

PERTINACITY

KOREY STRINGER INSTITUTE
2021 ANNUAL REPORT



THE MISSION OF THE KOREY STRINGER INSTITUTE IS TO PROVIDE RESEARCH, EDUCATION, ADVOCACY, AND CONSULTATION TO MAXIMIZE PERFORMANCE, OPTIMIZE SAFETY, AND PREVENT SUDDEN DEATH FOR THE ATHLETE, WARFIGHTER, AND LABORER.



WHAT WE ARE MADE OF

I am excited to welcome you to this issue of *Pertinacity*, the publication that highlights the work of the Korey Stringer Institute, which bears my husband's name. I know he would be embarrassed by all the attention, but he might give me a fist pump for the reason and the mission behind the institute.

First, I would like to share a few backstory details. Shortly after our son Kodie was born, Korey eschewed the party scene or opportunities to paint Minneapolis purple for books. The transition was an easy one; for Korey nightclubs and nightlife were never a big draw. During the off-season, a Saturday night on the couch with a good book was his normal, not exception.

Education, community, and family were extremely important to Korey. He realized all education, communities, families, and opportunities were not created equal, and was determined to do his part, to do his bit to bring about change. He went out into the Minneapolis community and talked and laughed with the kids, read to them, and contributed financially. But Korey never felt any of these things were enough. He always wanted to do more.

You know that my late husband, Korey Stringer, was an NFL Pro Bowler offensive lineman. But you may not know that I was a track and field athlete and I have a great appreciation for what sports teaches you about pertinacity and the human spirit.

PattiSue Plumer, a U.S. Olympian, was the first woman to beat one of Mary Decker's distance running records during the 1980s. But she saw her share of setbacks, including a broken leg after being hit by a taxi in Japan, several bouts with

pneumonia, food poisoning at the Seoul Olympics, and a dog bite at the 1991 World Championships.

But she once said something that, as a sprinter, I can appreciate. She said, "Racing teaches us to challenge ourselves. It teaches us to push beyond where we thought we could go. It helps us to find out what we are made of."

My life could not have been more of a test of that spirit than when in 2001 I lost my husband to an exertional heat stroke during a Minnesota Vikings pre-season football practice. On that hot summer July day, he was practicing in scorching heat that pushed his body temperature to 108.8°F.

In track and field, you train for your next race by working on your timing, your endurance, and your mental readiness. On that July scorcher, the whistle blew and there I was paralyzed in the blocks — unable to take off because this was a race that I was not prepared to run. ►

The day after Korey died, I was a 27-year-old widow and single parent of a 4-year-old son. I was devastated, as any young wife would have been. I struggled to come to grips with this unbearable loss. My parents raised my sister and me to be very independent and responsible courageous women. But I didn't know what to do. There was no training, no classes; there was nothing that had prepared me for this. My family and friends were supportive, but I internalized my grief so that I could get through the pain. One of the most difficult things I had to do during that time was to work through my grief to get to my purpose.

Soon after, I relocated to Atlanta, my hometown, with our young son and found strength in a song, in the

I did not simply wake up one day and just decide that our son needed me to get it together so that we could begin the healing process. It was not that systematic or calculating. Like the healing process itself, I took little bitty steps. Korey had an incredibly giving spirit and philanthropic heart. He believed in making intimate connections with people that made a huge impact. He almost rejected the practice of outward giving and photo ops that applauded his generosity.

While sitting in my living room in Atlanta one sunny afternoon, a light bulb went off and The Korey & Kelci Stringer Foundation was born. At the foundation, we were able to continue and expand upon Korey's important work. We went into the community

partnership with the National Football League, Gatorade, and the University of Connecticut, the vision for KSI was realized. I am grateful and humbled to see my husband's incredible legacy continue.

The institute's mission is both personal and absolute. It is to provide research, education, advocacy, and consultation to maximize performance, optimize safety, and prevent sudden death for the athlete, warfighter, and laborer.

As the author T. Alan Armstrong said, "Champions do not become champions when they win the event, but in the hours, weeks, months and years they spend preparing for it. The victorious performance itself is merely the demonstration of their championship character."

I want to thank KSI's staff, board of advisors, and supporters for their continuous and ongoing dedication to what has been a labor of love. I hope you will continue to forge forward with us as we push for meaningful change.

The Korey Stringer Institute will always have my personal commitment to making KSI a global resource for all athletes.

Finally, nowadays whenever I look at Kodie, at 6'4" and 240 pounds, I'm overwhelmed by his astonishing resemblance to Korey. And I am so proud that, like his father before him, he is creative, dedicated, compassionate, smart, and a lover of books!

Kelci Stringer
Founder and Spokesperson, Korey Stringer Institute

THE LEGACY OF KSI

I was sitting in a conference room at the World Headquarters for the International Olympic Committee in Lausanne, Switzerland, on the sunny morning of September 8, 2021, when I came to the powerful realization that the dream of creating an organization that can dramatically influence safety issues — the Korey Stringer Institute — was working. This moment, which will almost certainly go down as the proudest of my professional career, was special not because of what I had accomplished, but rather something I had the opportunity to witness. It was when I realized the true legacy of KSI will not be in what I helped build, but rather in the impact of the thousands of people who have worked tirelessly and passionately to fulfill our mission and the vastly growing web of influence the current and former staff of KSI has in making things safer for athletes, warfighters, and laborers around the world.

Yuri Hosokawa, Ph.D., ATC, a UConn/KSI alum, was speaking during a debrief meeting of the Olympic Committee Adverse Weather Impact Expert Working Group for the Olympic/Paralympic Games Tokyo 2020, just a couple of days after the completion of the Tokyo 2020 Olympics. Here was this brilliant, motivated, passionate, interpersonally gifted leader completely owning the room of world leaders in sports medicine. She spoke with incredible confidence about how the committee's work to overhaul exertional heat stroke (EHS) care for the country of Japan shaped the



infrastructure for all the heat policies and how she worked to educate and train Olympic officials and implement these policies for the Olympic Games.

Yuri was born and raised in Tokyo and earned her bachelor's at Waseda University there before pursuing her master's at the University of Arkansas (with UConn alums and KSI friends Drs. Kavouras, McDermott, and Ganio) before coming to KSI/UConn for her Ph.D. Listening to her, I realized the endless work to build KSI into an internationally recognized brand that advocates for the safety of athletes/warfighters/laborers was worth every second. Yuri was living proof that the amazing people who have come through our doors, along with so many other stakeholders (parents, survivors, medical professionals, supervisors, etc.) who carry our message forward, will be KSI's lasting legacy. As she spoke, a peaceful feeling came over me, the feeling that I was fulfilling the promise I had made to myself in my hospital bed on the night of August 8, 1985, when

I was recovering from EHS suffered while running a 10K race on a track. I had sworn to myself I was going to do something to make a difference, to help others regarding EHS. While I was fully aware that much work still needs to be done on this lengthy journey, I also was completely cognizant that we had already done so many positive things, and that Kelci, Jimmy, myself and others who worked to create KSI back in 2009 can be proud that our efforts to honor Korey's legacy has borne fruit.

(I am very proud to announce that Yuri Hosokawa will be the recipient of the inaugural KSI Annual Alumni Award at the KSI Awards Ceremony in May 2022. Given what I just described, are you surprised? Read about her Tokyo Olympics experience on page 8.)

Douglas J. Casa
CEO, Korey Stringer Institute
Professor, University of Connecticut

"NOBODY SAID LIFE WOULD BE EASY, THEY JUST PROMISED IT WOULD BE WORTH IT."

quiet whisper of the wind, the giggle of our son's laughter, the stillness of pending peace and the famous words attributed to Harvey MacKay: "Life is too short to wake up with regrets. So love the people who treat you right. Forget about those who don't. Believe everything happens for a reason. If you get a chance, take it. If it changes your life, let it. Nobody said life would be easy, they just promised it would most likely be worth it."

and schools — mentored boys and girls, conducted business and career-focused workshops, provided scholarships, and talked to athletes about the importance of hydration and launched a local "Drink 2 Live" campaign.

In 2010 I made the difficult decision to dissolve the foundation. Back then, I never could have imagined when partnering with UConn to establish the Korey Stringer Institute that it would turn out to be the extraordinary place it is today. The institute was created with the help of people like Doug Casa, Jimmy Gould, and others. Along with our

2021 BY THE NUMBERS

PUBLICATIONS

48

BOOK CHAPTERS/
MANUSCRIPTS
(published/in press)

MEDIA APPEARANCES (KSI SPEAKERS)

24

INTERVIEWS/
PODCASTS

.....

9

WEBINARS/
CONFERENCES

NUMBER OF ADDITIONAL STATES THAT MADE POLICY CHANGES IN 2021

8

CO, HI, IA, KS, MT,
ND, VA, WY

ACTIVE GRANTS CY 2021

11

RESEARCH

.....

1

NON-RESEARCH

PERSONNEL

26

PAID STAFF

.....

75+

VOLUNTEERS



2021 FUNDING

\$2,556,946

TOTAL

.....

\$1,776,676

RESEARCH

.....

\$584,986

NON-RESEARCH

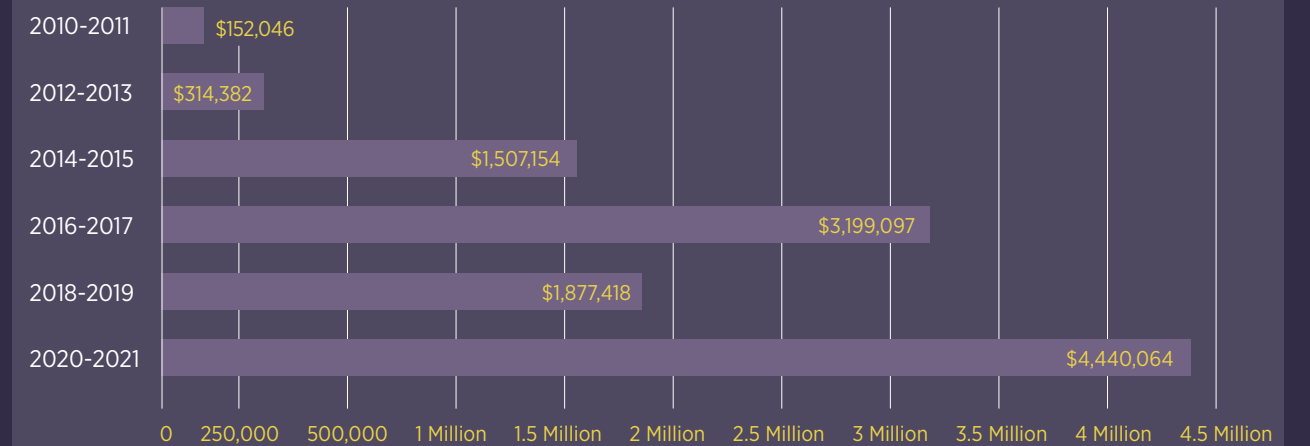
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\$195,284

CORPORATE
FUNDING/DONATIONS



TOTAL FUNDING BY YEAR - ALL SOURCES



TOTAL FUNDING 2010-2021 = \$11,490,161



KSI CORPORATE PARTNER: DEFIBTECH

Mike Papale is the Manager of Community Relations at Defibtech, one of KSI's corporate sponsors, and is a sudden cardiac arrest survivor. Mike also is the founder of In A Heartbeat and the author of "A Big Heart," and has joined our KSI team at several TUFSS meetings. Mike discusses his journey and perspective on the world of sports safety.

Q: WHAT ARE SOME OF THE BARRIERS/ADVERSITIES YOU'VE EXPERIENCED ALONG YOUR PURSUIT IN DEVELOPING THE IN A HEARTBEAT FOUNDATION?

A: Lack of awareness of sudden cardiac arrest, heart disease, and AEDs. Our goal, on top of donating AEDs and giving free electrocardiograms, includes raising awareness to ensure people understand the importance of AEDs and ECGs.

Q: WHAT HAVE BEEN SOME OF YOUR GREATEST ACCOMPLISHMENTS SINCE DEVELOPING THE IN A HEARTBEAT FOUNDATION?

