

Association of Gestational Age at Birth With Symptoms of Attention-Deficit/Hyperactivity Disorder in Children

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Abstract

IMPORTANCE:

Preterm birth is associated with an increased risk of attention-deficit/hyperactivity disorder (ADHD); however, it is unclear to what extent this association can be explained by shared genetic and environmental risk factors and whether gestational age at birth is similarly related to inattention and hyperactivity/impulsivity and to the same extent in boys and girls.

OBJECTIVES:

To investigate the association between gestational age at birth and symptoms of ADHD in preschool and school-age children after adjusting for unmeasured genetic and environmental risk factors.

DESIGN, SETTING, AND PARTICIPANTS:

In this prospective, population-based cohort study, pregnant women were recruited from across Norway from January 1, 1999, through December 31, 2008. Results of a conventional cohort design were compared with results from a sibling-comparison design (adjusting for genetic and environmental factors shared within families) using data from the Norwegian Mother and Child Cohort Study. Data analysis was performed from October 1, 2017, through March 16, 2018.

EXPOSURES:

Analyses compared children and siblings discordant for gestational age group: early preterm (delivery at gestational weeks 22-33), late preterm (delivery at gestational weeks 34-36), early term (delivery at gestational weeks 37-38), delivery at gestational week 39, reference group (delivery at gestational week 40), delivery at gestational week 41, and late term (delivery after gestational week 41).

MAIN OUTCOMES AND MEASURES:

Maternally reported symptoms of ADHD in children at 5 years of age and symptoms of inattention and hyperactivity/impulsivity at 8 years of age. Covariates included child and pregnancy characteristics associated with the week of delivery and the outcomes.

RESULTS:

A total of 113 227 children (55 187 [48.7%] female; 31 708 [28.0%] born at gestational week 40), including 33 081 siblings (16 014 female [48.4%]; 9705 [29.3%] born at gestational week 40), were included in the study. Children born early preterm were rated with more symptoms of ADHD, inattention, and hyperactivity/impulsivity than term-born children. After adjusting for unmeasured genetic and environmental factors, children born early preterm had a mean score that was 0.24 SD (95% CI, 0.14-0.34) higher on ADHD symptom tests, 0.33 SD (95% CI, 0.24-0.42) higher on inattention tests, and 0.23 SD (95% CI, 0.14-0.32) higher on hyperactivity/impulsivity tests compared with children born at gestational week 40. Sex moderated the association of gestational age with preschool ADHD symptoms, and the association appeared to be strongest among girls. Early preterm girls scored a mean of 0.8 SD (95% CI, 0.12-1.46; $P = .02$) higher compared with their term-born sisters.

CONCLUSIONS AND RELEVANCE:

After accounting for unmeasured genetic and environmental factors, early preterm birth was associated with a higher level of ADHD symptoms in preschool children. Early premature birth was associated with inattentive but not hyperactive symptoms in 8-year-old children. This study demonstrates the importance of differentiating between inattention and hyperactivity/impulsivity and stratifying on sex in the study of childhood ADHD.