

Mitigating Climate Impacts on Athletes: Sports Guidelines May Prevent Exertional Heat Illness

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The incidence of heat-related illnesses and deaths is expected to rise as heat waves become more frequent in some areas.¹ Can policies that mandate risk-reducing behaviors lower the likelihood of heat illness and save lives? Few studies have addressed this issue, but recent research in *Environmental Health Perspectives* found that when states implemented guidelines to help ward off exertional heat illness (EHI) in student athletes, rates did, in fact, fall dramatically.²

In 2009, the National Athletic Trainers' Association Inter-Association Task Force (NATA-IATF) published guidelines for preventing EHI among high school athletes.³ The NATA-IATF guidelines include giving students time to acclimatize to the heat during preseason activities, modifying the lengths of practice periods and breaks, and limiting days with two practices. In addition, an athletic trainer with the authority to cancel or delay practice due to heat should always be present during training.

EHI events in athletes range from heat-related cramping and heat exhaustion to the more serious exertional heat stroke, which

can lead to disability and death if not treated promptly.⁴ The Centers for Disease Control and Prevention estimates that more than 9,000 EHI events are treated in U.S. student athletes each year, with two-thirds occurring in August during preseason training.⁵ Most of these heat illnesses occur in football players; among this group, more than 83% of EHIs were estimated to occur during practice.

“In football, individuals must wear protective equipment that covers about 75% of the body,” explains William Adams, an assistant professor of kinesiology at the University of North Carolina at Greensboro, and coauthor of the study. “[This coverage] impedes the ability of the body from evaporating sweat from the skin’s surface, thus, exacerbating the magnitude of thermal strain that they are under and greatly increasing the risk of EHI events.”

For the current study, the authors analyzed EHI occurrence in state-years (i.e., a one-year time period in one state), comparing state-years in which NATA-IATF guidelines were met against state-years in which the guidelines were not met. Only



Guidelines developed by the National Athletic Trainers' Association Inter-Association Task Force are designed to prevent exertional heat illness among high school athletes. Schools in especially hot regions can take even further measures to keep students safe during practices and games. Image: © iStockphoto/FlamingoImages.

eight states had mandated NATA-IATF guidelines at the time of the study: Arizona, Connecticut, Iowa, Mississippi, New Jersey, North Carolina, Rhode Island, and Utah. The study also included injury and athlete-exposure data from the 2005–2006 to 2016–2017 school years, which were provided by the High School Reporting Information Online system. An “athlete-exposure” was defined as one athlete’s participation in one school-sanctioned practice or competition.

During state-years with mandates, 7 EHI events were reported during an estimated 167,418 preseason football practice athlete-exposures, for an average EHI rate of 0.42 per 10,000 athlete-exposures. During state-years without mandates, 183 EHI events were reported during an estimated 2,529,671 preseason practice athlete-exposures, for an average EHI rate of 0.72 per 10,000 athlete-exposures. In another analysis, the authors looked at state-years in partial compliance with the guidelines; they found a similar reduction, though it was not statistically significant.

“I think it was a bit surprising to see such how much lower the exertional heat illness rates in state-years with mandates were, compared to state-years without mandates,” says lead author Zachary Kerr, an assistant professor of exercise and sport science at the University of North Carolina at Chapel Hill. “We had suspected there would be a decrease, but to see a 55% reduction was quite astounding.”

Coauthor Adams suggests additional measures should be implemented in addition to the ones in the NATA-IATF guidelines. Certain geographic regions, particularly in the hot Southeast, should modify their work-to-rest ratios during practices and training sessions as environmental conditions become more extreme. “These modifications should include measures such as increasing the number and duration of rest/hydration breaks during activity, removing protective equipment in sports that utilize such equipment, reducing the length of practice/training/competition, and setting thresholds for canceling or rescheduling,” he says.

Rebecca Lopez, an associate professor in the Graduate Post-Professional Athletic Training Program at the University of South Florida, says the research is an important contribution to

athlete health. “This study illustrates that implementing these safety standards results in a significant reduction in EHI incidence,” she says.

Still, Lopez adds, “One must be careful when interpreting the results. The comparison of EHI rate with states where the heat acclimatization guidelines were mandated or not mandated rests on the assumption that those that are mandated actually followed the heat safety guidelines.” In other words, the authors could not confirm whether football teams and coaches actually followed the NATA-IATF guidelines. “However,” Lopez adds, “the large reduction in EHI rate found in this study suggests that the guidelines were followed, and this resulted in a decreased risk and incidence of EHI.”

Wendee Nicole has written for *Discover*, *Scientific American*, and other publications.

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