Journal of Athletic Training 2021;56(8):803–804
doi: 10.4085/1062-6050-1002-21

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Dear Editor:

We appreciate the opportunity to respond to the letter about our investigation of age, sex, environmental conditions, and the incidence of exertional heat stroke (EHS) in a warm-weather road race.[1] The letter author raises some points that allow us to further expand on our findings and, we hope, provide adequate context for his concerns.

Overall, in examining the implications of this investigation, we appear to diverge from the author of the letter on a key point. He argues that EHS is preventable. Although every case of EHS is theoretically preventable, the large numbers of people with a variety of individual risk factors exercising in warm environments make total prevention nearly impossible. In addition to running road races, large-scale events involving exercise, such as military basic training,[2] are subject to similar concerns regarding exertional heat illnesses despite comprehensive prevention efforts. However, we reiterate that data from this very race indicated that mortality from EHS did appear to be preventable with appropriate treatment.[3]

The purpose of this investigation was to examine the factors that influenced the incidence of EHS on a population level. Furthermore, we sought to identify the factors that medical teams and race organizers might be able to consider before the road race to help determine the staff and supplies needed to appropriately treat patients with EHS. In our discussion, we fully acknowledged that EHS risk is multifactorial and consists of both intrinsic and extrinsic factors.[4] However, the individual factors of the participants in running road races cited by the letter author (fitness, heat acclimatization, adiposity, and exertional intensity) are unknown and would likely require advanced laboratory techniques to ascertain. Even if these data were available for the cases presented, the utility of these analyses for onsite medical providers is limited. The mechanistic insights the author of the letter tried to glean from the presented data are beyond the scope of these data.

Several times, the letter author referenced our findings, saying that males and youth were found to be at a higher risk of EHS. Throughout the paper, we referred to the results as applying to "younger runners," not "youth," and further clarified in the conclusion that these results primarily applied to runners aged 19 to 39 years. We made this distinction for many of the reasons the author of the letter stated, including the fact that the physiological and behavioral circumstances of individuals under the age of 18 participating in this race were unique.

The letter author denoted several factors that may play a role in children having altered susceptibility to EHS. He correctly indicated that an altered body mass-to-surface area ratio did not solely explain the altered risk in youth individuals, and it is clear from his review that a description of the nuances of this risk extends beyond what is included in our manuscript. Runners under the age of 14 accounted for only 2.4% of race participants and 2.6% of patients with EHS. However, we would caution the author to avoid comparing EHS- and heat-related deaths (which include nonexertional cases); the mechanisms and causes of these conditions are clearly disparate.

Finally, the author of this letter highlighted the claim that "only younger age accounted for an increased incidence of EHS," yet we would like to stress that this statement was taken out of context: the other part of that sentence reads, "However, when sex was considered with age and WBGT [wet bulb globe temperature]. . ." We did not characterize age as the sole risk factor for EHS but rather our data supported that, of those variables we could study, age did statistically explain the greatest variance in EHS incidence.

We conclude by emphasizing that our findings were epidemiologic in nature. Many factors influence an individual's susceptibility to EHS; by examining the patterns of EHS incidence in events such as the Falmouth Road Race, we can observe trends that either allow researchers to study these mechanisms in controlled environments or establish reference incidences for medical providers. We agree with the letter author's recommendations to increase community collaboration and minimize the risk globally for all runners using the precautions listed.

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