




# Health Outcomes Research: The Gilliland Study

Bert Brunekreef, PhD on behalf of  Review Committee

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# Strengths of the Study

- Unique and rich data sets spanning two decades:
  - monitoring data across southern California
  - health outcomes data for several cohorts
- Solid attempt to bring together data from multiple disciplines and agencies
- Multiple air quality regulations implemented during this time period



# Initial Review – Central Issue

“To what extent does this research convince the reader that the observed changes in lung function growth and bronchitis symptoms are primarily due to changes in air pollution concentrations, and not the result of trends in demographics, health care delivery, or other secular trends?”

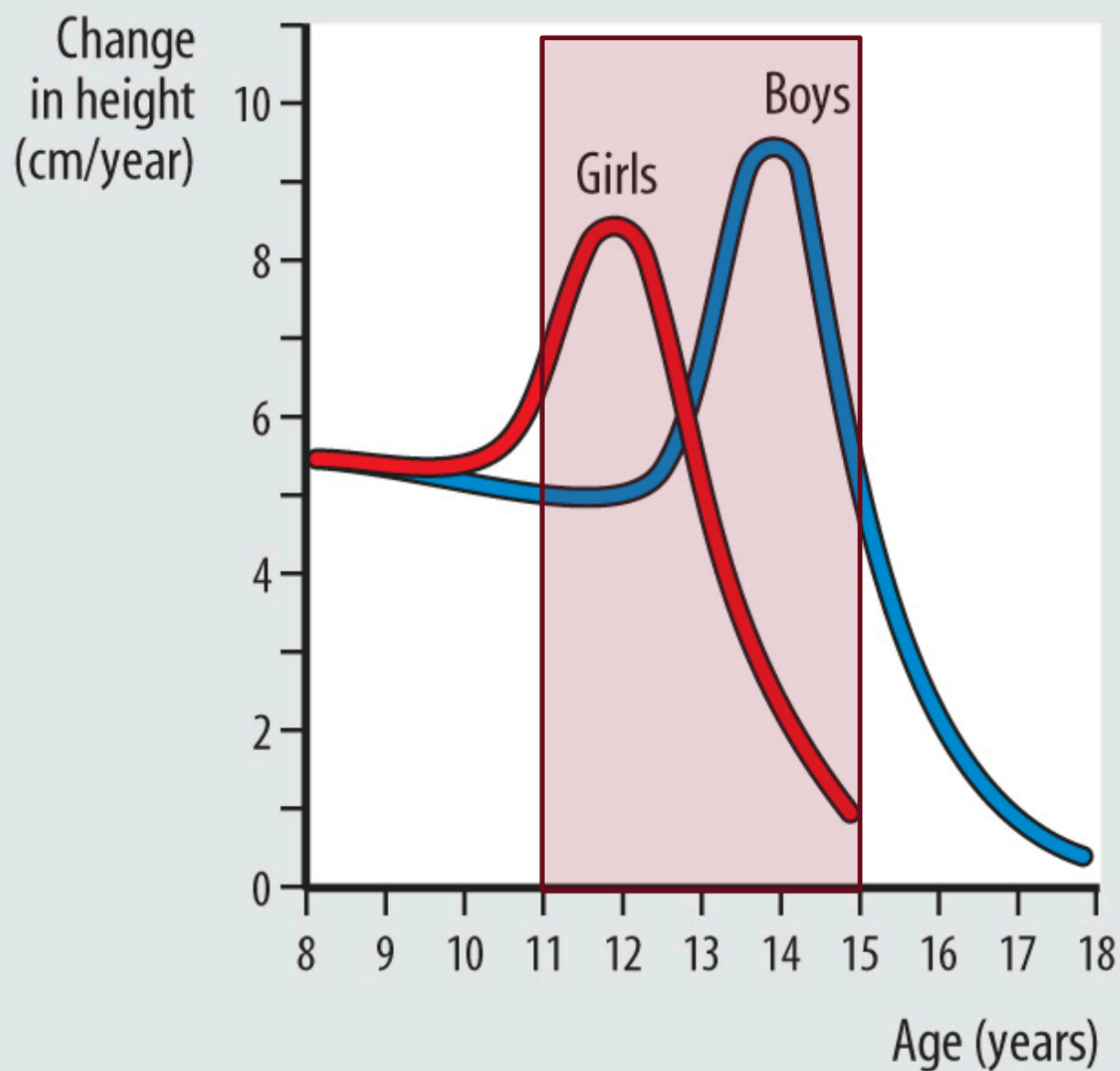


# Changes in Population?

- Is it possible that there are fundamental differences among the cohorts that may have affected lung function (and chronic bronchitic (CB) symptoms)?
  - Ethnic and demographic shifts over time ✓
  - Shift in puberty onset in later years ✓
  - Environmental tobacco smoke exposure ✓
  - Health care delivery (more aggressive outpatient asthma treatment in children) ~✓
  - Trends in enrollment and loss to follow-up in cohort
  - Absence of information on traffic-related pollution ✓



## Male and female comparative growth rates



# Gauderman NEJM 2015

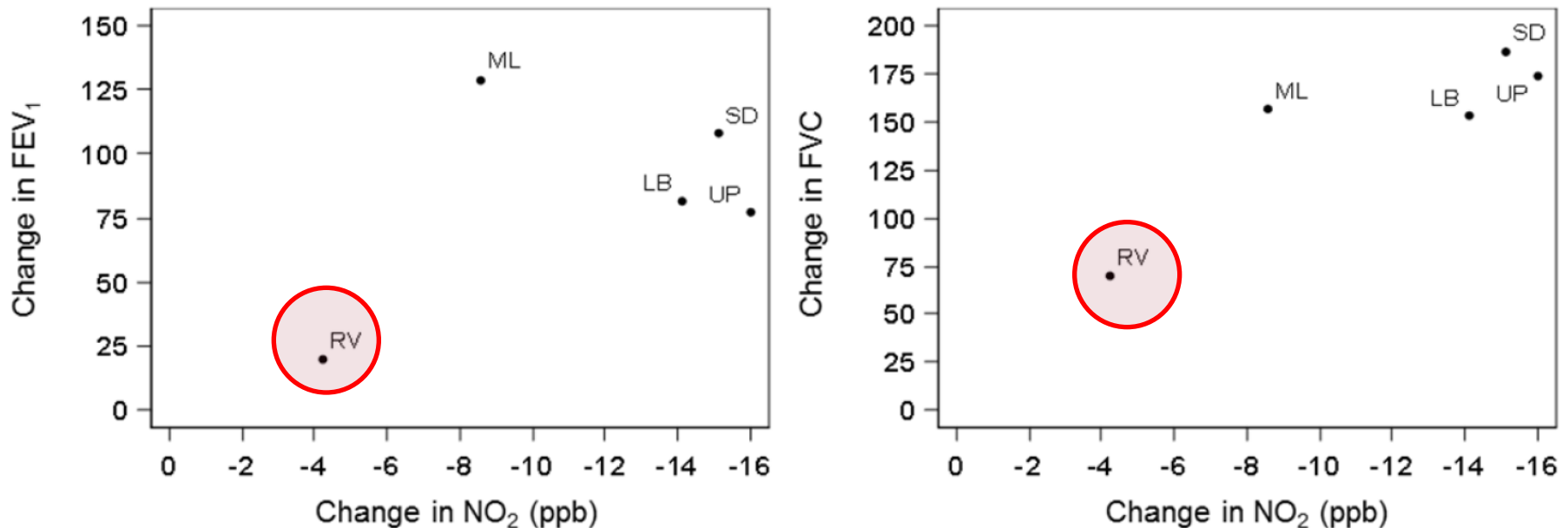
**Table S5: Estimated difference in 4-yr height growth for average decreases in ambient pollutant levels**