A: We have donated over 200 AEDs, one of which was used to save someone's life on November 27, 2019; we've donated \$35,000 to support research focusing on hypertrophic cardiomyopathy; and we've launched our Cardiac Screening program which provides free electrocardiograms to children, teens, and young adults (of the 2,100 screenings there was one diagnosis of Wolff-Parkinson-White syndrome, which resulted in an ablation).

Q: AS YOU'VE ATTENDED THE MARYLAND AND NEW YORK TUFSS MEETINGS, CAN YOU SPEAK TO YOUR PERCEPTION AND EXPERIENCE OF THESE MEETINGS?

A: I have thoroughly enjoyed and been inspired, attending both the Maryland and New York TUFSS meetings. It was amazing to see KSI bring together key stakeholders throughout the state to help save the lives of high school student-athletes. True change happens at the legislative level and that is what KSI is doing with the TUFSS program. I am proud to have been able to attend those meetings and plan to attend more in the future.

Q: WHAT ADVICE DO YOU HAVE FOR COACHES AND ATHLETES TO FACILITATE A CULTURE OF SAFETY IN ATHLETICS?

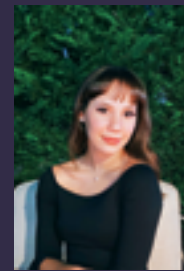
A: Be prepared! Young people are not supposed to die and it is the responsibility of coaches to be prepared to help in an emergency situation. I would encourage all athletes to be prepared to help save their teammates. I would also encourage athletes to listen to their body and if they are feeling symptoms they don't think are normal to tell their doctor immediately.

Q: WHAT DO YOU ENVISION FOR THE FUTURE OF SPORTS SAFETY AND PREVENTION AND TREATMENT OF EMERGENCY CONDITIONS?

A: I would love to see a culture where we are proactive rather than reactive. Unfortunately, oftentimes it takes a young person losing or almost losing their life for people to understand why sports safety and treatment of emergency conditions are important. We need to be proactive, so all young athletes are given a second chance.

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For more information on Mike Papale and the In A Heartbeat foundation and to read his book visit: inaheartbeat.org.

KSI STUDENT SPOTLIGHT



Grissy Sime-Mora
Year: Senior
Major: Exercise Science

Grissy has served as a student researcher at the Korey Stringer Institute for all four years of her undergraduate career. She has assisted on various projects during her time at KSI, including: "Heat and Cold Climate Effects on Thermoregulation and Exercise Performance," "Sodium Bicarbonate Lotion and Its Effects on Hydration During Rest and Exercise in the Heat," and "Effects of Sex Hormones on Hydration and Exercise in the Heat."

Grissy has been a joy to have in the labs and is always willing to go the extra mile. Her dedication to science has enabled her to become one of few prestigious McNair Scholars at the University of Connecticut — the Department of Kinesiology's first McNair Scholar on record. The McNair Scholars Program is an intensive research and graduate school preparation program for upper-division STEM students actively pursuing careers in academia. McNair Scholars become academically well-rounded, competitive candidates for graduate study, and are prepared to succeed in earning doctoral degrees.

Grissy will graduate with her Bachelor of Science in May 2022 and is seeking out graduate programs focused in kinesiology and exercise physiology. We cannot thank her enough for her dedication to the work she has done at KSI and we will miss her greatly!

Ph.D. ALUMNI UPDATE



William M. Adams, Ph.D., ATC, FACSM
Associate Director, Sports Medicine Research
United States Olympic & Paralympic Committee

In 2021, Dr. William Adams, Ph.D. class of 2016, started his new role as the Associate Director of Sports Medicine Research at the United States Olympic & Paralympic Committee in Colorado Springs, Colorado. Will is responsible for providing oversight for the development and forward direction of a sports medicine research program focused on preventing injury and illness in sport. They are currently prioritizing the expansion of their research agenda on head injuries in sliding sports, women's health and the female athlete, mental health, and the health and wellness of the para-athlete. Congratulations, Will!



Rebecca M. Lopez, Ph.D., ATC, FNATA
Associate Professor and Director, Post-Professional Advanced Athletic Training Program, and Assistant Director of Diversity, Equity, and Inclusion, School of Physical Therapy and Rehabilitation Sciences
Affiliate Faculty, Department of Orthopaedics and Sports Medicine, Morsani College of Medicine
University of South Florida

As a 2010 graduate of UConn's Kinesiology Ph.D. program, Rebecca Lopez has established herself as a leader within the athletic training profession. She was recently appointed as the co-chair of the NATA Diversity, Equity, Inclusion, and Access Task Force. The DEIA Task Force develops and recommends efforts to ensure the implementation and integration of diversity, equity, inclusion, and access commitments and principles approved by the NATA Board of Directors. She is co-chairing this task force alongside Trevor M. Bates, DHSc, AT, ATC. Additionally, Rebecca was announced as a Fellow of the NATA which recognizes members of the association who have demonstrated outstanding professional scholarly achievement in combination with service to the profession. Congratulations, Rebecca!

LEGACY OF TOKYO 2020



FIRST PERSON:
Yuri Hosokawa, Ph.D., ATC, FACSM
Associate Professor, Waseda University
Safety and Performance Optimization
Laboratory

As a heat advisor for the 2020 summer Olympic Games in Tokyo, my primary role was to provide on-site training about the prehospital management of exertional heat stroke (EHS) to local physicians and nurses. I was tasked to plan and prepare the heat deck operation in 11 competition sites covering 17 disciplines deemed high risk for EHS. Since most medical volunteers have never cared for EHS patients in out-of-hospital settings, I provided hands-on training to the leaders of all high-risk events. The same training was repeated within the venue for medical volunteers throughout the competition schedule.

In competitions where the likelihood of EHS was high (e.g., triathlon, marathon, race walk, tennis, and road cycling), I was based in the athlete medical station to manage the heat deck. Most of the heat cases we treated were heat exhaustion; however, we had two confirmed cases of EHS athletes. Because of the training and preparation leading up to the games, both athletes received the appropriate care following the “cool first, transport second” principle. This experience marked the first instance for the Japanese medical team to actively diagnose and treat EHS in the out-of-hospital setting.

“DATA-DRIVEN DECISIONS CAN SOMETIMES FAIL, AND YOU MUST BUILD RESILIENCE IN YOUR SYSTEM TO RESPOND.”

I’ve also learned from my experience in Tokyo 2020 that data-driven decisions can sometimes fail, and you must build resilience in your system to respond to anomalies. For example, despite the effort to move marathon and race walk events from Tokyo to Sapporo to avoid the heat, we experienced an unprecedented heatwave in Sapporo that no one predicted from historical data. Nonetheless, with the coordinated effort among Sapporo city, local medical volunteers, Tokyo Olympic and Paralympic Organizing Committee, International Olympic Committee, and International Federation, we swiftly made arrangements such as increasing the amount of ice and recovery ice baths and changing the start time of the women’s marathon. This experience was a great reminder that good race medicine is resilient to obstacles and can adapt and respond to ever-changing needs.

Now that we have a successful experience in the books, my next mission is to keep this legacy alive for future sporting events in Japan and in future summer Olympic games. I would like to thank Dr. Casa and Dr. Jardine for their training during my time in the U.S. I am proud to say that my experience in Korey Stringer Institute and Falmouth Road Race helped shape what I have implemented at Tokyo 2020.

KSI PREPARES U.S. WOMEN’S NATIONAL SOCCER TEAM FOR TOKYO OLYMPICS

As covered in an episode of “BEHIND THE CREST: USWNT Starts Off Send-Off Series” by U.S. Soccer, July 5th 2021, which appeared on Facebook #behindthecrest, the Korey Stringer Institute had the honor of working with the nation’s best women’s soccer players as they prepared for the brutal heat anticipated at the Tokyo Summer Olympics. Prior to the start of the Olympics, Tokyo was predicted to be the hottest Olympics on record by KSI Sports Medical Advisory Board members Dr. Jennifer Vanos, Dr. Andrew Grundstein, and Dr. Yuri Hosokawa, and CEO Dr. Douglas Casa. The publication appeared in the journal *Temperature* in December of 2019 and anticipated that temperatures would reach a maximum of 87.8°F with humidity levels of up to 90%.

While the players completed their final training camp sessions and friendly matches with Mexico before heading to Tokyo, they conducted several heat sessions throughout

the week in between their practices. Players learned quickly that these heat acclimation sessions, or “heat acc” for short, were not easy. Heat acc is the series of physiological adaptations that the human body undergoes when routinely exposed to a hot environment. Adaptations critical to the players’ ability to cool themselves such as lower core body temperature, increased blood volume, lower heart rate at a given intensity, and increased sweating efficiency all allow them to optimize their performance while exercising in the heat. In this case, the environment was set to exceed the conditions anticipated in Tokyo.

With the chamber set at 104°F and the humidity pumped up to 50%, players wore long sleeves and warmups and exercised in what is called “uncompensable” heat stress. This is where the body’s temperature continues to rise despite its best efforts to cool, unable to compensate with the heat. With the safety of the

players being continuously monitored by the U.S. Soccer medical and performance staff along with KSI’s expert staff, the players pushed through the grueling sessions with the grit and determination expected of high class Olympians.

“The level of fitness demonstrated by these women is truly remarkable, especially in those players who already have been training and playing in the southern-most states with their professional teams,” says KSI’s President of Athlete Performance and Safety Dr. Robert Huggins. “Their high level of fitness coupled with training in the heat with their clubs and now the sessions we are conducting with them will provide them with the highest performance benefit. Essentially we are ‘topping off their tanks’ with a high heat dose just as they are about to reach peak physical performance.”





NBC Sports journalist and UConn alum Mike Ryan went to the Korey Stringer Institute to see what athletes endured as they prepared for Tokyo 2020. (Jason Sheldon/UConn Photo)

UConn Alum Turns Up The Heat With NBC Sports



While most of us were trying to keep cool during record-breaking summer temperatures, UConn alumnus Mike Ryan was intentionally turning up the heat at UConn's Korey Stringer Institute.

The NBC Sports Medicine Analyst put himself through the same advanced heat acclimation protocol that helped the U.S. Women's National Soccer Team (USWNT) prepare for the Tokyo 2020 Olympics.

In a recently published paper, KSI researchers predicted that the Tokyo Olympics, which were postponed from last year due to the COVID-19 pandemic, would be the hottest summer games on record, a prediction that as the games began appeared to be coming true. This means heat would be a significant factor for players' performance and safety.

Heat acclimation involves subjecting your body to exercise in hot conditions in a lab environment to help your body enhance physiological changes, so athletes can perform better while doing specific activities in extreme heat.

Ryan visited the Storrs campus to learn more about KSI's MISSION Heat Lab, a space designed to simulate environments of extreme heat and humidity. He participated in a series of exercises and tests to report and share the experiences of elite athletes who use the facility for heat acclimatization, hydration, and other elements of performance and safety in warm weather conditions.

In addition to getting first-hand experience for his NBC Sports segment, Ryan also took some time to reconnect with his alma mater. "UConn really prepared me to take that next step [after graduation] and excel. I think it's a credit to the UConn professors and the whole physical therapy program here to get me ready for my career," he says.

An athletic trainer and physical therapist in the National Football League (NFL) for 26 years, Ryan earned his physical therapy degree from UConn in 1988. He was then hired by the New York Giants where he worked as an assistant athletic trainer for the next six years. He joined the Jacksonville Jaguars in their debut season in 1994 as head athletic trainer and physical therapist and continued in that role until 2014. He's taken this wealth of knowledge with him to his role as a seasoned sports medicine analyst at NBC Sports. He also serves on the Medical and Science Advisory Board for KSI.

Ryan credits UConn's physical therapy program with providing real-life opportunities to work with many different patient populations across the state.

"UConn really prepared me to take that next step [after graduation] and excel. I think it's a credit to the UConn professors and the whole physical therapy program here to get me ready for my career."

"I wanted to learn as much as I could beyond sports medicine, and that included working with burn patients, spinal cord injuries, and wound care. I learned to work with all kinds of individuals. I found I could take pieces of what I learned and bring it into sports medicine," Ryan says.

With a future in the NFL in mind, Ryan says he was able to tap into the expertise of UConn professors as well.

"I asked lots of questions and I was able to ask them about the specific types of injuries I had seen."

With that foundation, he became the youngest athletic trainer in the NFL.

