



ECHO

Environmental influences
on Child Health Outcomes

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Study Summary

ECHO Researchers Investigate Association of Early Childhood Phthalate Exposures with ADHD Behaviors in Childhood and Adolescence

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Who sponsored this study?

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

Why was this study needed?

[Phthalates](#) are widely used chemicals found in many everyday items such as food packaging, flooring, building materials, medicine coatings, medical supplies, cosmetics, and personal care products. When phthalates enter the body, they are metabolized and converted into various smaller molecules, known as metabolites.

Animal studies suggest that exposure to phthalates during early life may negatively affect the nervous system, but there has been limited investigation into potential associations between early childhood phthalate exposure and attention-deficit/hyperactivity disorder (ADHD) behaviors in later childhood and adolescence.

For this study, ECHO researchers wanted to investigate whether exposure to phthalates in children at ages 2-5 years was associated with ADHD symptoms when these children were ages 8-18 years.

[Learn how to say phthalate.](#)

What were the study results?

ECHO Cohort researchers evaluated the levels of several metabolites that result from phthalate exposure. They saw that in children ages 2-5 years, most of these molecules were not associated with ADHD behaviors in these children at ages 8-18 years.

However, among children who had been diagnosed with autism spectrum disorder (ASD), one of these metabolites—mono-2-heptyl phthalate (MHPP)—was associated with more ADHD behaviors. Among typically developing children, a different small molecule—mono-carboxy isooctyl phthalate (MCIOP)—was associated with more hyperactive/impulsive behaviors.

What was the study's impact?

This study suggests that early childhood exposure to certain phthalates may be associated with having both ASD and ADHD traits. Since ADHD behaviors are more commonly found in children with ASD, deepening the understanding of how exposure to environmental chemicals, such as phthalates, could contribute to this comorbidity may be important for managing and treating these conditions effectively.

Note: The results reported here are from a single study. Other or future studies may provide new information or different results. You should consult with a qualified healthcare provider for diagnosis and for answers to your personal questions.

Who was involved?

This study included 243 children living in Northern California and taking part in the ReCHARGE ([Revisiting Childhood Autism Risks from Genetics and Environment](#)) study. This study included both neurotypical and neurodiverse children, with about 60% of them having ever had neurodevelopmental concerns. Therefore, the children included in the study tended to have more ADHD behaviors compared with children in the general population.

What happened during the study?

Phthalate metabolites can be measured in biological samples, such as urine, to assess exposure to phthalates. In this study, the researchers measured 15 phthalate metabolites in urine samples of young children ages 2-5 years. Parents answered questions about each child's ADHD symptoms at ages 8-18 years.

What happens next?

While the metabolite MHPP and the phthalate it's derived from, di-n-heptyl phthalate (DHPP), are commonly found in children's urine, their influence on neurodevelopment has not been studied as much as other phthalates. Since exposure to DHPP has been linked to problems with development and behavior in animals, further studies need to look more closely at this compound to understand its effects on how the brain develops in children.

Where can I learn more?

Read the full research article, titled "Early childhood exposures to phthalates in association with attention-deficit/hyperactivity disorder behaviors in middle childhood and adolescence in the ReCHARGE study," in the journal [International Journal of Hygiene and Environmental Health](#).

Learn more about ECHO's other [chemical exposure](#) research.

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