

# Lead Exposure and the Black- White Test Score Gap

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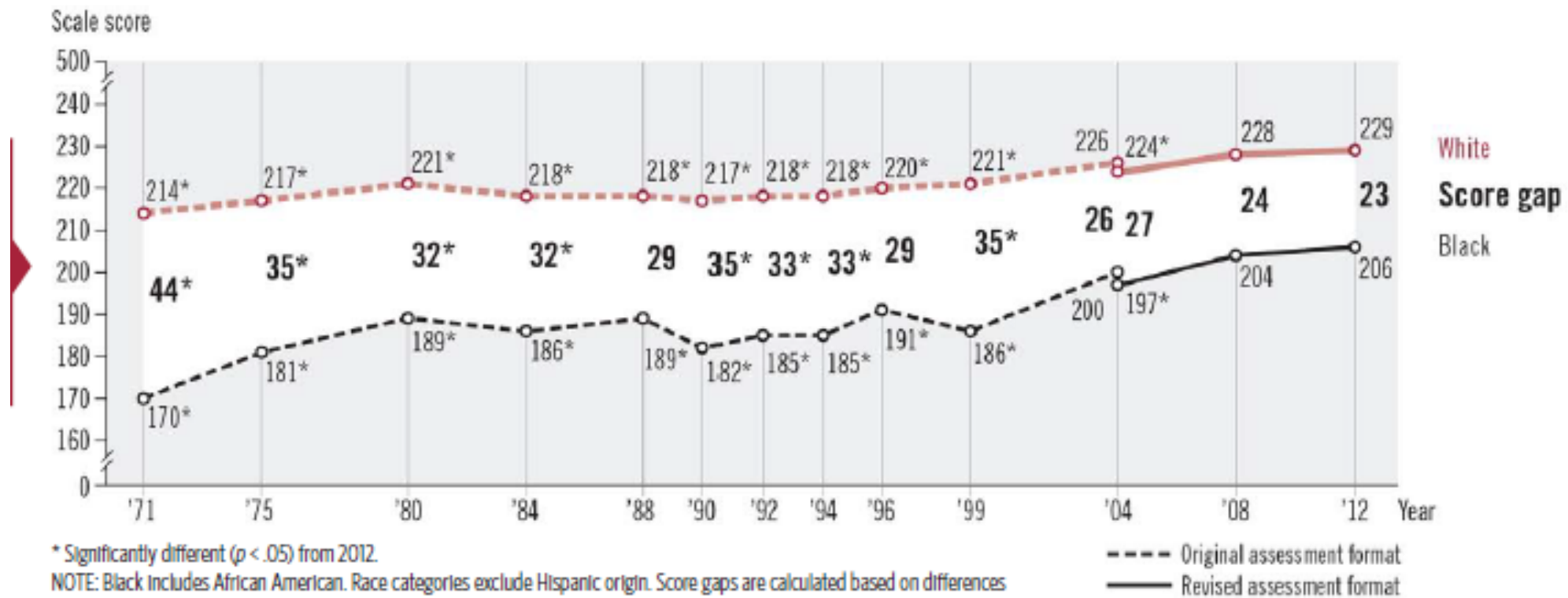
Janet Currie

Peter Simon

Patrick Vivier

# Racial Disparities in Test Scores

**Figure 7.** Trend in NAEP reading average scores and score gaps for White and Black 9-year-old students



\* Significantly different ( $p < .05$ ) from 2012.

NOTE: Black includes African American. Race categories exclude Hispanic origin. Score gaps are calculated based on differences between unrounded average scores.

# Large literature examining causes of the gap

- Reviewed by Jencks and Phillips, eds (2008 and 2011) and Magnuson and Waldfogel, eds (2008)
- Consider the following factors:
  - Family income
  - Family structure
  - Parenting practices
  - Quality of educational inputs
  - School segregation (Reber, 2010; Guryan, 2004))
  - Neighborhood segregation (Card and Rothstein, 2007)
- Even considering all the above factors, substantial gaps remain

# Two Related Questions:

- Can environmental inequality explain any of the racial gap in test scores?
  - African-Americans disproportionately exposed to pollutants
  - Conditional on exposure, may have fewer resources to counter negative effects (eg, nutrition)
- Can environmental regulation reduce disparities in test scores?