He was happy to have the chance to combine business and pleasure for his assignment reporting on KSI.

"I love UConn and I have a lot of gratitude for the people here and what they do. At the Korey Stringer Institute they care for people well beyond the campus. That level of caring is a UConn thing and it has instilled itself in all I do personally and professionally. UConn does it right."





TEAM UP FOR SPORTS SAFETY STATE POLICY MEETINGS PROMPT “ATLAS PROJECT CHALLENGES”

Since the last issue of *Pertinacity*, the Athletic Training Locations and Services (ATLAS) project has continued to track the level of AT services in secondary schools across the country. In addition to tracking, one of the main purposes of the ATLAS project is to provide Athletic Trainers and stakeholders with key information they can use to improve the level of health care offered by ATs to student athletes. Additionally, these data have been used in a variety of ways to advance and promote the growth of the profession. Most recently, ATLAS has provided critical informational support to one of KSI’s other major advocacy initiatives, the Team Up For Sports Safety project (TUFSS).

During each TUFSS state meeting, ATLAS Project Director Dr. Robert Huggins provides the attendees with information regarding the level and type of AT services provided to the high schools and access to emergency equipment to give context to those in the room prior to the key discussions about sports safety policies that occur during each

meeting. Many in the audience are medical professionals (physicians, nurses, athletic trainers, or physical therapists) while others are state leaders from the high school athletics association, sports medicine advisory committees, state representatives, coaches’ associations, and athletics directors. (Read more about TUFSS on page 18.)

During these meetings, ATLAS provides information on the percentage of schools with and without AT services for public and

private schools in the state; the predominant AT employment model (school district employed vs. outreach medical model) most common in the state; whether districts have full-time or part-time services; the reported presence and annual practice of emergency action plans; and the level of access to key life-saving equipment such as AEDs, first aid supplies, cold water tubs, environmental heat stress monitor (WBGT) devices, rescue inhalers, and CPR masks.

ksi.uconn.edu/atlas/about-atlas



- The latest ATLAS map indicates the locations of secondary schools that have full-time athletic training services with green dots and secondary schools that have part-time athletic training services with teal dots.

HOW OLD IS TOO OLD?

While these data are certainly relevant, their relevance only lasts so long. School data accuracy is also threatened when schools have staff turnover, or they merge with other schools, or athletics program change. Furthermore, there is often a great deal of turnover, merging of schools, and changes in athletics programs that are extremely difficult to keep up with. Following discussions with the NATA and the NATA SSATC Chairs, the ATLAS project decided data that was four years old or more would be removed from the database to ensure the data is as “real time” as possible. The ATLAS team began removing surveys from the database in an effort to eliminate all surveys that were out of date. The unfortunate consequence is that this dropped the overall national and state participation response rates substantially and replaced known schools on the online maps from “with AT services” to “unknown” or black dots. This choice to remove old data allows for more up-to-date information, but also creates more work for the ATLAS staff and state AT associations. In response, states have taken it upon themselves to help the ATLAS team out in creative ways



CHALLENGE ACCEPTED!

In early Fall, during preparation for the KSI TUFSS meeting in the state of Pennsylvania, state leaders inquired about how they could leverage the data being collected from the ATLAS project for the policies that they were examining (e.g. heatstroke prevention and treatment). They wanted to know answers to questions such as, “How many schools have cold water immersion tubs for the emergency treatment of heatstroke?” and “How many schools have environmental temperature monitors on site?”, information that ATLAS is typically able to provide. However, with the removal of “old” surveys and dwindling response rates due to COVID-19, the data lacked the accuracy needed to inform the key stakeholders who would be in the room that day. A few weeks later, Facebook posts appeared from the Pennsylvania Athletic Trainers’ Association (PATs) President Shelly DiCesaro challenging President Jess Springstead of the Athletic Trainers Society of New Jersey (ATSNJ) to

map as many districts as possible. The result was over 160 new surveys between the two states in little more than two weeks’ time, a great example of what a little competition can do. Since then, other states like Indiana and Michigan have followed suit. Rather than challenge one state, the Great Lakes Athletic Trainers’ Association thought it prudent to make the challenge even bigger and bring all the states into the challenge. Since February 7, 2022, over 300 surveys have been taken by the GLATA states, bringing four out of five of the states within GLATA into the top 10 states for total number of completed surveys in the 2021-2022 academic year.

As the TUFSS project continues, be on the lookout for the ATLAS Challenge in your state.



FOUR SCHOOLS SELECTED FOR FIRST innovATE COHORT

In the summer of 2020, the innovATE project officially launched with the mission of increasing access to medical care provided by an athletic trainer for secondary school athletes in underserved communities in the United States. The innovATE project is funded through the Education Fund that was established as part of the NFL Concussion litigation. Monies earmarked to the Education Fund are designated to support programs that promote safety and injury prevention of football players of all ages.

We had more than 20 school communities submit pre-proposal applications for the first cohort and meet the criteria of the innovATE project. Five external reviewers, including three secondary school athletic trainers and two sports medicine physicians, and two KSI senior staff reviewed all applications and selected four schools to receive funding as part of our first cohort.

Boston Public Schools, Cincinnati Public Schools, Early and Stewart Counties in Georgia, and Oakland Athletic League (OAL) all clearly expressed the value an athletic trainer would bring to their school communities and succinctly explained their need for support. In their application, OAL Commissioner Franky Navarro wrote: "Our community is in need of the same athletic training services our surrounding school districts provide for their student athletes ... There is great value in connecting our student population and parent community to athletic training services."

These school communities all have large uninsured populations, which typically means limited access to health care. They receive federal funding and the household incomes of students are low, many below the poverty line. They also have long EMS response times, even Boston Public

Schools, despite being located in a city that is known for its world-class health care. But these schools also have passionate administrators, dedicated coaches, caring teachers, and bright motivated student athletes.

To date, Boston, Cincinnati, and Early Counties have hired athletic trainers. Craig Storey, Early Counties Athletic Director says, "We are delighted to say that we have been able to hire an athletic trainer. She is already on the job helping our student-athletes. We are so appreciative of the KSI for all it has done for us and look forward to working with them in the future."



Cincinnati Public Schools' athletics manager, Josh Hardin, and their assistant district manager, Ricky Miller, spoke specifically about Korey Stringer's legacy and how they want to honor that in their communities. "We talk a lot in our office about come back, give back," says Hardin. "And Korey Stringer being a product and being able to come back and give back to the kids in our community and our city really means a lot to us. We do want kids to know about Korey Stringer and what his legacy was and how he's impacting our kids today."

In addition to providing financial support, the innovATE project has connected these communities with NFL alumni thanks to the support of the NFL Alumni Association. Former NFL Kicker Jim Breech, who played for the Cincinnati Bengals from 1980-1992 and now oversees the Cincinnati chapter of the NFL Alumni Association, has lent his support to the Cincinnati Public schools. NFL

Alumni President Bart Oates supports the project as well. "We are proud to assist the Korey Stringer Institute in their effort to provide access to those in need of quality care and education on and off the field," he says.

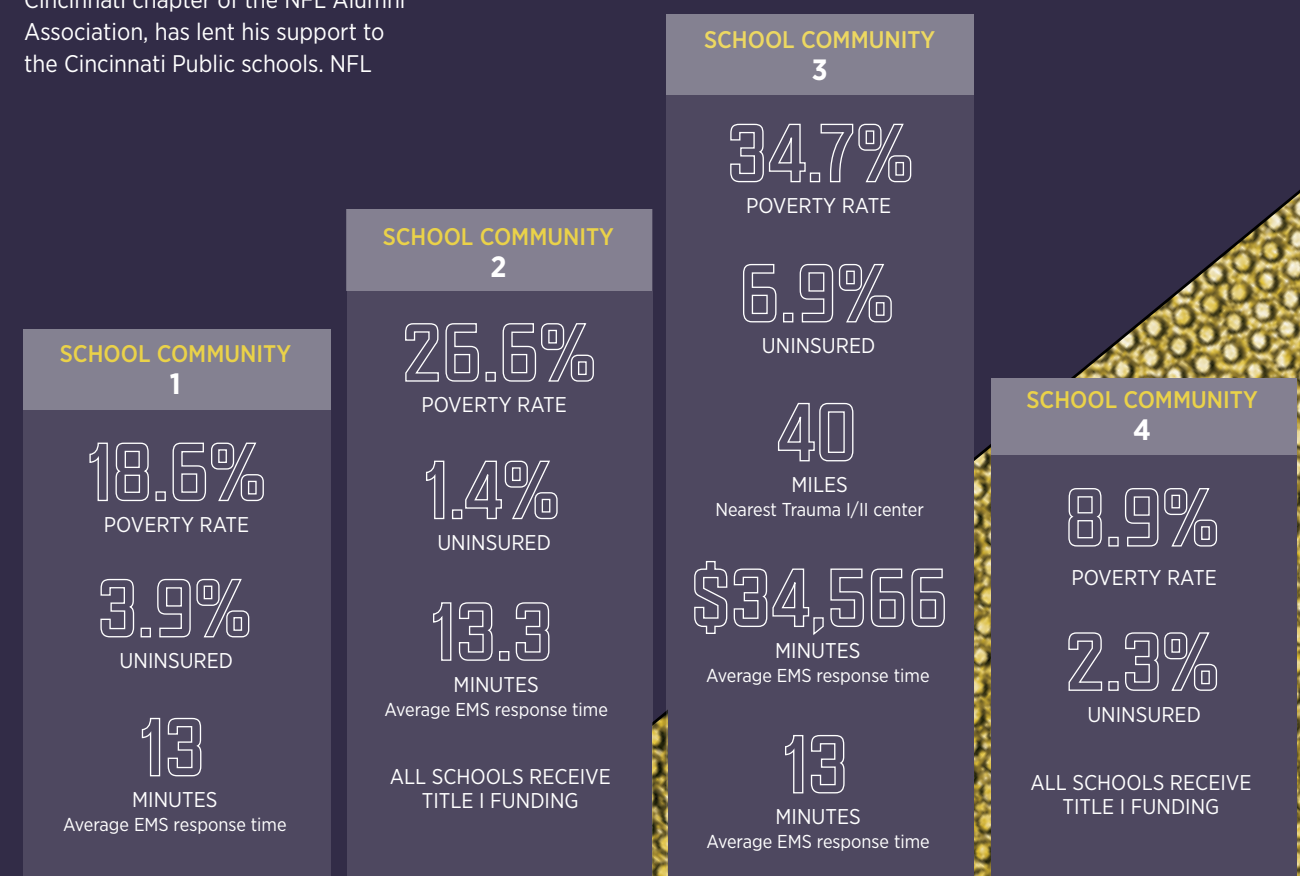
Mueller Sports Medicine in partnership with the Professional Football Athletic Trainers' Society (PFATS) Foundation and our corporate partner Kestrel graciously donated supplies to the cohort one schools that are crucial to the prevention, recognition, and treatment of exertional heat illnesses.

This spring, the PFATS will officially come on board to help support the innovATE schools and their newly hired athletic trainers by helping to promote the profession and

raise awareness of the value of the athletic trainer. Defibtech, another one of our corporate partners, has offered discounted prices on AEDs and supplies to all of our innovATE schools.

In just its second year, the innovATE project is making a tangible difference in communities across the country and we are excited to bring our second cohort of school communities into the innovATE family in the summer of 2023.

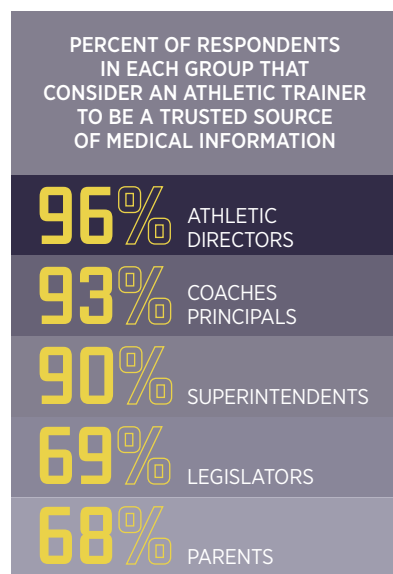
ksi.uconn.edu/outreach/innovate



“WE RELY ON THE NURSE. IF WE COULD AFFORD A PART-TIME ATHLETIC TRAINER, THAT WOULD BE GREAT.”

