

THE NATIONAL INTERSCHOLASTIC
CYCLING ASSOCIATION SAFETY
STUDY

2018

In partnership with the University of Utah
Sports Medicine



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INTRODUCTION

PREAMBLE:

The National Interscholastic Cycling Association (NICA) is committed to protecting the safety of everyone participating in interscholastic mountain bike programs. To this aim, NICA and its partners at the University of Utah have established the NICA Safety Study. The NICA Safety Study is a collaboration between NICA and sports medicine researchers at the University of Utah. The Safety Study is designed to better understand the types and causes of injuries seen in middle and high school mountain biking, and to pursue data-driven strategies to protect the safety of student-athletes, coaches, officials and fans.

The NICA Safety Study solicits and welcomes input from all stakeholders, including student-athletes, coaches, parents, race staff and others. The NICA Safety Study also partners with sports injury prevention experts from other prestigious institutions, including the Mayo Clinic.

After nearly three years of development, consultation with leading sports epidemiologists around the world and extensive beta testing, the NICA Safety Study formally started in the 2018 season. Because of the dedication and commitment of many individuals, the first year of data collection for the NICA Safety Study was very successful. The NICA Safety study is the largest and most comprehensive mountain biking injury surveillance system in the world. The NICA Safety Study is also the largest single-sport injury surveillance system, tracking over 900 teams and is also the first sports surveillance system to track injuries among coaches. With the knowledge gained from this study, NICA is leading the way in efforts to make the sport of mountain biking safer, and to protect the health of the student-athletes and all others involved in this sport.

This document is the first official NICA Safety Study Annual Report. The NICA Safety Study plans on producing publicly available reports on an annual basis. These reports will ultimately include results of injury reduction interventions.

***“...to pursue data-driven strategies
to protect the safety of student-
athletes...”***

Protection of Personal Information:

NICA and its partners take protection of personal information very seriously. All of the information used in the NICA Safety Study is always protected to the greatest degree possible. The NICA Safety Study meets or exceeds all national and local standards for the protection of personal information. All injury incident reports are only visible to NICA national staff, league staff, vetted University of Utah staff and NICA's insurance broker. NICA and its partners will never release an individual's personal health information without their formal permission. NICA's partners at the University of Utah never see any information that can personally identify individuals. All data is analyzed in aggregate, making it impossible to identify any individual in the final analysis.

DEFINITIONS

Injury Definition: Injury is defined as any physical event that occurs during a NICA sanctioned team practice, race, coaches training session or camp that results in physical harm to the participant significant enough to:

- 1) Warrant referral to a medical provider

OR

- 2) Lose time from training or competition beyond the day of injury

OR

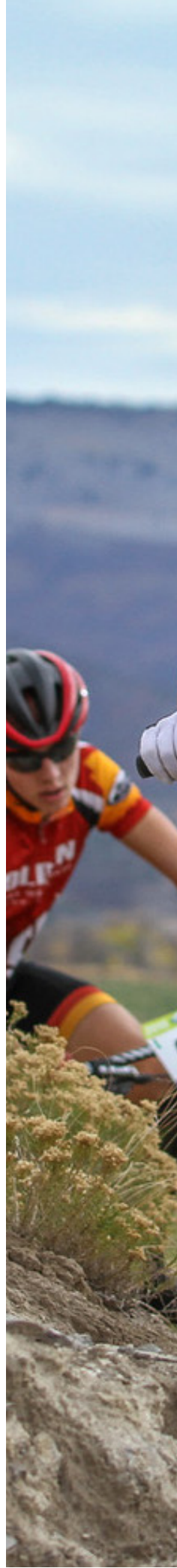
- 3) Miss school or work

Notes regarding Injury Definition:

- If an injury event does not result in an injury that meets one or more of the above parameters, then the injury event should not be entered into the NICA Safety Study database.
- If a rider is seen in the medical tent in the Pit Zone of a race, but otherwise none of the above 3 parameters are met, the injury event does not warrant inclusion in the injury database.

Injury Event: An injury event is a single event that caused one or more injuries meeting the above injury definition. In the majority of cases, an injury event is due to a crash or collision while riding. In some cases, an injury may be the result of chronic overload to a body part, for example tendinitis in the knee.

Note regarding Injury Event Definition: A single injury event can result in more than one injury. For example, A rider might crash and sustain a hip contusion (i.e. bruise) and a fracture of the clavicle (broken collarbone).





Exposure Reporting: The total amount that a student-athlete is exposed to the risk of injury is a very important parameter in sports epidemiology. Exposure can be estimated in many different ways. In order to obtain an estimate of how much student-athletes are exposed to risk, the NICA Safety Study asks the designated reporters to provide the following information on a weekly basis:

1) How many NICA-sanctioned races, practices and other activities(1) their team participated in each week

AND

2) How many student-athletes participated in each team race, practice and other activities.

This information provides the total number of student-athlete exposures.

Injury Proportion: The injury proportion is the number of injury events in one year divided by 100 student-athletes. The injury proportion is expressed as a percentage.

Injury Incidence: The injury incidence is the number of injury events per student-athlete exposure. In sports epidemiology, injury incidence is often considered more important than injury proportion because it takes into account how much exposure a student-athlete has to risk. Injury incidence can be reported in different ways. Some common examples include:

- the number of student-athlete injuries per 1,000 student-athlete practices and races;
- the number of student-athlete injuries per 1,000 student-athlete practices;
- the number of student-athlete injuries per 1,000 student-athlete races.

Note regarding exposure and injury incidence: During the 2018 inaugural year of the NICA Safety Study, exposure reporting was insufficient (~40%) to calculate injury incidences with confidence. Therefore, injury incidences are not included in this report. NICA is pursuing ongoing efforts to improve reporting of injury incidence.

Student-Athlete: The term student-athlete refers to any youth who have registered and paid for a given season in the NICA Pit Zone with the intent to participate in NICA programs.

Coach: The term coach refers to adults who have registered and paid for a given season in the NICA Pit Zone with the intent to volunteer for NICA programs.

Category: The term category refers to a group of student athletes defined by grade-level, gender and/or ability.