# Trends in racial disparities in lead & test scores

App Figure 2B: National Black-White Differences in Lead and Test Scores by Cohort, NHANES & NAEP Data



# Greater Exposure of African-Americans to Lead

- Nationally, African Americans more likely to live in old (pre 1978) housing
- Within RI, differences even greater with respect to the oldest housing
  - Due to concentration of African American in the core urban parts of the state
  - 60% of poor whites live in the urban core, 89% of poor blacks do

	RI Share in Housing Built	
	Pre 1978	Pre 1945
Black	0.83	0.52
White	0.74	0.37
<=100% FPL	0.81	0.43
>=200% FPL	0.76	0.4

# Structure of The Research:

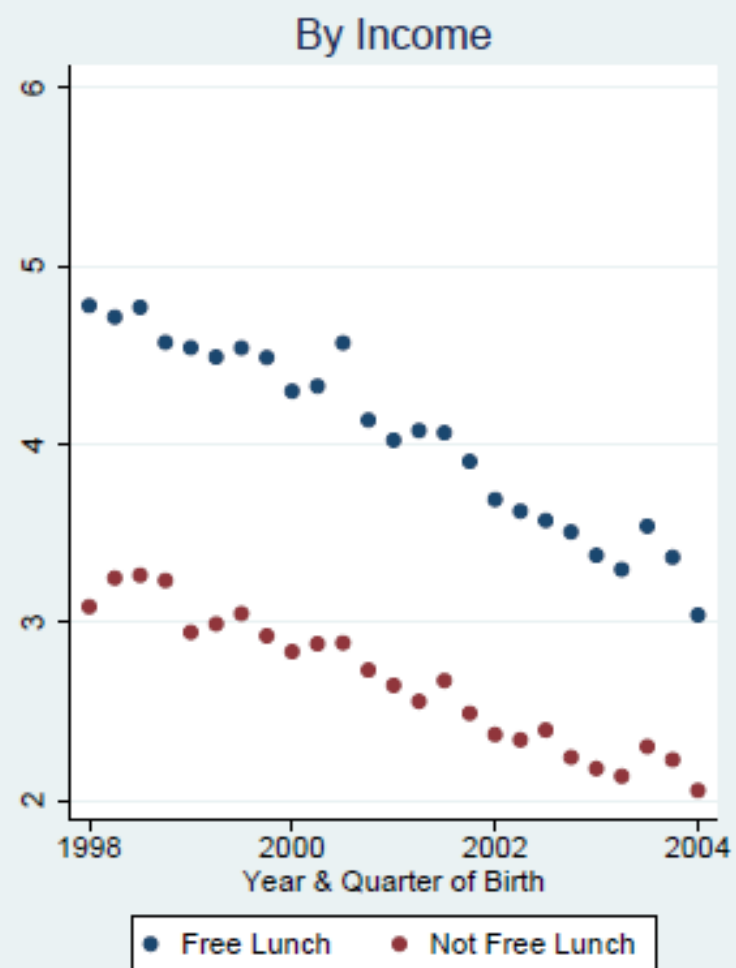
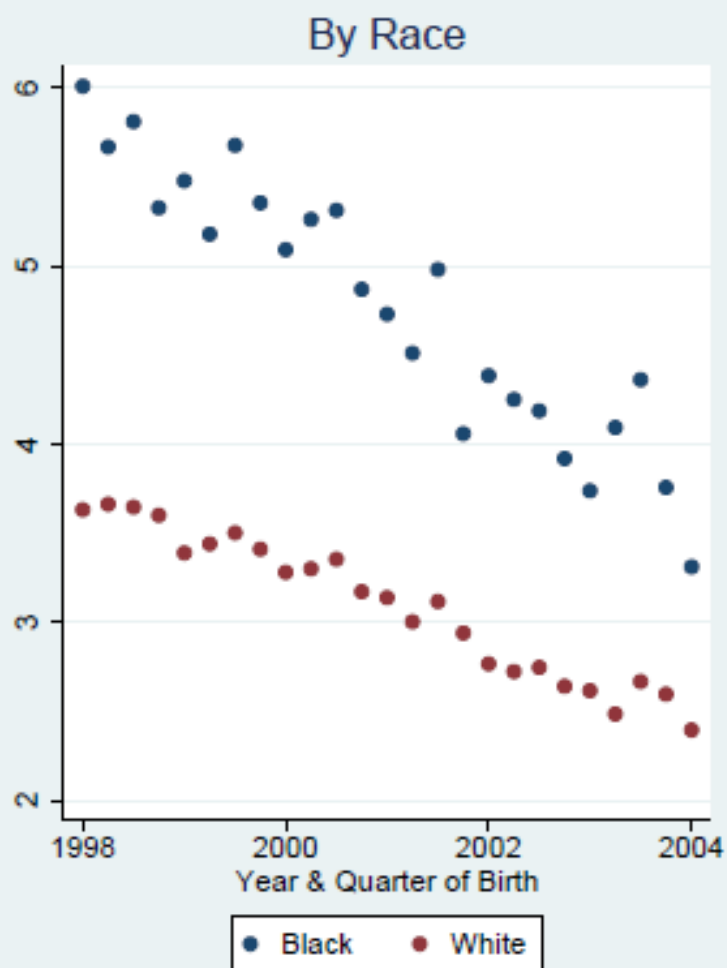
- Document disparities in lead levels by race and income
- Examine a policy aimed at reducing lead levels among RI children
  - Disproportionate declines in the lead levels of African American & the poor
- Link declining disparities in lead levels with declining disparities in test scores

