Temporal Effects of Distressed Housing on Early Childhood Risk Factors and Kindergarten Readiness*

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Funding for this study was provided by the John D. and Catherine T. MacArthur Foundation as part of the **How Housing Matters program.*

JACK, JOSEPH AND MORTON MANDEL SCHOOL OF APPLIED SOCIAL SCIENCES
CASE WESTERN RESERVE UNIVERSITY

MARCH 23-24, 2017 | WASHINGTON, D.C.
STRONGFOUNDATIONS
THE ECONOMIC FUTURES OF KIDS AND COMMUNITIES
Federal Reserve System Community Development Research Conference

Motivation

- Environment in which children spend their early years is crucial to their long-term outcomes.

- By kindergarten, children exposed to ‘toxic’ environments already well behind in their cognitive and social development.

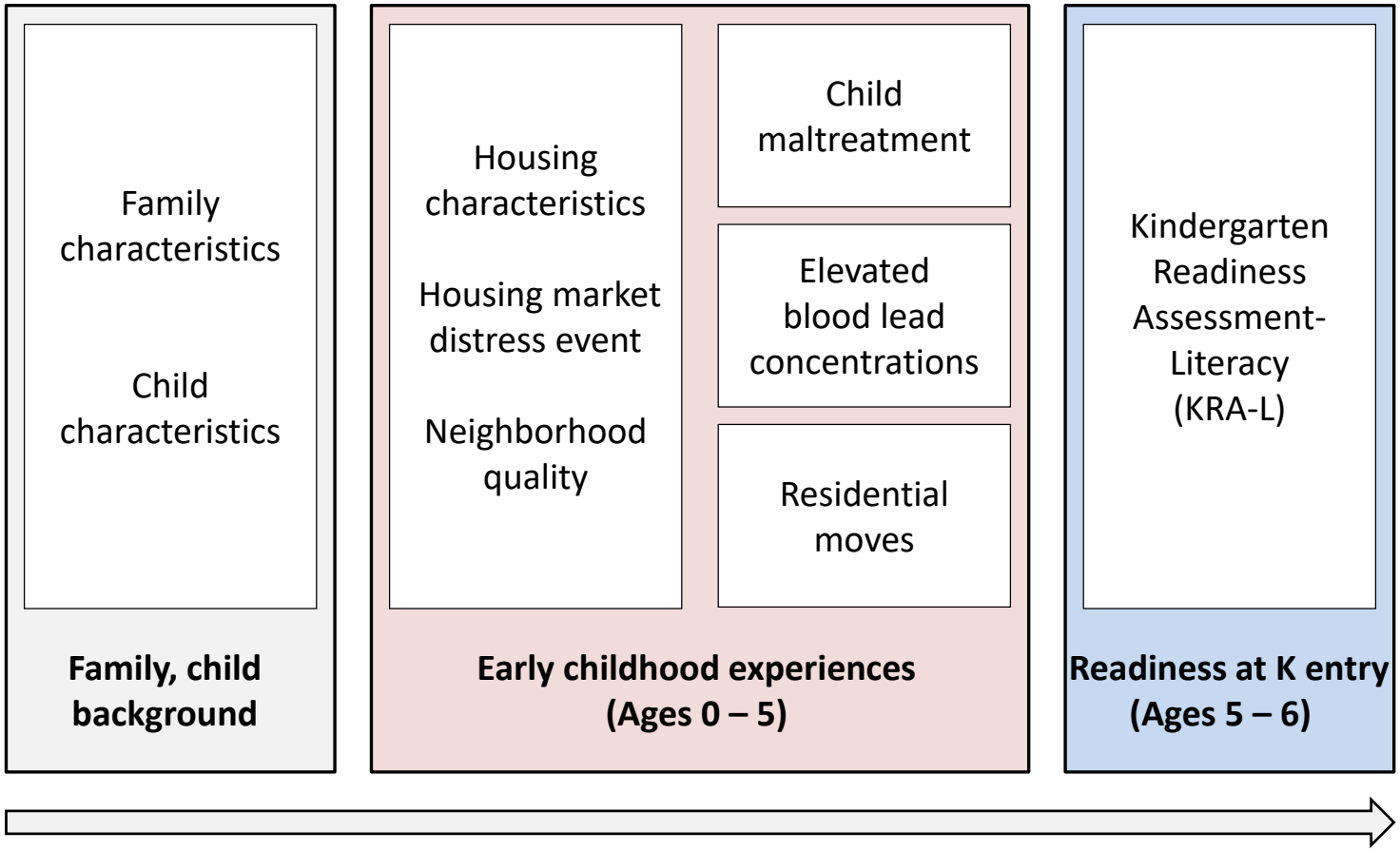
- How do housing conditions and the surrounding areas factor into their school readiness?

