Researchers link anxiety, ADHD to mothers breathing fouled air.

Inner-city women who breathe powerful airborne pollutants called polycyclic aromatic hydrocarbons while pregnant are more likely to have children who develop behavioral problems by the time they reach school age, researchers report.

The findings bolster what's known about the influence of prenatal conditions on later health.

In recent years, scientists have found that in utero exposure to a host of toxins including pesticides, outdoor air pollutants, secondhand tobacco smoke and prescription drugs influence a child's susceptibility to many conditions for years to come. Earlier this month, Yale researchers reported that studies in mice suggested that cell phone radiation might lead to neurological changes in the part of the brain associated with ADHD. The brain and nervous system of a fetus, still too immature to eliminate toxins or repair damaged DNA, may be particularly sensitive to these assaults.

The research team behind the latest findings, led by Frederica Perera, director of the Center for Children's Environmental Health at Columbia University's Mailman School of Public Health, previously linked prenatal exposure to polycyclic aromatic hydrocarbons (PAHs) from fossil fuels including gasoline, diesel and coal, to impaired fetal growth and development, possible chromosomal changes, developmental delays at age 3 and to reduced IQ at age 5.

Their newest study, published Wednesday in the journal Environmental Health Perspectives, expands on the previous finding that breathing air fouled by PAHs during pregnancy boosts the risk of giving birth to children with signs of anxiety and depression or ADHD by ages 6 or 7 years.

The scientists knew that PAHs inhaled by the mother can pass through her bloodstream, through the placenta and into the fetus' tissues. In the new study, they gauged the mothers' exposure by measuring PAH concentrations in home air samples collected during the third trimesters of their pregnancies. The scientists assessed how much of those pollutants got into their bodies by measuring blood levels of a chemical formed when PAHs interact with blood cells. They similarly gauged the newborns' exposure to PAHs by measuring levels of the marker in their umbilical cord blood.

"This study provides evidence that prenatal exposure to environmental PAH at levels encountered in the air of New York City may influence child behavior," the authors wrote. They said the PAH exposure "could impact cognitive development and the ability to learn."

PAHs are such a ubiquitous component of urban air pollution that air samples for 100 percent of the women contained detectable PAH levels, the researchers reported. At the same time, 40 percent of the women reported being exposed to second-hand smoke during their pregnancies.

Shanna H. Swan, a reproductive endocrinologist at the Children's Environmental Health Center at Mount Sinai School of Medicine in New York, who was not connected to the new study, said she was particularly struck by the study authors' observation that environmental tobacco smoke and "the demoralization of the mother" also contributed to behavioral issues in their children.
Many Prenatal Stresses Play Out Years Later in Offspring

"What I take away from this is neurodevelopment is really sensitive to stresses of various kinds," said Swan, vice chairman of preventive medicine at Mount Sinai. This (the influence of PAHs) is one. Environmental tobacco smoke is one. The mother's mental state is another one. And they all can play out in developmental effects upon the offspring many years later."

Perera and her colleagues have been following a group of 253 African-American and Dominican women, all non-smokers living in New York City, who gave birth between 1999 and 2006. They plan to follow their children to age 12.

Even if pregnant women knew earlier that just breathing city air potentially was putting their children's health at risk, there isn't much they could do to protect their sons and daughters other than keeping their homes smoke-free.

However, said Dr. Maida P. Galvez, associate professor of preventive medicine and pediatrics at Mount Sinai School of Medicine, "pregnant women and their families can support local, state and federal legislation promoting improved overall indoor and outdoor air quality. For example, several states have passed legislation banning smoking in public places," she said. "Groups like Mothers and Others for Clean Air are good resources for families."

"This is really a paper about social justice," Swan said. "Poor people have more exposure to these things on all counts, whether the bad air, or psychosocial stress and other things. That's a societal problem and the changes are not going to be on an individual level. They're going to be on a societal level."