

# A Prospective Birth Cohort Study on Early Childhood Lead Levels and Attention Deficit Hyperactivity Disorder: New Insight on Sex Differences.

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## Abstract

### OBJECTIVE:

To investigate the prospective associations between early childhood lead exposure and subsequent risk of attention deficit hyperactivity disorder (ADHD) in childhood and its potential effect modifiers.

### STUDY DESIGN:

We analyzed data from 1479 mother-infant pairs (299 ADHD, 1180 neurotypical) in the Boston Birth Cohort. The child's first blood lead measurement and physician-diagnosed ADHD was obtained from electronic medical records. Graphic plots and multiple logistic regression were used to examine dose-response associations between lead exposure and ADHD and potential effect modifiers, adjusting for pertinent covariables.

### RESULTS:

We found that 8.9% of the children in the Boston Birth Cohort had elevated lead levels (5-10  $\mu\text{g}/\text{dL}$ ) in early childhood, which was associated with a 66% increased risk of ADHD (OR, 1.66; 95% CI, 1.08-2.56). Among boys, the association was significantly stronger (OR, 2.49; 95% CI, 1.46-4.26); in girls, the association was largely attenuated (P value for sex-lead interaction = .017). The OR of ADHD associated with elevated lead levels among boys was reduced by one-half if mothers had adequate high-density lipoprotein levels compared with low high-density lipoprotein, or if mothers had low stress compared with high stress during pregnancy.

### CONCLUSIONS:

Elevated early childhood blood lead levels increased the risk of ADHD. Boys were more vulnerable than girls at a given lead level. This risk of ADHD in boys was reduced by one-half if the mother had adequate high-density lipoprotein levels or low stress. These findings shed new light on the sex difference in ADHD and point to opportunities for early risk assessment and primary prevention of ADHD.