Housing Assistance, Health, and Lost School Days Among Disadvantaged U.S. Children

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Overview

Theoretical Foundation and Traditions

Public housing in the United States

Housing assistance, neighborhoods, and child health

Data Source – Innovative data linkage

Findings

Implications

For health and urban inequality

For theory and policy
Housing Affordability Crisis

48% of US rental households are housing cost-burdened

Among those in the bottom 20% of income:
- 83% spend more than 30% of income on rent
- 72% spend more than half

In no state is it now possible to afford a market-rate one bedroom apartment on minimum wage
Theoretical Foundations

Political Economy of Health
Theoretical Foundations

Political Economy of Health

- Inserting agency into the linkage between social inequality and health inequality (Conrad 1981; Krieger 1994)
Social Determinants of Health

Sociopolitical Factors

Individual Factors

Community Factors

Health Care System

Health Outcomes and Disparities
Theoretical Foundations

Political Economy of Health

• Inserting agency into the linkage between social inequality and health inequality (Conrad 1981; Krieger 1994)
Theoretical Foundations

Political Economy of Health

• Inserting agency into the linkage between social inequality and health inequality (Conrad 1981; Krieger 1994)

• Places responsibility for health disparities on the institutions and policy choices that maintain and reproduce unequal outcomes
Theoretical Foundations

• Childhood origins of the social gradient in health

  • Socioeconomic deprivation in childhood \( \uparrow \) poor health events (Haas 2005)

  • Health problems in childhood \( \downarrow \) completed years of education (Jackson 2009)
Theoretical Model
Theoretical Model

Socioeconomic Inequality
Theoretical Model

Socioeconomic Inequality

- Housing Inequality
- Affordability
- Quality
- Instability
Theoretical Model

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Acute Health Events

- Asthma
- Frequent Illnesses
- Vision Problems
- Hospital Episodes
Theoretical Model

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Reduced Socioeconomic Mobility

- Missed School Days
- Chronic health problems
- Reduced Educational Attainment
Theoretical Model

Housing Assistance Programs

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Urban Public Housing in the 20th Century

Truman Boyd Manor
Long Beach, CA
1948
Urban Public Housing in the 20th Century

Lexington Terrace - Baltimore

Pruitt Igoe – St. Louis
Urban Public Housing in the 20th Century

Lexington Terrace – Baltimore

Pruitt Igoe – St. Louis

Odonnel Heights – Baltimore

Rainier Vista – Seattle
Housing Assistance Programs

Public Housing (Project-based housing)
Entire developments of PHA subsidized housing
Traditional housing projects (public housing often looks very different today)

Housing Choice Vouchers
An assistance subsidy pertaining to a specific family to enter the private rental market
Subsidy is to the family
Housing Assistance Programs

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Housing Choice Vouchers

- An assistance subsidy pertaining to a specific family to enter the private rental market
- Subsidy is to the family
The Rise of Housing Choice Vouchers

Source: HUD, 2013, Picture of Subsidized Households
Housing Assistance Imbalance

Demand for housing assistance greatly exceeds the supply

Only about 25% of eligible families receive assistance

Families can be on waiting lists for several years
Housing Assistance and Child Health

- Housing Affordability  (Newman and Holupka 2015)
- Housing Stability  (Font and Warren 2013; Keene et al 2017)
- Housing Quality  (Evans et al. 2001)
- Neighborhood effects
  - Disadvantage  (DeLuca 2012)
  - Social network  (Keene and Ruel 2013; Clampet-Lundquist 2010)

- Limited direct empirical research on housing assistance and children’s health
Housing Assistance – Research Challenges
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Measuring housing assistance participation
Housing Assistance – Research Challenges

Measuring housing assistance participation

Generalizability
Housing Assistance – Research Challenges

Measuring housing assistance participation

Generalizability

Selection bias
Research questions

Does access to housing assistance reduce the number of school days missed due to illness?

Do effects vary by housing program?

