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

Study Summary

Smoking During Pregnancy Linked to Mental Health Challenges in Children, ECHO Study Finds

Authors: Kristine Marceau, et al.

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?

Previous research has shown that children whose mothers smoked during pregnancy are more likely to develop behavior problems, particularly difficulties with acting out or following rules. However, it has been less clear whether prenatal smoking also increases the risk of mental health problems generally, or if it's a specific risk for difficulties with acting out or following rules alone. Researchers from this study wanted to understand whether prenatal smoking contributes to co-occurring emotional and behavioral symptoms or specifically behavioral symptoms, and whether its effects differ by age or sex. This study helps address these gaps by examining which developmental periods may be especially sensitive to prenatal smoking effects and whether boys or girls are more vulnerable.

What were the study results?

Children exposed to smoking before birth were more likely experience multiple co-occurring emotional and behavioral symptoms, and also to show more externalizing problems—such as attention problems, aggressive behavior, and rule-breaking. These associations were observed across nearly all age groups and remained even after accounting for family history, background, and other exposures.

The strongest effects on mental health symptoms were seen in early childhood (under age 7) and early puberty (ages 9 to 12). There were very few differences between boys and girls. Only at ages 13-14 did boys seem to have more co-occurring emotional and behavioral symptoms and externalizing-specific problems than girls. In general, both boys and girls were affected in similar ways.

What was the study's impact?

These results suggest that prenatal exposure to nicotine may increase the risk of mental health and behavioral problems. Because this study included a large number of children from different backgrounds, it helps clarify past research and contributes new insight about when certain problems tend to appear and how different symptoms may occur together.

Who was involved?

The study included 16,335 children and adolescents ages 1 to 18 from 55 U.S. ECHO Cohort Study Sites. All participants completed Child Behavior Checklist (CBCL) and Strengths and Difficulties Questionnaire (SDQ) behavioral assessments.

What happened during the study?

Researchers gathered standardized information about children's behavior and created a simple score to show how many symptoms a child had and whether those symptoms were more emotional (such as sadness, anxiety) or behavioral (such as acting out, rule breaking). They then looked at these patterns across different age groups, while taking into account important factors such as the mother's age and education, family mental health history, and exposure to smoke or other substances during and after pregnancy.

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?

Future work could help researchers understand how timing, dose, and frequency of smoking during pregnancy correlates with child mental health. Future research could also use methods to separate the effects of family background from the effects of smoking itself and look more closely at how nicotine and other chemicals in smoke might affect children's development.

Where can I learn more?

Access the full journal article, titled "Prenatal Smoking and Child Psychopathology Associations by Age and Sex in the ECHO Cohort," in *Development and Psychopathology*.