PERCEPTIONS STUDY ILLUMINATES VIEWS ON ATHLETIC TRAINERS

The goal of the Perceptions Study, which is partially funded by the National Athletic Trainers’ Association, is to assess current knowledge and opinions of athletic trainers and appropriate medical care for high school student-athletes from individuals who play key roles in the hiring of athletic trainers in secondary school communities. The study has obtained data from 3,916 stakeholders including state legislators, high school principals, coaches and athletic directors, superintendents, and parents/guardians of high school athletes. Data from the legislator stakeholder group was published in the *Journal of Athletic Training* in 2019, and in 2021 the journal published the data from the athletic director and principal stakeholder groups. Data from the superintendent stakeholder group was published in *Athletic Training and Sports Health Care*.



Only 16% of legislators, who are critical in efforts to advance athletic training scope of practice and advance sports safety legislation, considered an athletic trainer as the most appropriate individual to provide medical care to student-athletes on a daily basis. Additionally, there appeared to be a misconception that athletic trainers were personal trainers or strength and conditioning coaches and legislators lacked knowledge regarding the educational requirements of athletic trainers.

Superintendents and principals both identified athletic trainers’ roles in injury prevention and immediate care, though the remaining practice

domains were not frequently identified as areas athletic trainers are educated in or qualified to attend to. Nearly a quarter of high school principals felt \$30,000 to \$40,000 was a fair salary range for athletic trainers, while 27.1% of athletic directors who worked at a school that employed an athletic trainer felt \$60,000 was fair. Athletic directors discussed the value of athletic trainers as removing medical decisions from coaches and providing peace of mind.

The data we’ve obtained is invaluable in providing a better understanding of how these important stakeholder groups view athletic trainers. Each of these groups plays a critical role in access to athletic training services in high schools. Knowledge of perceptions will give athletic training leadership the opportunity to develop targeted education to help advocate for athletic trainers in this employment setting.

The high school coach and parent/guardian perceptions data is currently under peer review and data collection on the perceptions of high school nurses began in spring 2022.

“ATHLETIC TRAINERS SHOULD BE REQUIRED AT ALL HIGH SCHOOLS.”

▶ NATIONAL HEAT SAFETY COALITION HITS THE GROUND RUNNING

The National Heat Safety Coalition, a new branch of the Korey Stringer Institute, was officially launched on July 13, 2021. NHSC was created with two key industry leaders, Magid and MISSION, to provide heat-safety research, solutions, education, and awareness with the sole purpose of eliminating heat-related injuries and illnesses in the workplace. NHSC initiatives, resources, and services can be found at heatsafetycoalition.com. Margaret Morrissey serves as the President and Gabrielle Brewer as the Vice President of NHSC. heatsafetycoalition.com

PUBLICATIONS

- Fifty-one heat safety experts and key stakeholders worked together to systematically create 40 recommendations to protect workers from heat-related injuries and illnesses and published a peer-reviewed, heat safety best-practice document entitled, “Heat Safety in the Workplace: Modified Delphi Consensus to Establish Strategies and Resources at the Organizational Level to Protect U.S. Workers” in the journal *GeoHealth*.
- Published “Impact of Occupational Heat Stress on Worker Productivity and Economic Cost” in the *American Journal of Industrial Medicine*.

HEAT SAFETY LEGISLATIVE EFFORTS

- Submitted 56-page response to OSHA Docket 2021-0009, “Heat Injury and Illness Prevention in Outdoor and Indoor Work Settings” Advanced Notice of Proposed Rulemaking.

PRESENTATIONS

- Invited Speaker for webinar, “Showcasing Leading Practices in Climate Adaptation: Experiences from the Water Sector to Empower Other Sectors and Communities” Hosted by: National Oceanic and Atmospheric Administration (NOAA), Water Utility Climate Alliance (WUCA), The Water Research Foundation (WRF), and U.S. Environmental Protection Agency.
- Presented at VPPPA Safety+ Symposium, Nashville TN, August 31, 2021
- Invited Speaker for South Florida the Associated General Contractors of America. April 8, 2021 (virtual)
- Anticipated: Presentation at AIHA Conference & Expo 2022, Nashville TN, May 24, 2022

HEAT SAFETY ASSESSMENTS

- Heat safety assessment conducted for one of the largest appliance manufacturers in the U.S.
- 33-page SWOT analysis created by NHSC

MEDIA APPEARANCES

- Margaret C. Morrissey and Douglas J. Casa on the “EHS on Tap” podcast, August 10, 2021. Listen at: ehsdailyadvisor.blr.com/podcast/ehs-on-tap-e73-helping-workers-beat-the-heat/

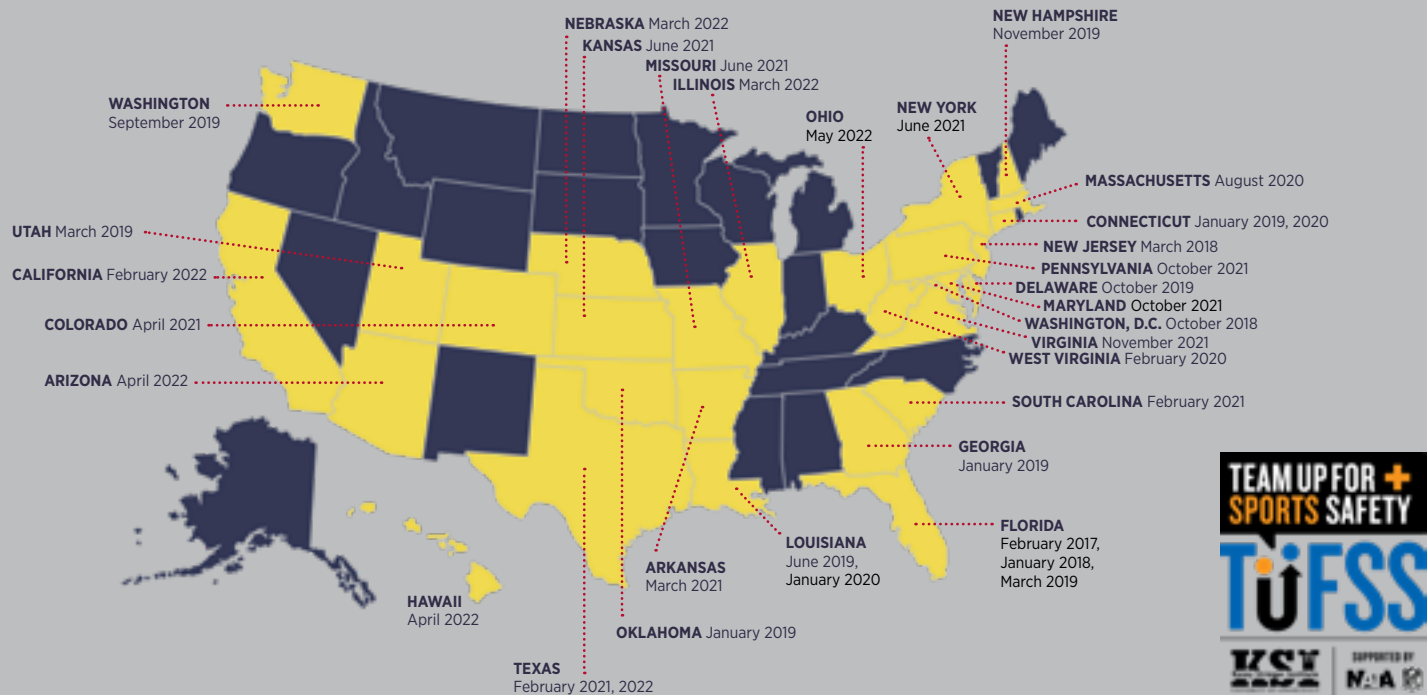
SERVICE

- Serving on the American Society of Safety Professionals (ASSP) subcommittee for the A10.50 Proposed Standard on Heat Stress
- Appointed as secretary of the newly created thermal stress working group at American Industrial Hygienist Association (AIHA)
- Served as expert panelists for Gatorade Sports Science Institute expert panel for physically demanding occupations

GRANTS

- Awarded Harvard-NIOSH Education and Research Center pilot grant
- Assisted Amnesty International in the recent report, “In the prime of their lives: Qatar’s failure to investigate, remedy, and prevent migrant workers’ death.” View the report at amnesty.org/en/documents/mde22/4614/2021/en/





TUFSS CONTINUES TO PROPEL POLICY NATIONWIDE

Since 2017, the Team Up for Sports Safety (TUFSS) initiative, led by KSI with support from the NATA and NFL, has worked to propel the adoption of policies proven to reduce catastrophic sport injury at the secondary school level. To accomplish this goal, KSI and the TUFSS initiative travel state to state, bringing together policymakers and key stakeholders to formalize plans to adopt or improve life-saving policies.

The TUFSS program has hosted 29 state meetings to date, which typically include state athletic/activity association representatives, state athletic/activity association sports medicine advisory committee members, superintendents, principals, state legislators, athletic trainers, coaches, and medical personnel, among others.

The initiative builds on KSI research published in 2017 that assessed state mandates' inclusion of best-practice policies to mitigate catastrophic injuries and illnesses in sport. KSI found that most states did not include the most widely accepted standards shown to reduce the risk of death from sudden cardiac arrest, traumatic head injuries, exertional heat strokes, and exertional collapse associated with sickling, conditions that comprise 90% of all sport-related sudden death. Simple, cost-effective strategies can prevent nearly all deaths, but currently no state meets 100% of the minimum best-practice standards.

A 2021 publication in the *American Journal of Sports Medicine* highlights the progress spurred by TUFSS meetings. In the first three years, 38 states made policy changes or adopted policies to require best-practice standards at the secondary school level. The top five states adopting the most policies were all states that TUFSS visited, while none of the states scoring in the bottom five had held a TUFSS meeting. The mean scores for states that had held TUFSS meetings increased by 10%.

In August 2021, Florida took over the top spot by having the greatest number of mandated best-practice standards at the secondary school level. In 2021 alone, 10 other states made policy improvements.

Connecticut and New Hampshire both had TUFSS meetings in 2021 and adopted legislative change in 2021. New Hampshire's new law, which goes into effect in September 2022, will produce the largest increase in sport safety policy adoption since the inception of TUFSS — a 31% increase in mandated best-practice policy within the state. In Connecticut, new policies related to Emergency Action Planning and heat safety coaching education requirements will take effect this fall.

To get involved in planning a meeting in your state, email Rebecca.Stearns@uconn.edu.

NEW HAMPSHIRE PASSES SWEEPING ATHLETE HEALTH AND SAFETY LEGISLATION

In August 2021, New Hampshire passed a sweeping athlete health and safety bill, SB148. KSI worked closely with local representatives to support the development and passage of SB148. Local representatives involved in its creation and passage include Senator Bill Gannon; Precious Burke, LAT, ATC, New Hampshire Athletic Trainers' Association Governmental Affairs Committee Chair and her committee; Demers & Prasol, Inc.; NHATA officers; Carol Dozibrin; and many others who provided live testimony.

THE BILL MANDATES FIVE MAJOR AREAS OF ATHLETE HEALTH AND SAFETY:

- ▶ Emergency action plans
- ▶ Pre-participation exams
- ▶ Cold water immersion treatment for exertional heat stroke patients
- ▶ WBGT meters
- ▶ Heat acclimatization policy

"This legislation is a big step toward closing the gap between schools and venues with and without access to onsite athletic health care services," says Sandy Snow, MS, N.H.LAT, ATC (NHATA Past President). "We created greater health care equity by establishing a standard of care for how acute and emergency injuries and illnesses are managed across the state for public and non-public schools that offer sports for grades 4-12. Players,

coaches, families, school administrators, and community emergency responders can more accurately anticipate a standard of care when using an off-site venue or traveling to host schools."

The bill goes into effect September 1, 2022. Congratulations New Hampshire!



LOCAL 12: ATHLETES AT RISK?

For several years, Local 12 in Cincinnati has been producing and airing stories related to sports safety and the importance of athletic trainers. The Local 12 Investigates feature, known as Athletes AT Risk?, was the brainchild of investigative and special projects producer Stephanie Kuzydym.

