ECHO
Environmental influences on Child Health Outcomes
A program supported by the NIH

Study Summary

Is prenatal substance exposure related to reasoning skills and problem behavior in childhood?

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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?

Little is known about how a pregnant mother's exposure to multiple substances, like tobacco, alcohol, or opioids, during pregnancy may be associated with outcomes for their children when they reach middle childhood. Most research looks at the effects of single-substance exposures or focuses on the effects of prenatal exposures on the child's health exclusively during birth or early childhood. In this study, the research team evaluated the effects of prenatal exposure to multiple substances (alcohol, tobacco, marijuana, and opioids) on children's reasoning skills and behavior during middle childhood.

What were the study results?

The team identified two groups of children based on their reasoning skills and problem behavior scores. Group 1 had average verbal reasoning skills, average spatial reasoning skills, and normal levels of problem behavior. Children in this group were exposed to fewer substances before birth. Group 2 included children with multiple substance exposures before birth. This group had below average verbal reasoning skills, but average spatial reasoning skills, and higher levels of problem behavior. Children in Group 2 were significantly more likely to be exposed to tobacco before birth. The effects of tobacco exposure on problem behavior and reasoning skills were stronger than expected.

What was the study's impact?

This study suggests that children exposed to tobacco and other substances before birth may be at increased risk for problem behaviors and lower verbal reasoning skill scores during middle childhood. These findings will help pediatricians identify children who are at risk for behavior problems and poorer reasoning skill scores. If replicated, this information might help pregnant women and their doctors to recognize how prenatal tobacco, especially in the context of other substance exposure, might affect their child's verbal reasoning and behavior in middle childhood.

Who was involved?

This study involved pairs of mothers and their biological children. There were 256 mother-child pairs from two ECHO research sites with locations in Rhode Island, Minnesota, Washington, California, and New York. Children were ages six to 11 at the time of the behavioral and reasoning skills assessments.

What happened during the study?

Researchers collected data on prenatal exposure to substances including alcohol, tobacco, marijuana, and opioids. When the children were between six and 11 years old, their caregivers reported on the presence of problem behaviors such as aggression and anxiety. The researchers also collected data on problem solving skills with words, pictures, and diagrams (verbal and nonverbal reasoning).

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.

What happens next?

Moving forward, the team wants to improve their measures of prenatal substance exposure and expand their sample size to include more ECHO participants. Grouping children that have been exposed to substances prenatally can help identify subgroups of children at risk for problem behaviors and low reasoning skill scores.

Where can I learn more?

The Center for Parenting and Opioids and National Institute on Drug Abuse have additional helpful resources.

The full journal article, titled "Prenatal Substance Exposure: Associations with Neurodevelopment in Middle Childhood" is published in the *American Journal of Perinatology*.

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