Are effects mediated by acute childhood health events?
Data Sources

1. National Health Interview Survey (NHIS) 1999-2012
   • Information on individual-level characteristics and well-being

2. HUD administrative records 1999-2014
   • Record of housing assistance episodes

   • Contextual characteristics of census tracts
Data Linkage

- HUD Administrative Record
- National Health Interview Survey

Year:
- 1995
- 2000
- 2005
- 2010
- 2015
Data Linkage

HUD Administrative Record

National Health Interview Survey


1999-2014

1999-2012
Data Linkage

- HUD Administrative Record: 1999-2014
- National Health Interview Survey: 1999-2012
Data Linkage

HUD Administrative Record

National Health Interview Survey


1999-2014

1999-2012

Current!
Sample

28,998 children aged 5-17 at interview who are eligible for linkage to HUD record

Current Assistance (5.1% of the sample)
- 1,479
Outcomes

Lost school days due to illness

- Report of the number of days of school missed due to illness in the past year (ranges from 0 – 240)
- Missing at least two weeks (10 days) of school
Outcomes

Lost school days due to illness
  • Report of the number of days of school missed due to illness in the past year (ranges from 0 – 240)
  • Missing at least two weeks (10 days) of school

Acute health events
  • Frequent headaches
  • Frequent ear infections
  • Vision problems
  • Asthma attacks
  • Hospitalizations
Independent Variables

Individual and Family Characteristics:

- Housing assistance status (more later)
- Sociodemographic characteristics:
  - Age, sex, race/ethnicity, household education, family income, household employment status, family structure, US region, interview year

Neighborhood Indexes (Principal Components Analysis):

- Neighborhood Disadvantage
- Neighborhood Instability
- Neighborhood Vacancy
- Racial Composition - % white, % Black, % Latino
Neighborhood Disadvantage
Analytical Strategy

Zero-Inflated Negative Binomial (ZINB) models predicting log lost school days, accounting for high number of zeroes (no lost school days)

The combination of two processes
  • Missing any days of school (modeled as a logistic function)
  • The count of missed school days among those missing any (modeled as a negative Binomial process)
## Descriptive Characteristics

<table>
<thead>
<tr>
<th></th>
<th>No Assistance</th>
<th>Current Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>n</strong></td>
<td>26,932</td>
<td>1,492</td>
</tr>
<tr>
<td>% Female</td>
<td>53.8</td>
<td>51.7</td>
</tr>
<tr>
<td>% Racial/Ethnic Minority</td>
<td>33.5</td>
<td>74.6</td>
</tr>
<tr>
<td>% Below Federal Poverty Line</td>
<td>11.6</td>
<td>68.0</td>
</tr>
<tr>
<td>% No Workers in Family</td>
<td>22.9</td>
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</tr>
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<table>
<thead>
<tr>
<th>Housing Status</th>
<th>Days Missed</th>
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<tbody>
<tr>
<td>No Housing Assistance (ref.)</td>
<td>OLS</td>
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<td>Current Housing Assistance</td>
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† p<0.10  * p<0.05  ** p<0.01
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Addressing Selection

The timing of housing assistance entry
- Current vs. future housing assistance

Current – Receiving housing assistance at interview

Pseudo-waitlist – Will enter housing assistance within 2 years
Current vs. Pseudo-waitlist

- Current
- Pseudo-waitlist

NHIS Interview

Period of HUD Assistance
ZINB Model predicting Lost School Days

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Mean Lost School Days

Pseudo-waitlist vs Current
Differences by Housing Program

Housing Choice Vouchers

Project-Based Housing
# Pseudo-waitlist – Vouchers

<table>
<thead>
<tr>
<th>Housing Status</th>
<th>Log lost school days (ZINB)</th>
<th>Lost at least two weeks (odds ratio)</th>
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<tr>
<td>Current Assistance</td>
<td>-0.214†</td>
<td>0.771</td>
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<th>Vision Problem</th>
<th>Asthma Attack</th>
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<tbody>
<tr>
<td>Pseudo-waitlist (ref.)</td>
<td>1.02</td>
<td>0.610*</td>
<td>0.668†</td>
<td>0.363**</td>
<td>0.372**</td>
</tr>
<tr>
<td>Current Assistance</td>
<td></td>
<td></td>
<td></td>
<td></td>
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# Full Model including Acute Health Events

Log lost school days  Log lost school days

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<tr>
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<th>Model 1 + Acute Health</th>
</tr>
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<tr>
<td>Pseudo-waitlist (ref.)</td>
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<td></td>
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<td>-0.340**</td>
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Frequent Headaches  
Frequent ear infections  
Vision Problem  
Asthma Attack  
Hospitalized

