	0	0.00	1	0.03
	Male	3	0.10	0	0.00	0	0.00
Tennis	Male	4	0.09	0	0.00	0	0.00
Track and Field	Female	6	0.04	1	0.01	0	0.00
	Male	32	0.19	0	0.00	0	0.00
Volleyball	Female	1	0.01	1	0.01	0	0.00
Water Polo	Female	1	0.33	0	0.00	0	0.00
	Male	3	0.69	0	0.00	0	0.00
Wrestling	Male	27	0.34	0	0.00	3	0.04

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	4	0.49	1	0.12	0	0.00
Basketball	Female	5	1.17	0	0.00	2	0.47
	Male	35	7.26	1	0.21	5	1.04
Cross Country	Female	1	0.29	0	0.00	0	0.00
	Male	2	0.56	0	0.00	0	0.00
Football	Male	55	3.04	0	0.00	1	0.06
Gymnastics	Female	1	2.09	0	0.00	0	0.00
Ice Hockey	Male	1	0.81	0	0.00	2	1.61
Lacrosse	Male	2	0.91	0	0.00	0	0.00
Rowing	Male	2	2.92	0	0.00	0	0.00
Soccer	Female	3	0.63	0	0.00	0	0.00
	Male	5	0.88	1	0.18	1	0.18
Swimming	Female	2	0.65	0	0.00	1	0.33
	Male	7	2.72	0	0.00	0	0.00
Tennis	Female	1	0.39	0	0.00	0	0.00
	Male	1	0.40	0	0.00	0	0.00
Track and Field	Male	2	0.16	0	0.00	0	0.00
Volleyball	Female	2	0.51	0	0.00	1	0.25
Water Polo	Male	2	6.37	0	0.00	0	0.00
Wrestling	Male	5	2.30	0	0.00	2	0.92

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

Table 11: Characteristics of all catastrophic injuries/illnesses AY 2013/14

	Direct		Indirect		All	
	N	%	N	%	N	%
Total	35	100.0%	45	100.0%	80	100.0%
Level						
College	5	14.3%	13	28.9%	18	22.5%
High school	30	85.7%	32	71.1%	62	77.5%
Severity						
Serious	22	62.9%	22	48.9%	44	55.0%
Non-fatal	3	8.6%	0	0.0%	3	3.8%
Fatal	10	28.6%	23	51.1%	33	41.3%
Sex						
Female	1	2.9%	10	22.2%	11	13.8%
Male	34	97.1%	34	75.6%	68	85.0%
Unknown	0	0.0%	1	2.2%	1	1.3%
Month						
Jul-Aug	7	20.0%	8	17.8%	15	18.8%
Sep-Oct	18	51.4%	19	42.2%	37	46.3%
Nov-Dec	7	20.0%	5	11.1%	12	15.0%
Jan-Feb	1	2.9%	9	20.0%	10	12.5%
Mar-Apr	2	5.7%	2	4.4%	4	5.0%
May-Jun	0	0.0%	2	4.4%	2	2.5%
Type of Activity						
Competition	24	68.6%	14	31.1%	38	47.5%
Personal recreation or conditioning	0	0.0%	5	11.1%	5	6.4%
Practice	8	22.9%	25	55.6%	33	41.3%
Scrimmage	2	5.7%	0	0.0%	2	2.5%
Other team activity	1	2.9%	1	2.2%	2	2.6%
Type of injury						
Bleed/hemorrhage	5	14.3%	0	0.0%	5	6.3%
Cardiac arrest	0	0.0%	23	51.1%	23	28.8%
Cardiac arrhythmia	0	0.0%	2	4.4%	2	2.5%
Cardiomyopathy	0	0.0%	3	6.7%	3	3.8%
Congenital heart	0	0.0%	2	4.4%	2	2.5%
Fracture/dislocate	9	25.8%	0	0.0%	9	11.3%
Heat exhaustion	0	0.0%	2	4.4%	2	2.5%
Heat stroke	0	0.0%	7	15.6%	7	8.8%
Hematoma/contusion	6	17.2%	0	0.0%	6	7.6%
Trauma, other	2	5.8%	0	0.0%	2	2.6%
Traumatic brain injury	8	22.9%	0	0.0%	8	10.0%
Unknown	4	11.5%	3	6.6%	7	8.9%