Purpose of the study

- To examine the influence of early childhood housing conditions on school readiness for all children entering kindergarten in a big city school system.

- To demonstrate the cost-effectiveness of using Integrated Data Systems (IDSs) that link administrative data on individual children and residential properties to investigate housing and early childhood policy concerns.

Conceptual model: Hypothesized relationships between housing, mediators and kindergarten readiness scores



Research questions

1. Does the data provide evidence that cumulative exposure to poor quality housing and disadvantaged neighborhoods during early childhood negatively affect school readiness at kindergarten entry?

2. How: Are problematic housing and nbhd conditions positively associated with the likelihood of child maltreatment, residential instability and lead poisoning in early childhood?

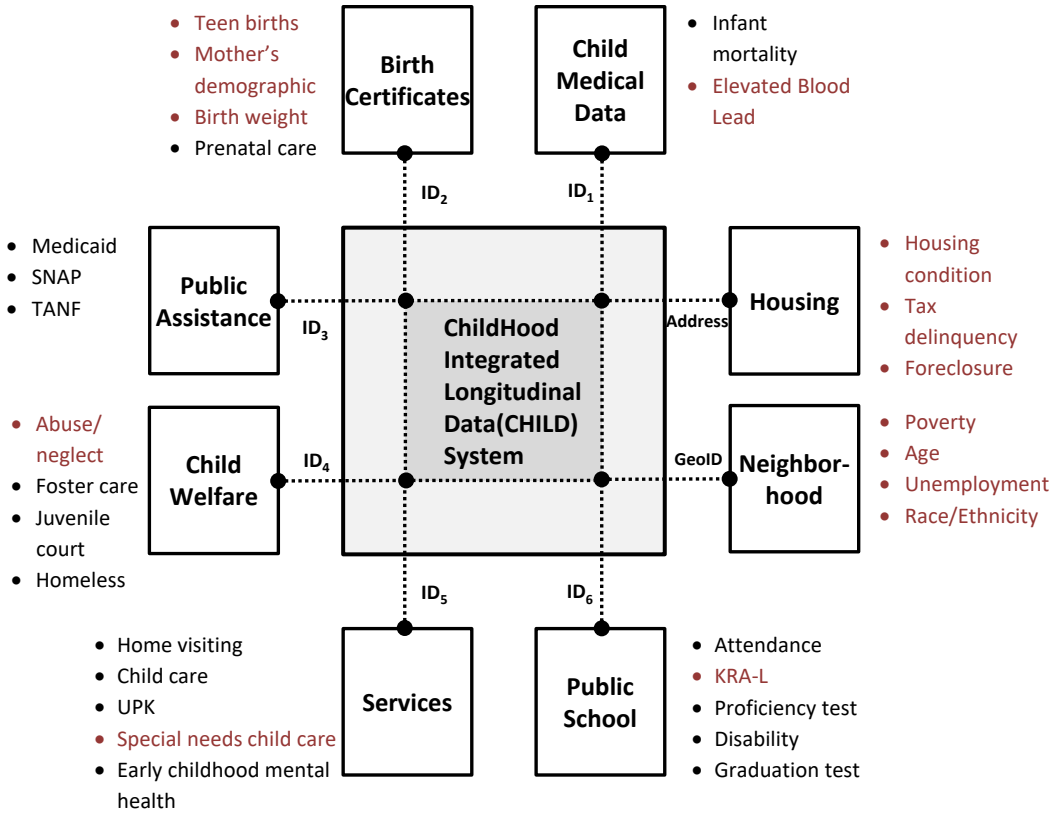
3. Are child maltreatment incidents, residential instability, and lead poisoning negatively associated (mediators) with housing conditions and school readiness?

