

Exposure to Air Pollution during Pregnancy Linked to Brain Alterations and Cognitive Impairment in Children

A study in [Biological Psychiatry](#) shows for the first time a relationship between air pollution exposure and difficulties with inhibitory control

BARCELONA, March 8, 2018 – A new [study](#) performed by the Barcelona Institute for Global Health (ISGlobal) –a centre supported by the “la Caixa” Foundation– and the Erasmus University Medical Center of Rotterdam has linked exposure to residential air pollution during fetal life with brain abnormalities that may contribute to impaired cognitive function in school-age children. The study, published in [Biological Psychiatry](#), reports that the air pollution levels related to brain alterations were within those considered to be safe.

The study showed for the first time a relationship between air pollution exposure and a difficulty with inhibitory control—the ability to regulate self-control over temptations and impulsive behavior—which is related to mental health problems such as addictive behavior and attention-deficit/hyperactivity disorder. Exposure to fine particles during fetal life was associated with a thinner cortex—the outer layer of the brain— in several areas of both hemispheres, which is one of the factors that may explain the observed impairment in inhibitory control.

The study used a population-based cohort in the Netherlands, which enrolled pregnant women and followed the children from fetal life onward. Researchers assessed air pollution levels at home during the fetal life of 783 children. The data were collected by air pollution monitoring campaigns, and included levels of nitrogen dioxide and coarse and fine particles. Brain morphology was assessed using brain imaging performed when the children were between 6 and 10 years old.

The relationship between fine particle exposure, brain structure alterations, and inhibitory control was found despite the fact that the average residential levels of fine particles in the study were well below the current EU limit—only 0.5% of the pregnant women in the study were exposed to levels considered unsafe. The average residential levels of nitrogen dioxide were right at the safe limit.

This finding adds to previous studies that have linked acceptable air pollution levels with other complications including cognitive decline and fetal growth development. “Therefore, we cannot warrant the safety of the current levels of air pollution in our cities,” said Dr. Mònica Guxens, lead author and researcher of ISGlobal and Erasmus University Medical Center. .

The fetal brain is particularly vulnerable —it hasn’t yet developed the mechanisms to protect against or remove environmental toxins. “Although specific individual clinical implications of these findings cannot be quantified, based on other studies, the observed cognitive delays at early ages could have significant long-term consequences such as increased risk of mental health disorders and low academic achievement, in particular due to the ubiquity of the exposure,” said Dr. Guxens.

Reference

Guxens M., Lubczyńska M.J., Muetzel R., Dalmau-Bueno A., Jaddoe V.W., Hoek G., Van der Lugt A., Verhulst F.C., White T., Brunekreef B., Tiemeier H., El Marroun H. *Air pollution exposure during fetal life, brain morphology, and cognitive function in school-age children*. *Biological Psychiatry*, 2018 <https://doi.org/10.1016/j.biopsych.2018.01.016>

About ISGlobal

The Barcelona Institute for Global Health, ISGlobal, is the fruit of an innovative alliance between the "la Caixa" Banking Foundation and academic and government institutions to contribute to the efforts undertaken by the international community to address the challenges in global health. ISGlobal is a consolidated hub of excellence in research that has grown out of work first started in the world of health care by the Hospital Clínic and the Parc de Salut MAR and in the academic sphere by the University of Barcelona and Pompeu Fabra University. The pivotal mechanism of its work model is the transfer of knowledge generated by scientific research to practice, a task undertaken by the institute's Education and Policy and Global Development departments. ISGlobal a member of the CERCA programme of the Generalitat de Catalunya.

ISGlobal's Press Office

Pau Rubio

pau.rubio@isglobal.org

93 214 73 33 / 696 91 28 41

Aleix Cabrera

aleix.cabrera@isglobal.org

93 214 73 33 / 661 45 16 00