*...strong minds,
bodies, character...*

NICA SAFETY STUDY TEAM



Chris Spencer

Director of Risk Management and Training

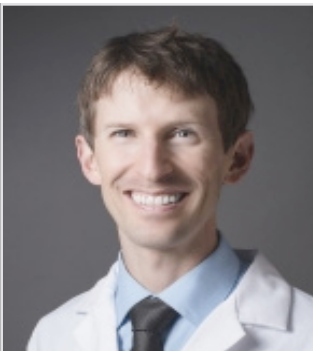
Chris is a proud NorCal League Alumni. Since 2009, he has worked for the NorCal League and then the NICA national office. Chris has had many roles at NICA with his primary contributions being the development and refinement of the risk management and training programs. The focus of his post-high school education has been economics, project management, counseling, program development, and risk management. Chris brings a wide range of experience including work as a bike mechanic, deckhand-engineer on tug boats, aviation and maritime insurance adjuster, comedian, residential advisor, outside salesman, and marketing representative.



Stuart Willick, MD

Professor University of Utah

Stuart Willick, MD is a fellowship trained, board certified sports medicine physician. He has worked with numerous elite sports organizations, including the University of Utah, the United States Ski and Snowboard Association, US Speedskating, the US Bobsled and Skeleton Federation, and the International Olympic and Paralympic Medical Committees. Dr. Willick helps athletes of all ages recover from their sports injuries and stay healthy and active.



Dan Cushman, MD

Associate Professor University of Utah

Dan Cushman, M.D., is board-certified in both Sports Medicine and Physical Medicine & Rehabilitation, and specializes in the care of musculoskeletal injuries in both athletes & non-athletes, musculoskeletal ultrasound, electrodiagnostics, and endurance sports-specific injuries with a particular interest in runners, cyclists, swimmers, and triathletes.



Sarah Thomson

Registration Coordinator

Sarah is a Bay Area native, growing up in Menlo Park and attending UC Santa Cruz where she earned a degree in Marine Biology. She has been a competitive fencer for over 15 years and has worked with fencing clubs and leagues for over 10 years. Sarah is excited to join NICA and bring her extensive experience with fencing tournaments and registration to her new role here. In her spare time she likes to read, in particular murder mysteries.



Masaru Teramoto, PhD, MPH
Research Assistant Professor University of Utah



Matthew Brobeck, BS
Clinical Research University of Utah



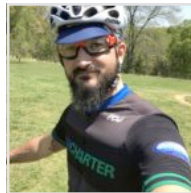
Luke Garcia
Student Volunteer University of Utah



Jerel Wilson
Senior Training Manager



Lauren Duensing
VP Programs



Michael Eastwood
Coach Licensing Senior Manager



Nargis Solis
Systems Management



Julia Lawrence
Registration & Administration Manager

“Every youth is empowered to be part of a thriving and engaged cycling community”



2018 STUDENT-ATHLETE INJURY DATA

2018 Student-Athletes Summary

2018 student-athletes summary	All student-athletes Nationwide:		All male student-athletes Nationwide:		All female student-athletes Nationwide:	
	n	%	n	%	n	%
Total student-athletes Nationwide:	18,577	100.00%	14,819	79.77%	3,757	20.22%
Total number of student-athletes by Division						
Middle school	7,094	38.19%	5,591	37.73%	1,503	40.01%
Freshman	3,687	19.85%	3,021	20.39%	666	17.73%
Sophomore	2,353	12.67%	1,957	13.21%	396	10.54%
Junior varsity	4,564	24.57%	3,642	24.58%	922	24.54%
Varsity	878	4.73%	608	4.10%	270	7.19%
Total number of student-athletes Injured						
Total of injured student-athletes Nationwide:	554	2.98%	426	2.87%	128	3.41%
Number and % of injured student-athletes by Division						
Middle school	172	2.42%	128	2.29%	44	2.93%
Freshman	128	3.47%	101	3.34%	27	4.05%
Sophomore	88	3.74%	72	3.68%	16	4.04%
Junior varsity	134	2.94%	101	2.77%	33	3.58%
Varsity	30	3.42%	23	3.78%	7	2.59%

Table 1. 2018 student-athlete summary data. The percentages refer to the number of injury events per 100 student-athletes.

Percent of Injury Events by Race Category

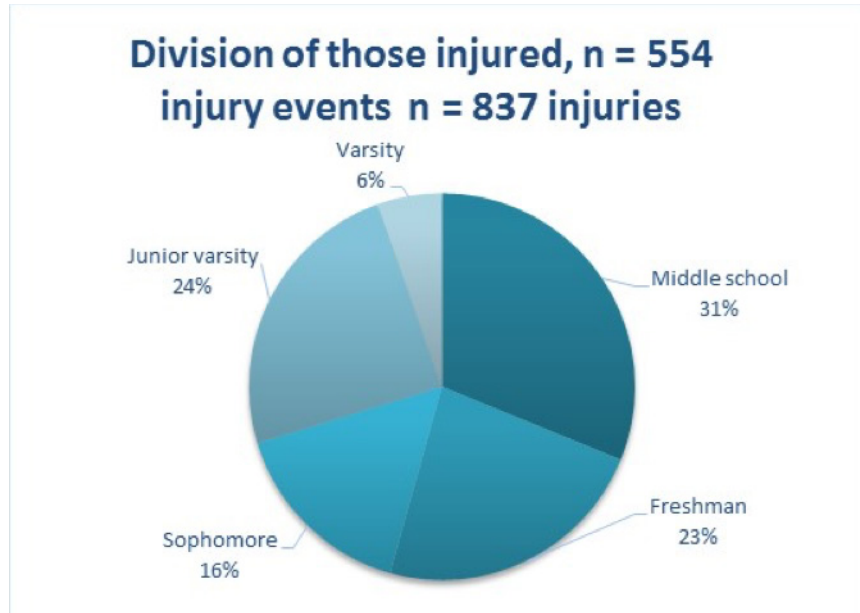


Figure 1. Percent of injury events by race category. The percentages refer to the number of injured student-athletes per total number of student-athletes.