Sampling and Study Design

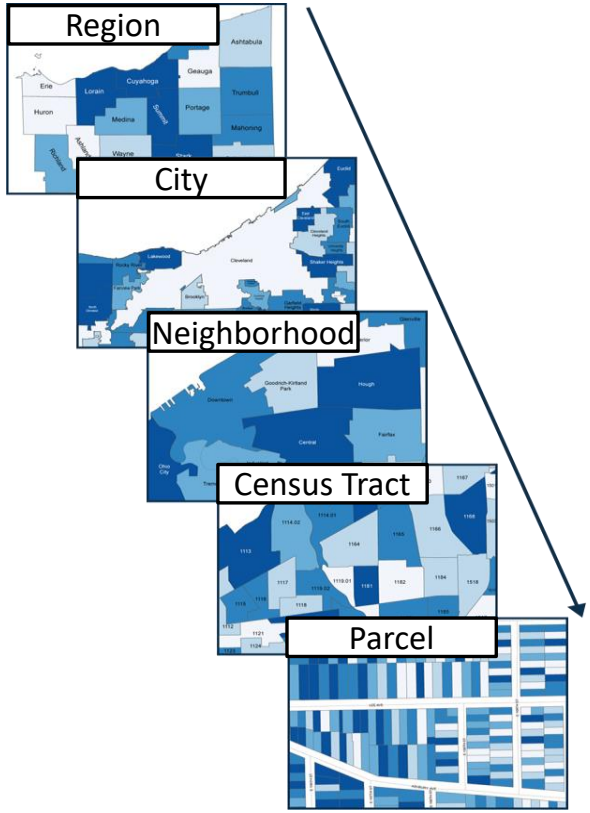
- Sampling criteria
  - Children who entered kindergarten for the first time in the Cleveland Metropolitan School District (CMSD) during the 2007-2010 academic years
- Sample size
  - 13,762 children
- Study design
  - Longitudinal, population-based study that draws on IDSs covering children and properties
  - Study population was followed from birth through kindergarten entry using monthly address histories from a combination of administrative records.

Data Systems: Childhood Integrated Longitudinal Data (CHILD) System and Neighborhood Stabilization Team (NST) Web App.

- CHILD system

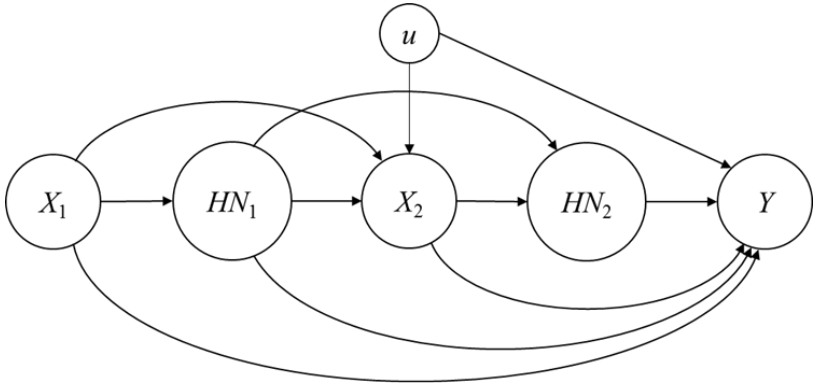


- NST web application



Model specification: Marginal Structural models (MSM)

- Dynamic selection into housing-nbhd conditions (HN) is influenced by poverty (X_1) and in turn influences subsequent poverty (X_2) .
- Mediators in the housing-nbhd readiness relationship (HN-Y) for one stage (HN_1) are confounders for another (HN_2).



- Typical regression fails to identify the full effect of housing and neighborhoods when variables are simultaneously mediators and confounders.
- Thus, we estimate inverse probability of treatment weights based on a selection model and apply to a marginal structural model of cumulative exposure (Robins et al., 2000).

