Children's Environmental Health Network

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Title

Exposure to Road Traffic Noise and Behavioral Problems in 7-Year-Old Children: A Cohort Study

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Abstract

Background

Traffic noise is an increasing problem in modern society throughout the world and has been regularly associated with adverse effects on human health and development. One area of particular concern is the association of traffic noise pollution with adverse neuro-psychological effects in children. Previous studies have indicated that children living in proximity to high levels of traffic noise pollution are at greater risk of developing learning and cognitive impairments, including difficulties with reading and memorization problems; however, findings with regard to behavioral problems related to traffic noise pollution have been inconsistent.

Objective

To investigate whether residential road traffic noise exposure is associated with behavioral problems in 7-year-old children.

Methods

A birth cohort of 46,940 children born in Denmark was formed during 1996-2002. Parents were interviewed twice: once at the 12th week of pregnancy, and again when their children were 7 years of age. Information was collected on behavior problems at 7 years of age, along with complete residential address history. The addresses were included in a noise-predicting model to estimate exposure for each study participant. To determine behavior problems, children's behaviors were assessed by the parent-reported Strengths and Difficulties Questionnaire (SDQ). The five subscales that were examined in the questionnaire were: emotional symptoms, conduct problems, hyperactivity/inattention, peer relationship problems, and prosocial behaviors. Care was taken to include questions related to maternal lifestyle factors during pregnancy, such as alcohol consumption and smoking habits, as well as questions related to maternal mental health. These and other possible confounding factors, including air pollution indicators, were accounted for in adjusted analyses.

Results

Exposure to residential road traffic from birth until 7 years of age was significantly, positively associated with parent-reported hyperactivity/ inattention problems at 7 years. The other behavioral subscales were also positively associated with the noise, but the associations were not statistically significant, and exposure to noise *during* pregnancy was not associated with any of the 5 behavioral problem subscales in childhood.

Conclusion

The findings from this study support the evidence that high levels of residential road traffic in early childhood may be associated with increased behavioral problems, particularly with regard to hyperactivity and inattention symptoms.

Policy Implications

Established in 1972, the Noise Control Act (NCA) established a national policy to promote an environment for all Americans free from noise pollution that would endanger their physical and mental health. Under the NCA, the U.S. Environmental Protection Agency (EPA) was given the authority to regulate noise emissions from numerous sources,

including any motors or engines[1]. Thus EPA's Office of Noise Abatement and Control (ONAC) set limits on noise emitted from motorcycles and medium and heavy trucks. However, ONAC lost funding in 1982 as the Administration decided to shift primary responsibility of noise regulation to state and local governments. Direct regulatory action at the federal level provides the most effective public health intervention with regard to noise pollution, but requires support from Congress and prioritization within national public health agendas.

Increased noise monitoring and mapping can inform targeted traffic noise pollution interventions. State and local governments can alter certain aspects of the built environment, such as through: adoption of sustainable building design that addresses acoustics; use of low-noise pavement in vehicular high-speed areas; and adoption of safe siting practices (away from noise pollution sources) of residential areas, schools and child care facilities[2]. Healthy community design can incorporate preventive strategies such as: providing safe and plentiful pedestrian and bicycle infrastructure to facilitate walking and biking; and consideration of cumulative noise from other sources in addition to traffic-related noise.

Reference

Article available in Environmental Health Perspectives.

Keyword(s)

Environmental Noise

For more information on noise and children's health, and for tips to reduce children's exposure to noise pollution, the Children's Environmental Health Network offers an Eco-Healthy Child Care® fact sheet on Noise Pollution.

[1] Summary of the Noise Control Act. EPA. (2015). http://www.epa.gov/laws-regulations/summary-noise-control-act

[2] Hammer MS, Swinburn TK, and Neitze RL. (2014). Environmental Noise Pollution in the United States: Developing an Effective Public Health Response. *Environmental Health Perspectives, 122*: 115-119.