Injury Proportion by Race Category

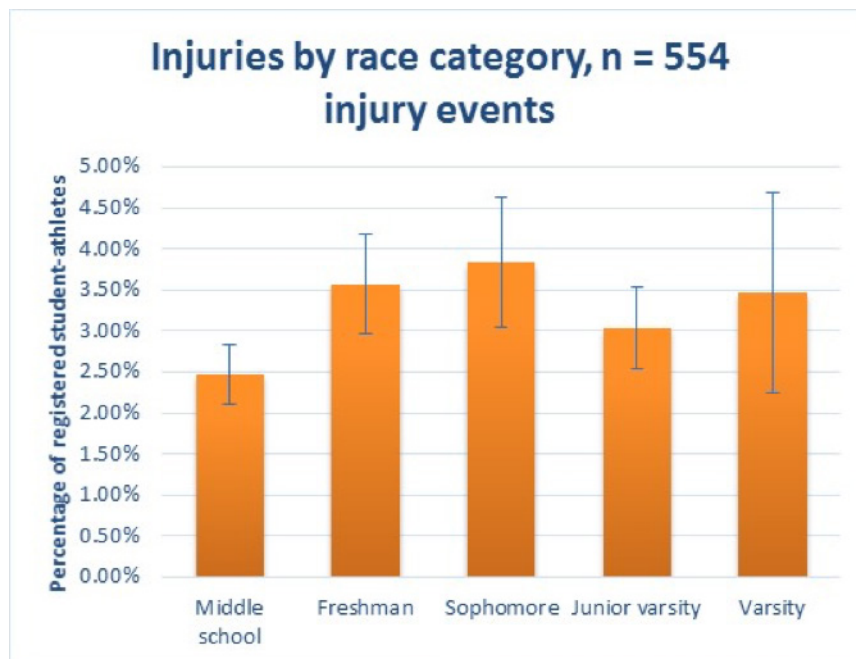


Figure 2. Injury proportion by category. The vertical blue lines are confidence intervals. When there is no overlap in the confidence intervals between two different bars, it means that the differences between the bars is statistically significant.

Student-Athlete Injuries by Body Part

Which body part(s) did the student-athletes injure?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Head/brain	123	22.2%	102	23.9%	21	16.4%
Head/superficial	30	5.4%	25	5.9%	5	3.9%
Face	48	8.7%	40	9.4%	8	6.3%
Neck	17	3.1%	11	2.6%	6	4.7%
Shoulder	87	15.7%	72	16.9%	15	11.7%
Arm	28	5.1%	20	4.7%	8	6.3%
Elbow	62	11.2%	43	10.1%	19	14.8%
Forearm	71	12.8%	59	13.8%	12	9.4%
Wrist/hand	105	19.0%	85	20.0%	20	15.6%
Thoracic	9	1.6%	9	2.1%	0	0.0%
Lumbar	8	1.4%	6	1.4%	2	1.6%
Abdomen/chest	33	6.0%	27	6.3%	6	4.7%
Pelvis/hip	33	6.0%	22	5.2%	11	8.6%
Thigh	32	5.8%	19	4.5%	13	10.2%
Knee	76	13.7%	52	12.2%	24	18.8%
Leg	32	5.8%	25	5.9%	7	5.5%
Foot/ankle	26	4.7%	16	3.8%	10	7.8%
Other	17	3.1%	13	3.1%	4	3.1%
Total # and % of injuries	837	151.1%	646	151.6%	191	149.2%

Table 2. Student-athlete injuries by body part. The first category, "Head/brain," refers to concussions.¹ The second category, "Head/superficial" refers to other injuries to the head and face, such as abrasions (scrapes), but without a concussion. The total number of injuries (837) is greater than the total number of injury events listed in Table 1 (554) because a single injury event can result in more than one injury.



Student-Athlete Injuries by Body Part

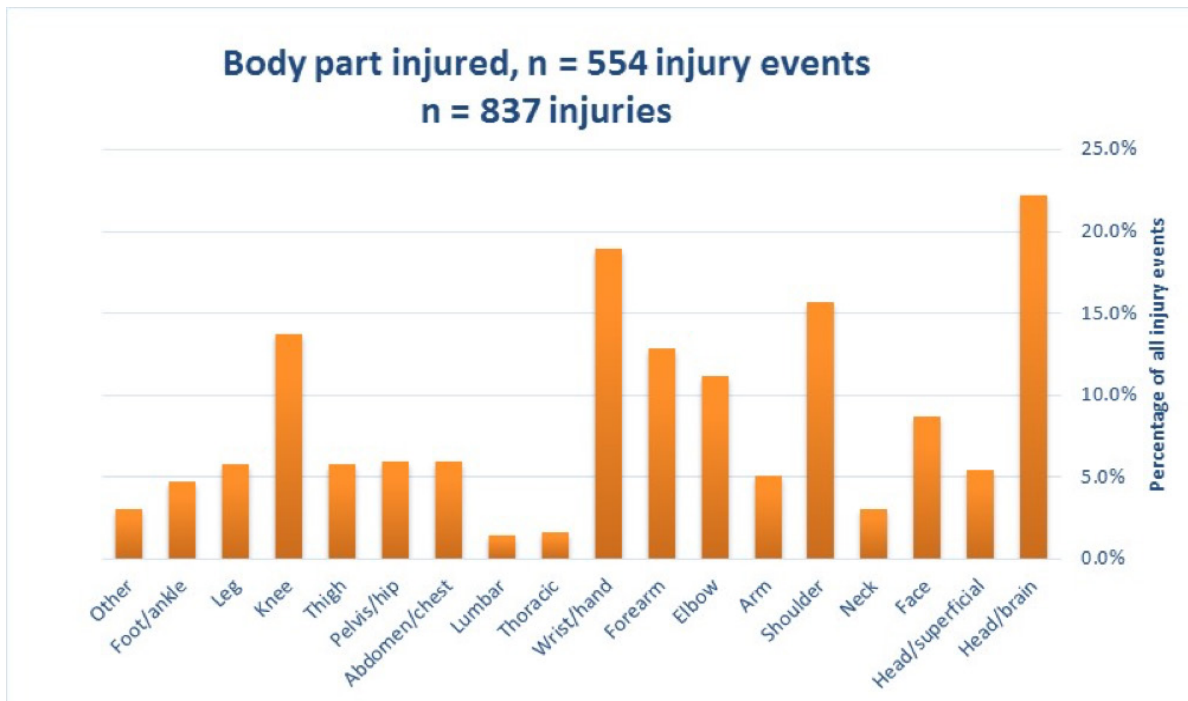


Figure 3. Bar chart of the same information presented in Table 2: percentage of all student-athlete injuries by body part. The first category, “Head/brain,” refers to concussions. The second category, “Head/superficial” refers to other injuries to the head and face, such as abrasions (scrapes), but without a concussion.