	Direct		Indirect		All	
	N	%	N	%	N	%
Body part						
Head/brain	14	40.0%	1	2.2%	15	18.8%
Neck	15	42.9%	0	0.0%	15	18.8%
Heart	1	2.9%	33	73.3%	34	42.5%
Total body	0	0.0%	10	22.2%	10	12.5%
Other	3	8.6%	0	0.0%	3	3.8%
Unknown	2	5.8%	1	2.2%	3	3.8%
Sport						
Baseball	0	0.0%	2	4.4%	2	2.5%
Basketball	0	0.0%	14	31.1%	14	17.5%
Cheerleading	0	0.0%	1	2.2%	1	1.3%
Cross Country	0	0.0%	5	11.1%	5	6.3%
Football	31	88.6%	11	24.4%	42	52.5%
Ice Hockey	1	2.9%	0	0.0%	1	1.3%
Rodeo	1	2.9%	0	0.0%	1	1.3%
Skiing	0	0.0%	1	2.2%	1	1.3%
Soccer	1	2.9%	2	4.4%	3	3.8%
Swimming	0	0.0%	1	2.2%	1	1.3%
Track and Field	0	0.0%	1	2.2%	1	1.3%
Volleyball	0	0.0%	1	2.2%	1	1.3%
Water Polo	0	0.0%	1	2.2%	1	1.3%
Wrestling	1	2.9%	5	11.1%	6	7.5%

Table 12. Participation numbers, 1982-1983 to 2013-2014

	High School ¹		College ²	
	Female	Male	Female	Male
Baseball	29,373	14,189,915	-	810,878
Basketball	13,670,490	17,045,671	425,553	481,984
Cheerleading	1,780,437	46,058	-	-
Cross Country	4,739,744	5,614,021	343,071	354,550
Equestrian	17,692	3,195	20,223	1,004
Field Hockey	1,806,074	4,349	170,840	-
Football	26,250	31,865,918	-	1,811,335
Golf	1,610,413	4,583,318	88,828	242,330
Gymnastics	751,951	111,649	47,769	17,319
Ice Hockey	125,552	939,663	30,220	124,019
Lacrosse	1,030,402	1,443,070	158,496	219,282
Rowing	52,530	45,344	143,251	68,450
Skiing	264,067	321,536	16,200	19,969
Soccer	7,377,732	9,597,215	476,512	567,921
Softball	10,429,221	48,863	435,278	-
Swimming	3,892,538	3,105,718	307,286	257,672
Tennis	4,864,656	4,579,407	257,861	247,821
Track and Field	13,947,594	17,149,999	1,032,789	1,235,590
Volleyball	11,332,264	1,014,257	393,981	34,633
Water Polo	301,325	437,794	19,129	31,417
Wrestling	92,824	7,850,077	-	217,040

¹NFHS available online: <http://www.nfhs.org/ParticipationStatics/ParticipationStatics.aspx>