In the last year alone, Athletes AT Risk? has featured stories discussing the importance of athletic emergency action plans, Ohio's athletic training practice act, coaching education, and several of KSI's initiatives including our TUFSS, State High School Sports Safety Review, and innovATe projects.

In August 2021, the 20th anniversary of Corey Stringer's death was woven into a story announcing that Cincinnati Public schools had been one of four communities selected to receive innovATe funding. Corey was a product of Ohio who played at Warren High School in Northeast Ohio and became an All-American at Ohio State. Through his legacy, high school student-athletes in his home state are now safer because they have access to an athletic trainer.

In February, KSI's President of Sport Safety Christianne Eason and Director of Communications Gabrielle Brewer had the opportunity to meet Stephanie during a visit to Cincinnati Public Schools. Stephanie is a passionate sports safety advocate and a powerful voice for the athletic training community. She is creating her own legacy through her work with Local 12's Athletes AT Risk? and deserves a standing ovation.



Wet Bulb Globe Temperature Thermometer in use at football practice.

WET BULB GLOBE TEMPERATURE THERMOMETERS DISTRIBUTED TO PREVENT HEAT ILLNESSES

The National Federation of State High School Associations (NFHS) Foundation has recently announced a grant program that is meant to distribute 5,000 wet bulb globe temperature thermometers (WBGT) to high schools in need across the country with the goal of minimizing heat-related illnesses during outdoor activities. The NFHS planned to send out the first batch of thermometers to 2,500 schools in April with the second batch ready to be distributed in time for late-summer workouts.

The NFHS has opted to distribute WBGT devices made by Kestrel.

WBGT is a type of “heat index” that reflects the level of heat stress that exercising individuals are experiencing. A WBGT device is an environmental monitoring tool that uses ambient temperature, relative humidity, wind, and solar radiation from the sun to obtain a measure that can be used to monitor environmental conditions during exercise. Establishing WBGT guidelines that dictate modifications in activity (additional water breaks, amount of equipment worn, a safe length of practice) at a given WBGT reading dramatically reduces exertional heat illnesses and exertional heat stroke.

This grant is helping overcome a financial barrier and will help keep high school student athletes safe from exertional heat-related illness

across the country. The Kestrel WBGT thermometers will come calibrated by geographic zone and will have Bluetooth capability for easy access of the WBGT value by those operating the devices. The NFHS has also committed to providing a tutorial video on operating the devices.

More information on education, prevention, and treatment of exertional heat illnesses can be found at ksi.uconn.edu. Information about the NFHS grant program can be found at <https://nfhs.org/articles/nfhs-foundation-approves-grant-to-distribute-wet-bulb-globe-thermometers-to-high-schools/>.



Zac Taylor suffered exertional heat stroke.

BELOW 104

In the summer of 2018, Maggie Taylor watched as her son, Zac, struggled to fight for his life in a critical care unit after suffering from an exertional heat stroke. After more than a week on a ventilator and nearly two weeks in the hospital, Zac was able to return home with his parents. The February following his heat stroke, Zac came to UConn to undergo a heat tolerance test in KSI’s heat chamber. Zac did not pass his first test, nor the second test he completed in May. In July the family once again traveled to UConn. After months of conditioning and heat acclimatization, Zac passed the heat tolerance test and was

cleared to return to football. His return included several safety measures such as monitoring of his core temperature with an ingestible thermometer, environmental monitoring with a WBGT device, appropriate water breaks, and ice tubs available for cooling.

Through her family’s experience, Maggie recognized that there is a lack of support and resources available to help parents navigate EHS. Maggie set out on a mission to support, educate, and advocate for those who have been affected by an exertional heat stroke. Together with Carol Knighten, Michele Ciancola, and Laurie Martin Giordano, family members of those who have had an exertional heat stroke, they set out to create Below 104.

As advocates for change, Below 104 is looking to address policy implementation, education for athletic trainers and coaches, and mandatory use of ice water immersion tubs when exertional heat stroke occurs while providing support for those affected. Greg Taylor, Maggie’s husband, shared their story at our South Carolina TUFSS meeting to help push for policy changes.

Their vision for Below 104 is to become a national community to advocate for protections of high school and college student athletes against EHS. Not only do they want to be the starting point for anyone who wants to learn about EHS, but they also want to be the group reaching out for support when someone is affected by EHS.

If you would like to be a part of the Below 104 community’s quarterly meetings or if you have been affected by EHS, please email info@below104.org or visit below104.org. Follow @104Below on Twitter for more opportunities to connect.



PREVENTING SUDDEN DEATH IN YOUTH SPORTS

The Korey Stringer Institute had the opportunity to work with the National Alliance for Youth Sports (NAYS) this past year to help promote sports safety and topics related to preventing sudden death in youth sports. Dr. Robert Huggins, President of Research and Athlete Performance, traveled to Texas in October to present at the NAYS Youth Sport Conference and Dr. Christianne Eason, President of Sport Safety, authored a piece that was posted on the NAYS website, an excerpt of which is printed below.

SIMILAR TO FIRE DRILLS THAT CAN OCCUR DURING THE SCHOOL DAY, EMERGENCY ACTION PLANS ARE ESSENTIAL TO REDUCING DELAYS IN CARE.

National Alliance for Youth Sports

It's estimated that more than 30 million children between the ages of 6 to 14 participate in at least one sport each year. Data has indicated that 39% of life-threatening injuries treated in emergency departments involving children between the ages of 6 to 18 years old were sport-related. Given the large number of children participating in youth sport and emergency room-documented serious sport injury data, it is imperative to improve sport safety policies and work toward implementation of best practices. Youth sport national governing

bodies, member organizations and leagues, and member coaches play an essential role in supporting and prioritizing the health and safety of the young athletes participating in organized sport across the country. It is important to recognize that each organization is unique, which will require different strategies to successfully implement best practice policies. Many deaths in youth sports are preventable with appropriate planning and implementation of policies and procedures.

Risk Factors for Children and Young Adults

While pre-existing conditions and genetics are a large contributor to cases of sudden death in sport, there are numerous other external factors that can also contribute to catastrophic illness and injury. Environmental conditions, specifically heat and lightning, as well as lack of access to medical care, such as having an athletic trainer or other health care professional on site, are potential contributors and risk factors. Additionally, a lack of education specific to recognition of the common causes of sudden death in sport among coaches and a lack of emergency preparedness are all contributors to sudden death in sport.

Importance of Emergency Action Plans

Sport specific emergency action plans (EAPs) are concrete written plans that outline what should be done in the event of a catastrophic injury in sport. Similar to fire drills that can occur during the school day, EAPs are essential to reduce delays in care. These written documents should include health care professionals in the creation of the plan, EMS contact information, and be venue specific. The EAP should outline where

MANY DEATHS IN YOUTH SPORTS ARE PREVENTABLE WITH APPROPRIATE PLANNING AND IMPLEMENTATION OF POLICIES AND PROCEDURES.

emergency equipment (such as AEDs or cold-water immersion tubs) is located and should be updated, reviewed, and rehearsed annually.

Importance of Coaching Education

Coaches play an important role in helping to prevent catastrophic illness and injuries because they are present at all practices and games to observe their athletes and they can structure their practices and workouts in ways that can reduce risk. If coaches are educated on the signs and symptoms of the leading causes of sudden death in sport, trained in basic emergency care (CPR/AED), or they know how to respond in the case of an emergency, the chances of survival increase. Education is a crucial component of catastrophic illness and injury prevention. Whether a health care provider is on site at practices and games or not, it's important for coaches to have education to help protect the health and well-being of youth athletes.

Read the full article at nays.org/sklive/features/preventing-sudden-death-in-youth-sports.



Sweat is collected during a research trial in the MISSION Heat Lab.

Although face mask use may affect overall breathing discomfort due to the changes in the face mask microenvironment, face mask use itself did not cause an increase in whole body thermal stress. Therefore, our study concluded that face mask use is feasible and safe during exercise in the heat at low-to-moderate exercise intensities for physically active, healthy individuals.

DoD Acquiring and Targeting Heat Exposures Necessary for Action (ATHENA) Research Project

This project is a \$1.8M Department of Defense (DoD) grant secured by Dr. Douglas Casa and Dr. Elaine Lee, designed to investigate physiological and cognitive stress and resiliency strategies for female warfighters in hot and humid environments. The ATHENA Project started in fall 2021 and will continue until 2024. A total of 60 participants will be enrolled over the three-year duration of the grant. Years two and three will see the project expand to stress biomarkers in skeletal muscle, which will be obtained via muscle biopsy. Collaboration between KSI and Lee's laboratory will provide insight into different biomarkers of stress after repeated exercise sessions in the heat. Environmental conditions for all trials are 40°C (104°F) and 40%RH in order to simulate conditions often faced by those in the Armed Forces.

Wearing A Face Mask Does Not Impact Body Temperature With Exercise

Since the COVID-19 pandemic began, the use of face masks has been widely recommended by international and national authorities to limit the transmission of airborne infectious agents. Present studies have reported the protective face masks may cause discomfort due to increased breathing resistance and thermal perception. However, the data related to the thermal burden of face masks are limited. To increase knowledge of the effect of the face mask on the thermoregulation, we used four different face masks during exercise in the heat: a surgical mask, an N95, a MISSION adjustable gaiter, and a MISSION adjustable sport mask. During our trials we monitored rectal temperature, skin temperature, and heart rate. We also measured temperature and humidity inside and outside of the masks.

The study found that face mask use during 60 minutes of low-to-moderate exercise intensity in the heat did not significantly affect rectal temperature or heart rate.

Does New Hand Cooling Tech Impact Performance and Recovery?

While cold water immersion is the gold standard for the treatment of exertional heat stroke, other cooling strategies aim to prevent heat-related illnesses or enhance performance. One such proposed strategy is a novel hand-cooling device by Kelvi-Hypothermia Devices, Inc. Using semiconductor heat extraction technology that does not require the use of ice or water, the aim of the device is to deliver a portable and applicable method for cooling. Funded by the Department of Defense we conducted the study, SHE-Cool (semiconductor heat extraction cooling) to examine the effects of using the Kelvi hand cooling device. Male and female participants completed four trials with different types of intermittent cooling. ►



Continued from page 23

Performed in our heat chamber (36°C and 30% relative humidity), each trial consisted of performance and cognitive assessments before and after bouts of exercise with intermittent cooling. Both acute and chronic measures of recovery were assessed following each trial. The aim of the SHE-Cool study was to explore the effects of intermittent and post cooling on changes in core body temperature, heart rate, perception, and recovery. Additionally, we sought to examine the effects of intermittent cooling on measures of cognition, performance, and injury prevention. The findings of the SHE-Cool study will contribute to literature exploring the benefits of hand cooling as well as investigate the validity of a novel device that could provide a cooling option without the use of water.

Detecting Shock and Death Before It Occurs

One of the studies conducted at the 2021 Falmouth Road Race was to assess Compensatory Reserve Index™(CRI) created by Flashback Technologies. The Compensatory Reserve Index™ (CRI) categorizes the stages of shock as insult, compensated shock, decompensated shock, and death. These categories are used as a predictive measure of the remaining reserve of blood volume before compensation is diminished. In the event of physical

activity with progressive dehydration, CRI monitoring may allow for the early detection of hypovolemic shock. The purpose of this year's Falmouth Road Race study was to assess normative CRI values surrounding exercise in the heat and evaluate the effectiveness of utilizing CRI for detection of physiological stress caused by exercise in the heat.

This fall we evaluated the CRI in a controlled laboratory setting to further assess normative values surrounding performance in extreme conditions. Two trials were conducted in extreme heat (-95°F with 55% relative humidity) and two trials were conducted in temperate conditions (-75°F with 55% relative humidity) in both hydrated and dehydrated states. In the dehydrated trials, participants were rehydrated upon completion of the trial to assess the ability of the device to detect this change in fluid consumption and recovery.

Findings from this study will be utilized for improvements in wearable technology for the detection of physiological stress caused by exercise, heat, and hydration status. Monitoring CRI in the athlete, laborer, or warfighter may prevent collapse prior to its occurrence, severe dehydration, cognitive impairments, organ damage, and death.

