

Pollution exposure is higher in city kids who are active, finds study

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Children from urban areas of New York City who engaged in vigorous daily exercise had greater exposure to black carbon, a traffic-related pollutant, than children who were less active, according to a study by a multidisciplinary team of researchers from Columbia University's College of Physicians & Surgeons and Columbia's Mailman School of

Public Health.

The researchers also found that while physically active [children](#) had reduced airway inflammation compared to less active children, this association that was offset by having high [black carbon](#) exposure.

Findings from the study were published recently online in the journal *Environmental Research*.

Black carbon, a pollutant that is also an indicator of diesel exhaust exposure, is known to have an adverse impact on health. However, little research has examined whether children living in [urban areas](#) receive a higher dose of the pollutant when they engage in regular physical activity.

"There are numerous health benefits associated with regular physical activity, particularly for children," says Stephanie Lovinsky-Desir, MD, assistant professor of Pediatrics at Columbia University Medical Center (CUMC) and lead author of the study. "We wanted to determine if regular exercise increases the risk of exposure to air pollution in city children, and if that exposure has an impact on the lungs."

The study included 129 children (age 9 to 14 years) from the Columbia Center for Children's Environmental Health longitudinal birth cohort, which is composed of children of African American and Dominican heritage living in the Bronx and Northern Manhattan.

The participants wore wrist motion detectors to measure their physical activity over a period of six days. Nearly 60 percent of the children were considered active, engaging in 60 minutes or more of moderate to vigorous activity per day, per recommendations from the Centers for Disease Control and Prevention. Those who obtained less exercise were characterized as non-active.

Personal exposure to black carbon was monitored during two 24-hour periods, at the beginning and at the end of the physical activity assessment, with a wearable vest containing a miniature black carbon-detection device. Following each 24-hour black carbon collection period, the researchers measured each child's level of fractional exhaled nitric oxide, a marker of airway inflammation. They also measured each child's specific sensitivity to indoor and outdoor allergens.

The study revealed that the active children were exposed to 25 percent greater concentration of black carbon compared to non-active children. Daily physical activity was associated with reduced airway inflammation, but that effect primarily occurred among the children who were exposed to lower concentrations of black carbon. Exercise had no effect on airway inflammation among children exposed to the highest concentrations of black carbon.

"This study's findings clearly add to evidence that physical activity may benefit the respiratory health of children, but exposure to high levels of black carbon may lessen this effect," said Rachel Miller, MD, professor of medicine (in Pediatrics) at CUMC and of environmental health sciences at Columbia's Mailman School of Public Health. "Future studies should be aimed at understanding the precise levels of pollutant exposure during periods of high activity so that we might better understand which children are at the highest risk for lung disease."

The study is titled, "Physical Activity, Black Carbon Exposure, and Airway Inflammation in an Urban Adolescent Cohort."

More information: Stephanie. Lovinsky-Desir et al, Physical activity, black carbon exposure and airway inflammation in an urban adolescent cohort, *Environmental Research* (2016). [DOI: 10.1016/j.envres.2016.09.005](https://doi.org/10.1016/j.envres.2016.09.005)

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