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CORRESPONDENCE

Daytime napping results in an underestimation of thermal strain during exercise in the heat

We were very interested to read the recent article by Tokizawa *et al*[1] that investigated the effect of partial sleep restriction (PSR) and a daytime nap on thermal strain during exercise heat stress. Tokizawa *et al* confirm our previous findings[2] that disrupted sleep does not affect thermal strain during exercise-heat-stress in the morning but extend our findings by showing that PSR increases heat strain during moderate exercise-heat-stress in the afternoon (core temperature <37.8°C and heart rate <110 bpm). This interesting finding indicates that the effect of PSR on thermal strain during exercise-heat-stress may be dependent on the time of day and provides supporting evidence, in a controlled laboratory setting, for the field observation that sleep disruption is often a risk factor for exertional heat illness.[3] Unfortunately, we do not concur with the contention of Tokizawa *et al*[1] that daytime napping can 'handle the safety risk' for heatstroke in the afternoon after PSR. A closer inspection of the data in figure 3 shows that a nap results in participants underestimating thermal sensation and fatigue (physical and psychological) during subsequent exercise-heat-stress. Specifically overlooked by the authors were the findings that a daytime nap decreased thermal sensation following both normal sleep and PSR (figure 3B), and decreased physical and psychological fatigue (figure 3D, E) after PSR despite similar, if not slightly elevated, core temperature during exercise-heat-stress after a nap (figure 1A). In our view, this raises the possibility that napping may actually increase the risk of exertional heat illness, as participants perceived themselves to be cooler than they really were. Underestimation of the challenge of physical activity in a hot environment could result in increased exercise intensity and/or duration in self-limiting exercise.

Based on the findings of Tokizawa *et al*, a daytime nap may offset feelings of fatigue and improve vigilance in 'at risk' personnel experiencing PSR. However, napping may also result in an underestimation of physical and thermal strain during exercise in the heat. Whether a daytime nap results in a greater risk of heat injury in personnel during exertional heat stress requires further investigation.

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