

LETTER TO THE EDITOR

Traffic-related air pollution and dry night cough during the first 8 years of life

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Editor,

With great interest, we read the article by Sucharew et al. (1) published in this journal. The authors studied the association between traffic exhaust exposure and recurrent dry night cough during the first 3 yr of life in a cohort of 550 children of allergic parents living in the greater Cincinnati Ohio area. Children with traffic exhaust exposures in the highest tertile were found to have a 45% [adjusted odds ratio (95% confidence interval) 1.45 (1.09–1.94)] increased risk of recurrent dry night cough compared to less exposed children.

Few studies so far have investigated the association between exposure to traffic-related air pollution and dry night cough, and most data published so far including the data presented by Sucharew et al.(1) were limited to young children. Gehring et al. (2) reported significant positive associations between traffic-related air pollution (fine particulate matter, $PM_{2.5}$; nitrogen dioxide, NO_2 ; and soot) and dry night cough during the first year of life for 1756 participants of two German birth cohort studies living in the city of Munich [adj. OR (95% CI) 1.31 (1.07–1.60) per $1.5 \mu g/m^3$ increase in $PM_{2.5}$; 1.36 (1.07–1.74) per $8.5 \mu g/m^3$ NO_2 ; and 1.27 (1.04–1.55) per $0.4 \times 10^{-5}/m$ soot]. During the second year of life, these associations were attenuated. Within the Dutch Prevention and Incidence of Asthma and Mite Allergy (PIAMA) birth cohort study (3), we collected information on asthma and related symptoms including dry cough during the first 8 yr of life by means of annual standardized questionnaires. We recently reported statistically significant positive associations between traffic-related air pollution and the incidence of asthma [odds ratio (95% confidence interval) per $3.2 \mu g/m^3$ increase in $PM_{2.5}$ 1.28 (1.10–1.49)] and prevalence of asthma [1.26 (1.04–1.51)] as well as the prevalence of wheeze [1.20 (1.08–1.33)] and prevalence of asthma symptoms [1.15 (1.02–1.28)] during the first 8 yr of life (4). Age-specific associations from models with air pollution/age interaction terms revealed little variation of the effects of air pollution on asthma and related symptoms with age. Findings were similar for NO_2 and soot. Dry night cough was not considered as a health outcome in this analysis.

We do have information on traffic-related air pollution and dry night cough for a total of 3861 children. The annual prevalence of dry night cough ranged from 13.6 to 23.3% during the first 8 yr of life (Fig. 1). We analyzed the association between dry night cough and annual average levels of traffic-related air pollution (fine particulate matter, $PM_{2.5}$;

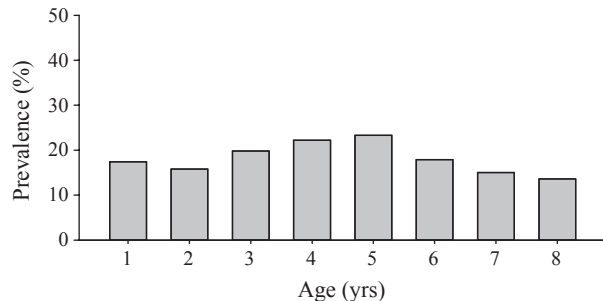


Figure 1 Prevalence of dry night cough at ages 1–8 yr.

nitrogen dioxide, NO_2 ; and soot) at the birth address by means of generalized estimation equations (GEE) as described previously (4) adjusting for confounding variables. Overall, there was a significant positive association between dry night cough and traffic-related air pollution [adj. OR (95% CI) 1.11 (1.02–1.22) per $3.2 \mu g/m^3$ increase in $PM_{2.5}$;

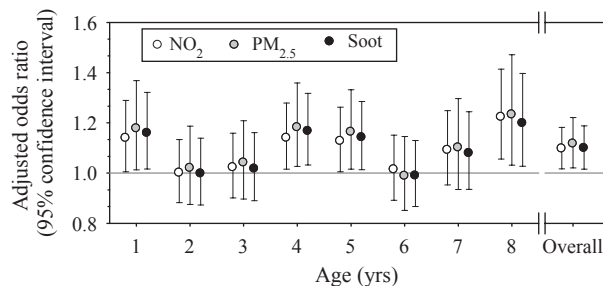


Figure 2 Adjusted overall and age-specific association between annual average levels of air pollution at the birth address and dry night cough during the first 8 yr of life. Results are presented as adjusted odds ratios with 95% confidence intervals. We adjusted for gender, study arm (natural history; intervention with mite-impermeable mattress covers; intervention with placebo mattress covers), parental allergies, parental education, maternal smoking during pregnancy, breastfeeding at 3 months, gas stove, unvented gas water heater, any siblings at birth, any smoking in the child's home, signs of dampness in living room/child's bedroom, any pets at home, daycare attendance during the 1st year of life, and Dutch nationality. ORs were calculated for an interquartile range increase in air pollution levels ($10.4 \mu g/m^3$ for NO_2 , $3.2 \mu g/m^3$ for $PM_{2.5}$, and $0.57 \times 10^{-5}/m$ for soot).

1.09 (1.01–1.18) per $10.4 \mu\text{g}/\text{m}^3$ NO_2 ; and 1.10 (1.01–1.19) per $0.57 \times 10^{-5}/\text{m}^1$ soot]. Age-specific odds ratios were significantly increased at some ages with no systematic pattern (Fig. 2). To facilitate the comparison of our findings with the findings by Sucharew et al. (1) and to explore the impact of parental allergies on the association between traffic-related air pollution and dry night cough, we repeated the analysis within the group of children with allergic parents ($N = 1183$). Results remained largely unchanged [adj. OR (95% CI) 1.13 (1.03–1.23) per $3.2 \mu\text{g}/\text{m}^3$ increase in $\text{PM}_{2.5}$; 1.10 (1.02–1.19) per $10.4 \mu\text{g}/\text{m}^3$ NO_2 ; and 1.11 (1.02–1.20) per $0.57 \times 10^{-5}/\text{m}$ soot].

The association between traffic-related air pollution and dry night cough is less consistent between ages than the associations between traffic-related air pollution and the incidence and prevalence of asthma and the prevalence of asthma symptoms that we reported earlier. Nevertheless, our findings support the findings by Sucharew et al. (1) published in this journal and the findings from the German birth cohort studies (2). Our findings come from a larger cohort and were not restricted to high-risk children. Associations between traffic-related air pollution and dry night cough in this study were weaker than the associations reported from the US and German studies (1, 2). The reason for this is not clear. Estimated air pollution levels in this study were comparable to those in

the German study, and the differences between the present study and the US study could not be explained by the restriction of the latter to children of allergic parents.

Our findings suggest that the association between traffic-related air pollution and dry night cough persists beyond the first 3 yr of life.

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References

- Sucharew H, Ryan PH, Bernstein D, et al. Exposure to traffic exhaust and night cough during early childhood: the CCAAPS birth cohort. *Pediatr Allergy Immunol* 2010; **21**: 253–9.
- Gehring U, Cyrus J, Sedlmeir G, et al. Traffic-related air pollution and respiratory health during the first two years of life. *Eur Respir J* 2002; **19**: 690–8.
- Brunekreef B, Smit J, de Jongste J, et al. The prevention and incidence of asthma and mite allergy (PIAMA) birth cohort study: design and first results. *Pediatr Allergy Immunol* 2002; **13** (Suppl 15): 55–60.
- Gehring U, Wijga AH, Brauer M, et al. Traffic-related air pollution and the development of asthma and allergies during the first 8 years of life. *Am J Respir Crit Care Med* 2010; **181** (6): 596–603.