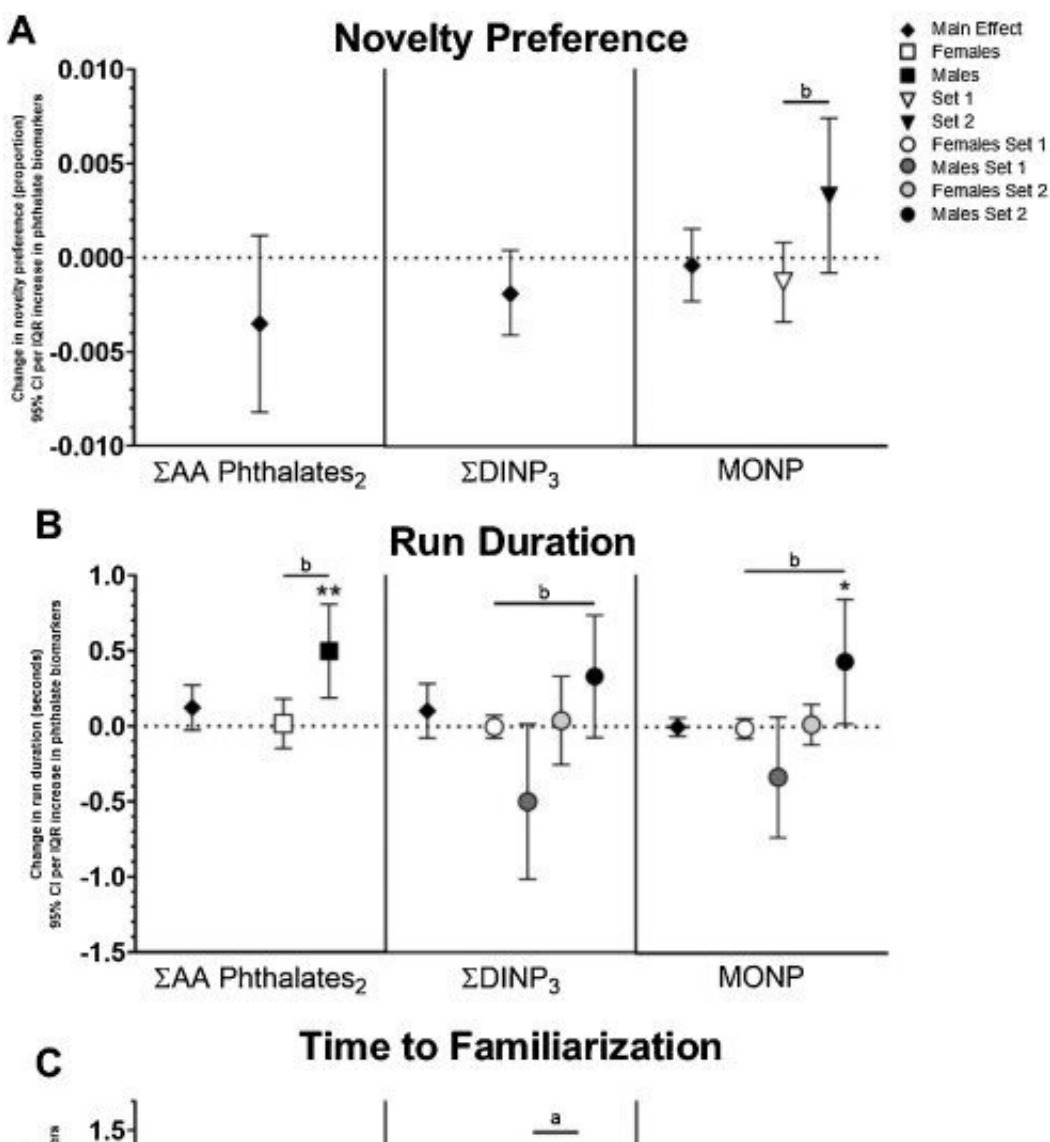


Prenatal phthalate exposure can significantly impact infant behavior and cognition, says study

November 15 2022, by Tejas Mahadevan



Credit: *Neurotoxicology and Teratology* (2022). DOI: 10.1016/j.ntt.2022.107102

Prenatal exposure to phthalates, a set of chemicals commonly found in plastics and personal care products, has been shown to significantly impact aspects of behavior and cognition in infants, according to a team of researchers at the University of Illinois Urbana-Champaign.