# Data

- Data on child blood lead levels (BLLs) in first 72 months of life (RIDOH) linked with third through eighth grade test scores (RIDE)
  - On average, 4.7 (median=4) BLLs per child
  - Date of test, location of child, method, level
  - NECAP test scores for reading and math in grades 3-8, free-lunch status, IEP
  - Linked with vital statistics data: maternal race, ethnicity, education, marital status, birth weight, gender, month prenatal care initiated, birth order
  - Covers birth cohorts 1997-2005 in the state.
    - In RI, 80% of all children screened at least once by 36 months
    - In RI, 15-20% in private school as of 2010
    - Final sample of 70,000 linked children



Figure 3B: Trends in Lead by Child Characteristic



### Difference in Certifications per HH: 2010-1998

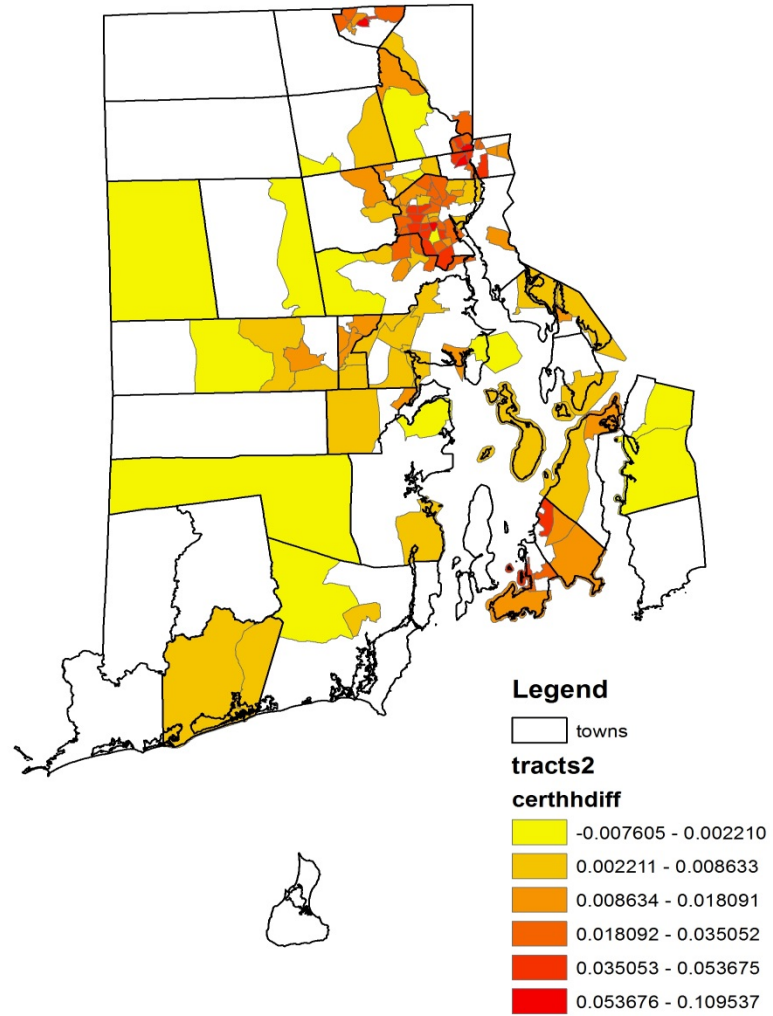
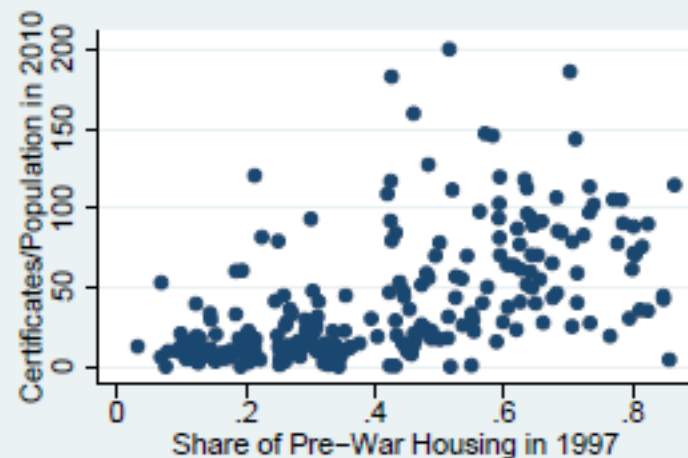
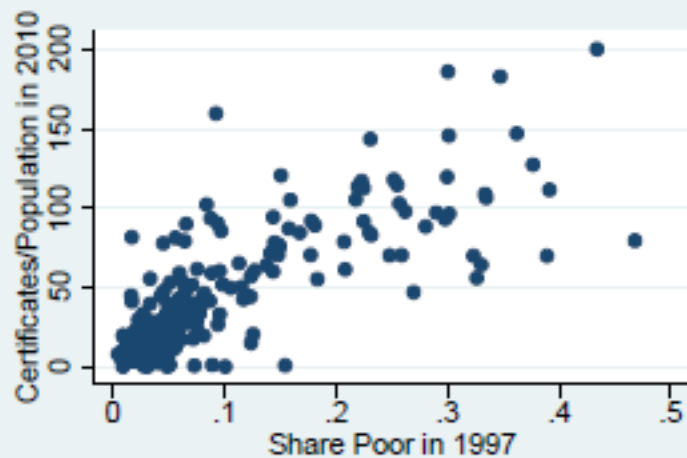
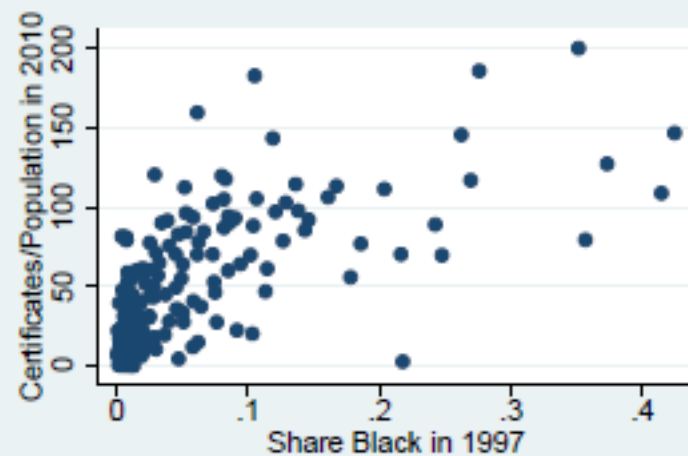
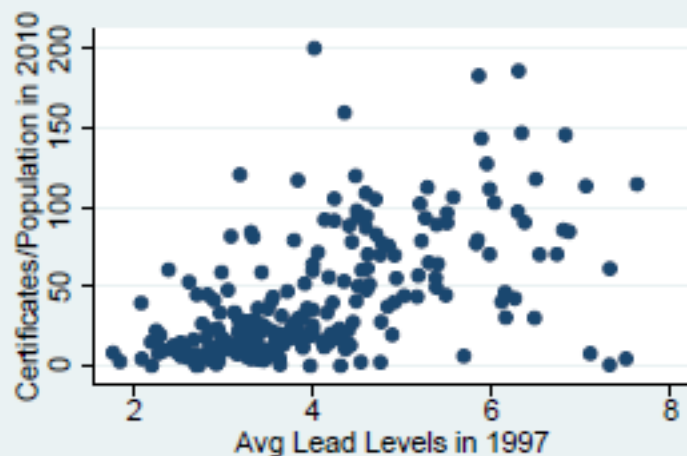


