



# ECHO

Environmental influences  
on Child Health Outcomes

A program supported by the NIH

## Study Summary

### ***Does prenatal PFAS exposure affect a child's risk for developing autism-related traits?***

*Authors: Jennifer Ames, Ghassan Hamra, et al.*

#### Who sponsored this study?

This research was supported by the Environmental influences on Child Health Outcomes (ECHO) Program, Office of The Director, National Institutes of Health.

#### Why was this study needed?

Per- and polyfluoroalkyl substances (PFAS) are widely used, long lasting chemicals, the components of which break down very slowly over time. Previous studies looking at associations between prenatal PFAS exposure and childhood autism spectrum disorder (ASD) are inconsistent and mostly conducted in small sample sizes. The objective of this research was to determine whether blood concentrations of PFAS during pregnancy were linked to the development of autism-related traits in children. The researchers in this study were able to examine this question by continuously measuring the development of autism-related traits in a large number of children across the U.S, independently of whether a child received a clinical ASD diagnosis.

#### Who was involved?

The participants of this study included 1,224 mother-child pairs from ten cohorts across the United States. The participants were geographically, racially, and ethnically diverse, and one of the cohorts included families with an increased genetic likelihood of ASD. Most of the participating children were born between 2011 and 2018.

#### What happened during the study?

The researchers measured the levels of eight different PFAS in blood samples collected from mothers during pregnancy. Later, when their children were aged 2.5 years or older, researchers asked caregivers to report on the child's autism-related traits using a questionnaire called the Social Responsiveness Scale (SRS). The research team tracked the relationship between child SRS scores and prenatal exposure to each individual PFAS as well as the combination of the eight PFAS.

#### What were the study results?

The researchers found that prenatal exposure to one specific PFAS chemical, perfluorononanoic acid (PFNA) may be associated with an increase in autism-related traits in children. Prenatal exposure to the mixture of all PFAS chemicals combined was not associated with increased autism-related traits in children.

Footnote: Results reported here are for a single study. Other or future studies may provide new information or different results. You should not make changes to your health without first consulting your healthcare professional.

## Impact

This study draws attention to the potential risks of PFAS chemicals on child neurodevelopment. In the U.S., exposures to some specific PFAS, such as PFOA and PFOS, have dropped substantially since the industry voluntarily phased these chemicals out in the early 2000s. However, other PFAS exposures have increased over time, including thousands of these substances with unknown toxicity. These so-called “forever chemicals” continue to pose risks to health even after they are phased out because they persist in the environment and inside people’s bodies and don’t break down easily. While the estimated effects of PFAS chemicals on child autism-related traits are relatively small in this study, future studies may investigate whether early childhood exposure to PFAS chemicals are associated with effects on other neurodevelopmental outcomes.

## What happens next?

Additional research is needed to continue studying the effect of early life exposure to PFAS on child neurodevelopment, including cognition, attention, and other neurobehaviors. Future studies can also investigate whether biological sex and other factors—such as genetics, underlying health conditions, and nutritional status—may change the effect of PFAS exposure on brain development.

## Where can I learn more?

Access the full journal article, titled “Prenatal exposure to per- and polyfluoroalkyl substances and childhood autism-related outcomes,” in [Epidemiology](#).

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