



# RISK REDUCTION GUIDANCE

---

## BEHAVIORAL INTERVENTIONS

---

Alan Wang, BA; Jeremy J. Hess, MD, MPH

### ABSTRACT

Behavioral interventions to reduce heat risks to health include a variety of actions and lifestyle changes to reduce indoor temperatures, reduce body temperature, increase individuals' recognition of heat-related illness in themselves and others, and increase the likelihood that affected individuals will seek care early when feeling ill. Interventions include indoor cooling with air conditioning or evaporative coolers; individual cooling strategies including fans, dousing, foot immersion, misting, and cool showers; staying hydrated; and education to increase recognition of heat-related illness and how to seek help. Most are implemented at the individual or household level and can be implemented quickly and cheaply, though air conditioning and evaporative coolers are more expensive to install and operate. Many vulnerable groups are not able to utilize behavioral interventions as easily or effectively as other groups. Ideally, behavioral interventions are part of a constellation of interventions at multiple levels to protect vulnerable individuals and communities.

Last updated 19 June 2023

---

[What is the intervention?](#)

[How effective is the intervention at protecting people's health?](#)

[How long does the intervention take to implement?](#)

[How much does the intervention cost?](#)

[Are there downsides to consider?](#)

[What other strategies should be considered?](#)

[What are some good sources of additional information?](#)

---

### What is the intervention?

Behavioral interventions are a group of actions and lifestyle changes that individuals can take in order to decrease the risk of heat injury. Behavioral interventions listed by the U.S.

---



# RISK REDUCTION GUIDANCE

---

Centers for Disease Control and Prevention (CDC) include but are not limited to: wearing appropriate clothing; staying in air-conditioned spaces; using fans; using evaporative coolers; staying hydrated; replacing electrolytes; cooling off with showers, self-dousing, foot immersion, wet clothes, and misting; and monitoring others who are at high risk for heat injury. Of these, all except for air-conditioning and evaporative coolers are low-cost and sustainable (Jay et al. 2021). High-risk individuals such as people aged 65 and older, children younger than two, people with chronic diseases, and people who regularly physically exert themselves during work or exercise should be particularly mindful of these precautions due to the nature of their risk factors (CDC 2022b). Behavioral interventions are particularly important because they operate at an individual level, are easy to describe, are adaptable to various contexts, generally have low barriers to entry, are intuitive and familiar, and unlike interventions such as heat warning systems which operate on a larger community or population level, they can be taken by almost anyone at any time.

## **How effective is the intervention at protecting people's health?**

Behavioral interventions to reduce heat exposure generally follow common sense but have relatively little evidentiary support. There is significant evidence regarding the protective effect of air conditioning, which effectively eliminates the hazard from a person's environment (Ito et al. 2018; CDC 2022a), though there are significant cost and other barriers to its utilization and its protective effects are inequitably distributed (Frosch et al.). There is, however, limited research on the effectiveness of other behavioral interventions (Sorensen and Hess 2022). One randomized controlled trial evaluated the effect of a behavioral intervention, including a refrigerator magnet and [brochure](#) with recommendations for reducing heat exposure, a summary of how to recognize heat illness, and specific instructions for seeking assistance when needed. The intervention group reported higher rates of cooling system utilization and cooling the skin with a wet cloth and a 63% reduction in heat stress over the summer season (RR 0.37; 95% CI 0.22–0.63) (Nitschke et al. 2017). There is no evidence that specifically estimates associations between behavioral interventions to reduce heat-health risk and unplanned health care utilization or mortality.

## **How long does the intervention take to implement?**

Most behavioral interventions can be implemented immediately. Interventions that rely on more complex and costly technology such as air conditioning and evaporative coolers take longer to implement, are more costly to install, and are more costly to operate, all of which can be barriers to implementation (Jay et al. 2021). Other interventions such as drinking more water and taking cool showers can be put into action at any time.



# RISK REDUCTION GUIDANCE

---

## How much does it cost?

Most behavioral interventions are low cost and many are free, including limiting outdoor activities (presuming the indoor environment is cooler than the outdoors). Installation of air conditioning units is the most expensive of the aforementioned interventions, with window air conditioners costing anywhere from \$150 to \$800, and central air conditioning often costing upwards of a few thousand dollars to purchase and install (Hawkins 2023).