"Phthalates are widespread, and several well-known studies have reported that 100% of pregnant individuals had detectable levels of phthalates in their bodies," said developmental neurotoxicologist Jenna Sprowles, a former postdoctoral research associate at the Beckman Institute for Advanced Science and Technology.

Children's toys, cosmetics, and constructional materials are all potential sources of phthalate exposure, as are other materials made from polyvinyl chloride.

When individuals who are pregnant are exposed to phthalates, the chemical compound crosses the placental barrier to interact directly with the fetus. Phthalates can also be transferred to a newborn through breast milk.

"With manufactured chemicals like phthalates being placed in food we eat, water we drink, and products we buy, it's so important to investigate how they impact infant development and behavior," said Sarah Geiger, a professor of kinesiology and community health. "Our ancestors were not exposed to manmade chemicals like we are today, so the time is really now to understand their impact."

While the researchers found certain types of phthalates to be associated with positive neurobehavioral outcomes in infants, other types were associated with negative outcomes.

Their study, reported in the journal *Neurotoxicology and Teratology*, investigated the neurobehavioral impacts of prenatal phthalate exposure in infants aged 4.5 and 7.5 months. Since many existing studies focus on individuals in early and middle childhood, providing attention to this age group is especially important.

Phthalates have a wide range of properties and potential effects that have yet to be fully investigated.

"Phthalates are endocrine-disrupting chemicals, meaning they interact with and alter how hormones typically act in the body. Hormones play crucial roles in brain development, so when the activities of hormones are altered by chemicals like phthalates, adverse functional effects are possible," Sprowles said. "While we do know that different phthalates can affect different hormone systems, we don't yet know exactly how particular phthalates exert their specific effects."

Participants in this study were recruited as a part of the Illinois Kids Development Study, or IKIDS, a program housed in the Beckman Institute dedicated to understanding how exposure to phthalates and other chemicals during pregnancy impacts children's physical and behavioral development. Geiger is also an IKIDS investigator.

Multiple [urine samples](#) across pregnancy were used to measure participating parents' phthalate levels during gestation, and the Ages & Stages Questionnaires was used to evaluate the infants' cognitive, psychological, and motor development. The questionnaire covers five developmental domains: communications, person-social, problem-solving, fine motor, and gross motor.

The researchers found that the impact of prenatal phthalate exposure was specific to each phthalate's particular properties. For example, higher prenatal concentrations of a [phthalate](#) called MEP, which is

commonly found in [personal care products](#), were associated with lower ASQ scores (indicating below-average development) in certain domains. Conversely, concentrations of phthalates such as DEHP and DINP, which are commonly found in plastics, were associated with higher ASQ scores (indicating above-average development) in certain domains.

"Just because we found that some phthalates were associated with higher scores does not mean those chemicals are not harmful," Sprowles said. "The mechanisms of phthalates and the effects they have on various neurobiological outcomes are complex, and additional research with a large, diverse sample can help researchers to better understand the effects of these chemicals on neurodevelopment."

Their results align with existing studies, some of which have been carried out in animal models, which indicate that both prenatal and neonatal exposure to phthalates alters neural structure and function, resulting in impaired cognition and altered behavior.

Ultimately, the researchers hope that their results will give [federal policy](#) a push toward healthier, safer products.

"We hope that this study, and our other published results, will ultimately lead to changes in federal policies that allow the use of [phthalates](#) in food packaging and other consumer products," said Susan Schantz, a professor emerita in the Department of Cognitive Biosciences, a researcher at the Beckman Institute, and IKIDS director.

More information: Jenna L.N. Sprowles et al, Associations of prenatal phthalate exposure with neurobehavioral outcomes in 4.5- and 7.5-month-old infants, *Neurotoxicology and Teratology* (2022). [DOI: 10.1016/j.ntt.2022.107102](#)

Provided by Beckman Institute for Advanced Science and Technology

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