Pollutant	Growth, age 11 to 15		
	Difference		P-value
NO <sub>2</sub>	-0.39	(-1.12, 0.34)	0.29
O <sub>3</sub> (10-6)	0.01	(-0.44, 0.46)	0.97
PM <sub>10</sub>	-0.24	(-0.81, 0.34)	0.42
PM <sub>2.5</sub>	-0.14	(-0.83, 0.56)	0.70



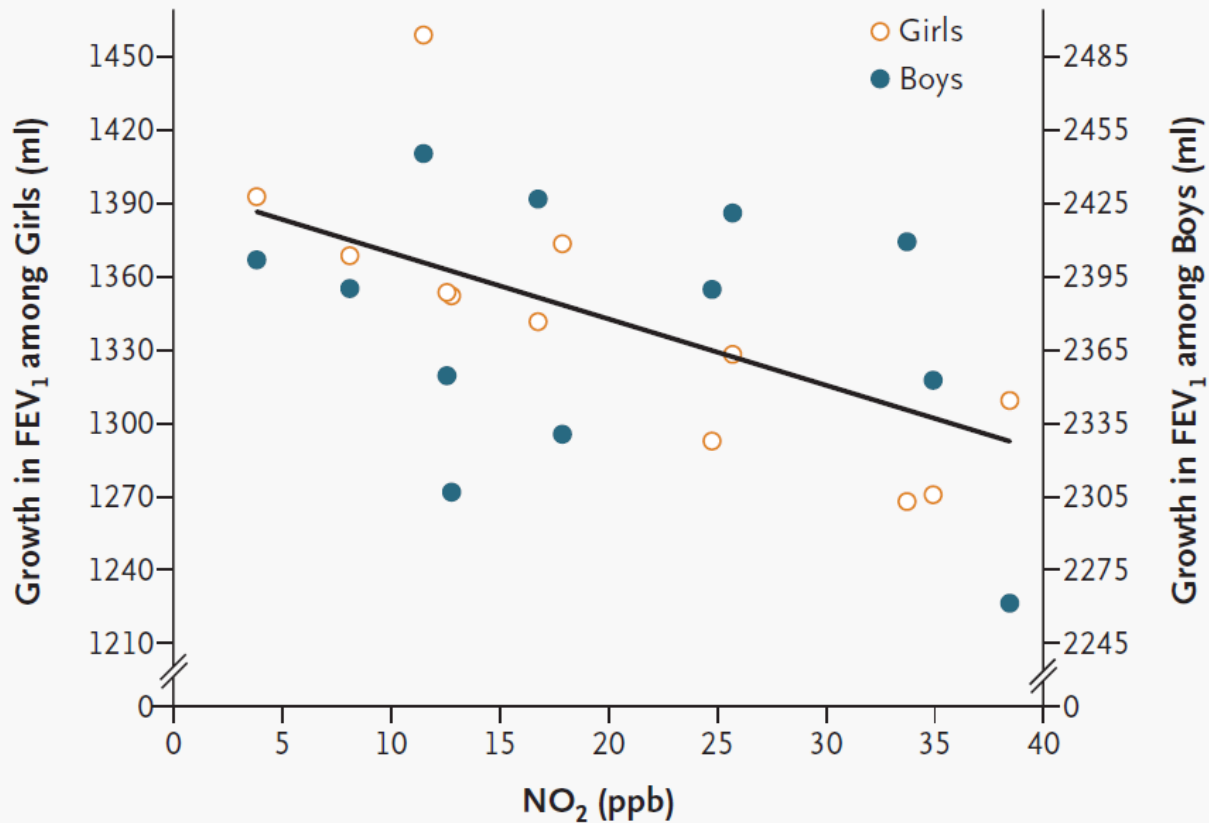
# Gauderman NEJM 2015

Figure S5: Predicted change in 4-yr lung function growth (vertical change in the trend lines of Figure 2) versus the change in average  $\text{NO}_2$  over the study period (horizontal change in the trend lines of Figure 2) for each community (LB=Long Beach, ML=Mira Loma, RV=Riverside, SD=San Dimas, UP=Upland)





