Parental Stress Increases the Detrimental Effect of Traffic Exposure on Children's Lung Function

ONLINE DATA SUPPLEMENT

Talat Islam, Robert Urman, W.James Gauderman, Joel Milam, Fred Lurmann, Ketan Shankardass, Ed Avol, Frank Gilliland, Rob McConnell

Study population

Participants were children in eight southern California communities with heavy traffic corridors selected from a larger 13-community CHS cohort established in 2002-2003. During the 2007-2008 school year, lung function was measured on 1,811 children from these eight communities. Of the 1811, 1,523 children have been followed since 2002-2003 and 288 children were first time observed during 2007-2008. Due to the unavailability of comparable stress information in this new cohort of children, they were excluded from the current study. Of the 1,523 children with longitudinal follow-up information, 124 were excluded from the current study as stress information at baseline was missing.

At study entry, a questionnaire was sent to the home of each participant to be completed by a parent. Questions regarding the child's medical history, socio-demographic information and home characteristics were included. We also inquired about perceived stress of the parent in the baseline questionnaire. Yearly follow up questionnaires, including the year of lung function testing, inquired about child's medical history (i.e., new diagnosis of physician diagnosed asthma or new onset wheeze) and home characteristics (i.e. exposure to second hand smoking). However, the yearly follow-up questionnaires conducted through the year of lung function measurement were much shorter than the baseline questionnaire and did not collect information about stress. Children excluded from the sensitivity analyses restricted to those without asthma were those with a history of asthma diagnosis reported at study entry, defined as prevalent asthma, or new onset physician-diagnosed asthma reported on any yearly follow-up questionnaire.

In the baseline questionnaire the parents were asked two questions about the child's race and ethnicity: "What is your child's racial or ethnic background?" and 'Is your child of Hispanic or Spanish or Latino descent?". In the current manuscript, we have kept the race and Hispanicity responses separate. However, we could have combined the two questions to create a single race-ethnicity variable. If any parent responded affirmatively to the hispanicity questions, then the child was considered 'Hispanic'. Using the single race-ethnicity definition, the distribution in the current sub-population (n=1399) would be: 769 Hispanic White (54.9%) , 473 non-Hispanic White (33.8%), 59 Asian (4.2%), 19 African American (1.4%), 67 mixed (4.8%) and 12 others, including Native American (0.9%).

Other covariate information included a parental history of asthma, maternal smoking while pregnant with the child, household income and responding parent's education, health insurance for the child, and current second-hand tobacco smoke exposure in the child's home at the time of the questionnaire. Housing characteristics included type of house, presence of air conditioner, pests in the home during the previous year, a dog or cat in the home, and mold or mildew on household surfaces.

Statistical methods:

As described in the Methods section of the manuscript, we fitted a hierarchical two-stage multiple linear regression model to investigate associations between the three previously described pulmonary function outcomes and indicators of TRP exposure. A base model was first developed using variables that are known predictors of lung function measurements. The base model included age at time of lung function testing, sex, an interaction term between age and

sex, race, an indicator for Hispanic ethnicity, log of height (measured at time of lung function testing) and its squared value, body-mass index (BMI) and its squared value, presence of acute respiratory illness during lung function testing, indicator variables for which field technician administered the test, and indicator variables for study community. A log transformation of each pulmonary function measure was used to satisfy the assumptions of linear regression. The final model included appropriate exposure (TRP at home and school), stress (dichotomized PSS) and interaction terms in addition to the base model. Additionally, the two-stage model included a random effect term for school. There were 38 schools in the eight communities.

Table E1: Effect of parental stress on lung function levels.

Lung Function	Stress Level	% Change
FEV1	Low	Ref
	High	0.41 (-0.82, 1.64)
FVC	Low	Ref
	High	0.47 (-0.73, 1.69)
MMEF	Low	Ref
	High	0.20 (-2.26, 2.72)

* Models adjusted for log height and square term for log height, BMI and square term for BMI, gender, age, age-gender interaction, race, Hispanic ethnicity, respiratory illness at time of LF, field technician, and community.

Table E2: Effect of traffic related pollutants on FEV1, stratified by health insurance status*.

TRP	Location	Has Health Insurance	No Health Insurance	Interaction
		% change (95%CI)	%change (95%CI)	p-value
NOx	Home	-1.34 (-2.9, 0.25)	-9.03 (-13.94, -3.84)	0.036
	School	0.47 (-1.64, 2.63)	2.30 (-7.70, 13.38)	0.590

* Models adjusted for log height and square term for log height, BMI and square term for BMI, gender, age, age-gender interaction, race, Hispanic ethnicity, respiratory illness at time of PFT, field technician, and community. Percent (%) change was scaled to 2 standard deviations (NOx=21.8ppb, NO=16.2ppb, NO2=7.3ppb) of the TRP difference between home and school (averaged across schools).

Table E3: Effect of traffic related pollutants on FEV1among children with health insurance, stratified by parental stress status.*

TRP	Location	Low Parental Stress % change (95%CI)	High Parental Stress %change (95%CI)	Interaction p-value
NOx	Home	0.87 (-1.39, 3.18)	-3.70 (-5.86, -1.49)	0.015
	School	2.78 (-0.16, 5.80)	-1.75 (-4.85, 1.45)	0.130

* Models adjusted for log height and square term for log height, BMI and square term for BMI, gender, age, age-gender interaction, race, Hispanic ethnicity, respiratory illness at time of PFT, field technician, and community. Percent (%) change was scaled to 2 standard deviations (NOx=21.8ppb, NO=16.2ppb, NO2=7.3ppb) of the TRP difference between home and school (averaged across schools).