Does proximity to residential traffic influence blood pressure in adolescents?

Erica Marrone[1] BSc; Cristina Longo[2,3] PhD; Jennifer O'Loughlin[4] PhD; and Tracie Barnett[1,3,5] PhD

[1]Department of Family Medicine, McGill University; [2]Faculty of Pharmacy, Université de Montréal; [3]CHU Sainte-Justine Children's Hospital Research Centre; [4]School of Public Health, Université de Montréal; [5]Epidemiology and Biostatistics Unit, INRS-Institut Armand Frappier

McGill | Department of Family Medicine | Département de médecine de famille

Background

- Elevated blood pressure (BP) puts children and adolescents at risk for:
  - developing cardiovascular pathologies, notably left ventricular hypertrophy, and
  - developing hypertension and cardiovascular disease later in life
- Residential traffic may impact BP; plausible mechanisms include:
  - exposure to **transport noise** → reduced sleep quality and adverse stress response → elevated BP
  - exposure to **air particulate matter** → inflammatory response in the lungs → release of chemical mediators → altered autonomic nervous system control of cardiac rhythm → elevated BP
- To date, the association between traffic noise/air pollution and BP has only been studied in children (<13 years old) and adults (>18 years old), but not in adolescents

Objectives

<u>Primary</u>: To examine the relationship between residential traffic and blood pressure among adolescents

<u>Secondary</u>: To examine the role of material and social deprivation (potential modifier or confounder)

Participants & Setting

Purposive sample of 10 public secondary schools in or near Montreal, Canada
- English, French
- Urban, suburban, rural
- SES (low, medium, high)

Methods

Design: Cross-sectional analysis in 2004 when students were in grade 11 (mean age: 17.0 years)

Exposures:
- Area-level traffic indicators within a 750-metre radius from residential postal code (buffer zone)
- Air quality data (N_2O, O_3, $PM_{2.5}$)

Outcome: Systolic BP (SBP) and diastolic BP (DBP) measured by trained technicians using a Dinamap® oscillometric device

Potential confounders: Sex, BMI, deprivation, ethnicity

Analysis: Descriptive statistics; assess how deprivation and other characteristics modify association between traffic and BP; multivariate regression models adjusting for confounders; GEE to account for school clustering effects

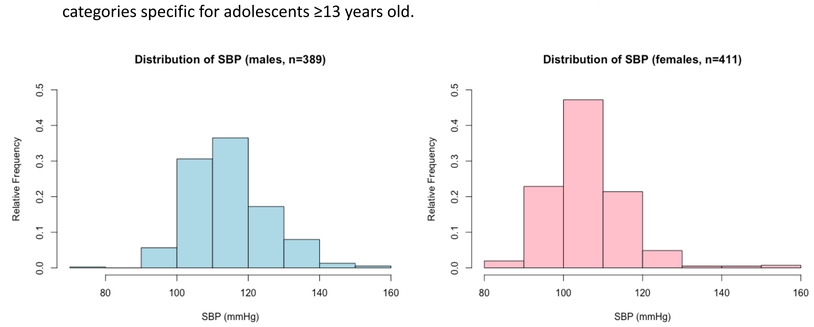
Data sources:
1. **NDIT:** a longitudinal study of the natural course of nicotine dependence in youth where self-report questionnaires were completed in class every 3 months from grade 7 to 11
2. **MEGAPHONE:** a Montreal-based geographic information system
3. **CANUE**: Canadian Urban Environmental Health Research Consortium; a national database containing information about air pollution, socioeconomic conditions & more

NDIT	MEGAPHONE	CANUE
• SBP and DBP • Body Mass Index (BMI) • Age • Sex • Physical activity • Postal code • Demographic information	• Length of roads in buffer zone with and without heavy traffic • Density of private dwellings within buffer zone	• Material and social deprivation indices from 2001 Census • Annual average concentration of nitrous oxide at postal code • Annual average concentration of ground level ozone at postal code • 3-year annual average concentration of fine particulates ($PM_{2.5}$) at postal code

Preliminary Results

Distribution of SBP measures[1] (%)			
	Males (n=389)	**Females (n=411)**	**Total (n=800)**
Normal BP (<120mmHg)	35.0	48.2	83.2
Elevated BP (120-129mmHg)	8.5	2.4	10.9
Stage I HTN (130-139mmHg)	4.0	0.4	4.4
Stage II HTN (≥140mmHg)	0.9	0.6	1.5

[1]Categories are according to the 2017 *Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents* by the American Academy of Pediatrics. These categories specific for adolescents ≥13 years old.



- Prevalence of hypertension (HTN) in this cohort is **roughly 6%** which is significantly higher than the estimated prevalence in the literature 3.5%
- Stage I HTN is significantly more prevalent in **males** compared to females

Next Steps

- Obtain CANUE data and link to NDIT data via postal code
- Create relevant indices of exposures
- Analyze distribution of environmental exposures
- Complete analyses

Funding

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