

# AN INTERSTATE AWAY

Living near a freeway may be associated with increased risk of autism

**T**he numbers are stark. Between 2002 and 2006, the Centers for Disease Control and Prevention reported a 57 percent increase in the number of children affected by autism.

Air pollution, specifically the variety related to vehicular pollutants, could be one factor related to the developmental disorder. Just ask Heather Volk, PhD, MPH, a scientist at The Saban Research Institute of Children's Hospital Los Angeles.







Volk penned a recent study that found children born to mothers living within 309 meters, or just over 1,000 feet, of a freeway at birth appeared to be twice as likely to develop autism. Her findings have ricocheted throughout the pediatric developmental sciences world—not to mention those of many parents—and suggest that pollution from vehicles like cars and trucks increases the risk for autism.

The study is the first of its kind to link the two.

“There was good biologic reasoning that this might be possible since other research points to lasting adverse health effects among children living near highways,” Volk says. She holds a joint appointment in the Department of Preventive Medicine and the Zilkha Neurogenetic Institute in the Keck School of Medicine of the University of Southern California (USC).

The study, which appeared online in the journal *Environmental Health Perspectives*, supports a theory that environmental factors, in conjunction with a strong genetic risk, may be one possible explanation for the drastic increase in autism. Volk worked with a team of researchers from the Keck School of Medicine of USC and the UC Davis MIND Institute.

While little is known about the role of environmental pollutants in autism, air pollution exposure during pregnancy has been seen in other studies to have physical and

developmental effects on the fetus. Exposure to air pollution during the first months of life also has been linked to cognitive developmental delay.

Autism has long been attributed to genetics. So why is it on the rise? Changes in diagnostic criteria and increased awareness are thought to be contributing factors. But many, including Volk and her fellow researchers, felt that those factors don’t tell the whole story.

“There was some rationale that air pollution could be associated with autism,” she says.

Researchers analyzed data from the Childhood Autism Risks from Genetics and the Environment (CHARGE) study, a population-based case-control study of preschool children. Volk focused on children with autism and typically developing children, who served as controls. The children in the study were between the ages of 2 and 5 years old at the start of the study and lived in communities around Los Angeles, San Francisco and Sacramento. Population-based control groups were recruited from the state of California.

The study examined the locations of the children’s homes during the first, second and third trimesters of their mothers’ pregnancies and at the time of their birth, and looked at the proximity of these homes to a major road or freeway.

“By working to understand environmental risks that work with genetics, we can understand more of what causes autism and can begin to identify treatments and preventive factors.”

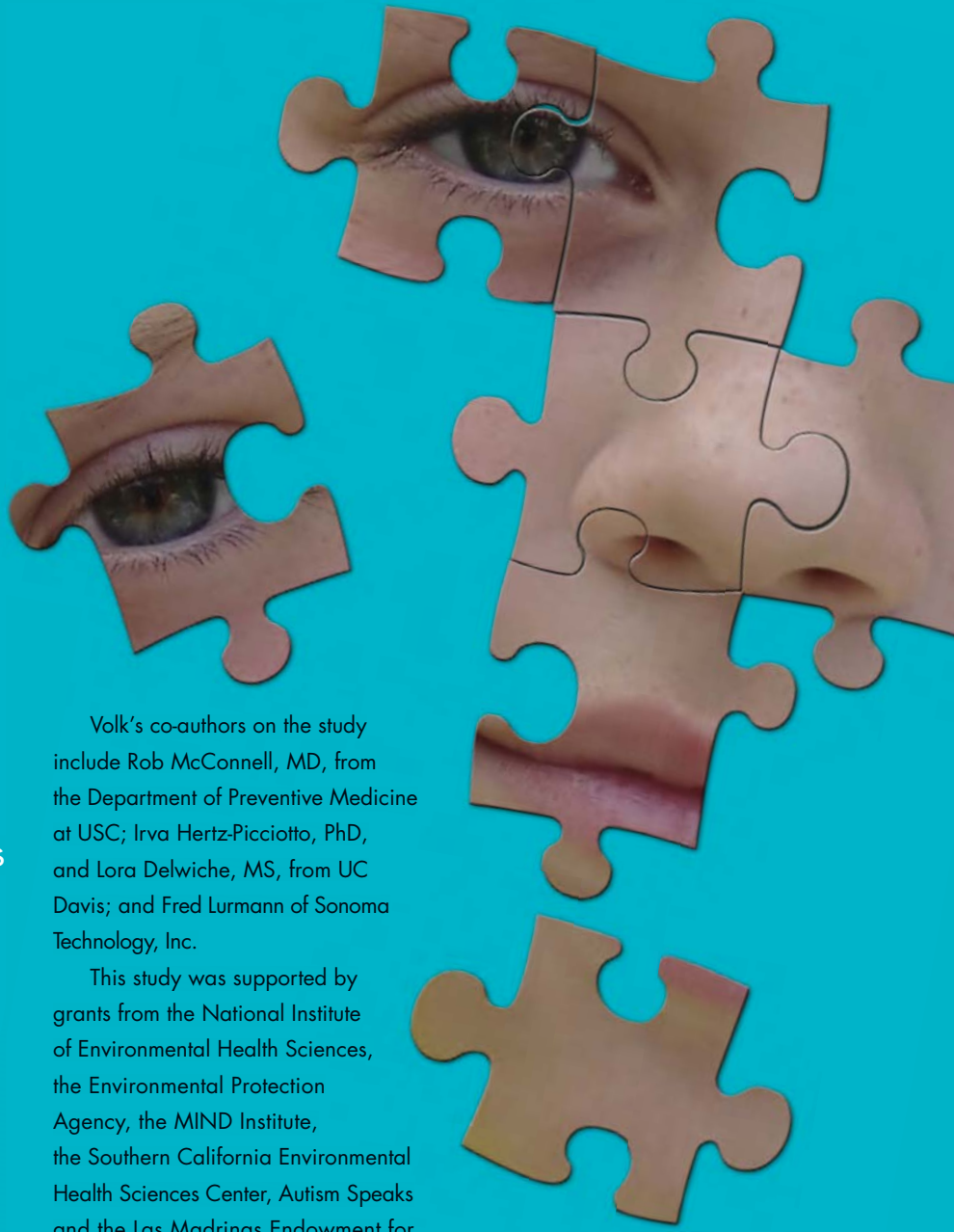
Heather Volk, PhD, MPH



Volk next hopes to uncover exactly when and how developmental effects occur. She's working to pinpoint the amount of air pollution children are exposed to during all levels of pregnancy, including specific trimesters, through the first two years of life. This might help scientists understand the timing of autism and identify thresholds of pollutants associated with the disorder.

As her studies evolve, she and other researchers expect to find other environmental factors that contribute to autism, as it is highly likely that most of them operate in conjunction with other exposures and/or with genes.

"Autism is a debilitating disorder that is increasingly prevalent among children," Volk says. "By working to understand environmental risks that work with genetics, we can understand more of what causes autism and can begin to identify treatments and preventive factors."



Volk's co-authors on the study include Rob McConnell, MD, from the Department of Preventive Medicine at USC; Irva Hertz-Picciotto, PhD, and Lora Delwiche, MS, from UC Davis; and Fred Lurmann of Sonoma Technology, Inc.

This study was supported by grants from the National Institute of Environmental Health Sciences, the Environmental Protection Agency, the MIND Institute, the Southern California Environmental Health Sciences Center, Autism Speaks and the Las Madrinas Endowment for Autism Research, Intervention and Outcomes.

