Air pollution and psychological distress during pregnancy

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Maternal psychological distress combined with exposure to air pollution during pregnancy have an adverse impact on the child's behavioral development, according to researchers at the Columbia Center for Children's Environmental Health at the Mailman School of Public Health.

The study, which appears in the journal *Pediatrics*, reports that maternal demoralization, a measure of psychological distress capable of affecting a mother's ability to cope with stressful situations, was linked with a number of behavioral problems, including anxiety, depression, attention problems, rule-breaking, externalizing problems, and aggressive behavior. The effects of demoralization were greatest among children with higher levels of prenatal exposure to polycyclic aromatic hydrocarbons (PAH) in air pollution.

"This study shows that the combination of physical and psychosocial stressors during fetal development magnifies the effect of each exposure," says lead author Frederica Perera, DrPH, PhD, director of the Center. "The findings are of concern because attention problems and anxiety and depression have been shown to affect peer relationships, academic performance, and future well- being of children."

The paper is the first to assess the interaction between PAH, combustion-related pollutants measured in air the mother breathed during pregnancy, and maternal demoralization on a variety of behavioral problems in childhood.

PAH are air pollutants generated by combustion sources such as motor vehicles, coal-fired power plants, residential heating and tobacco smoke. In Krakow, Poland, where the study took place, as in many areas worldwide, coal burning is an important air pollution source. Although Krakow has relatively high ambient concentrations of PAH from coal-burning and vehicle emissions, levels are within the range seen in many other urban areas worldwide. "Air pollution exposure is ubiquitous and often co-occurs with socioeconomic disadvantage and maternal psychological distress," notes Dr. Perera.

Researchers, led by Dr. Perera and Wieslaw Jedrychowski, MD, PhD, from the University of Krakow, followed 248 mother-child pairs from pregnancy through 9 years of age. Personal air sampling was completed during pregnancy to estimate prenatal PAH exposure. Behavioral problems were assessed using the Child Behavioral Checklist, a set of questions to which mothers responded about their child's behavior. Maternal demoralization has been correlated with socioeconomic factors such as material hardship. Levels of maternal demoralization were ascertained by a questionnaire during the second trimester.

Relationships between prenatal air pollution and behavioral or cognitive problems in childhood have previously been observed in the Center's Mothers & Newborns study in New York City and in the Polish cohort. This new study builds upon prior findings to examine the joint impact of maternal psychological distress and air pollution on behavioral problems.

Understanding the interactions between the social and physical environment will help to explain health disparities and create interventions to prevent health and developmental problems in children. Notes Dr. Perera, "The findings support policy interventions to reduce air pollution exposure in urban areas as well as programs to screen women early in pregnancy to identify those in need of psychological or material support."

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