

Lead Exposure and the Black-White Test Score Gap

Anna Aizer

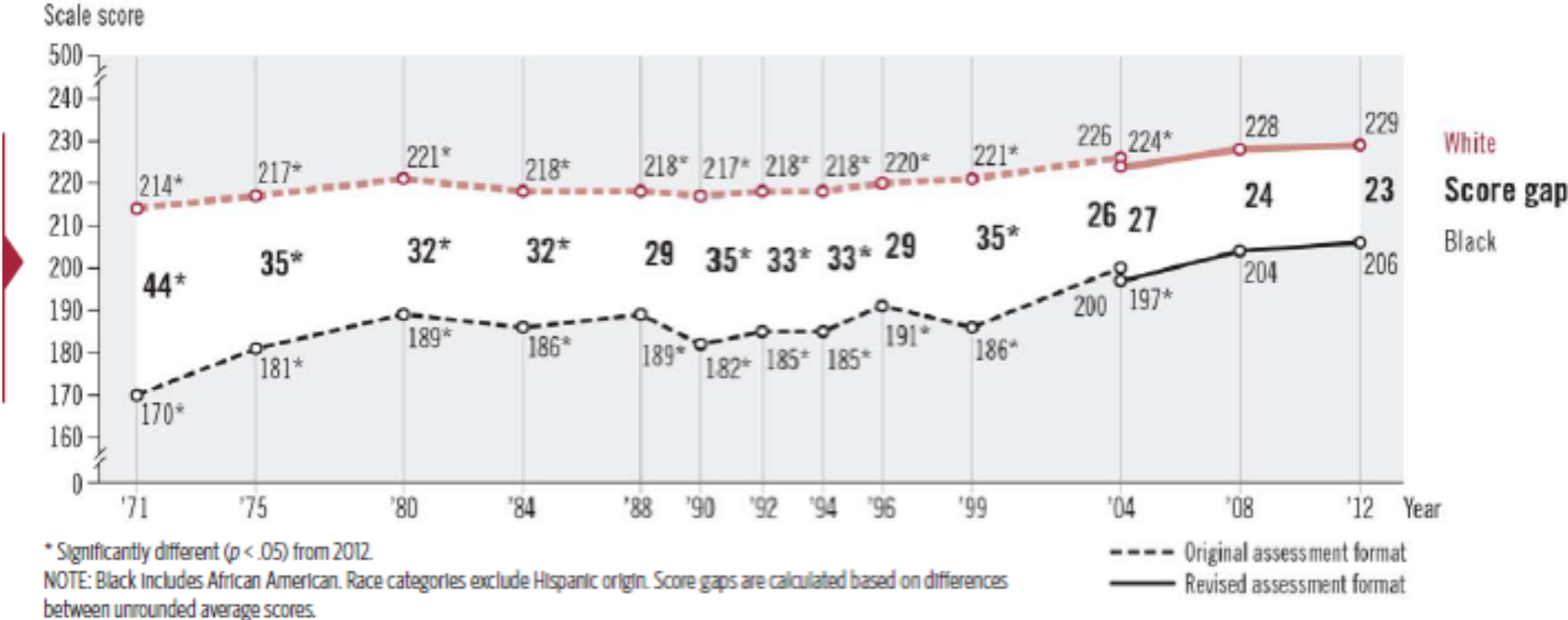
Janet Currie

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



Large literature examining causes of the gap

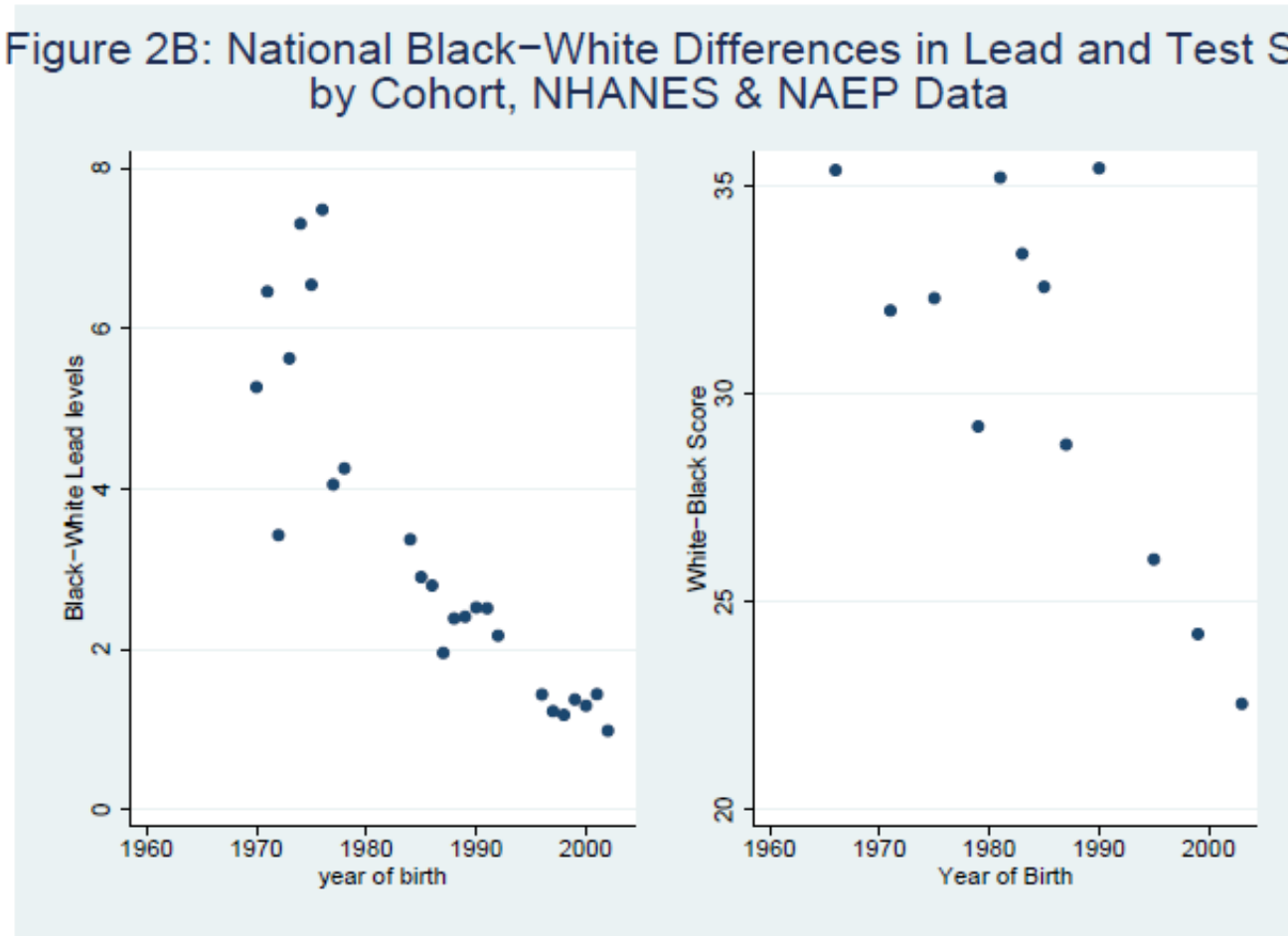
- Reviewed by Jencks and Phillips, eds (2008 and 2011) and Magnuson and Waldfogel, eds (2008)
- Consider the following factors:
 - Family income
 - Family structure
 - Parenting practices
 - Quality of educational inputs
 - School segregation (Reber, 2010; Guryan, 2004)
 - Neighborhood segregation (Card 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)
 - Conditional on exposure, institutional response may differ
- 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

