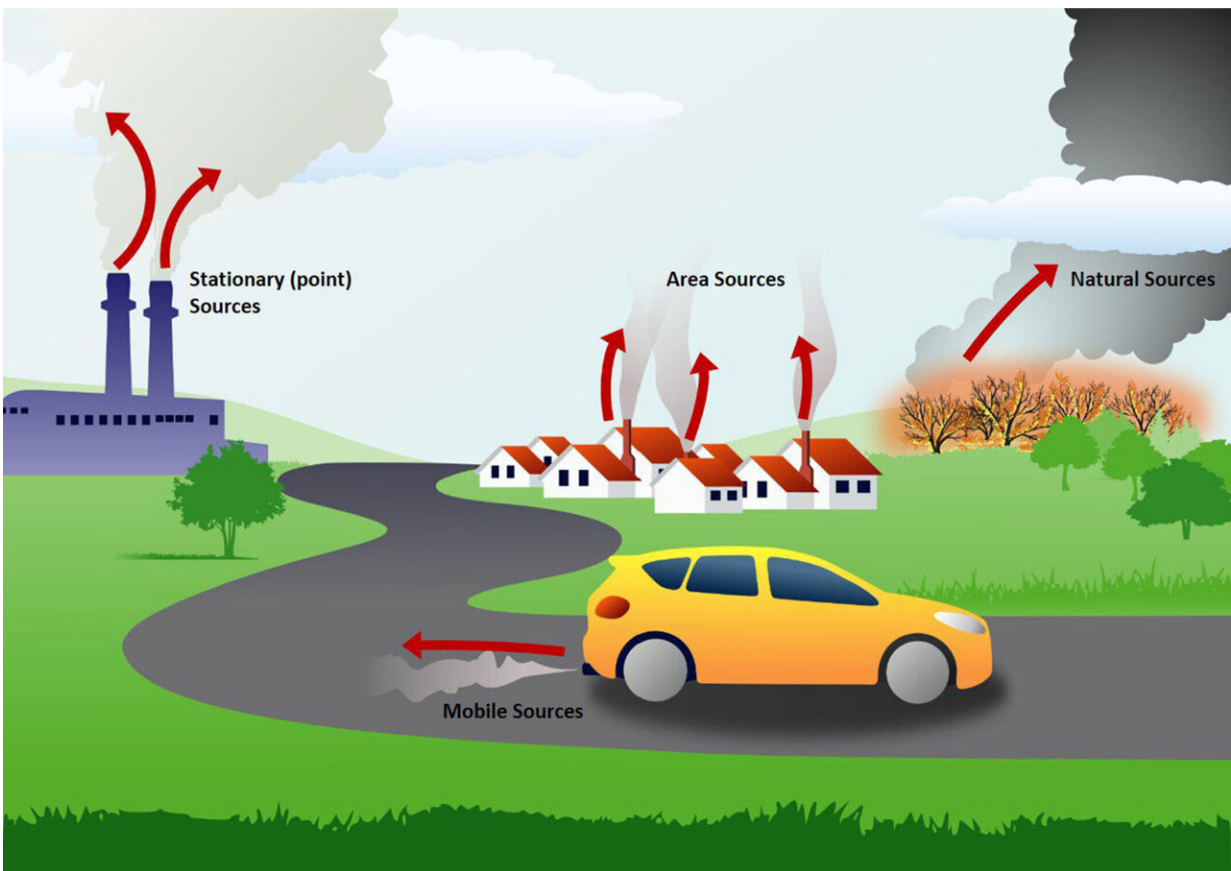


Researcher explores how air pollution affects the body during exercise

April 30 2024



Sources of air pollution. Credit: Environmental Protection Agency

A new review explores the interaction between exercise and air pollution exposure to determine how a person's physiology reacts—and in some cases, acclimates—to environmental pollutants. The [review](#) is published in *Physiological Reports*.

Exposure to air pollution can lead to a variety of chronic health conditions, including dementia, Type 2 diabetes, [chronic obstructive pulmonary disease](#), [heart disease](#) and an increased risk of dying by any cause. However, air pollution is not constant in type or state. Different kinds of pollutants include dust and pollen.

They also include traffic-related pollutants such as diesel particles from car exhaust, and ozone, a toxin that is a by-product of other pollutants such as ultraviolet rays and carbon from wildfires. Pollution levels may vary by time of day, weather and location.

Exercise, on the other hand, has been proven to help prevent and manage many of the same ailments. Scientists and [medical professionals](#) grapple with the questions that arise when thinking about the two together: Do the [health benefits](#) of being physically active outweigh the effects of pollution exposure that may occur when exercising? How do environmental pollutants affect the body?

An invited review, written by Michael Koehle, MD, Ph.D., aims to "highlight some of the recent advances in the physiology of the air pollution and exercise interaction." Koehle is director of the Environmental Physiology Lab at the University of British Columbia in Canada.

Health and [exercise performance](#) are two items that pique researchers' interest regarding the intersection of exercise and air pollution. The

review, compiled from more than 30 previous studies, summarized findings about this connection point in four main areas:

Exercise intensity

Previous research has shown that people breathe in more pollutant particles when they exercise at high intensity. Reasons for this may include the increased ventilation and breathing through the mouth—rather than the nose—that occur during physical activity. However, one crossover study delivered the surprising finding of "minimal differences between the diesel exhaust and clean air conditions, regardless of intensity." Koehle explained that this study examined only short-term effects of diesel particle exposure within two hours of exercise, and longer-term effects and other types of air pollution require more research.

Pre-exposure to pollution

People are potentially exposed to air pollution at any time, not solely during physical activity. Thus, it may be difficult to pinpoint how—and when—pollution affects exercise performance. One study showed that heart rates increased during exercise in people who were exposed to diesel particles for an hour before they exercised. "[More] research is needed to assess the effect of non-exercise pollution exposure on the interaction between air pollution and exercise," Koehle wrote.

Acclimation

Studies have shown that, like heat acclimatization, athletes living in more polluted areas may have the ability to acclimate to certain pollutants, such as ozone. A 2018 study found that people who competed in a track meet where ozone levels were high had fewer performance impairments

because their bodies had acclimated to ozone.

Masking

Although wearing a particle filtration mask was found to reduce inhaled particle count, existing studies explored masking only on those walking and not vigorously exercising. In addition, the [psychological factors](#) associated with wearing a mask during [physical activity](#), such as perceived breathing difficulties, have led to a lack of abundant research. This is another area that needs more study.

More information: Michael Stephen Koehle, Physiological impacts of atmospheric pollution: Effects of environmental air pollution on exercise, *Physiological Reports* (2024). [DOI: 10.14814/phy2.16005](https://doi.org/10.14814/phy2.16005)

Provided by American Physiological Society

Citation: Researcher explores how air pollution affects the body during exercise (2024, April 30) retrieved 22 May 2024 from <https://medicalxpress.com/news/2024-04-explores-air-pollution-affects-body.html>

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