

'Children are not little adults' and need special protection during heat waves

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After more than a week of record-breaking temperatures across much of the country, public health experts are cautioning that children are more susceptible to heat illness than adults are—even more so when they're on the athletic field, living without air conditioning, or waiting in a parked car.

Cases of heat-related illness are rising with average air temperatures, and experts say almost half of those getting sick are children. The reason is twofold: Children's bodies have more trouble regulating temperature than those of adults, and they rely on adults to help protect them from overheating.

Parents, coaches, and other caretakers, who can experience the same heat very differently than kids do, may struggle to identify a dangerous situation or catch the early symptoms of heat-related illness in children.

"Children are not little adults," said Dr. Aaron Bernstein, a pediatric hospitalist at Boston Children's Hospital.

Jan Null, a meteorologist in California, recalled being surprised at the effect of heat in a car. It was 86 degrees on a July afternoon more than two decades ago when an infant in San Jose was forgotten in a parked car and died of heatstroke.

Null said a reporter asked him after the death, "How hot could it have gotten in that car?"

Null's research with two emergency doctors at Stanford University eventually produced a startling answer. Within an hour, the temperature in that car could have exceeded 120 degrees Fahrenheit. Their work revealed that a quick errand can be dangerous for a kid left behind in the car—even for less than 15 minutes, even with the windows cracked, and even on a mild day.

As record heat becomes more frequent, posing serious risks even to healthy adults, the number of cases of heat-related illnesses has gone up, including among children. Those most at risk are [young children](#) in parked vehicles and adolescents returning to school and participating in sports during the hottest days of the year.

More than 9,000 high school athletes are treated for heat-related illnesses every year.

Heat-related illnesses occur when exposure to high temperatures and humidity, which can be intensified by physical exertion, overwhelms the body's ability to cool itself. Cases range from mild, like benign heat rashes in infants, to more serious, when the body's core temperature increases. That can lead to life-threatening instances of heatstroke, diagnosed once the body temperature rises above 104 degrees, potentially causing organ failure.

Prevention is key. Experts emphasize that drinking plenty of water, avoiding the outdoors during the hot midday and afternoon hours, and taking it slow when adjusting to exercise are the most effective ways to avoid getting sick.

Children's bodies take longer to increase sweat production and otherwise acclimatize in a warm environment than adults' do, research shows. Young kids are also more susceptible to dehydration because a larger percentage of their body weight is water.

Infants and younger children also have more trouble regulating their body temperature, in part because they often don't recognize when they should drink more water or remove clothing to cool down. A 1995 study showed that young children who spent 30 minutes in a 95-degree room saw their core temperatures rise significantly higher and faster than their mothers'—even though they sweat more than adults do relative to their size.

Pediatricians advise caretakers to monitor how much water children consume and encourage them to drink before they ask for it. Thirst indicates the body is already dehydrated.

They should also dress kids in light-colored, lightweight clothes; limit outdoor time during the hottest hours; and look for ways to cool down, such as by visiting an air-conditioned place like a library, taking a cool bath, or going for a swim.

To address the risks to student athletes, the National Athletic Trainers' Association recommends that high school athletes acclimatize by gradually building their activity over the course of two weeks when returning to their sport for a new season—including by slowly stepping up the amount of any protective equipment they wear.

"You're gradually increasing that intensity over a week to two weeks so your body can get used to the heat," said Kathy Dieringer, president of NATA.

Warning signs and solutions

Experts note a flushed face, fatigue, muscle cramps, headache, dizziness, vomiting, and a lot of sweating are among the symptoms of heat exhaustion, which can develop into heatstroke if untreated. Call a doctor if symptoms worsen, such as if the child seems disoriented or cannot drink.

Taking immediate steps to cool a child experiencing heat exhaustion or heatstroke is critical. The child should be taken to a shaded or cool area; be given cool fluids with salt, like sports drinks; and have any sweaty or heavy garments removed.

For adolescents, being submerged in an ice bath is the most effective way to cool the body, while younger children can be wrapped in cold, wet towels or misted with lukewarm water and placed in front of a fan.

Although children's deaths in parked cars have been well documented,

the tragic incidents continue to occur. According to federal statistics, 23 children died of vehicular heatstroke in 2021. Null, who collects his own data, said 13 children have died so far this year.

Caretakers should never leave children alone in a parked car, Null said. Take steps to prevent young children from entering the car themselves and becoming trapped, including locking the car while it's parked at home.

More than half of cases of vehicular pediatric heatstroke occur because a caretaker accidentally left a child behind, he said. While in-car technology reminding adults to check their back seats has become more common, only a fraction of vehicles have it, requiring parents to come up with their own methods, like leaving a stuffed animal in the front seat.

The good news, Null said, is that simple behavioral changes can protect kids. "This is preventable in 100% of the cases," he said.

A lopsided risk

People living in low-income areas fare worse when temperatures climb. Access to [air conditioning](#), which includes the ability to afford the electricity bill, is a serious health concern.

A study of heat in [urban areas](#) released last year showed that low-income neighborhoods and communities of color experience much higher temperatures than those of wealthier, white residents. In more impoverished areas during the summer, temperatures can be as much as 7 degrees Fahrenheit warmer.

The study's authors said their findings in the United States reflect that "the legacy of redlining looms large," referring to a federal housing

policy that refused to insure mortgages in or near predominantly Black neighborhoods.

"These areas have less tree canopy, more streets, and higher building densities, meaning that in addition to their other racist outcomes, redlining policies directly codified into law existing disparity in urban land use and reinforced urban design choices that magnify urban heating into the present," they concluded.

This month, Bernstein, who leads Harvard's Center for Climate, Health, and the Global Environment, co-authored a commentary in JAMA arguing that advancing health equity is critical to action on climate change.

The center works with front-line health clinics to help their predominantly low-income patients respond to the health impacts of climate change. Federally backed clinics alone provide care to about 30 million Americans, including many children, he said.

Bernstein also recently led a nationwide study that found that from May through September, days with higher temperatures are associated with more visits to children's hospital emergency rooms. Many visits were more directly linked to heat, although the study also pointed to how high temperatures can exacerbate existing health conditions like neurological disorders.

"Children are more vulnerable to climate change through how these climate shocks reshape the world in which they grow up," Bernstein said.

Helping people better understand the health risks of extreme heat and how to protect themselves and their families are among the public health system's major challenges, experts said.

The National Weather Service's heat alert system is mainly based on the heat index, a measure of how hot it feels when relative humidity is factored in with air temperature.

But the alerts are not related to effects on health, said Kathy Baughman McLeod, director of the Adrienne Arsht-Rockefeller Foundation Resilience Center. By the time temperatures rise to the level that a weather alert is issued, many [vulnerable people](#)—like children, pregnant women, and the elderly—may already be experiencing heat exhaustion or heatstroke.

The center developed a new heat alert system, which is being tested in Seville, Spain, historically one of the hottest cities in Europe.

The system marries metrics like air temperature and humidity with public health data to categorize heat waves and, when they are serious enough, give them names—making it easier for people to understand heat as an environmental threat that requires prevention measures.

The categories are determined through a metric known as excess deaths, which compares how many people died on a day with the forecasted [temperature](#) versus an average day. That may help health officials understand how severe a heat wave is expected to be and make informed recommendations to the public based on risk factors like age or medical history.

The health-based alert system would also allow officials to target caretakers of [children](#) and seniors through school systems, preschools, and senior centers, Baughman McLeod said.

Giving people better ways to conceptualize [heat](#) is critical, she said.

"It's not dramatic. It doesn't rip the roof off of your house," Baughman

McLeod said. "It's silent and invisible."

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