Fig 1: Certificates and 1997 Tract Characteristics



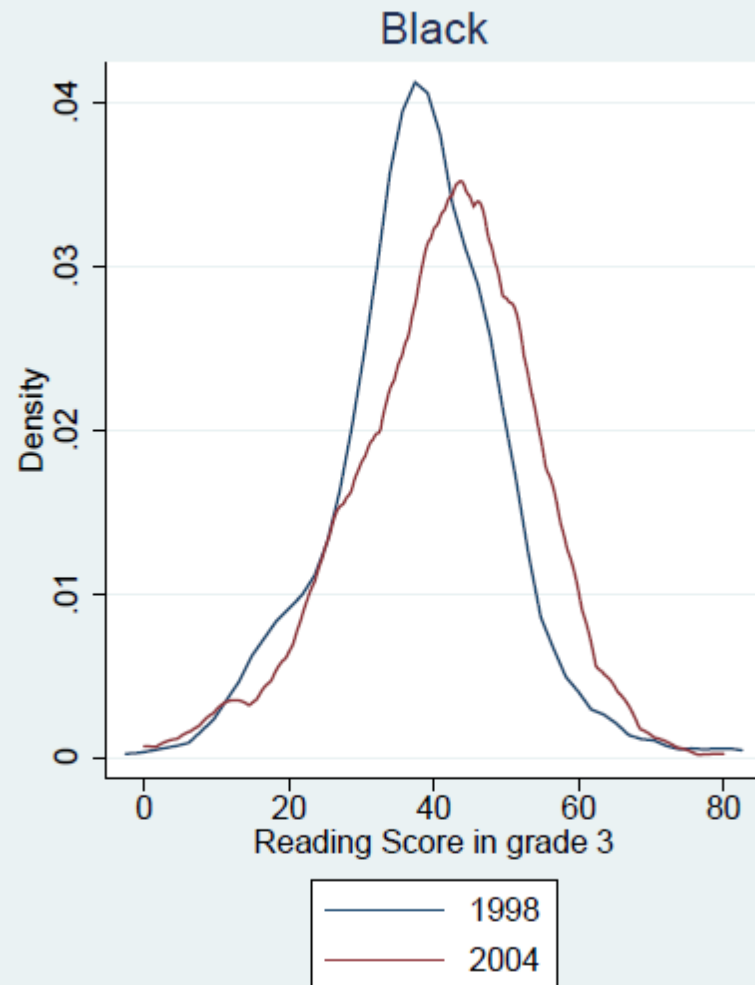
# Effect Size

- Average lead levels fell from 4 to 2.5 over this period
- On average, the rise in DOH certificates can explain 15-20% of this decline.
- DOH certificates not evenly distributed across the state: living in a neighborhood that received a high number of certificates, associated with slightly less than a doubling of the decline in lead levels