## Are there downsides to consider?

There are two primary downsides of behavioral interventions. The first, as noted, is that certain interventions, namely air conditioning and evaporative cooling, are costly to implement and maintain, and thus tend to be inequitably distributed and less available to those who are more vulnerable as a result of having lower incomes. The second downside is that behavioral interventions require the ability to recognize the threat of increasing temperatures and take action to implement the behavioral interventions (Jay et al. 2021; Hess et al. 2022; Sorensen and Hess 2022). The vulnerability of certain populations (e.g., those living with psychiatric disorders) results in part from challenges assessing the threat associated with environmental heat. In other populations (e.g., very young children, some workers), vulnerability derives in part from an inability to modify environmental conditions. Lastly, those who are more isolated, socially or linguistically, may have trouble accessing needed protections.

## What other strategies should be considered?

Among all the aforementioned behavioral interventions, increased exposure to air conditioning is the most effective method of protection against heat-related illness and death (CDC 2022a). Promoting equitable access can be challenging, however (Ito et al. 2018). Several states have also begun to implement programs that mandate air conditioning in housing units, and that provide financial support for those who are otherwise unable to afford the cost of purchasing and installing air conditioning units. Utility assistance and legislation limiting cutoffs during extreme weather are important potential policy adjuncts ([White-Newsome et al. 2014](#); [Hernández and Laird 2022](#)).

Ideally, individual behavioral interventions should be deployed in the context of interventions at multiple other levels, including the level of organizations, in the built environment, and at higher levels of government (Jay et al. 2021). In addition, improving communications regarding behavioral and other strategies could result in wider and more effective adoption (McLoughlin et al. 2023).

## What are some good sources of additional information?

---



# RISK REDUCTION GUIDANCE

---

[World Health Organization Fact Sheet on Heat and Health Planning and Preparedness resources from Heat.gov](#)

## References

- CDC. Extreme Heat [Internet]. Centers for Disease Control and Prevention. 2022a [cited 2023 Jun 14]. Available from: <https://www.cdc.gov/nceh/features/extremeheat/index.html>
- CDC. Tips for Preventing Heat-Related Illness [Internet]. Centers for Disease Control and Prevention. 2022b [cited 2023 Jun 14]. Available from: <https://www.cdc.gov/disasters/extremeheat/heattips.html>
- Frosch RM, Pastor M, Sadd J. The climate gap: Inequalities in how climate change hurts Americans and how to close the gap. *Planning for Climate* [Internet]. Available from: <https://www.taylorfrancis.com/chapters/edit/10.4324/9781351201117-17/climate-gap-rachel-morello-frosch-manuel-pastor-jim-sadd-seth-shonkoff>
- Hawkins A. How Much Does Window AC Installation Cost? (2023 Guide) [Internet]. *Architectural Digest*. 2023 [cited 2023 Jun 14]. Available from: <https://www.architecturaldigest.com/reviews/hvac/window-ac-installation-cost>
- Hess JJ, Errett NA, McGregor G, Isaksen TB, Wettstein ZS, Wheat SK, et al. Public Health Preparedness for Extreme Heat Events. *Annu Rev Public Health* [Internet]. 2022 Jan 6; Available from: <http://dx.doi.org/10.1146/annurev-publhealth-071421-025508>
- Ito K, Lane K, Olson C. Equitable Access to Air Conditioning: A City Health Department's Perspective on Preventing Heat-related Deaths. *Epidemiology* [Internet]. 2018 Nov;29(6):749–52. Available from: <http://dx.doi.org/10.1097/EDE.0000000000000912>
- Jay O, Capon A, Berry P, Broderick C, de Dear R, Havenith G, et al. Reducing the health effects of hot weather and heat extremes: from personal cooling strategies to green cities. *Lancet* [Internet]. 2021 Aug 21;398(10301):709–24. Available from: [http://dx.doi.org/10.1016/S0140-6736\(21\)01209-5](http://dx.doi.org/10.1016/S0140-6736(21)01209-5)
- McLoughlin N, Howarth C, Shreedhar G. Changing behavioral responses to heat risk in a warming world: How can communication approaches be improved? *Wiley Interdiscip Rev Clim Change* [Internet]. 2023 Jan 9; Available from: <https://onlinelibrary.wiley.com/doi/10.1002/wcc.819>
-



# RISK REDUCTION GUIDANCE

---

Nitschke M, Krackowizer A, Hansen AL, Bi P, Tucker GR. Heat Health Messages: A Randomized Controlled Trial of a Preventative Messages Tool in the Older Population of South Australia. *Int J Environ Res Public Health* [Internet]. 2017 Aug 31;14(9). Available from: <http://dx.doi.org/10.3390/ijerph14090992>

Sorensen C, Hess J. Treatment and Prevention of Heat-Related Illness. *N Engl J Med* [Internet]. 2022 Sep 28; Available from: <http://dx.doi.org/10.1056/NEJMcp2210623>