Student-Athlete Injury Diagnosis

What was the diagnosis?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Contusion	115	20.8%	77	18.1%	38	29.7%
Abrasion	168	30.3%	137	32.2%	31	24.2%
Laceration	91	16.4%	74	17.4%	17	13.3%
Ligament sprain	61	11.0%	47	11.0%	14	10.9%
Muscle/tendon strain	27	4.9%	20	4.7%	7	5.5%
Fracture	146	26.4%	115	27.0%	31	24.2%
Dislocation	19	3.4%	14	3.3%	5	3.9%
Unknown	35	6.3%	23	5.4%	12	9.4%
Other	30	5.4%	23	5.4%	7	5.5%
Total # and % of injuries	692	124.9%	530	124.4%	162	126.6%

Table 3. Number and percentage of student-athlete injuries by type of injury, excluding concussions. There were a high number of relatively mild injuries such as contusion (bruise) and abrasion (scrape). However, there were also a high number of more significant injuries such as fracture (broken bone) and laceration (cut). The total number of diagnoses (674) is greater than the total number of injury events listed in Table 1 (554) because a single injury event can result in more than one type of injury.

Student-Athlete Injury Diagnosis

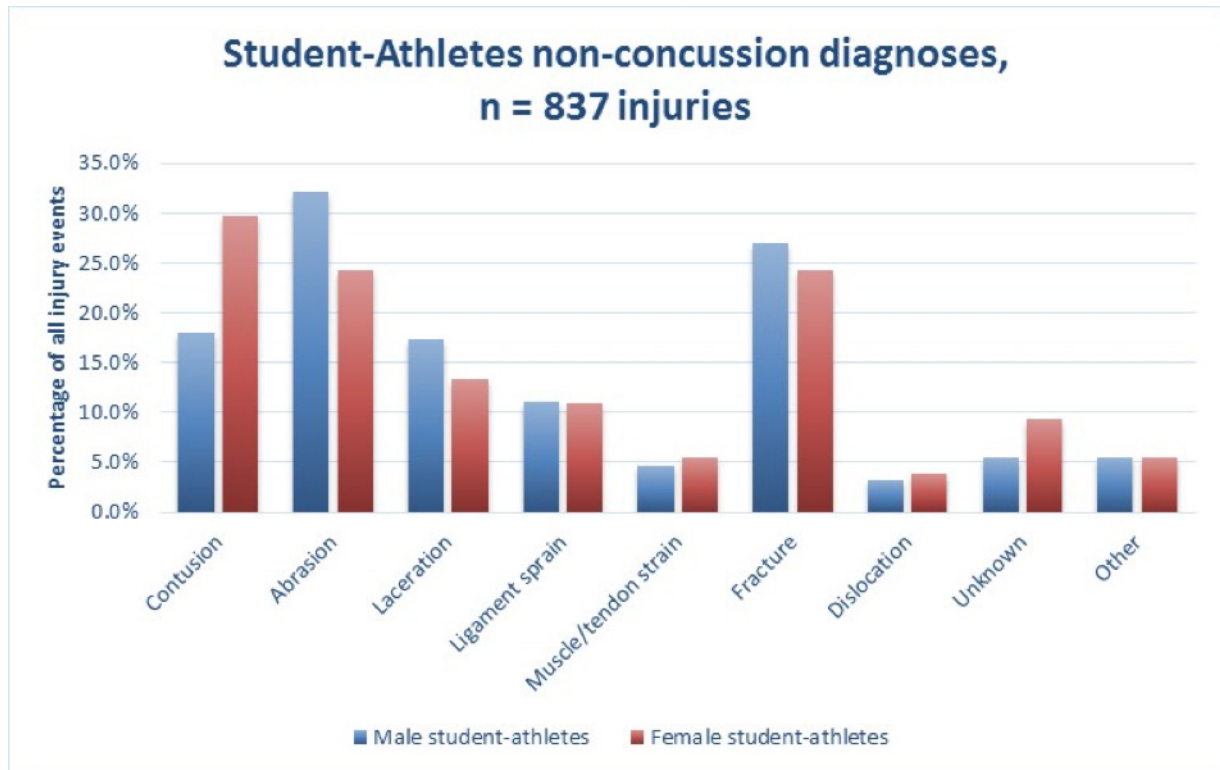


Figure 4. Bar chart of the same information presented in Table 3: percentage of injury types in male and female student-athletes. The total number of diagnoses (674) is greater than the total number of injury events listed in Table 1 (554) because a single injury event can result in more than one type of injury.



Student-Athletes Who Were and Were Not Able to Complete the Training Session or Race

Were the student-athletes able to complete the training session or race?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Completed	154	27.8%	111	26.1%	43	33.6%
Did not complete	389	70.2%	307	72.1%	82	64.1%
N/A or other	11	2.0%	8	1.9%	3	2.3%
Total	543	98.0%	418	98.1%	125	97.7%

Table 4. Number and percentage of student-athletes who were and were not able to complete their practice ride or race after a reportable injury. The events in which the student-athlete was able to complete the training session or race likely resulted in less severe injuries to the student-athlete compared with the events in which the student-athlete was unable to complete the training session or race.

Mode of Transportation From Injury Site

How were the student-athletes transported from the site where the injury occurred?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Ambulance	36	6.5%	29	6.8%	7	5.5%
Helicopter	2	0.4%	2	0.5%	0	0.0%
Private vehicle	18	3.2%	14	3.3%	4	3.1%
ATV	29	5.2%	20	4.7%	9	7.0%
Other	6	1.1%	6	1.4%	0	0.0%
Total	91	16.4%	71	16.7%	20	15.6%

Table 5. Number and percentage of all injured student-athletes who required transport from the site of an injury. Only 16.4% of all injured student-athletes required assisted transportation from the injury site.