Protecting Male and Female Warfighters During Weather Extremes

We had the unique opportunity to study the effects of extreme cold and heat in men and women through funding by the Biotechnology High Performance Computing Software Applications Institute (BHSAI) and the Department of Defense (DoD). We investigated both males and females during rest and exercise at both temperature extremes. Our purpose was to examine thermoregulatory, cardiovascular (blood flow, heart rate), metabolic (lactate, energy expenditure), perceptual, and hydration differences between the two temperature extremes, and how these differed between sexes and between menstrual phases in females.

Additionally, validation of wearable technologies was assessed through a separate National Institute for Occupational Safety & Health (NIOSH) grant secured by Maggie Morrissey. This study consisted of more extreme temperatures (-20°C, -10°C, 0°C). By understanding the physiological consequences experienced by our male and female warfighters, laborers, and athletes in extreme environments, our findings will help with the development of novel technologies and strategies to combat these effects.



Establishing a Body Temperature Alert System

Continuing to partner with Biotechnology High Performance Computing Software Applications (BHSAI), KSI focuses on testing and validating technologies to help ensure the safety of soldiers and warfighters from extreme environments. KSI conducted a research study to validate a body temperature alerting system using physiological responses that occur during rest, exercise in the heat, and during body cooling. Using this system during cooling will allow health care professionals and military personnel to monitor body temperature to ensure cooling is effective.

Performance Enhancing Lotion

Maintenance of an optimal hydration status has proven to be critical for the health and performance of athletes, laborers, and military soldiers when performing in hot environments. Sodium bicarbonate (NaHCO₃) has been considered as an alternative rehydration strategy. However, the incidence of gastrointestinal stress has led to reductions in use.

In an attempt to overcome this limitation, AMP Human/Momentous has produced a commercially available topical sodium bicarbonate lotion (AMP Human PR Lotion).

The benefits of sodium delivery through the skin have not been investigated during the performance of dehydrated heat stress and may prove beneficial for populations that repeatedly encounter these situations, such as U.S. Air Force pilots.

In efforts to investigate these unknowns, a two-phase project has been implemented to assess the influence of PR Lotion on hydration status and fluid balance in humans when exposed to heat stress. The secondary phase will identify its influence on measures of cardiovascular function, physical performance, and cognition with differing levels of hydration status and types of heat stress.



TASK FORCE CONVENED: PREVENTING EXERTIONAL HEAT STROKE DEATH IN FOOTBALL LINEMEN

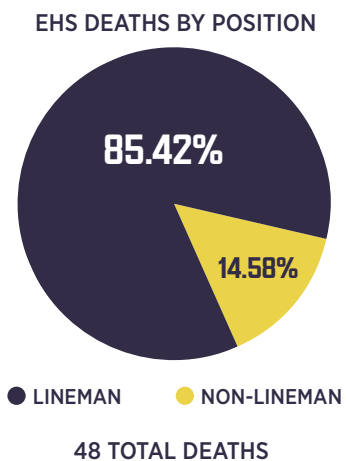
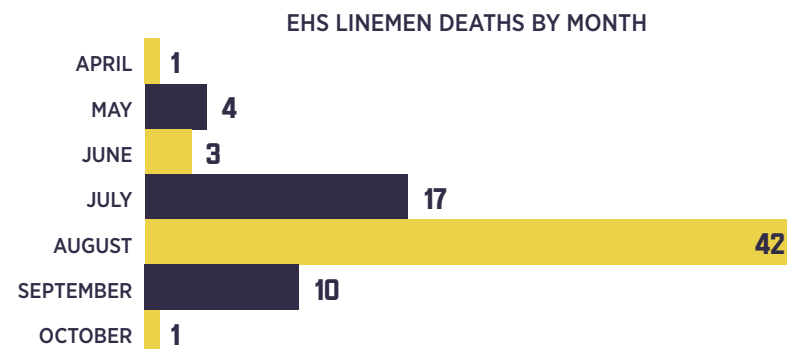
In February 2022, a panel of experts gathered in Frisco, Texas, to discuss the state of exertional heat stroke (EHS), specifically in football linemen. The meeting was called due to the alarming rate of death observed in football linemen. Since 1982, it is estimated that at least 85% of high school and college football EHS deaths occurred in linemen.

The timing of these deaths is also concentrated around August. Of football EHS deaths, 88% occur within July to September, regardless of player position. However, 54% occur in August alone.

Support for the meeting was provided by the College Athletic Trainers' Society (CATS), KSI, and the National Athletic Trainers' Association (NATA). Representatives from across sports medicine were in attendance, including NATA, CATS, the NFL, the National Federation of State High School Associations (NFHS), USA

Football, National Consortium for Catastrophic Sport Injury Research (NCCSIR), the American College of Sports Medicine, the American Medical Society for Sports Medicine (AMSSM), and the American Orthopedic Society for Sports Medicine (AOSSM).

The goal of the meeting was to create the content for a consensus statement specifically related to the prevention of exertion-related deaths for American secondary and high school football linemen. The publication is being planned for submission to the *Journal of Athletic Training*.



PARTNER RESEARCH CORNER: CAMELBAK

Michael Eidson filled an IV bag with water and slipped it into a white tube sock in order to hydrate during the "Hotter'N Hell" 100 bike race in Wichita Falls, Texas. This is when hands-free hydration was born. Camelbak, a company in Petaluma, California, was subsequently created to investigate, create, and deliver hydration products to quench thirst and help individuals achieve their goals. Camelbak has now become a household name and the leader in hydration products around the world.

The minds at Camelbak keep science and innovation closely connected. Product development is not only aimed to appease the eye, it facilitates the accomplishments of the human body. The products work for the athlete, warfighter, the laborer, and the individual. The packs and reservoirs allow the user to be hands free, focused on the task ahead. Maneuvering a bike on gravel and dirt paths, bouldering up terrain, dodging branches and rocks on a trail are all easier with a hydration pack.

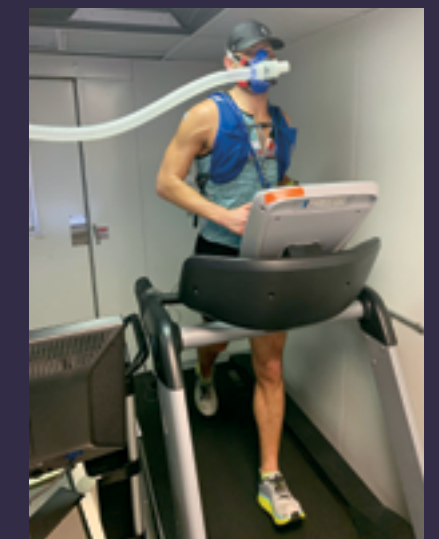
KSI and Camelbak came together to test four hydration packs in the heat on a simulated trail run. Two of these packs had new design features and one used new material. These were compared to a vest that was currently in production. Participants came to the lab and were outfitted with these packs while climbing 15% gradients and running through an hour and a half of varying intensity. Physiological data was collected from the

participants during the four trials to look for evidence that one pack could potentially maximize performance more than the others. Metabolic masks, temperature and humidity sensors, heart rate monitors, and more were utilized to measure variables while these participants exercised.

Conclusions from the study were utilized by the company for decisions on product manufacturing. It gave the company ideas on how to develop future products based on user feedback and science. The easier it is for athletes to hydrate and stay cool in hot, tough conditions, the safer and more efficient they will be while accomplishing their goals.



CAMELBAK



PROTECTING WORKERS LABORING IN THE HEAT



Dr. Douglas Casa and Margaret Morrissey of KSI were among the nine experts who assisted Amnesty International in its efforts to analyze Qatar's approach to preventing, investigating, and certifying the deaths of infrastructure laborers preparing for the World Cup, drawing on a range of published studies focusing on the impact of heat stress on workers.

"Ever since FIFA awarded the 2022 World Cup to Qatar in 2010, there have been repeated allegations that migrant workers were dying in significant numbers while working on vast infrastructure projects, as a result of the country's extremely hot climate and abusive working conditions," states the Amnesty International report, titled "In the Prime of Their Lives: Qatar's failure to investigate, remedy, and prevent migrant workers' deaths."

"Following four years of high-profile and significant labor reforms aimed at dismantling Qatar's exploitative 'kafala' sponsorship system, and with the World Cup just over one year away, the safety of workers in Qatar remains an issue of huge importance and continued controversy. Over the last decade, thousands of migrant workers have died suddenly and unexpectedly in Qatar, despite passing their mandatory medical tests before traveling to the country," it continues. "Yet despite clear evidence that heat stress has posed huge health risks to workers, and one peer-reviewed study suggesting that hundreds of lives could have been saved with adequate protection measures, it remains extremely difficult to know exactly how many people have died as a result of their working conditions."

Amnesty International is a global movement of more than 7 million people who campaign for a world where human rights are enjoyed

by all. The report was created to expose the wrongdoings of the Qatar government in adequately protecting migrant workers from heat stress while building the FIFA World Cup stadium.

KSI will continue its work on protecting human rights of workers laboring in the heat and advocacy for better safety and health outcomes for vulnerable workers. This initiative will occur through KSI's new branch, the National Heat Safety Coalition (NHSC). This branch is entirely focused on preventing heat-related injuries and illnesses in laborers.

The full report can be found at [amnesty.org/en/documents/mde22/4614/2021/en/](https://www.amnesty.org/en/documents/mde22/4614/2021/en/).



AMNESTY INTERNATIONAL

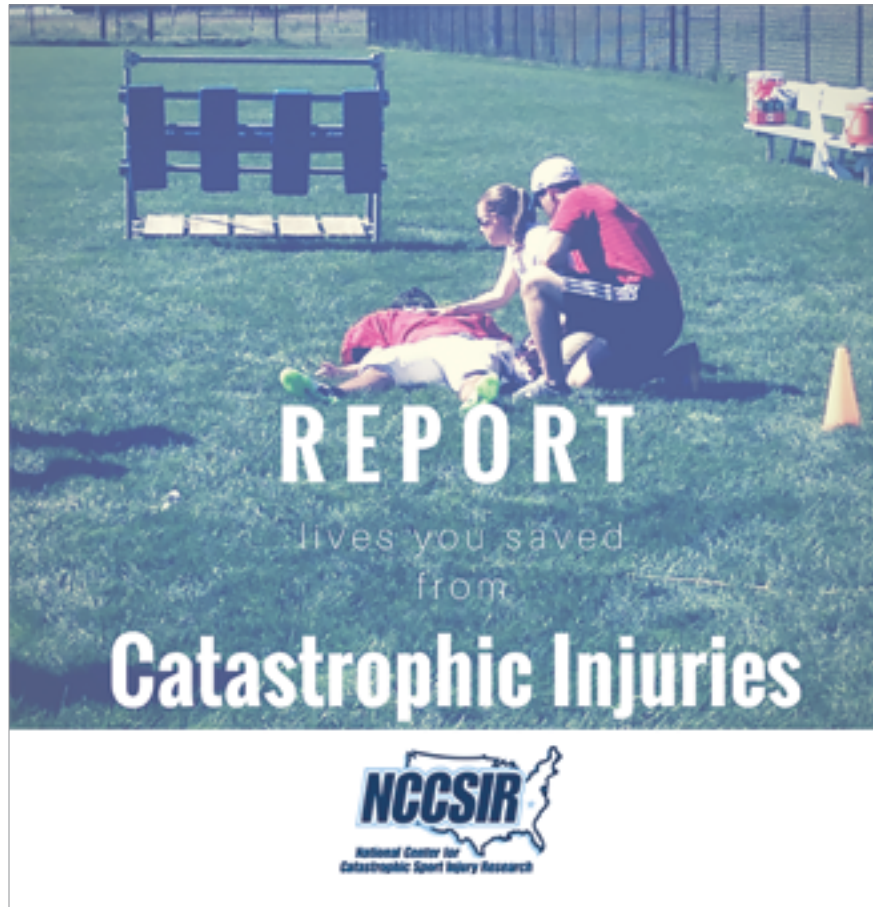
EDUCATING AND PREVENTING THE NEXT WAVE OF WEST POINT CADETS FROM EXERTIONAL HEAT STROKE



KSI had the opportunity to visit West Point, the U.S. Military Academy, to deliver a series of presentations on February 9 and 10, 2022. Dr. Douglas Casa, Maggie Morrissey, and Gabby Brewer met with the faculty and staff of West Point's departments of physical education and kinesiology and West Point's dietitians to discuss military specific considerations for prevention, recognition, and treatment of exertional heat stroke. The KSI team also presented on sports performance in the heat to the West Point

Marathon, Triathlon, and Orienteering teams and had the unique privilege to guest lecture for "Theory of Advanced Performance," which is a kinesiology seminar for the kinesiology senior cadets at West Point (or "Firsties" as they are known). KSI would like to thank Col. Gist, Col. Magennis, Dr. Morogiello, Dr. Furlong, and Maj. Ferreira for their hospitality and warm welcome to West Point!