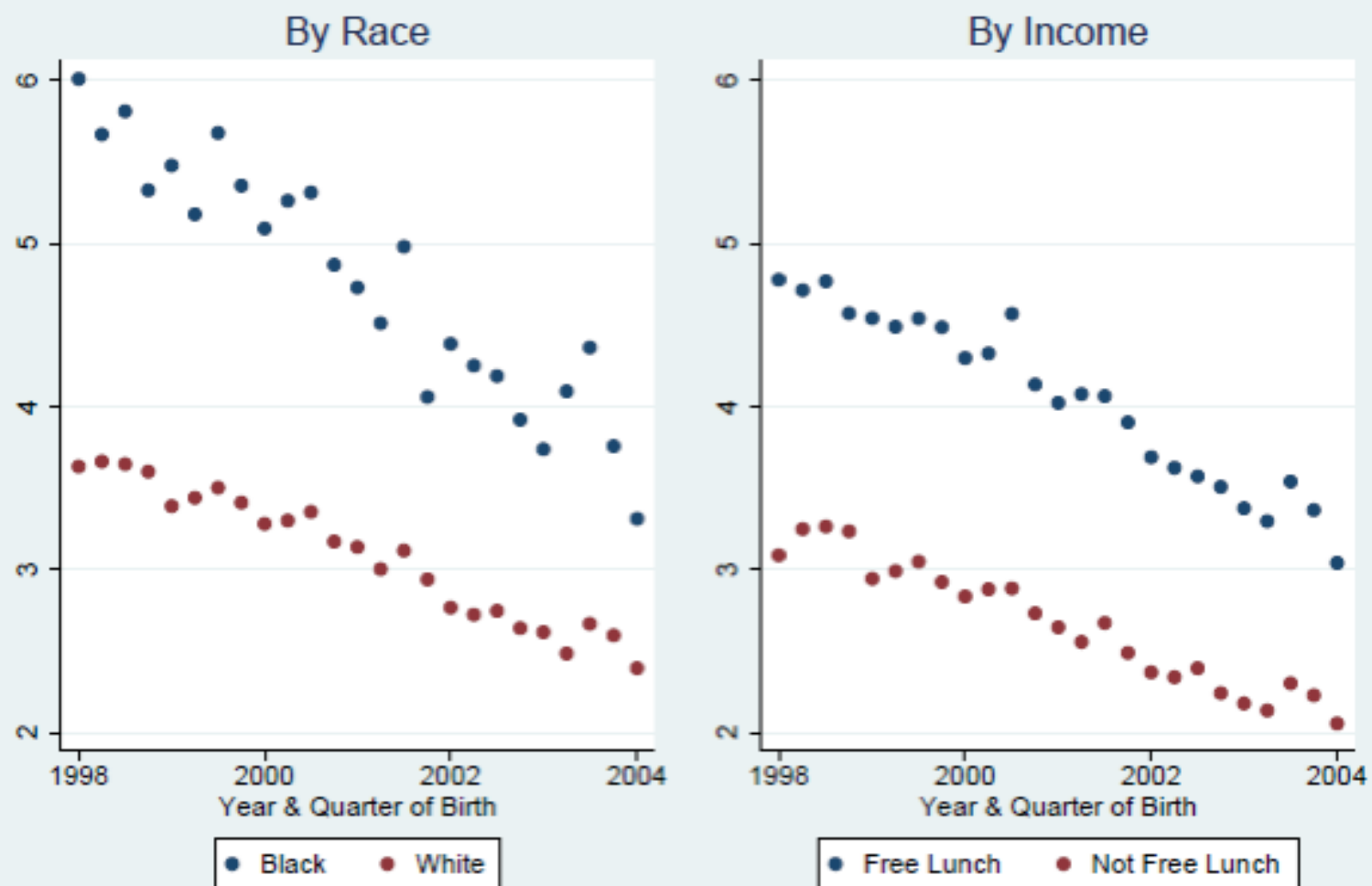
Structure of The Research:

- 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
- Link lead exposure with disciplinary infractions in school (suspensions)
 - The same level of lead exposure is more likely to result in a school suspension among African American children than among white children

RI Data Made this Possible

- Data on child blood lead levels (BLLs) in first 72 months of life (RIDOH) linked with third through eight grade test scores (RIDE)
- 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



DOH policy to mitigate lead hazards

- Provided landlords with information and modest funding to reduce lead hazards in rental properties starting in 1998
- If landlord effectively reduced lead hazards, provided a “Lead safe” certificate (more carrot than stick)
 - Incentive for the landlords: reduces legal liability
- Neighborhoods with the most certificates by 2010 were characterized by:
 - High rates of old housing
 - High lead levels in 1997
 - High rates of African American families
 - High rates of poor families