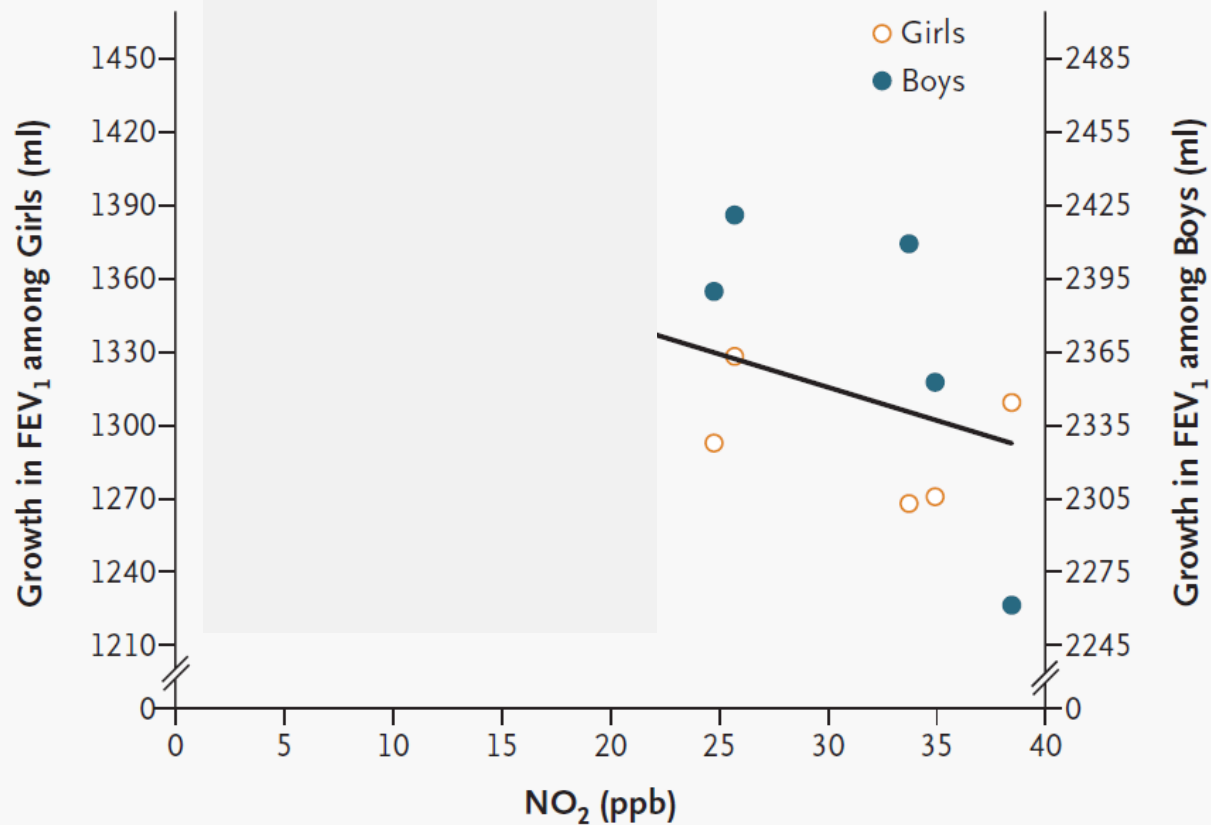
# Gauderman NEJM 2004



**Figure 2.** Community-Specific Average Growth in FEV<sub>1</sub> among Girls and Boys During the Eight-Year Period from 1993 to 2001 Plotted against Average Nitrogen Dioxide (NO<sub>2</sub>) Levels from 1994 through 2000.

