

## TITLE

## Gestational Exposure to Endocrine-Disrupting Chemicals and Reciprocal Social, Repetitive and Stereotypic Behaviors in 4- and 5-Year-Old Children: The HOME Study

## AUTHOR(S)

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## ABSTRACT

Background:

According to the U.S. Centers for Disease Control and Prevention (CDC), around 1 in 68 American children suffer from an autism spectrum disorder (ASD), a ten-fold increase in prevalence over the past 40 years. Currently, ASDs, characterized in varying degrees by difficulties with social interaction, verbal and nonverbal communication and repetitive behaviors, has no clear cause. However, recent research suggests that, in combination with genetic risk factors, exposure to environmental stresses before and during birth may increase a child's susceptibility to the disorder. With multiple lines of evidence linking to the role of the endocrine system, it has been proposed that endocrine-disrupting chemicals (EDCs) may be associated with a variety of adverse health effects, including neurodevelopmental delays in children. EDCs are commonly found in materials such as pesticides, metals, additives in foods, and personal care products. These man-made chemicals can be transferred from the mother to the child prenatally via the placenta, and after birth via breast milk.

Objective:

The purpose of the study was to identify gestational EDC exposures associated with autistic behaviors.

Methods:

Researchers measured the concentrations of different groups of EDCs (8 phthalate metabolites, bisphenol A, 25 polychlorinated biphenyls (PCBs), 6 organochlorine pesticides, 8 brominated flame retardants, and 4 perfluoroalkyl substances) in blood or urine samples from 175 pregnant women in the HOME (Health Outcomes and Measures of the Environment) Study (Cincinnati, OH). When the children were 4 and 5 years old, the mothers completed the Social Responsiveness Scale (SRS), a measure of autistic behaviors. Researchers examined associations between the EDCs and the SRS scores.

Results:

Most of the EDCs were associated with negligible absolute differences in SRS scores ( $\leq 1.5$  point). Increases in serum concentrations of polybrominated diphenyl ether-28 (PBDE-28) or trans-nonachlor were associated with more autistic behaviors. In contrast, fewer autistic behaviors were observed among children born to women with detectable versus nondetectable concentrations of PCB-178,  $\beta$ -hexachlorocyclohexane, or PBDE-85. Increasing perfluorooctanoate (PFOA) concentrations were also associated with fewer autistic behaviors.

Conclusion:

Some EDCs were associated with autistic behaviors in this cohort, but the modest sample size prevents researchers from dismissing chemicals with null associations. PFOA,  $\beta$ -hexachlorocyclohexane, PCB-178, PBDE-28, PBDE-85, and trans-nonachlor deserve additional scrutiny as factors that may be associated with childhood autistic behaviors.

## POLICY IMPLICATIONS

In 1996, the U.S. Congress passed the Food Quality Protection Act (FQPA) and the Safe Drinking Water Act (SDWA) Amendments. These Amendments required the U.S. Environmental Protection Agency (EPA) to screen pesticide chemicals and also give them authority to screen certain other chemicals for potential endocrine effects, thus initiating the Endocrine Disruptor Screening Program (EDSP). In November of 2012, EPA released the List of EDSP Universe of Chemicals, a document containing approximately 10,000 chemicals as defined under 1996 amendments.

Despite EPA's efforts to initiate an EDC screening process, the chemicals listed in the EDSP Universe of Chemicals have yet to be tested, due to multiple obstacles and objections. The agency plans to prioritize these chemicals for screening by considering physical and chemical properties, exposure risk, and a health effect-based approach, using advanced computational toxicological methods.

The growing evidence emerging from peer-reviewed science of the damage of human health and development from EDCs, including this study, emphasizes the need for effective and timely identification of endocrine-disrupting chemicals. The EPA must press forward to create a successful Endocrine Disruptor Screening Program. With adequate testing of these potentially dangerous chemicals, children and pregnant women, those most susceptible to the effects of EDCs, would be able to better limit their exposure and, in turn, better protect their health.

## References

*Background:*

[www.autismspeaks.org/what-autism](http://www.autismspeaks.org/what-autism)

[www.who.int/ceh/risks/cehemerging2/en/](http://www.who.int/ceh/risks/cehemerging2/en/)

*Policy Implications:*

[www.epa.gov/endo/](http://www.epa.gov/endo/)

## REFERENCE

Article available in [Environmental Health Perspectives](#).

## KEY WORD(S)

[Autism / ASDs](#), [Endocrine Disrupting Chemicals \(EDCs\)](#)