

Air pollution, including during wildfires, shows ill effects in children

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New research linking air pollution data from federal monitors in the Sacramento area of California, including during significant fires, is showing ill effects of pollution exposure among children, a new University of California, Davis, study suggests.

Blood samples show that children have elevated [markers of](#)

[inflammation](#), such as interleukin 6, if they were exposed to higher air pollution. Further, higher air pollution was linked to lower [cardiac autonomic regulation](#) in children, which impacts how fast the heart beats and how hard it pumps, according to the study.

In the study, published Aug. 3 date in the journal *New Directions for Child and Adolescent Research*, researchers looked at [blood samples](#) from more than 100 healthy children ages 9-11 in the Sacramento area where pollutants near their homes were recorded by the Environmental Protection Agency. The study was authored by Anna M. Parenteau, a doctoral student, and Camelia E. Hostinar, associate professor, both from the UC Davis Department of Psychology. The work took place at UC Davis.

These findings are important because exposure to pollutants released during wildfires has been related to numerous negative health outcomes in children, who have smaller bodies and [organ systems](#) than adults, including asthma and decreased [lung function](#), as well as neurodevelopmental outcomes like [attention deficit hyperactivity disorder](#), autism, and deficits in [school performance](#) and memory, researchers said.

Looked at particulates

Researchers looked at fine [particulate matter](#) data from the EPA (PM2.5)—or the fine particles that can penetrate lungs and pass into the bloodstream—finding the children's blood contained markers of systemic inflammation. Additionally, PM2.5, which refers to particulate matter measuring 2.5 micrometers or smaller by the EPA, was linked to lower cardiac autonomic regulation assessed using an electrocardiogram. Specifically, researchers used data files maintained by the EPA, which have daily air quality summary information from each outdoor monitor in the country.

In total, 27 of the children studied had inflammation markers in their blood recorded during significant fires when their neighborhoods recorded significant levels of PM2.5 in the air. These times when fires were burning included during the Mendocino Complex Fire in 2018, which was active about 100 miles from the lab where blood was drawn. The findings were similar to those found in an earlier study, in which the blood of young primates was collected by UC Davis researchers after significant wildfires.

"By examining daily and monthly levels of particulate matter in relation to children's inflammation and autonomic physiology, this study further demonstrates the immediate consequences of exposure to air pollution, which may increase risk of future disease," Parenteau said. Furthermore, Parenteau added: "As [climate change](#) continues to impact children and families, it is paramount to understand the impact of environmental contaminants such as air pollution on children's physiology."

Previous studies with children have shown significant associations between ambient air pollution and allergic sensitization, respiratory symptoms, and ultra-structural and cellular changes to their lungs and airways, researchers said.

Researchers have found [children](#) may be especially susceptible to the effects of air pollution, given that, compared to adults, they have a higher intake of contaminants and greater lung surface area relative to their body weight.

Continued developmental research on environmental contaminants can sound the alarm about the effects of air pollution and inform policy changes that could promote long-term population health, researchers concluded.

Co-authors, all who had graduated and completed research at UC Davis

during the study, include researchers from University of Trier, Germany; UC San Francisco; Whitman College; and University of Denver.

More information: Anna M. Parenteau et al, Associations of air pollution with peripheral inflammation and cardiac autonomic physiology in children, *New Directions for Child and Adolescent Development* (2022). [DOI: 10.1002/cad.20474](https://doi.org/10.1002/cad.20474)

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