Disposition Following Injury

Disposition following injury	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Did not go to emergency room (ER)	264	47.7%	199	46.7%	65	50.8%
Went to ER, then sent home	246	44.4%	190	44.6%	56	43.8%
Went to ER, then admitted to hospital	15	2.7%	14	3.3%	1	0.8%
Unknown	26	4.7%	21	4.9%	5	3.9%
N/A or unreported	3	0.5%	2	0.5%	1	0.8%
Total	551	99.5%	424	99.5%	127	99.2%

Table 6. Disposition of injured student-athletes. Close to half of all injured student-athletes sought emergency evaluation, but only a small percentage (2.7%) of injured student-athletes required admission to the hospital

Type of Activity at which Injury Occurred

At which type of ride did the injury occur?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Team practice (on mountain bike trails)	302	54.5%	240	56.3%	62	48.4%
Race	176	31.8%	132	31.0%	44	34.4%
Team practice (riding on paved roads)	18	3.2%	12	2.8%	6	4.7%
Team practice (skills training)	22	4.0%	16	3.8%	6	4.7%
NICA On-the-Bike Skills	1	0.2%	1	0.2%	0	0.0%
Other	35	6.3%	25	5.9%	10	7.8%
Total	519	93.7%	401	94.1%	118	92.2%

Table 7. Type of ride or other NICA sanctioned activity at which student-athletes were injured. Over half of all injury events occurred during practice rides on mountain bike trails. Just under one-third of all injury events occurred during races. The high percentage of injury events that occurred during practice rides likely reflects the fact that student-athletes are exposed to more practice rides than other types of rides, including races. Not all student-athletes participate in their League's race series. As exposure reporting improves, the NICA Safety Study will be better able to calculate injury incidence by factoring in exposure.

Trail Familiarity

Was the venue or route familiar to the injured rider?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Yes, the rider had ridden on this trail	427	77.1%	339	79.6%	88	68.8%
No, the rider had not ridden on this trail	88	15.9%	58	13.6%	30	23.4%
N/A or unsure	37	6.7%	28	6.6%	9	7.0%
Total	552	99.6%	425	99.8%	127	99.2%

Table 8. Trail familiarity at time of injury event: The majority of injuries occurred on a trail that was familiar to the student-athlete. As in Table 7, the high percentage of injury events that occurred on trails with which the student-athlete was familiar may reflect the greater amount of time spent riding on familiar trails, as opposed to time spent riding on unfamiliar trails. Alternatively, these data could indicate that student-athletes take more risk when riding on familiar trails versus unfamiliar trails.

Trail Incline

What was the trail incline where the injury occurred?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Uphill / ascending	48	8.7%	33	7.7%	15	11.7%
Flat	177	31.9%	137	32.2%	40	31.3%
Downhill / descending	267	48.2%	207	48.6%	60	46.9%
Other	62	11.2%	49	11.5%	13	10.2%
Total	492	88.8%	377	88.5%	115	89.8%

Table 9. Incline of trail at time of injury: Nearly one-half of injury events occurred when riding downhill. Nearly one-third of injury events occurred on flat section of trails. Trail incline at time of injury was not available for 11.2% of injury events

Time Off Due to Injury

Time lost from injury for student-athletes (in days)	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Less than 1 week	157	36.4%	116	34.9%	41	41.4%
1-2 weeks	78	18.1%	60	18.1%	18	18.2%
2-4 weeks	72	16.7%	56	16.9%	16	16.2%
At least 4 weeks	124	28.8%	100	30.1%	24	24.2%
Not reported	123	22.2%	94	22.1%	29	22.7%
Total	431	100.0%	332	100.0%	99	100.0%

Table 10. Time lost from injury. More than a third of injuries resulted in less than a week off the bike. More than a quarter of injuries resulted in more than a month off the bike.

Time Off Due to Injury

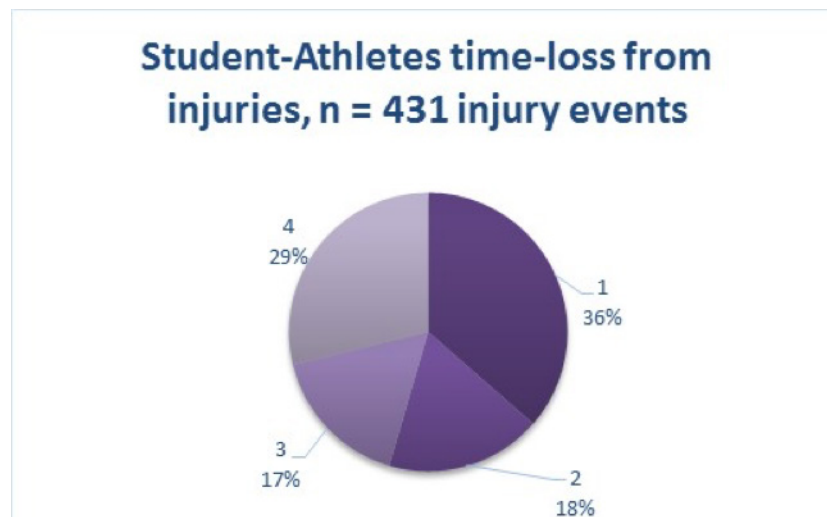


Figure 5. Pie chart representing percentages of time that student-athletes lost from practices and races following an injury event.

Links clicked for student-athletes	All student-athletes	
	n	%
NICA website	259	46.8%
Blank field from email	37	6.7%
Unique field from email	258	46.6%
Total	554	100.0%

Table 11. How the injury reporting form was accessed. About an equal number of injury reporting forms were accessed through the NICA website compared with from the weekly email received by coaches. Completing the injury reporting form directly from the weekly email is strongly preferred because the student-athlete's demographic information is pre-populated in the form and because the injury reporting form accessed

Injury Associated with Internal Conditions

Were any of the following internal conditions associated with the injury?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Dehydration	4	0.7%	3	0.7%	1	0.8%
Lack of sleep	3	0.5%	2	0.5%	1	0.8%
Improper nutrition	4	0.7%	3	0.7%	1	0.8%
Illness at time of the ride	0	0.0%	0	0.0%	0	0.0%
Rider too hot	4	0.7%	3	0.7%	1	0.8%
Rider too cold	0	0.0%	0	0.0%	0	0.0%

Table 12: Student-athlete conditions that were felt to contribute to the injury event. These include preventable conditions including dehydration, lack of sleep, improper nutrition and medical illness at the time of the ride.

Injury Associated with External Conditions

Were any of the following external conditions associated with the injury?	All student-athletes		Male student-athletes		Female student-athletes	
	n	%	n	%	n	%
Injury occurred on a turn	93	16.8%	75	17.6%	18	14.1%
Weather	11	2.0%	8	1.9%	3	2.3%
Passing	43	7.8%	40	9.4%	3	2.3%
Mechanical	14	2.5%	9	2.1%	5	3.9%
Technical nature of trail	106	19.1%	86	20.2%	20	15.6%
Inexperience	118	21.3%	84	19.7%	34	26.6%
Nothing	167	30.1%	123	28.9%	44	34.4%
Other	80	14.4%	64	15.0%	16	12.5%

Table 13: Student-athlete conditions that were felt to contribute to the injury event.