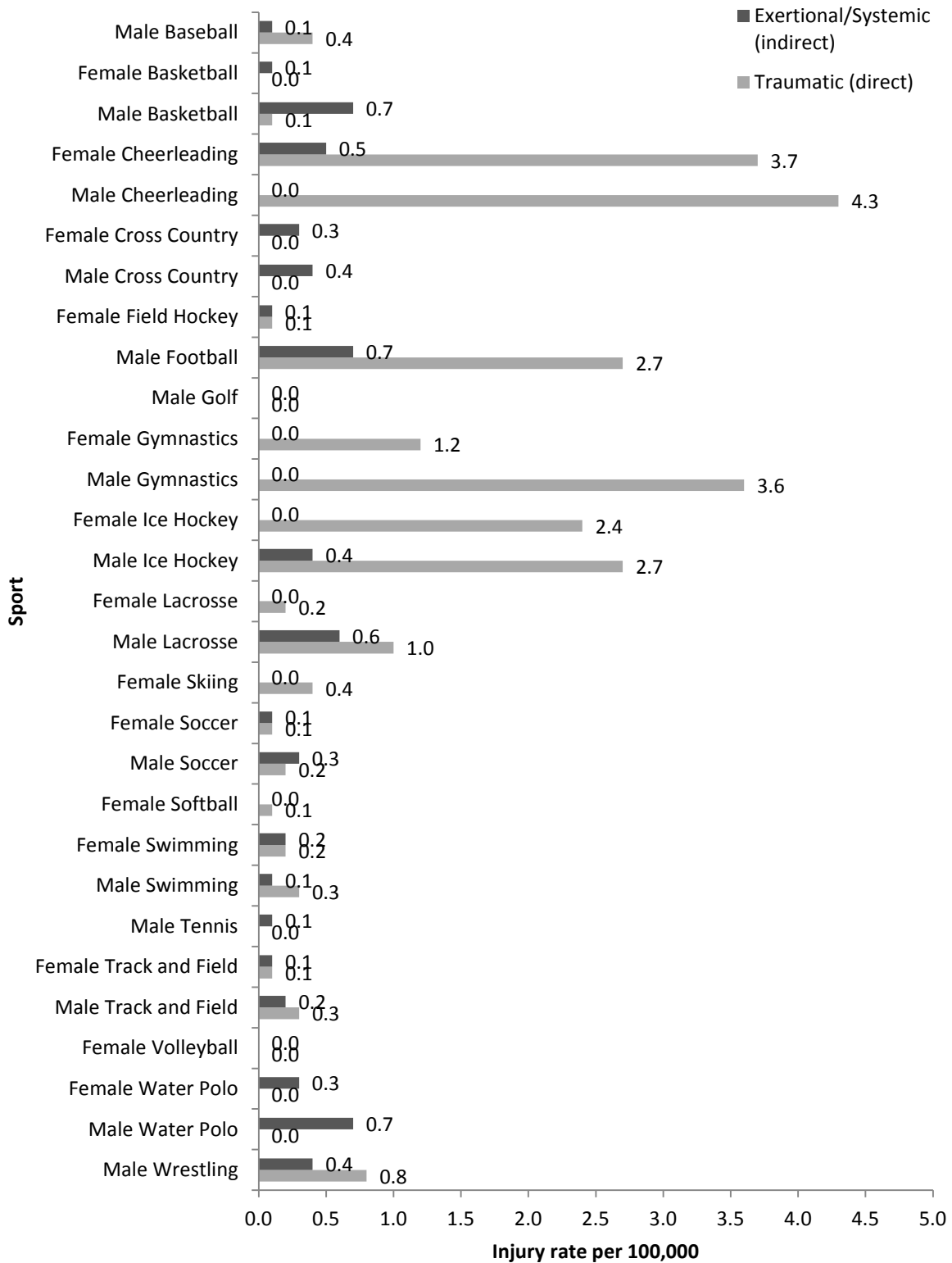
²NCAA accessed online: <http://www.ncaapublications.com/productdownloads/PR1314.pdf>

Figure 1: Rates of fatal catastrophic direct and indirect injuries/illnesses by sport-gender among high school participants, 1982/83-2013/14