NATIONAL CENTER FOR CATASTROPHIC SPORT INJURY RESEARCH (NCCSIR)

NCCSIR was founded at the University of North Carolina Chapel Hill in 1982 under the leadership of Frederick O. Mueller and is currently directed by Dr. Kristen Kucera. In 2013, NCCSIR created three research branches: the Traumatic, Cardiac, and Exertional Injury divisions, the last of which KSI leads. The mission of NCCSIR is to conduct surveillance of catastrophic injuries and illnesses related to participation in organized sports in the United States at the collegiate, high school, and youth levels of play.

The goal of the Center is to improve the prevention, evaluation, management, and rehabilitation of catastrophic sports-related injuries. The center also brings together many prominent research and funding partners to accomplish its goals. Research now focuses on generating reliable data that can be used to make sports safer for athletes, increase the amount of information that is available about catastrophic sports injuries, and increase general awareness of catastrophic injuries in all sports.

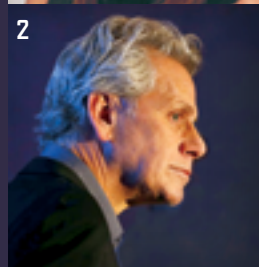
NCCSIR has become the leader for housing the critical epidemiological evidence for catastrophic injury in sport, which has helped to drive policy change to enhance the health and safety of athletes across all levels of play. In 2019, KSI published an epidemiological paper on sudden death in youth athletes, which was the first comprehensive article to address this topic. Most notably, it concluded that the majority of youth athlete deaths occurred in males, were due to cardiac causes, and occurred while playing basketball.

sportinjuryreport.org

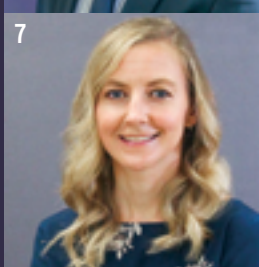
TAKING ACTION IN 2021 WITH OUR CORPORATE PARTNERS

- NFL**
FOUNDING PARTNER
 - Team Up for Sports Safety (TUFSS)
 - Marketed KSI's "Preventing and Treating Exertional Heat Stroke" video to athletes at all levels
- UConn**
FOUNDING PARTNER
 - Home to MISSION Heat Lab and KSI headquarters
- G**
FOUNDING PARTNER
 - Host of Preventing EHS in Football Linemen consensus statement
- MISSION**
 - National Heat Safety Coalition
 - The MISSION Heat Lab hosted the USWNT
- NATA**
NATIONAL ATHLETIC TRAINERS ASSOCIATION
 - Athletic Training Locations and Services (ATLAS)
 - Team Up for Sports Safety (TUFSS)
 - Increasing access to athletic training services in secondary schools (innovATE)
- Kestrel**
 - Heat Stress Tracker Donation Program
 - innovATE Equipment Provider
- CAMELBAK**
 - Circuit Vest Study
- defibtech**
 - innovATE Equipment Provider
 - Donated AED to EO Smith High School
 - Provided KSI with new AED pads
- FIRST LINE TECHNOLOGY**
 - New Corporate Partner for 2021
 - Partnering with KSI to bring awareness and resolution to lethal heat stress-related incidents through innovative products such as the Immersion Cooling Equipment (ICE) System

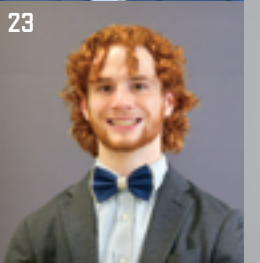
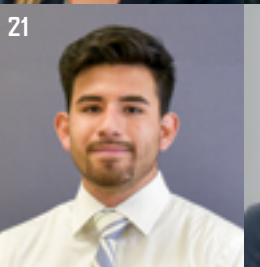
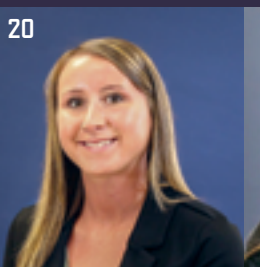
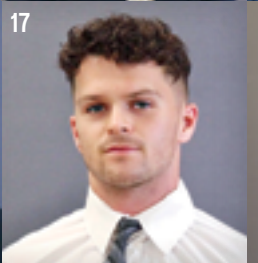
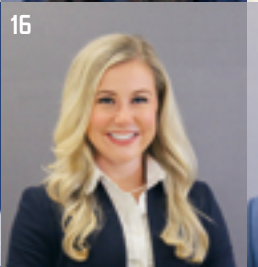
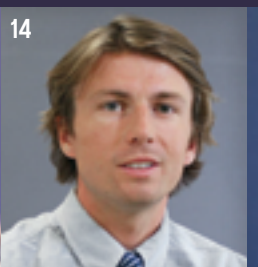
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► 2021 PUBLICATIONS

Langan SP, Szymanski MR, Casa DJ. (Can) what does not kill you make you stronger (?). *J Appl Physiol* (1985). 2021;131(6):1850-1851. doi:10.1152/jap-physiol.00741.2021

Scarneo-Miller SE, Flanagan KW, Belval LN, Register-Mihalik JK, Casa DJ, DiStefano LJ. Adoption of Lightning Safety Best-Practices Policies in the Secondary School Setting. *J Athl Train*. 2021;56(5):491-498. doi:10.4085/175-20

Morrissey MC, Scarneo-Miller SE, Giersch GEW, Jardine JF, Casa DJ. Assessing the Validity of Aural Thermometry for Measuring Internal Temperature in Patients With Exertional Heat Stroke. *J Athl Train*. 2021;56(2):197-202. doi:10.4085/1062-6050-0449.19

Suzuki-Yamanaka M, Huggins RA, Armstrong KJ, Coleman KA, Casa DJ, Kaneoka K. Athletic training employment in secondary schools by geographic setting and school size within the United States. *J Athl Train*. 2021;56(9):1010-1017. doi:10.4085/109-20

Szymanski MR, Giersch GEW, Morrissey MC, et al. Availability of a Flavored Beverage and Impact on Children's Hydration Status, Sleep, and Mood. *Nutrients*. 2021;13(6):1757. doi:10.3390/nu13061757

Sekiguchi Y, Benjamin CL, Dion SO, et al. Changes in Hydration Factors Over the Course of Heat Acclimation in Endurance Athletes. *Int J Sport Nutr Exerc Metab*. Published online July 24, 2021:1-6. doi:10.1123/ijnsnem.2020-0374

Butler CR, Dierickx E, Bruneau M, Stearns R, Casa DJ. Current Clinical Concepts: Heat Tolerance Testing. *J Athl Train*. Published online November 18, 2021. doi:10.4085/1062-6050-352-21

Bartley JM, Stearns RL, Muñoz CX, et al. Effects of cold water immersion on circulating inflammatory markers at the Kona Ironman World Championship. *Appl Physiol Nutr Metab*. 2021;46(7):719-726. doi:10.1139/apnm-2020-0602

Yoshihara A, Dierickx EE, Brewer GJ, Sekiguchi Y, Stearns RL, Casa DJ. Effects of Face Mask Use on Objective and Subjective Measures of Thermoregulation During Exercise in the Heat. *Sports Health*. 2021;13(5):463-470. doi:10.1177/19417381211028212

Sekiguchi Y, Benjamin CL, Manning CN, et al. Effects of Heat Acclimatization, Heat Acclimation, and Intermittent Exercise Heat Training on Time-Trial Performance. *Sports Health*. Published online October 27, 2021:19417381211050644. doi:10.1177/19417381211050643

Hosokawa Y, Murata Y, Stearns RL, Suzuki-Yamanaka M, Kucera KL, Casa DJ. Epidemiology of sudden death in organized school sports in Japan. *Inj Epidemiol*. 2021;8(1):27. doi:10.1186/s40621-021-00326-w

Giersch GEW, Charkoudian N, Morrissey MC, et al. Estrogen to Progesterone Ratio and Fluid Regulatory Responses to Varying Degrees and Methods of Dehydration. *Front Sports Act Living*. 2021;3:722305. doi:10.3389/fspor.2021.722305

Muniz-Pardos B, Angeloudis K, Guppy FM, et al. Ethical dilemmas and validity issues related to the use of new cooling technologies and early recognition of exertional heat illness in sport. *BMJ Open Sport Exerc Med*. 2021;7(2):e001041. doi:10.1136/bmjsem-2021-001041

Curtis RM, Huggins RA, Benjamin CL, et al. Factors Associated With Noncontact Injury in Collegiate Soccer: A 12-Team Prospective Study of NCAA Division I Men's and Women's Soccer. *Am J Sports Med*. 2021;49(11):3076-3087. doi:10.1177/03635465211036447

Grundstein AJ, Scarneo-Miller SE, Adams WM, Casa DJ. From theory to practice: operationalizing a climate vulnerability for sport organizations framework for heat hazards among US High schools. *J Sci Med Sport*. 2021;24(8):718-722. doi:10.1016/j.jsams.2020.11.009

Benjamin CL, Sekiguchi Y, Struder JF, et al. Heat Acclimation Following Heat Acclimatization Elicits Additional Physiological Improvements in Male Endurance Athletes. *Int J Environ Res Public Health*. 2021;18(8):4366. doi:10.3390/ijerph18084366

Morrissey MC, Casa DJ, Brewer GJ, et al. Heat Safety in the Workplace: Modified Delphi Consensus to Establish Strategies and Resources to Protect the US Workers. *Geohealth*. 2021;5(8):e2021GH000443. doi:10.1029/2021GH000443

Scarneo-Miller SE, Lopez RM, Miller KC, Adams WM, Kerr ZY, Casa DJ. High Schools Struggle to Adopt Evidence Based Practices for the Management of Exertional Heat Stroke. *J Athl Train*. Published online February 24, 2021. doi:10.4085/361-20

Scarneo-Miller SE, Lopez RM, Miller KC, Adams WM, Kerr ZY, Casa DJ. High Schools' Adoption of Evidence-Based Practices for the Management of Exertional Heat Stroke. *J Athl Train*. 2021;56(10):1142-1153. doi:10.4085/1062-6050-361-20

Morrissey MC, Brewer GJ, Williams WJ, Quinn T, Casa DJ. Impact of occupational heat stress on worker productivity and economic cost. *Am J Ind Med*. 2021;64(12):981-988. doi:10.1002/ajim.23297

Adams WM, Scarneo-Miller SE, Vandermark LW, et al. Movement Technique and Standing Balance After Graded Exercise-Induced Dehydration. *J Athl Train*. 2021;56(2):203-210. doi:10.4085/1062-6050-0436.19

Muniz-Pardos B, Angeloudis K, Guppy FM, et al. Potential use of new cooling technologies during Tokyo 2020 Olympics and associated ethical dilemmas. *Br J Sports Med*. 2021;55(23):1315-1316. doi:10.1136/bjsports-2021-104014

Hosokawa Y, Racinais S, Akama T, et al. Prehospital management of exertional heat stroke at sports competitions: International Olympic Committee Adverse Weather Impact Expert Working Group for the Olympic Games Tokyo 2020. *Br J Sports Med*. 2021;55(24):1405-1410. doi:10.1136/bjsports-2020-103854

Adams WM, Hosokawa Y, Casa DJ. Preseason Heat Safety in Secondary School Athletics. *J Athl Train*. 2021;56(4):349-351. doi:10.4085/1062-6050-430-20

Sekiguchi Y, Huggins RA, Curtis RM, et al. Relationship Between Heart Rate Variability and Acute:Chronic Load Ratio Throughout a Season in NCAA D1 Men's Soccer Players. *J Strength Cond Res*. 2021;35(4):1103-1109. doi:10.1519/JSC.0000000000002853

