

Prenatal air pollution exposure linked to infants' decreased heart rate response to stress

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A mother's exposure to particulate air pollution during pregnancy is associated with reduced cardiac response to stress in six-month-old infants, according to Mount Sinai research published in *Environmental Health Perspectives* in October. This study is the first to find that particulate air pollution exposure in utero can affect heart rate variability, which is a known risk factor for health issues.

Variability in how the heart rate responds to stressful experiences is essential for maintaining optimal functioning of the cardiovascular, respiratory, and digestive systems and also is central to emotional well-being and resilience to stress over one's lifetime. Decreased [heart rate variability](#), as observed in this study, is a known risk factor for mental and physical health problems in later life. Air pollution's [negative effect](#) on heart rate variability has previously been found to lead to medical and psychological conditions such as heart disease, asthma, allergies, and mood or

behavioral disorders in studies of older children, adolescents, and adults.

Mount Sinai researchers studied 237 Boston-based mothers and their infants and used satellite data and air pollution monitors to determine the level of particulate air pollution the mothers were exposed to during pregnancy. The [air pollution levels](#) in this study were similar to levels experienced by the general U.S. population.

By studying the babies' heart rate and respiration at age six months, researchers found that the higher the level of the mother's exposure to air pollution in pregnancy, the less variability in the infant's heart rate in response to a stress challenge.

"These findings, in combination with increasing worldwide exposure to particulate air pollution, highlight the importance of examining early-life exposure to [air pollution](#) in relation to negative medical, developmental, and psychological outcomes," said senior author Rosalind Wright, MD, MPH, Dean for Translational Biomedical Research, and Professor of Pediatrics, Environmental Medicine and Public Health, and Medicine (Pulmonary, Critical Care and Sleep Medicine), at the Icahn School of Medicine at Mount Sinai. "A critical step in identifying children at risk for costly chronic disorders is identifying exposures that lead to early vulnerability."

"Identifying exposures that disrupt key processes such as [heart rate](#) response will lead to prevention strategies early in life when they can have the greatest impact. Specifically, these findings support individual-level and policy-level action to reduce exposure to [particulate air pollution](#) exposure during pregnancy," said the study's first author, Whitney Cowell, Ph.D., a postdoctoral fellow in Environmental Medicine and Public Health at the

Icahn School of Medicine.

Provided by The Mount Sinai Hospital

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