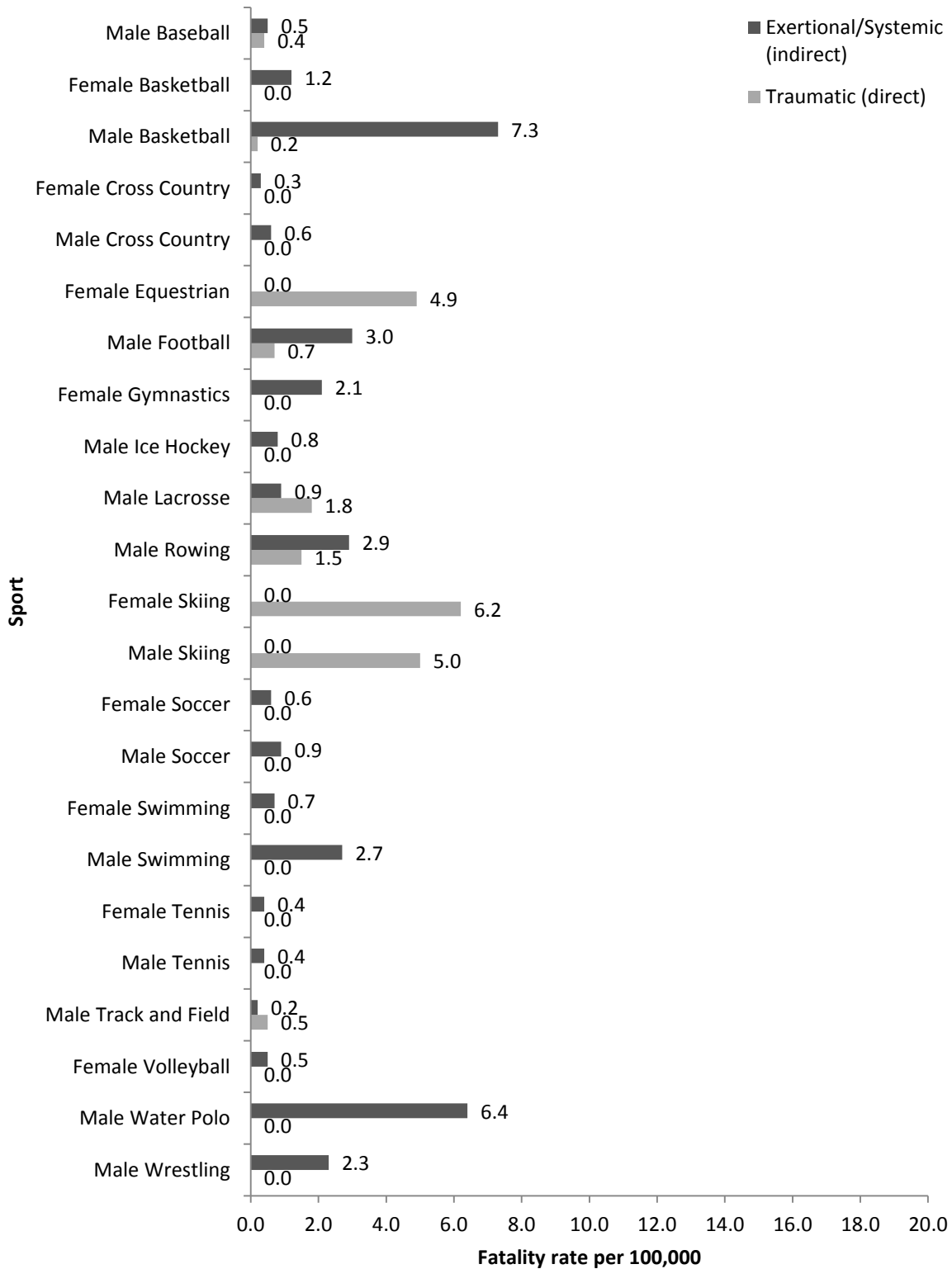
Note: Rates with number of incidents less than 5 should be interpreted with caution.