Sekiguchi Y, Benjamin CL, Butler CR, et al. Relationships Between WUT (Body Weight, Urine Color, and Thirst Level) Criteria and Urine Indices of Hydration Status. *Sports Health*. Published online August 31, 2021:19417381211038496. doi:10.1177/19417381211038494

Belval LN, Giersch GEW, Adams WM, et al. Reply. *J Athl Train*. 2021;56(8):803-804. doi:10.4085/1062-6050-1002-21

Hosokawa Y, Adams WM, Casa DJ, et al. Roundtable on Preseason Heat Safety in Secondary School Athletics: Environmental Monitoring During Activities in the Heat. *J Athl Train*. 2021;56(4):362-371. doi:10.4085/1062-6050-0067.20

Adams WM, Hosokawa Y, Casa DJ, et al. Roundtable on Preseason Heat Safety in Secondary School Athletics: Heat Acclimatization. *J Athl Train*. 2021;56(4):352-361. doi:10.4085/1062-6050-596-20

Miller KC, Casa DJ, Adams WM, et al. Roundtable on Preseason Heat Safety in Secondary School Athletics: Prehospital Care of Patients With Exertional Heat Stroke. *J Athl Train*. 2021;56(4):372-382. doi:10.4085/1062-6050-0173.20

Pike Lacy AM, Eason CM, Stearns RL, Casa DJ. Secondary School Administrators' Knowledge and Perceptions of the Athletic Training Profession, Part I: Specific Considerations for Athletic Directors. *J Athl Train*. 2021;56(9):1018-1028. doi:10.4085/54-20

Pike Lacy AM, Eason CM, Stearns RL, Casa DJ. Secondary School Administrators' Knowledge and Perceptions of the Athletic Training Profession, Part II: Specific Considerations for Principals. *J Athl Train*. 2021;56(9):1029-1036. doi:10.4085/55-20

Giersch GEW, Morrissey MC, Butler CR, et al. Sex difference in initial thermoregulatory response to dehydrated exercise in the heat. *Physiol Rep*. 2021;9(14):e14947. doi:10.14814/phy2.14947

Pryor RR, Pryor JL, Vandermark LW, et al. Short term heat acclimation reduces heat strain during a first, but not second, consecutive exercise-heat exposure. *J Sci Med Sport*. 2021;24(8):768-773. doi:10.1016/j.jsams.2021.03.020

Scarneo-Miller SE, Eason CM, Adams WM, Stearns RL, Casa DJ. State-Level Implementation of Health and Safety Policies to Prevent Sudden Death and Catastrophic Injuries Within High Schools: An Update. *Am J Sports Med*. 2021;49(12):3372-3378. doi:10.1177/03635465211031849

Benjamin CL, Sekiguchi Y, Morrissey MC, et al. The effects of hydration status and ice-water dousing on physiological and performance indices during a simulated soccer match in the heat. *J Sci Med Sport*. 2021;24(8):723-728. doi:10.1016/j.jsams.2021.05.013

Benjamin CL, Sekiguchi Y, Armstrong LE, et al. The efficacy of weekly and bi-weekly heat training to maintain the physiological benefits of heat acclimation. *J Sci Med Sport*. Published online October 19, 2021. doi:10.1016/j.jsams.2021.10.006

Morrissey MC, Wu Y, Zuk EF, Livingston J, Casa DJ, Pescatello LS. The impact of body fat on thermoregulation during exercise in the heat: A systematic review and meta-analysis. *J Sci Med Sport*. 2021;24(8):843-850. doi:10.1016/j.jsams.2021.06.004

Sekiguchi Y, Curtis RM, Huggins RA, et al. The Relationships Between Perceived Wellness, Sleep, and Acute: Chronic Training Load in National Collegiate Athletics Association Division I Male Soccer Players. *J Strength Cond Res*. 2021;35(5):1326-1330. doi:10.1519/JSC.0000000000004003

Bazarian JJ, Elbin RJ, Casa DJ, et al. Validation of a Machine Learning Brain Electrical Activity-Based Index to Aid in Diagnosing Concussion Among Athletes. *JAMA Netw Open*. 2021;4(2):e2037349. doi:10.1001/jamanetworkopen.2020.37349

Muniz-Pardos B, Angeloudis K, Guppy FM, et al. Wearable and telemedicine innovations for Olympic events and elite sport. *J Sports Med Phys Fitness*. 2021;61(8):1061-1072. doi:10.23736/S0022-4707.21.12752-5

Langan S, Grosicki G. Exercise Is Medicine...and the Dose Matters. *Front Physiol*. 2021;12:1-5. doi:10.3389/fphys.2021.660818

Garrett B, Lopez R, Szymanski M, Eidt D. Proper Recognition and Management of Exertional Heat Stroke in a High School Cross Country Runner: A Validation Clinical Case Report. *J Athl Train*. 2021. doi:10.4085/1062-6050-462-21

Kisiolek J, Smith K, Baur D et al. Sleep Duration Correlates With Performance in Ultra-Endurance Triathlon. *Int J Sports Physiol Perform*. 2022;17(2):226-233. doi:10.1123/ijsp.2021-0111

Langan S, Murphy T, Johnson W, Carreker J, Riemann B. The Influence of Active Hamstring Stiffness on Markers of Isotonic Muscle Performance. *Sports*. 2021;9(5):70. doi:10.3390/sports9050070

Culver M, Langan S, Hutchison Z. What's all the hype with fibre type? Selective single fibre adaptations with lifelong endurance exercise. *J Physiol*. 2021;599(19):4413-4414. doi:10.1113/jp281986

Dierickx E, Scarneo-Miller S, Casa D. High School Coaches' Knowledge and Behaviors for Emergency Preparedness. *Int Sport Coach J*. 2022;9(1):40-50. doi:10.1123/iscj.2020-0110

Post EG, DiSanti JS, Eason CM, Root HJ, Abdenour, TE (2021). Collegiate athletic trainers' experiences of preparing for return to sports during Covid-19: A qualitative research study. *Internet Journal of Allied Health Sciences and Practice*, 19(4); Article 14.

► 2021 MEDIA AND OUTREACH

INTERVIEWS AND PODCASTS

1. Gatorade Performance Partner Chat at vNATA 2020 LinkedIn Live
2. Gatorade Informational Video – “Beat the Heat” with Dr. Douglas Casa
3. “The In with Dr. Tim” Podcast
4. “The Healthy Young Athlete” Podcast
5. “Three Cycle Strength” Podcast
6. “Madam Athlete” Podcast
7. WILI Radio
8. “Doug Casa Discusses Decade Leading Stringer Institute,” Athletic Business
9. “UConn’s KSI Launches innovATe Program to Aid High School Athletes,” UConn Today
10. “NFL Partner Korey Stringer Institute Drives Progress in High School Sport Safety,” NFL.com
11. “Korey Stringer Institute: Progress Made in High School Sports Safety Policies,” UConn Today
12. “Recommended Is Not Enough: Korey Stringer Institute Releases State Policy Scores,” Local 12 Cincinnati
13. “Where’s the Water? Schools Not Allowed to Supply Hydration Stations,” Local 12 Cincinnati
14. “The All-American Who Became the Protector of Thousands of Athletes,” Fox 28 Columbus
15. “Florida Enacts Heat Stroke Protections for Student Athletes,” NBC 6 Miami (Laurie Giardano, KSI Ambassador)
16. “Focusing on Solutions by Teaming Up for Sport Safety in High Schools,” Local 12 Cincinnati
17. “38 States Have Made Policy Changes Under KSI Rubric but Not Ohio,” Local 12 Cincinnati
18. “Ohio Scores 43.93 out of 100 on Korey Stringer Institute Evaluation,” Local 12 Cincinnati
19. “Hot Zones: Dr. Doug Casa and Return to Play,” AFCA Insider
20. “Secondary School AT? Then You Should Be Familiar With and Completed the Atlas Project Survey,” The Sports Medicine Broadcast

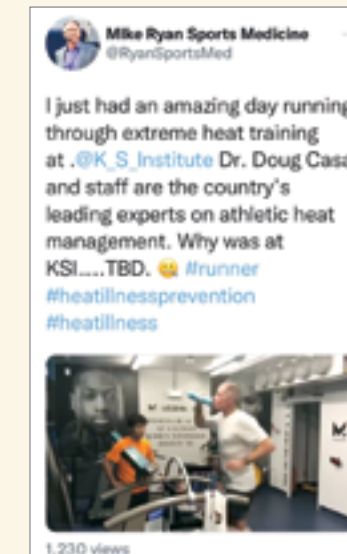
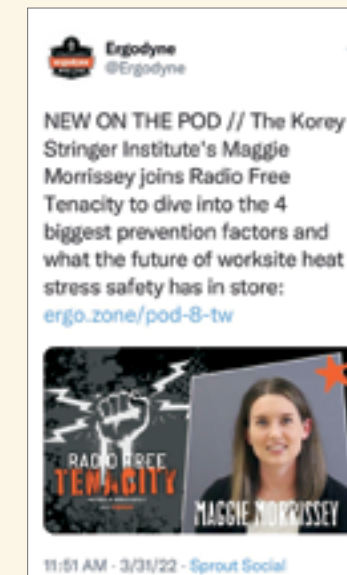
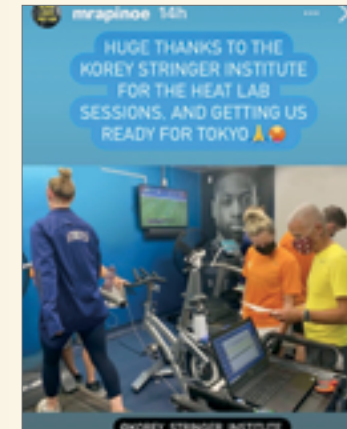
WEBINARS AND CONFERENCES

1. Earth Networks Webinar
2. vNATA 2020
3. WV TUFSS Visit
4. LA TUFSS Visit
5. MA Virtual TUFSS Meeting
6. CT TUFSS Meeting
7. “Preparing Athletes & Athletic Trainers to Return to Sports after the COVID-19 Pandemic: Physical and Psychosocial Considerations” Webinar by A.T. Still University
8. Virtual Environmental Ergonomics: Heat Preparation for Tokyo 2021 and Major Events
9. 2020 National NSCA Coaches Conference

OTHER

1. Arizona State University EHI Infographic Collaboration

► SOCIAL MEDIA MENTIONS



ACTIVE GRANTS CY 2021

GRANTS - RESEARCH

SPONSOR	TITLE	PROJECT PERIOD	TOTAL AWARD
University of North Carolina, Chapel Hill	National Center for Catastrophic Sport Injury Research (NCCSIR)	8/1/17 – 7/31/21	\$150,000
NFL Concussion Settlement-Education Fund	InnovATe	6/1/20 – 12/31/24	\$3,000,000
NATA	TUFSS	4/1/20 – 3/31/24	\$600,000
First Line	First Line Technology ICE Study	7/1/20 – 6/31/21	\$49,982
Amp Human	AMPlify Human Hydration Study	8/23/20 – 5/22/21	\$90,234
NFL Foundation	TUFSS	12/1/19 – 11/30/21	\$799,960
Magic Glove & Safety Company	The National Heat Safety Coalition	1/6/21 – 1/5/24	\$173,648
Flashback Technologies	The Compensatory Reserve Index (CRI): Establishment of Normative Values Surrounding Performance in the Heat	4/1/21 – 3/31/22	\$186,261
Neuro Rescue	Impact of NeuroRescue Neck Cooling Collar on Exercise Performance in the Heat	7/1/20 – 6/30/22	\$49,879
MPUSA, LLC	The National Heat Safety Coalition	1/6/21 – 1/5/24	\$173,648
CamelBak	The Effect of Running Vest Garment Material and Design During Exercise in the Heat	1/6/21 – 1/5/22	\$49,964
DOD	Optimizing Customized, Precision Heat Acclimation Protocols to Enhance Performance and Readiness of Female Warfighters	9/1/22 – 8/31/25	\$1,800,000



A SPECIAL THANK YOU TO OUR
CORPORATE PARTNERS. WITHOUT YOU,
NONE OF THIS WOULD BE POSSIBLE.

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