Controls for SES and neighborhood chars. ✔

† p<0.10  * p<0.05  ** p<0.01
### Full Model including Acute Health Events

Log lost school days Log lost school days

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<tbody>
<tr>
<td>Pseudo-waitlist (ref.)</td>
<td>-0.340**</td>
<td>-0.207*</td>
</tr>
<tr>
<td>Current Assistance</td>
<td>-0.340**</td>
<td>-0.207*</td>
</tr>
<tr>
<td>Frequent Headaches</td>
<td>0.43*</td>
<td></td>
</tr>
<tr>
<td>Frequent ear infections</td>
<td>0.35*</td>
<td></td>
</tr>
<tr>
<td>Vision Problem</td>
<td>0.44**</td>
<td></td>
</tr>
<tr>
<td>Asthma Attack</td>
<td>0.68**</td>
<td></td>
</tr>
<tr>
<td>Hospitalized</td>
<td>0.39*</td>
<td></td>
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</table>

Controls for SES and neighborhood chars. ✔ ✔

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What About Neighborhood Context?

Does housing assistance impact children’s exposure to neighborhood disadvantage?
Neighborhood Disadvantage Index

Public Housing

Housing Choice Vouchers

† p<0.10  * p<0.05  ** p<0.01
Neighborhood Disadvantage Index

![Bar chart showing Neighborhood Disadvantage Index for Public Housing and Housing Choice Vouchers. The chart indicates a higher index for Public Housing compared to Housing Choice Vouchers. The chart includes symbols for statistical significance: † p<0.10, * p<0.05, ** p<0.01.]
Neighborhood Disadvantage Index

![Bar chart showing the Neighborhood Disadvantage Index for Public Housing and Housing Choice Vouchers. Current and Pseudo-waitlist categories are compared. The chart indicates statistical significance with † p<0.10, * p<0.05, and ** p<0.01.]
Neighborhood Disadvantage

Neighborhood Disadvantage Index

Coefficient for Current Assistance

-3 -2 -1 0 1 2
Summary

1. Housing assistance and economic disadvantage
Summary

1. Housing assistance and economic disadvantage

2. Housing assistance leads to improved school attendance, reducing the number of days missed due to illness
Summary

1. Housing assistance and economic disadvantage

2. Housing assistance leads to improved school attendance, reducing the number of days missed due to illness

3. Effects are stronger for children receiving Housing Choice Vouchers
Summary

1. Housing assistance and economic disadvantage

2. Housing assistance leads to improved school attendance, reducing the number of days missed due to illness

3. Effects are stronger for children receiving Housing Choice Vouchers

4. Effects of housing assistance on school attendance reflect reduced risk of acute health events in childhood
Implications for Health Inequalities

Housing assistance is a platform for narrowing SES inequalities in child health

• Significant reduction in the risk of acute health events in childhood
Implications for Health Inequalities

Housing assistance is a platform for narrowing SES inequalities in child health
- Significant reduction in the risk of acute health events in childhood

Housing assistance is a platform for narrowing inequalities in adult health and SES
- Significant reduction in missed school days due to illness
- Housing assistance may facilitate intergenerational mobility for children in disadvantaged families
Theoretical and Policy Implications

Investments in housing affordability and stability for low-income families are truly investments in children’s futures.

Project-based housing vs. Vouchers

Unmet housing need, population health, and reproduced inequality
  - 10 million children in eligible families not receiving assistance
Acknowledgements

Collaborators:

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University of Maryland, College Park

Natalie Slopen
University of Maryland, College Park

Sandra J. Newman
Johns Hopkins University

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National Institute of Child Health and Human Development
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Maryland Population Research Center Infrastructure and Seed Grant
Thank you!