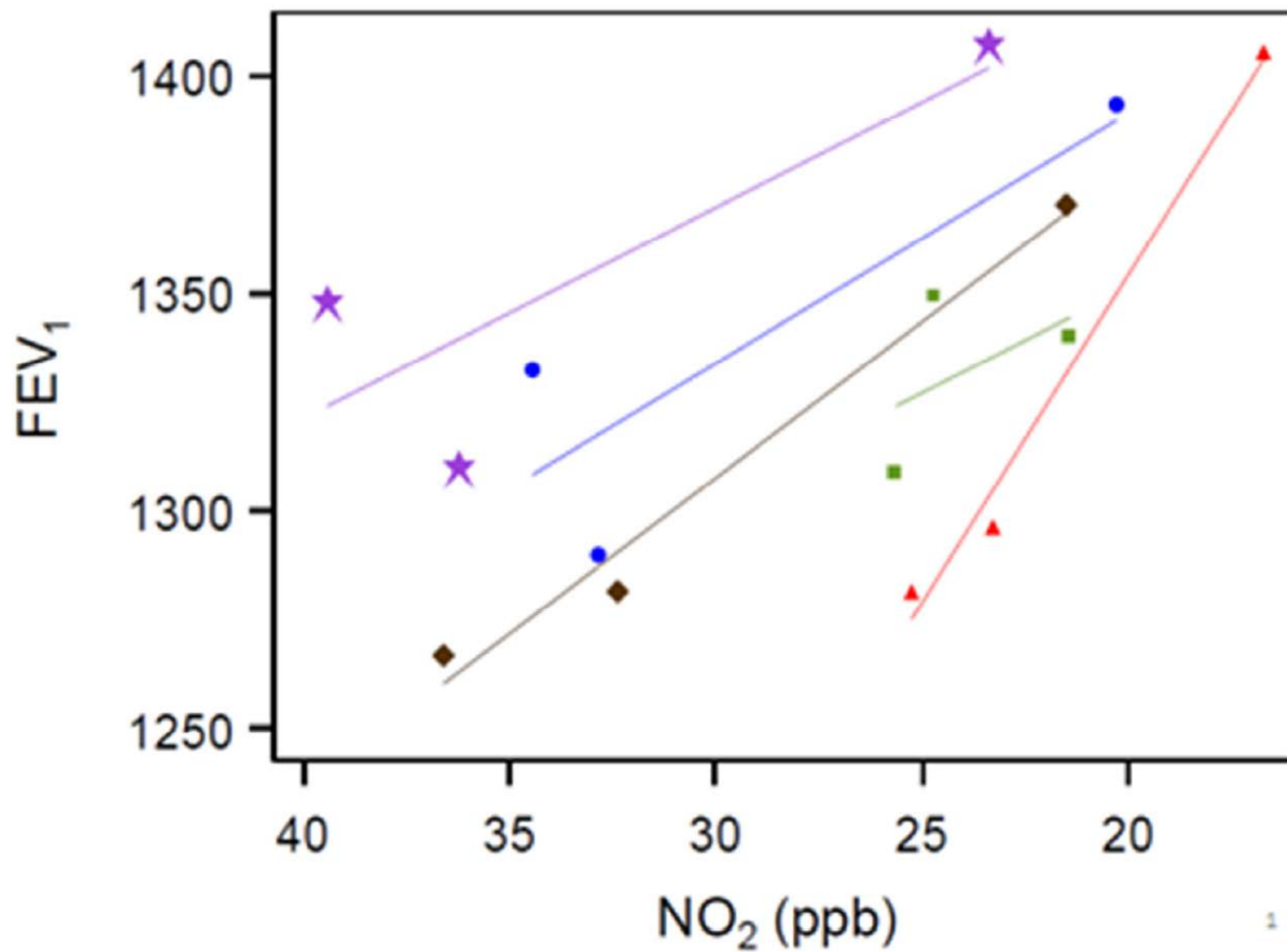


# Gauderman NEJM 2004



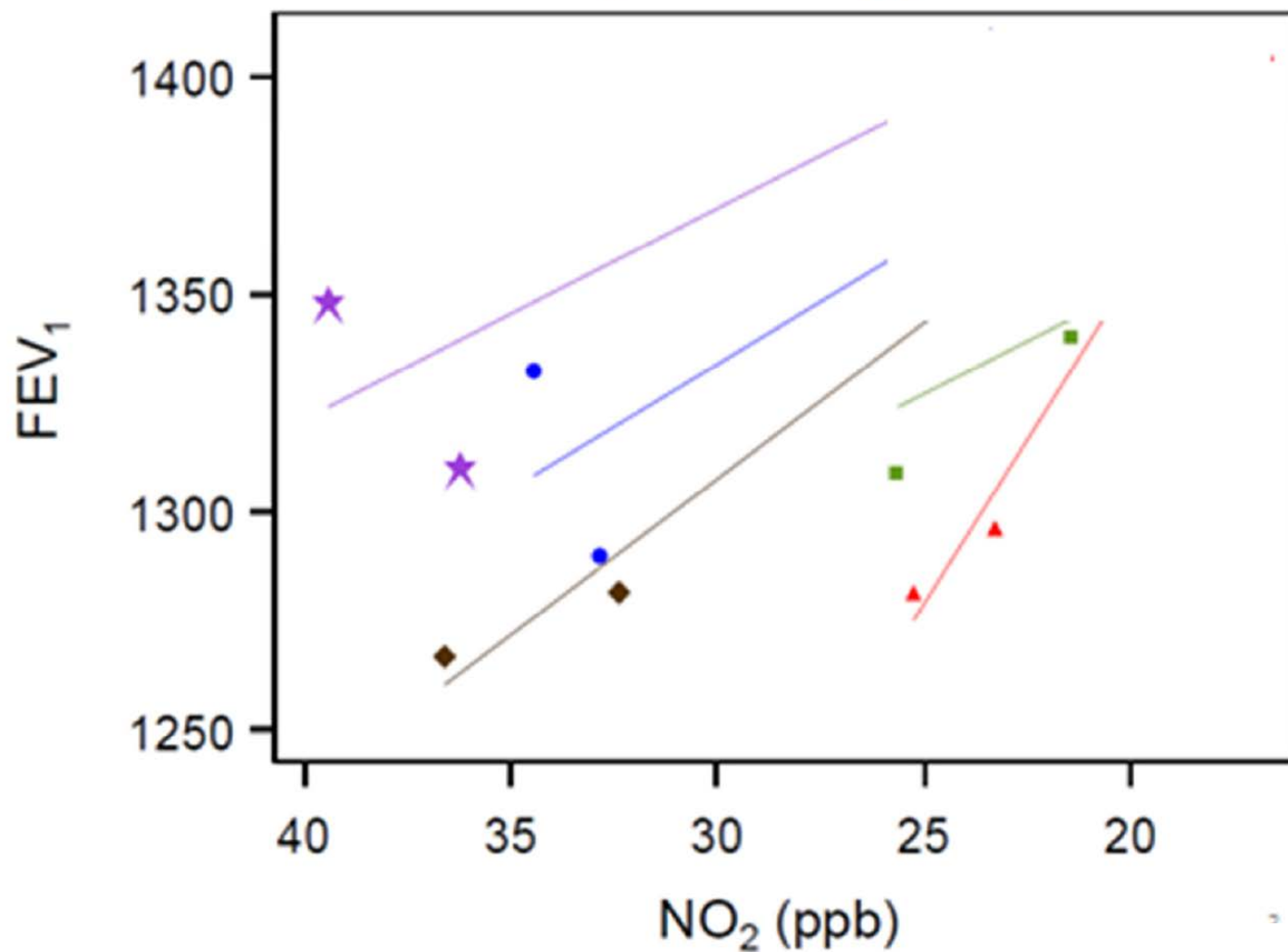
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## USC report Figure 7



