Outdoor air pollution, greenspace, and incidence of ADHD: A semi-individual study

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Abstract

BACKGROUND:
Attention deficit hyperactivity disorder (ADHD) is a frequently occurring neurodevelopmental disorder, symptoms of which first appear in early childhood. Etiology of ADHD is not well understood. We investigated whether outdoor air pollution and greenspace affect ADHD incidence in children residing in Saxony.

METHODS:
66,823 children, all beneficiaries of the statutory health insurance company AOK PLUS and born between 2000 and 2004, were followed until 2014. We considered any child with at least one ICD-10-GM F90 diagnosis by a child/adolescent psychiatrist, neuropaediatrician, or psychotherapist an ADHD case. Children's home addresses were known up to their four-digit postal code area. Population-weighted mean values of particulate matter with diameter of < 10 μm (PM10), nitrogen dioxide (NO2), and MODIS Normalized Difference Vegetation Index (NDVI) were calculated for 186 postal code areas. Associations with each exposure were assessed by two-level adjusted Poisson regression models.

RESULTS:
2044 children (3.06%) were diagnosed with ADHD within the observation period. An increase of PM10 and NO2 by 10 μg/m3 raised the relative risk of ADHD by a factor of 1.97 [95% CI: 1.35-2.86] and 1.32 [1.10-1.58], respectively. A 0.1-unit increase in NDVI decreased the relative risk of ADHD by a factor of 0.82 [0.68-0.98]. Better access to child/adolescent psychiatrists was the most important confounder that increased ADHD risk across all models.

CONCLUSION:
Our results provide some evidence that air pollution might affect ADHD. Future studies with more detailed address information and better control for confounders, in particular socioeconomic status and parental psychopathology, should replicate the observed associations.