Summary Statistics 2007-2010 K Cohort

Poverty

75%

Share of time below poverty line

Housing Quality

Poor condition	Low value	Public/subsidized
36 %	**59%**	**18%**
	Percent ever	

Housing Finance Distress

Tax delinquency, Foreclosure, Owned by speculator

50%

Percent ever

Neighborhood Disadvantage

Concentrated disadvantage (>70p)

0.66

Mean share of time

Kg Readiness

15.8

Average KRA-L score (0-29)

Elevated Lead

39%

Tested positive (>5 µg/dL)

Child Maltreatment Investigation

40%

Percent ever

Residential Mobility

3.3

Average # of moves

Marginal Structural Models (MSM) for the relationship between KRA-L and housing conditions

Variable	I			II			III		
	b	*se*		*b*	*se*		*b*	*se*	
Neighborhood quality[a]									
Concentrated disadvantage[b]	-0.71	0.20	***	-0.77	0.22	***	-0.74	0.22	***
Housing characteristics[a]									
Poor condition housing	-0.43	0.23	†	-0.34	0.24		-0.13	0.24	
Low value housing[c]	-0.13	0.20		-0.33	0.20		-0.25	0.20	
Public housing or project based Section 8				-0.17	0.29		-0.15	0.29	
Housing mkt distress[a]									
Parcel with tax delinquency				-0.78	0.28	**	-0.52	0.29	†
Parcel in foreclosure				-1.39	0.44	**	-1.01	0.44	*
Parcel owned by speculator				-1.54	0.39	***	-1.25	0.39	**
Buffer 500ft- Avg. number of parcels									
With tax delinquency				0.05	0.02	**	0.05	0.02	*
In foreclosure				-0.11	0.05	*	-0.11	0.05	*
Owned by speculator				0.02	0.05		0.03	0.05	
Mediators									
Child neglect/abuse investigation[a]							-2.21	0.34	***
Residential moves (average per year)							-0.45	0.17	*
Lead level in blood>5µg/dL (Ref:Negative)									
(Positive)							-0.84	0.14	***

Note. †p<.10, *p<.05, **p<.01, ***p<.001. N=13,689 (Multiple imputation, m=30). All models included a dummy variable for the year of entry into kindergarten. [a] Share of years up to k entry exposed to each condition. [b] Score>70th percentile. [c] <$30,000 inflation adjusted. MSM=weighted by the Inverse Probability of Treatment.

