

Hypothermia may go unnoticed when exercising in the cold

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Credit: AI-generated image ([disclaimer](#))

In a study published this month in *Physiology & Behavior*, research teams at the University of Tsukuba, led by Takeshi Nishiyasu, and at Niigata University of Health and Welfare, led by Tomomi Fujimoto, have found that, when exercising, people cannot perceive decreases in their core body temperature caused by the cold as well as they can when

they are resting. This research has implications for recreational activities in colder climates, such as hiking and skiing.

Body [temperature](#) is maintained in several ways. Although your body subconsciously adjusts energy, fluid secretion, and [blood flow](#) to control [heat loss](#) through shivering, sweating, and dilation or constriction of blood vessels, a person's conscious behavior—seeking shelter or relief when too hot or too cold—plays an important role in keeping the body's core temperature within the narrow range required by its systems. "Both behavioral and autonomic thermoregulation depend on input from sensors located centrally and peripherally in the body," notes Professor Nishiyasu.

During exercise, heat produced by muscles is partially dispersed to the surroundings with the help of temperature-regulating responses like sweating. In addition, skin temperature sensation is reduced, possibly because of a built-in mechanism that dulls pain during exercise by releasing opioids in the brain—this is also known as a runner's high. Normally, the perception of [core body temperature](#) is unaffected by these changes. In cold environments, however, heat that is produced by muscles during exercise is lost to the environment more easily. In fact, in a previous study, the research team demonstrated that shivering kicks in at a lower core temperature during exercise than it does at rest.

Lead author Tomomi Fujimoto explains, "While this suggested to us that temperature inputs to the hypothalamus were affected, the question remained whether exercise affected skin or core temperature sensation in cold environments." To answer this question, the team monitored skin temperature, core body temperature (measured by inserting a probe through the nasal cavity), skin sensation, and perception of cold, as well as heart rate, blood pressure, and oxygen uptake in healthy young men, both as they rested and as they performed low-intensity exercise while partially submerged in a cold water tank.

Skin temperature sensation appeared to be unaffected in this scenario because the exercise was low intensity, that is, not intense enough to elicit a "high"; however, they found that the perception of core body temperature was affected by exercise.

This study revealed important information for people living in [colder climates](#) or those who perform recreational water activities. Both physiological and behavioral thermoregulation can be affected by reduced perception of the cold. Consequently, there is a need for such people to pay close attention to [body](#) temperature.

More information: Tomomi Fujimoto et al, Effects of low-intensity exercise on local skin and whole-body thermal sensation in hypothermic young males, *Physiology & Behavior* (2021). [DOI: 10.1016/j.physbeh.2021.113531](#)

Provided by University of Tsukuba

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