Comparative Analysis of Competitive Mountain Biking Injuries against other High School Sports Surveillance Study data

The NICA Safety Study was developed to use the National High School Sports-Related Injury Surveillance Study as a comparative study to compare injury rates in high schoolers between NICA and other high school sports.

NICA vs. High School Football vs. High School Soccer

Sports	Per 1000 student-athlete competition exposures	Per 1000 male student-athlete competition exposures	Per 1000 female student-athlete competition exposures	Per 1000 middle school student-athlete competition exposures	Per 1000 freshman student-athlete competition exposures	Per 1000 sophomore student-athlete competition exposures	Per 1000 JV student-athlete competition exposures	Per 1000 varsity student-athlete competition exposures
NICA	10.11	9.76	11.47	9.57	10.82	10.6	9.58	8.6
HS football	12.53	12.53						
HS soccer	4.32	3.28	5.54					

Table 14. Per 1000 student-athlete competition exposure comparing injury rates in high schoolers between NICA and other high school sports.

Incident Definition

The National High School Sports-Related Injury Surveillance System defined an injury as: A) An injury that occurred as a result of participation in an organized high school competition or practice and B) Required medical attention by a team physician, certified athletic trainer, personal physician, or emergency department/urgent care facility and C) Resulted in restriction of the high school athlete's participation for one or more days beyond the day of injury and D) Any fracture, concussion, dental injury, or exertional heat event regardless of whether or not it resulted in restriction of the student-athlete's participation.

Exposure Definition

An athlete exposure was defined as one athlete participating in one practice or competition where he or she is exposed to the possibility of athletic injury. Exposure was expressed in two parts: 1) A) Number of athlete-practices = the sum of the number of athletes at each practice during the past week. For example, if 20 athletes practiced on Monday through Thursday and 18 practiced on Friday, the number of athlete-practices would equal 98. B) Number of athlete-competitions = the sum of the number of athletes at each competition during the past week. For example, if 9 athletes played in a Freshman game, 12 in a JV game, and 14 in a Varsity game, the number of athlete-competitions would equal 35

Timeframe for National High School Sports-Related Injury Surveillance Study

The National Federation of High School Sports Associations Study Annual Report tracked competition injuries on the 2017-2018 scholastic year while the NICA Safety Study Annual Report tracked competition injuries on the 2018 calendar year.

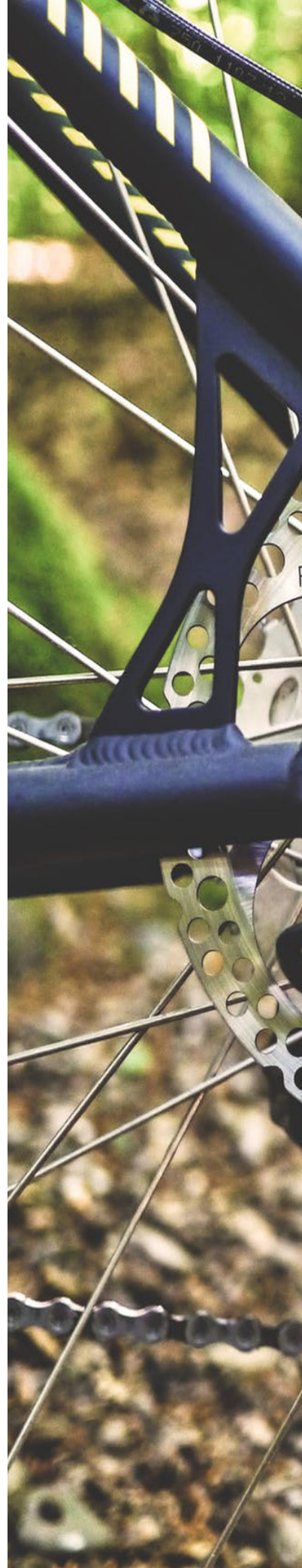
Sample Size

The National High School Sports-Related Injury Surveillance Study tracks 100 nationally representative high schools while the NICA Safety Study Tracks over 800 high school teams.

Reporters

The National High School Sports-Related Injury Surveillance Study relies on certified Athletic Trainers for reporting while the NICA Safety Study relies on licensed NICA Coaches.

For more information about our comparative study, please see the [National High School Sports-Related Injury Surveillance Study 2017- 2018 School Year Annual Summary Report](#). (3)





2018 COACH INJURY DATA

Introduction: To our knowledge, the NICA Safety Study is the first injury surveillance system that tracks injuries among coaches, who ride with the student-athletes during practice but not during races.

2018 Coach Summary

2018 coaches summary data	All coaches Nationwide:		All male coaches Nationwide:		All female coaches Nationwide:	
	n	%	n	%	n	%
Total n of coaches Nationwide:	8,739	100.00%	6,596	75%	2,077	24%

Table 15. Number and percentage of NICA registered coaches, male coaches and female coaches. The percentages refer to the number of injuries per 100 coaches.

Coach Injury by Sex

Coach injuries by sex	All coaches Nationwide:		All male coaches Nationwide:		All female coaches Nationwide:	
	n	%	n	%	n	%
n and % of injured coaches Nationwide:	68	0.78%	50	0.76%	18	0.87%

Table 16. Number and percentage of NICA registered male and female coaches who sustained injuries during NICA sanctioned rides. Overall, the percentage of injuries among coaches was very low. Please note that coaches do not participate in as many NICA sanctioned rides and other activities as the student-athlete, and do not race in NICA sanctioned races.