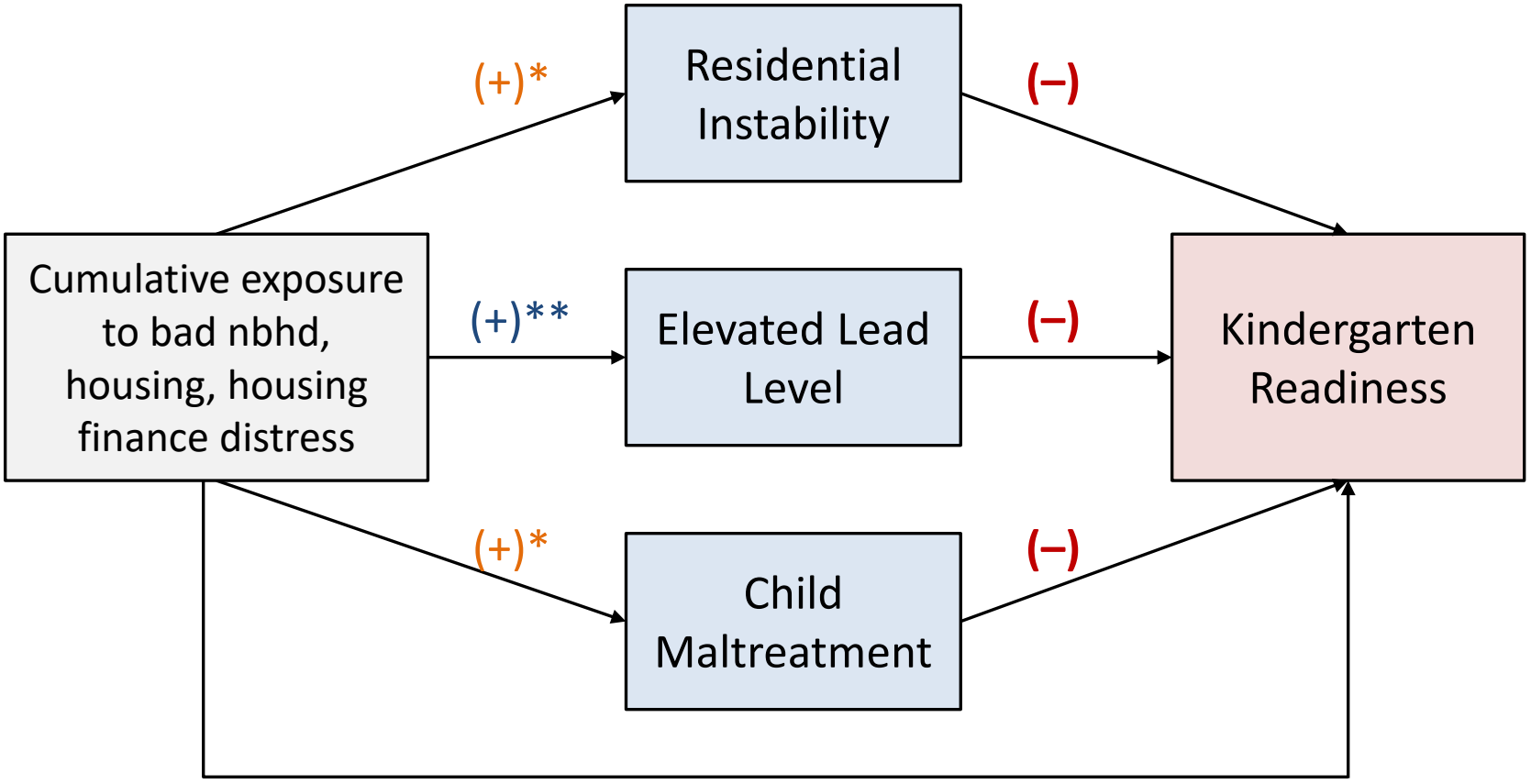
Marginal effects for probability of testing positive

Multinomial Lead Model (tested positive, negative, not tested)

Variable	*dy/dx*	*se*	
Neighborhood quality[a]			
Concentrated disadvantage score above 70th p.	0.086	0.013	***
Housing characteristics[a]			
Poor condition housing	0.038	0.012	**
Low value housing (<$30,000 inflation adjusted)	0.054	0.011	***
Public housing or project based Section 8	-0.008	0.017	
Housing mkt distress[a]			
Parcel with tax delinquency	0.057	0.014	***
Parcel in foreclosure	0.051	0.024	*
Parcel owned by speculator	0.046	0.027	†
Buffer 500ft- Avg. number of parcels			
With tax delinquency	0.003	0.001	***
In foreclosure	0.010	0.003	**
Owned by speculator	0.000	0.004	

Note. †p<.10, *p<.05, **p< .01, ***p<.001. N=13,758 children over all periods for child maltreatment and residential moves panel models. N=13,681 children for lead model (Multiple imputation, m=30). Fixed effects models include an age variable; lead model controls for year of birth. Dependent variable values=Positive, Negative, Not Tested.
[a]Share of years up to age 3 exposed to each condition. *dy/dx* = Margins for probability of testing positive