Figure 2: Rates of all catastrophic direct and indirect injuries/illnesses by sport-gender among high school participants, 1982/83-2013/14



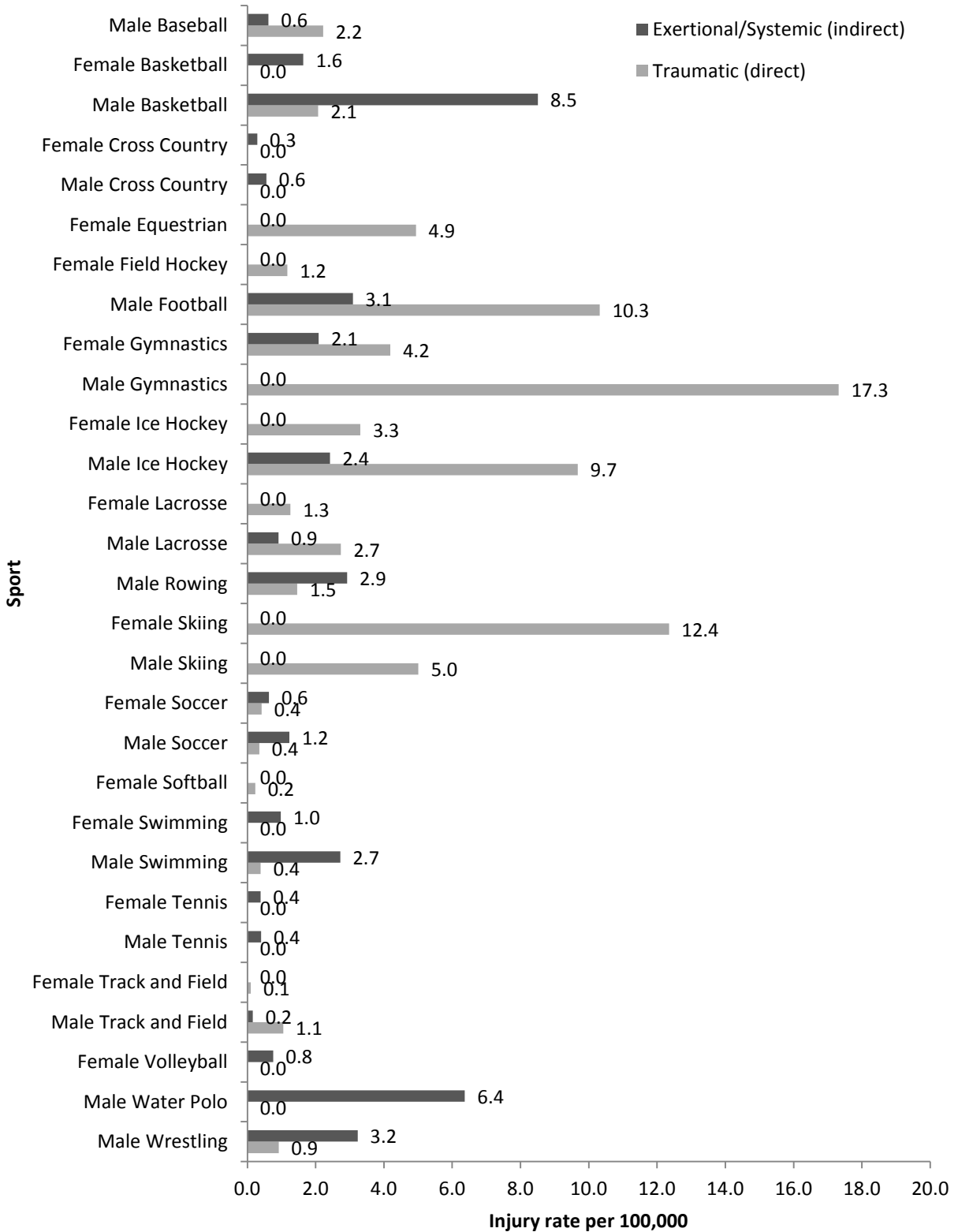
Note: Rates with number of incidents less than 5 should be interpreted with caution.

Figure 3: Rates of fatal catastrophic direct and indirect injuries/illnesses by sport-gender among Collegiate participants, 1982/83-2013/14



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, 1982/83-2013/14



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