Coach Injuries by Body Part

Which body part(s) did the coaches injure?	All coaches		Male coaches		Female coaches	
	n	%	n	%	n	%
Head/brain	12	17.6%	9	18.0%	3	16.7%
Head/superficial	8	11.8%	4	8.0%	4	22.2%
Face	10	14.7%	5	10.0%	5	27.8%
Neck	8	11.8%	3	6.0%	5	27.8%
Shoulder	26	38.2%	19	38.0%	7	38.9%
Arm	10	14.7%	6	12.0%	4	22.2%
Elbow	8	11.8%	5	10.0%	3	16.7%
Forearm	5	7.4%	5	10.0%	0	0.0%
Wrist/hand	9	13.2%	5	10.0%	4	22.2%
Thoracic	3	4.4%	1	2.0%	2	11.1%
Lumbar	2	2.9%	2	4.0%	0	0.0%
Abdomen/chest	8	11.8%	4	8.0%	4	22.2%
Pelvis/hip	6	8.8%	4	8.0%	2	11.1%
Thigh	3	4.4%	2	4.0%	1	5.6%
Knee	7	10.3%	4	8.0%	3	16.7%
Leg	3	4.4%	3	6.0%	0	0.0%
Foot/ankle	4	5.9%	1	2.0%	3	16.7%
Other	2	2.9%	2	4.0%	0	0.0%
Total	134	197.1%	84	168.0%	50	277.8%

Table 17. Coach injuries by body part. The first category, “Head/brain,” refers to concussions. The second category, “Head/superficial” refers to other injuries to the head and face, such as abrasions (scrapes), but without a concussion. The total number of injuries (134) is greater than the total number of injury events listed in Table 15 (68) because a single injury event can result in more than one injury. For the same reason, the total percentage of injuries is greater than 100%.

Coach Injury Diagnosis

What was the diagnosis?	All coaches		Male coaches		Female coaches	
	n	%	n	%	n	%
Contusion	18	26.5%	11	22.0%	7	38.9%
Abrasion	18	26.5%	12	24.0%	6	33.3%
Laceration	7	10.3%	6	12.0%	1	5.6%
Ligament sprain	10	14.7%	7	14.0%	3	16.7%
Muscle/tendon strain	9	13.2%	5	10.0%	4	22.2%
Fracture	22	32.4%	14	28.0%	8	44.4%
Dislocation	5	7.4%	3	6.0%	2	11.1%
Unknown	11	16.2%	4	8.0%	7	38.9%
Other	9	13.2%	4	8.0%	5	27.8%
Total	109	160.3%	66	132.0%	43	238.9%

Table 18. Number and percentage of coach injuries by type of injury. There were a high number of relatively mild injuries such as contusion (bruise) and abrasion (scrape). However, there were also a high number of more significant injuries such as fracture (broken bone) and laceration (cut). The total number of diagnoses (109) is greater than the total number of injury events listed in Table 15 (68) because a single injury event can result in more than one type of injury.

Coach Injury Diagnosis

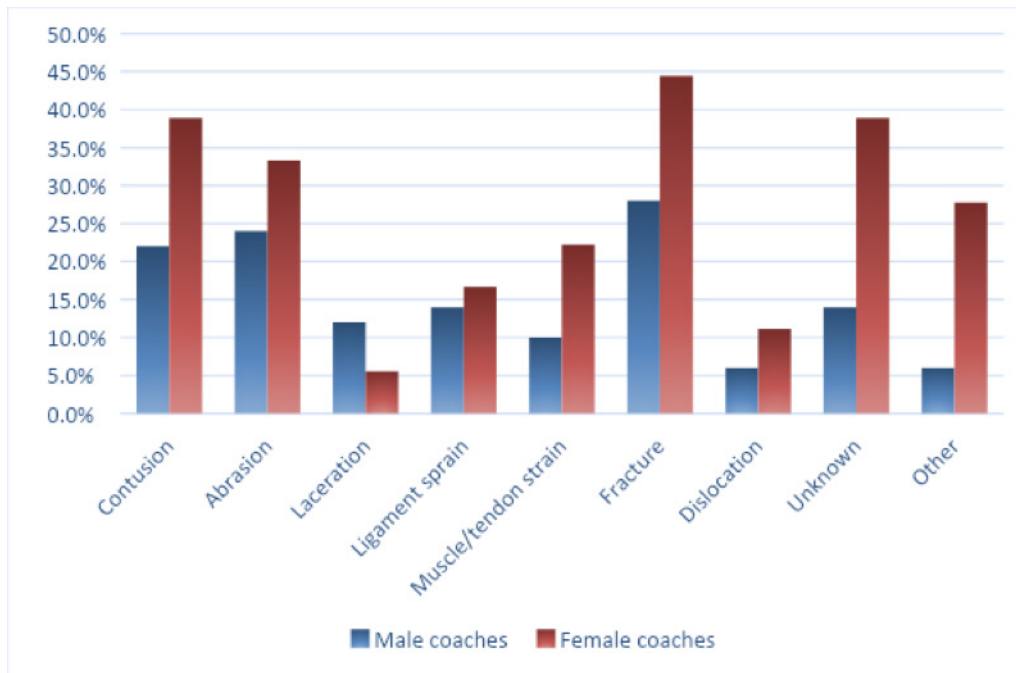


Figure 6. Non-concussion coach injuries by diagnosis.

Mode of Transportation From Injury Site

How was the coaches transported from the site where the injury occurred?	All coaches		Male coaches		Female coaches	
	n	%	n	%	n	%
Ambulance	8	11.8%	6	12.0%	2	11.1%
Helicopter	4	5.9%	4	8.0%	0	0.0%
Private vehicle	0	0.0%	0	0.0%	0	0.0%
ATV	5	7.4%	3	6.0%	2	11.1%
Other	0	0.0%	0	0.0%	0	0.0%
Total	17	25.0%	13	26.0%	4	22.2%

Table 19. Number and percentage of all coaches who required transport from the site of an injury. One-quarter of all injured coaches required assisted transportation from the injury site.

Disposition Following Injury

Disposition following injury	All coaches		Male coaches		Female coaches	
	n	%	n	%	n	%
Did not go to emergency room (ER)	28	41.2%	19	38.0%	9	50.0%
Went to ER, then sent home	31	45.6%	24	48.0%	7	38.9%
Went to ER, then admitted to hospital	9	13.2%	7	14.0%	2	11.1%
Unknown	0	0.0%	0	0.0%	0	0.0%
N/A or unreported	0	0.0%	0	0.0%	0	0.0%
Total	68	100.0%	50	100.0%	18	100.0%

Table 20. Disposition of injured coaches. Close to half of all injured coaches sought emergency evaluation. 13.2% of all injuries sustained by coaches required admission to the hospital.

Trail Incline

What was the trail incline where the injury occurred?	All coaches		Male coaches		Female coaches	
	n	%	n	%	n	%
Uphill / ascending	7	10.3%	4	8.0%	3	16.7%
Flat	16	23.5%	12	24.0%	4	22.2%
Downhill / descending	41	60.3%	31	62.0%	10	55.6%
Other	4	5.9%	3	6.0%	1	5.6%
Total	64	94.1%	47	94.0%	17	94.4%

Table 21. Incline of trail at time of injury: 60% of coaches' injury events occurred when riding downhill. Less than a quarter of injury events occurred on flat section of trails.