Findings from dynamic selection and fixed effects models

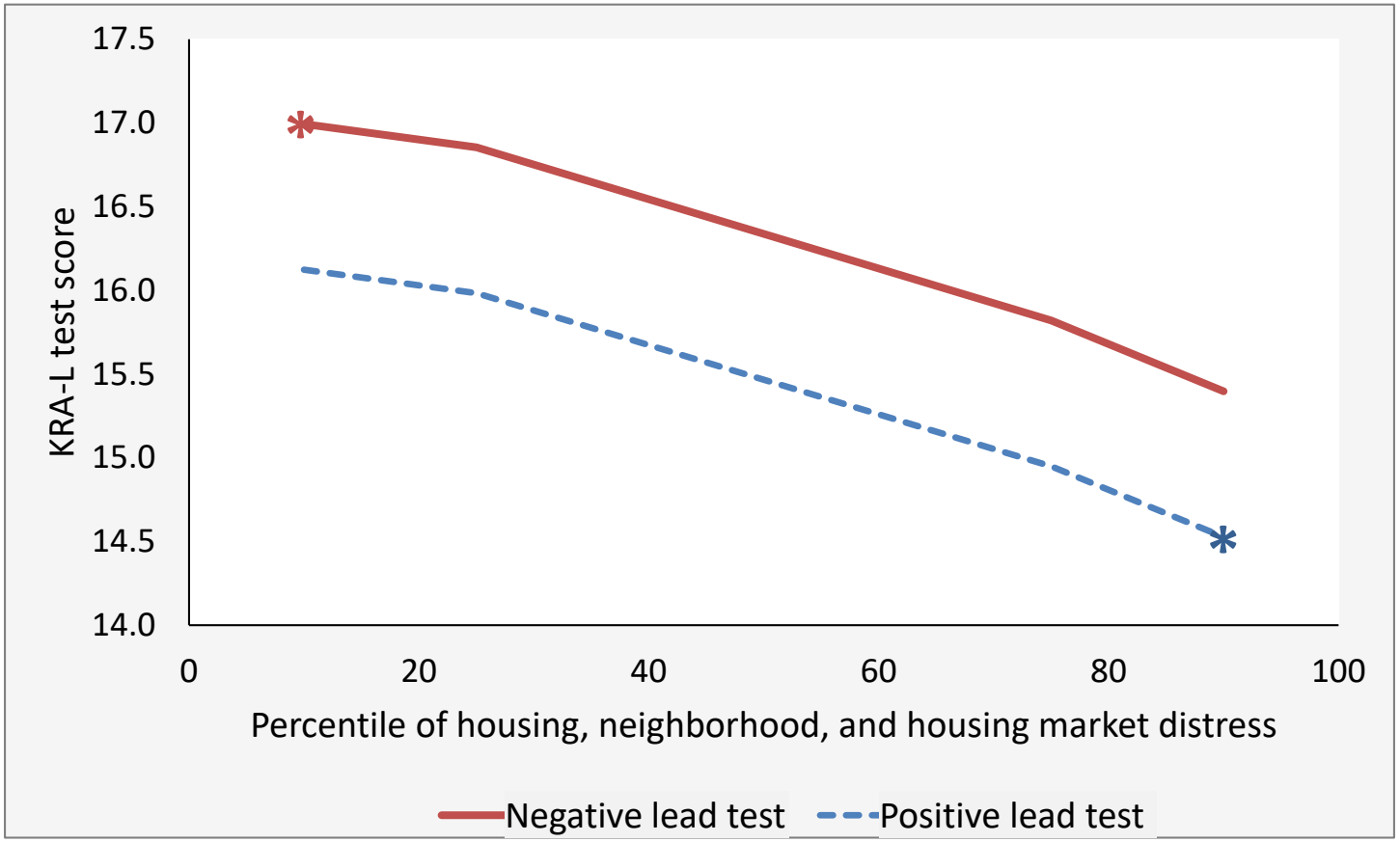


K-RAL MSM

*Fixed Effects models of change

**Lead-Housing MSM

Average predicted test scores for levels of housing and neighborhood distress



Limitations

- This study focused on the population of school children in one large city during a particular time, and the results cannot be readily generalized to other times and places.
- The study relied on administrative records data, which limited our choice of study variables.
- Several of our key outcome variables have limitations (e.g., KRA-L test, lead test, and child maltreatment).
- Despite a rich set of variables and various methods to control for selection bias and confounding, we could not rule out all threats.

Policy Considerations

- Our analysis evidences that neighborhood and housing quality further impacts educational outcomes of low income children.
- Housing finance crisis in old industrial cities played a role in exacerbating housing problems and their effects on children.
- Two-thirds of renter families below the poverty line receive no housing assistance*. What is the role of housing policy?
- Replicate successful lead remediation programs like Rochester's.
- IDSs that incorporate detailed information on children and on the conditions of the properties that they live in can be useful for research and policy planning at a population scale.

*Desmond, M. 2015. Unaffordable America: Poverty, housing, and eviction. Fast Focus 22-2015. University of Wisconsin Madison.