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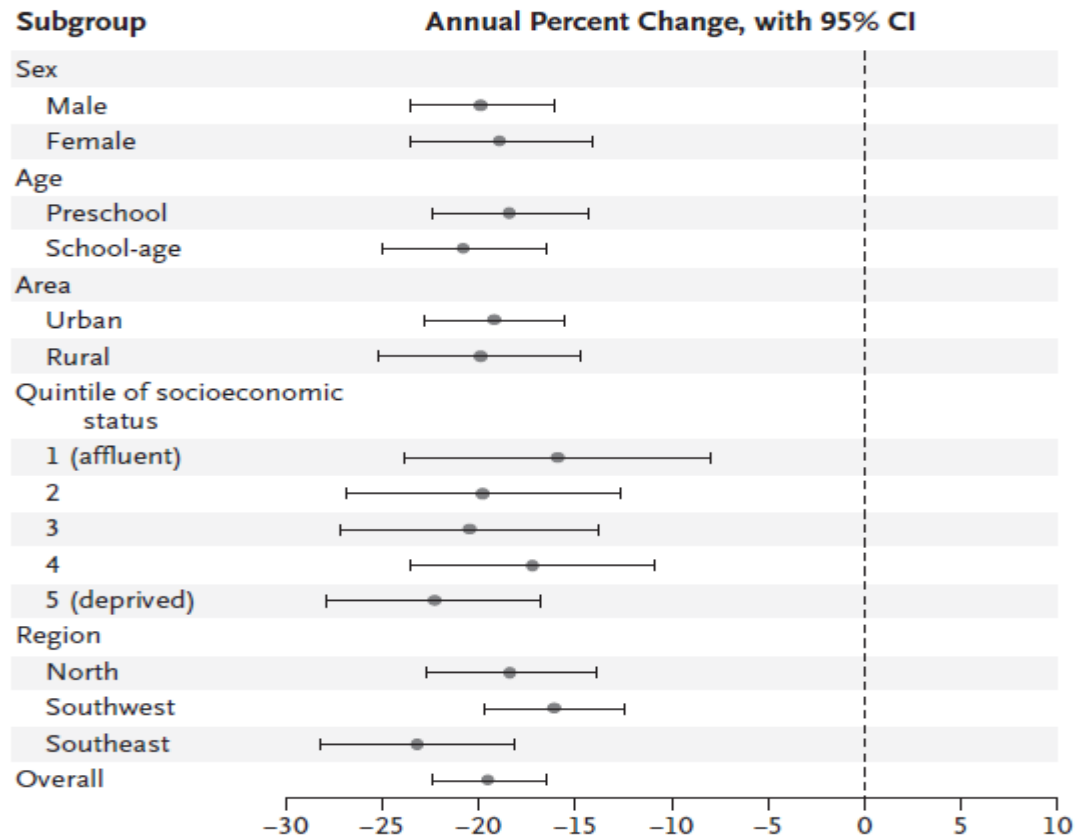


# Smoke-free Legislation and Hospitalizations for Childhood Asthma

Daniel Mackay, Ph.D., Sally Haw, B.Sc., Jon G. Ayres, M.D.,  
Colin Fischbacher, M.B., Ch.B., and Jill P. Pell, M.D.

NEJM

2010



**Figure 2.** Forest Plot of the Adjusted Annual Change in the Rate of Hospital Admissions for Asthma after Implementation of Smoke-free Legislation, According to Subgroup.

The annual change shown here is the change relative to the rate on March 26, 2006 — the date on which the smoke-free legislation was implemented. Analyses were adjusted for sex, age group, urban or rural area, quintile of socioeconomic status, and region.



# Status of Gilliland report

- Report still in purgatory (i.e., HEI Review Committee)
- Revised version will be submitted soon



HEI



**A relatively benign...**

**COMMENTARY**  
**Health Review Committee**

**INTRODUCTION**

Epidemiologic studies conducted in a variety of locations have reported that short-term increases of particulate matter (PM<sub>10</sub>) at low atmospheric concentrations are asso-

pollutant concentrations; and (4) the within-subject and between-subjects variations of personal exposure. In addition, only limited data are available on the composition of ambient aerosol mixtures, which, when defined, might permit pollutants to be apportioned to indoor and outdoor

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**An Unpublished report**



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