Time Off Due to Injury

Time lost from injury for coaches	All coaches	
	n	%
Less than 1 week	14	27.5%
1-2 weeks	10	19.6%
2-4 weeks	5	9.8%
At least 4 weeks	22	43.1%
Not reported	17	25.0%
Total	51	100.0%

Table 22. Time lost from injury for coaches. Time-lost data was available for 51 of 68 coach injury events. More than a one-fifth of injuries resulted in more than a month off the bike.

Time Off Due to Injury



Figure 7. Pie chart representing percentages of time that student-athletes lost from practices and races following an injury event.

LIMITATIONS

As with all sports epidemiology endeavors, the NICA Safety Study is not without limitations. It is necessary to understand the limitations in order to appropriately interpret the data. It is also necessary to understand, accept and find ways to decrease these limitations in order to lessen the impact of the limitations on data analysis and improve the value of the data.

One primary limitation is that the information entered into the Safety Study is not usually entered by medical personnel, but rather by team personnel such as the designated reporter. The Safety Study does not collect primary source clinical documentation such as physician's clinic notes and x-ray reports. However, the individual who is entering the information into the Safety Study is instructed to consult with the student-athlete, the student-athlete's parents/guardians and others so that they have the best information possible about the circumstances of the injury. A key component of the Safety Study is that the electronic injury reporting form allows the designated reporter to return to the injury form and update it as they obtain additional information about the injury and its outcome. In the inaugural 2018 first year of data collection, the information entered into the database regarding injuries was deemed to be of good quality, despite not having primary source medical documentation.

A second important limitation involves the challenges of obtaining exposure data. Exposure is a very important concept in sports epidemiology. A basic definition of exposure is the amount that a student-athlete is exposed to risk. Exposure can be estimated in different ways. In mountain biking, exposure can be a count of number of practices and races, or the amount of time that student-athletes are on their bikes, or the distance ridden in a given period of time. For practical reasons, the simplest estimate of exposure for the purposes of the NICA Safety Study is estimated as the number of student-athletes at each NICA sanctioned practice or race. This information is supposed to be provided by a team designee such as the team director. Unfortunately, in the inaugural 2018 year of data collection, compliance with reporting exposure information was not adequate for use in data analyses. NICA and its partners are actively working with all stakeholders to improve the capture of exposure information. Without adequate exposure data, the NICA Safety Study will remain limited in its ability to draw firm conclusions about when and why injuries are occurring, and how to decrease the risk of injury.

A third limitation involves the challenges of communicating and coordinating with hundreds of teams and thousands of student-athletes across the country. The NICA Safety Study will be most effective if all stakeholders understand the importance of contributing to the effort. NICA will continue to have regular communications with all stakeholders and will post reports such as this one on the NICA Safety Study web page.

Another limitation is that the NICA Safety Study currently focuses on acute traumatic injuries. This is because acute injuries are by far the most common type of injury sustained in mountain biking. Depending on the results of data analysis, it is possible that an additional focus on insidious onset, overuse injuries will be added in the future. It is also possible that additional questions regarding medical illness in mountain biking will also be added in the future.

As with all large injury surveillance systems, there are some incomplete fields in the database. These missing data are primarily the result of the manner in which the designated reporters complete the injury incident forms. Ongoing communications with the designated reports should decrease the number of missing fields.

Finally, the NICA Safety Study is limited by time, money and brainpower. The sports medicine researchers at the University of Utah and elsewhere have been volunteering their time and expertise in order to find ways to make the sport safer. NICA and its collaborators continually seek research grant funding and other funding to support this important project.

SUMMARY AND FUTURE DIRECTIONS

Thanks to the hard work of many individuals, the first full year of data collection for the NICA Safety Study was a tremendous success. The NICA Safety study is the largest and most comprehensive mountain biking injury surveillance system in the world. It is also the first injury surveillance system to track injuries among coaches. With the knowledge gained from this study, NICA is leading the way in efforts to make the great sport of mountain biking safer, and to protect the health of the student-athletes and all others involved in this sport. Over the next 2 years, NICA and its partners will be pursuing the following steps for the NICA Safety Study:

- Continue to communicate with all stakeholders about the importance of the project and the importance of obtaining quality exposure and injury data;
- Solicit feedback from stakeholders and safety experts for more insights on how to improve the effectiveness of the project;
- Post reports of findings to the NICA Safety Study web page;
- Review and improve the web-based injury reporting form;
- Carry out sub-analyses of the 2018 data;
- Pursue increased compliance with reporting of exposure data;
- Add analyses of race versus practice injuries;
- Pursue research grant funding and other sources of funding to support the project;
- Start planning future safety interventions;
- NICA and its partners at the University of Utah plan to conduct a large-scale, prospective, controlled safety intervention study in select leagues in the fall of 2020. More information will be provided as this exciting initiative develops.



The NICA Safety study is the largest and most comprehensive mountain bike injury surveillance system in the world.



FUN - NICA inspires friendship, joy, and adventure.

INCLUSIVITY - NICA believes everyone should be able to participate in our programs and feel welcomed, respected, and supported.

EQUITY - NICA is committed to fair treatment, equal access, opportunity, advancement, and elimination of barriers to encourage participation for all.

RESPECT - NICA expects consideration for all others, oneself, and the outdoors.

COMMUNITY - NICA unites diverse people, families, and communities through cycling by creating fun and welcoming experiences

Endnotes:

1. For the purposes of this report, the term “concussion” generally refers to a sports concussion, or a mild traumatic brain injury that occurs as the result of sports participation. However, there were a very small number of concussions that occurred that were more than mild. At the present time, the NICA Safety Study does not have the ability to assess the severity of these injuries. For questions regarding the use of the term concussion, please contact the NICA Director of Risk Management and Training.
2. For the purposes of this report, the term “activity” is an inclusive term that covers all NICA sanctioned activities that participants are involved with, including NICA sanctioned races, team practices on mountain biking trails, team practices on dirt or paved roads, skills training for student-athletes and coaches, and other activities during which a mountain biking injury might occur, such as Grit rides and “Adventure Days.”
3. <http://www.ucdenver.edu/academics/colleges/PublicHealth/research/ResearchProjects/piper/projects/RIO/Documents/2017-18.pdf>



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