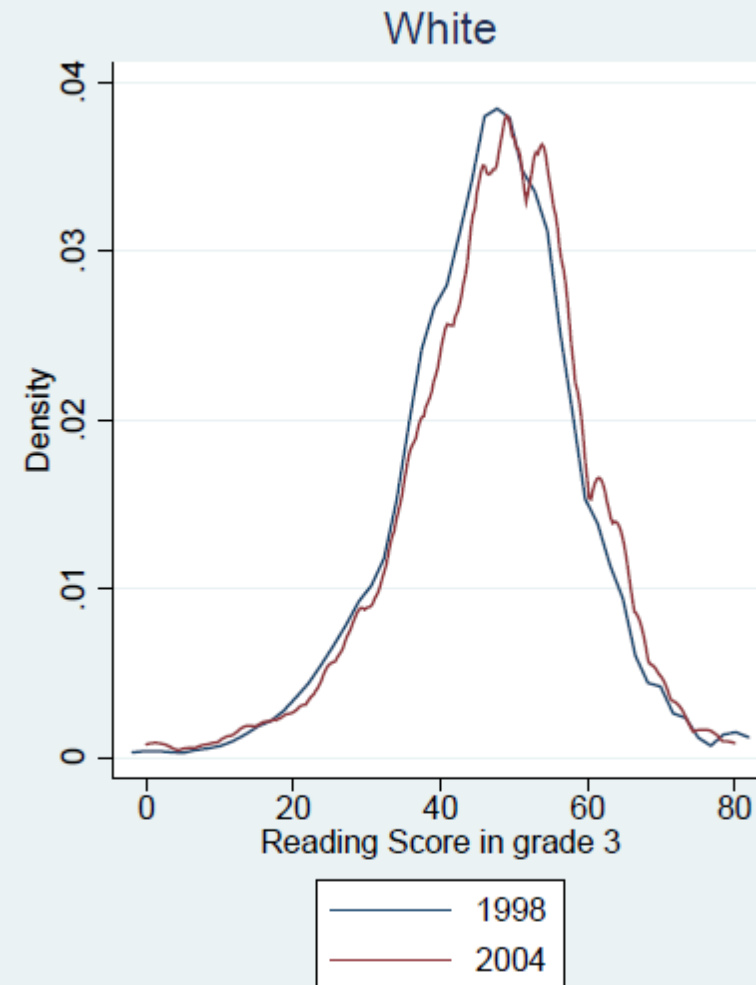
# Can lead certificates explain the disproportionate decline in lead among black children?

- More certificates in neighborhoods with a larger share black
- Within neighborhoods, black children's lead levels disproportionately affected by certificate availability
- Of the 2.3 point decline in average lead levels among African Americans for 1998-2004 birth cohorts, 52% is explained by the rise in certificates.

Figure 5C: Reading Scores by Race & Cohort



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# Trends in disparities in test scores

- Racial gap in test scores fell from 9.7 for those born in 1998 to 6.3 for those born in 2004 (from 70% to 45% of a standard deviation).
- For lead, the racial gap fell from 2.2 to 0.9 over this same period
- Based on our estimates, the decline in the gap in lead levels explains half of the decline in the test score gap.
- Income gap in test scores and lead both fell, but by smaller amounts:
  - Income test score gap fell from 9.3 to 8.4 (67% to 60% of a std deviation)
  - Income lead level gap fell from 1.83 to 0.99

# Conclusions

- RI policy targeted and disproportionately reduced the lead levels of African American and low income children
- The resulting declines in racial disparities in lead exposure can explain a substantial share of the recent decline in racial test score disparities.
  - Eliminating the black-white test score gap single most effective way to reduce racial economic inequality (Jencks and Phillips, 2011).
- Policy Implications: Targeting environmental regulation at children at greatest risk has the potential to reduce disparities in future economic outcomes