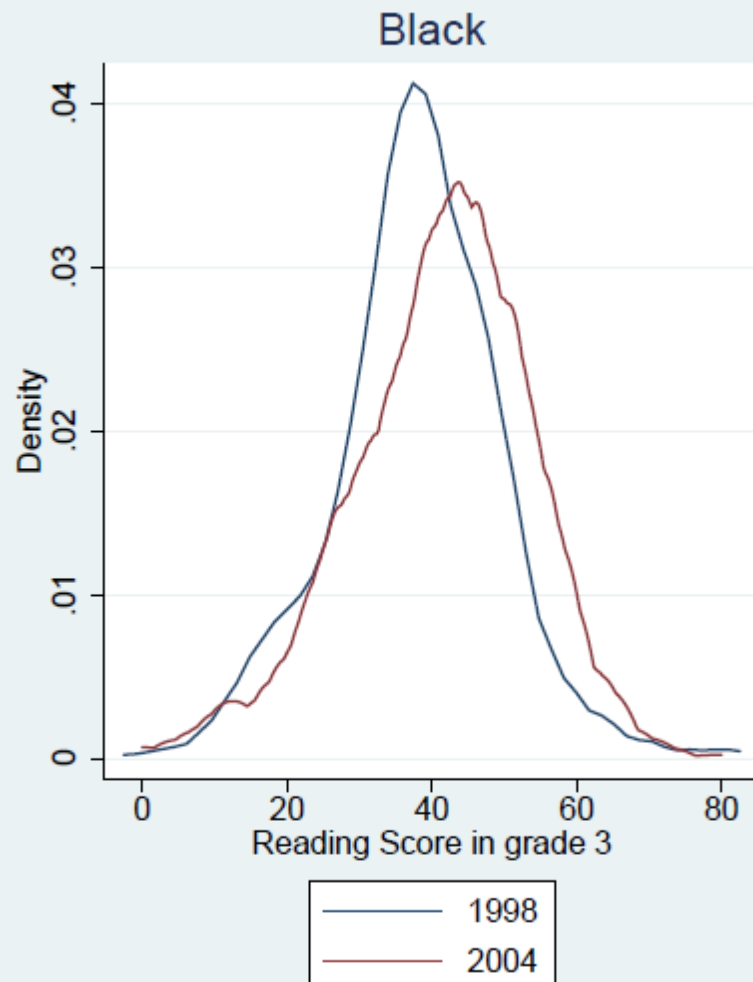
Effect Size

- 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

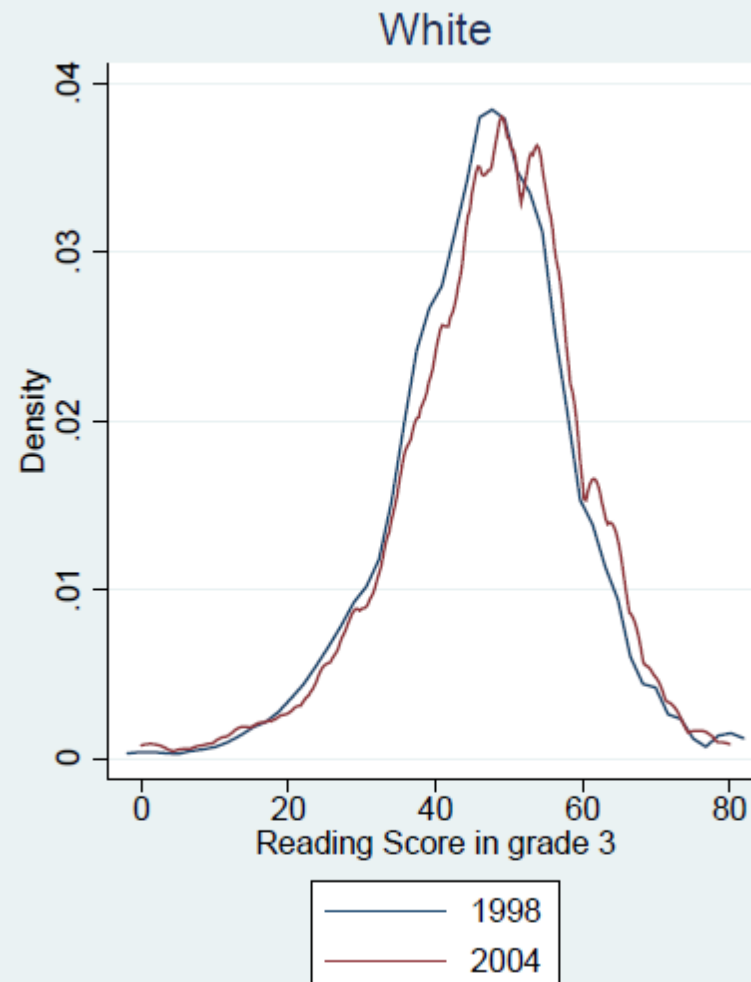
Can lead certificates explain the disproportionate decline in lead among black children?

- 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).
- Based on our estimates, the decline in the racial 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

Lead and School Suspensions

- Separate study using data on 120,000 children with linked lead and school
- A 1 ug/dl increase in average BLL increased the probability of ever being suspended by 6 % among boys
- Reductions in blood lead over the 15 year period 1990-2004 can explain a third of the 72% decline in suspensions observed over this time period.
- In RI, black school children are twice as likely to be suspended as white children, suggesting that lead exposure may play a role in explaining these disparities.

Conclusions

- African American children more likely to be exposed to lead, conditional on household income, because they are more likely to reside in the older, urban areas of the state
- 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)
- The declines in lead levels also resulted in significant reductions in school suspensions, which disproportionately affect African American children
- Policy Implications: Targeting environmental regulation at children at greatest risk has the potential to reduce disparities in future educational and, ultimately, economic outcomes