Andrew Fenelon
afenelon@umd.edu
Table 1: Descriptive characteristics of NHIS-HUD sample by Housing Assistance Status 1999-2012

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<tr>
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<tbody>
<tr>
<td><strong>n</strong></td>
<td>1,492</td>
<td>574</td>
</tr>
<tr>
<td><strong>Age Groups</strong></td>
<td></td>
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<tr>
<td>2-5</td>
<td>0.151</td>
<td>0.218</td>
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<tr>
<td>6-11</td>
<td>0.536</td>
<td>0.513</td>
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<td>12-17</td>
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<td>non-Hispanic White</td>
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<td>non-Hispanic Black</td>
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<tr>
<td>non-Hispanic Other</td>
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<td>0.050</td>
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<tr>
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<td><strong>Family Structure</strong>*</td>
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<tr>
<td>Single Parent</td>
<td>0.817</td>
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<tr>
<td>Married/Partered Parents</td>
<td>0.184</td>
<td>0.245</td>
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<tr>
<td><strong>Highest Level of Education</strong></td>
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</tr>
<tr>
<td>Less than High School</td>
<td>0.259</td>
<td>0.230</td>
</tr>
<tr>
<td>High School</td>
<td>0.330</td>
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</tr>
<tr>
<td>More than High School</td>
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<td>0.448</td>
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<tr>
<td><strong>Family Poverty Status</strong></td>
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<tr>
<td>Below 50% FPL</td>
<td>0.364</td>
<td>0.331</td>
</tr>
<tr>
<td>50-99% of FPL</td>
<td>0.373</td>
<td>0.340</td>
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<td>0.245</td>
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<tr>
<td>200%+ of FPL</td>
<td>0.048</td>
<td>0.084</td>
</tr>
<tr>
<td><strong>Family Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Worker in Family</td>
<td>0.467</td>
<td>0.420</td>
</tr>
<tr>
<td>Any Worker in Family</td>
<td>0.533</td>
<td>0.580</td>
</tr>
</tbody>
</table>
Table 4: Adjusted Pseudo-waitlist Models Predicting Effects of Housing Assistance (current vs. pseudo-waitlist) on Child Mental Health by Child Age Group

<table>
<thead>
<tr>
<th>Current Assistance (by Age Group)</th>
<th>SDQ Symptom Score&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Likely Socioemotional Problem&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Emotional Difficulty&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5 Years</td>
<td>-0.227</td>
<td>1.75</td>
<td>0.649</td>
</tr>
<tr>
<td>95% CI</td>
<td>(-0.91, 0.46)</td>
<td>(0.42, 7.34)</td>
<td>(0.32, 1.33)</td>
</tr>
<tr>
<td>6-12 Years</td>
<td>-0.562*</td>
<td>0.617</td>
<td>1.068</td>
</tr>
<tr>
<td>95% CI</td>
<td>(-1.04, -0.08)</td>
<td>(0.32, 1.19)</td>
<td>(0.73, 1.57)</td>
</tr>
<tr>
<td>13-17 Years</td>
<td>-0.499+</td>
<td>0.561</td>
<td>0.599+</td>
</tr>
<tr>
<td>95% CI</td>
<td>(-1.00, 0.03)</td>
<td>(0.19, 1.62)</td>
<td>(0.35, 1.03)</td>
</tr>
</tbody>
</table>
## Differences by Race/Ethnicity – SDQ

<table>
<thead>
<tr>
<th>Housing Status</th>
<th>Black/African-American</th>
<th>White</th>
<th>Hispanic/Latino</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudo-waitlist (ref.)</td>
<td>-0.416*</td>
<td>-0.297†</td>
<td>-0.344*</td>
</tr>
<tr>
<td>Current Assistance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controls</td>
<td>age, age-squared, sex, survey year, race/ethnicity, education, family income, employment status, family structure, survey year, census tract characteristics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† p<0.10  * p<0.05  ** p<0.01
Appendix Table B1: Pseudo-waitlist Models Predicting Child Mental Health Measures as a Function of Housing Assistance Status including Fixed Effects

<table>
<thead>
<tr>
<th>Housing Assistance</th>
<th>SDQ symptom score</th>
<th>Likely Socioemotional Problem</th>
<th>Emotional Difficulties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Assistance</td>
<td>-0.444**</td>
<td>0.710</td>
<td>0.752+</td>
</tr>
<tr>
<td>95% CI</td>
<td>(-0.76,-0.13)</td>
<td>(0.45,1.24)</td>
<td>(0.56,1.01)</td>
</tr>
<tr>
<td>Public Housing</td>
<td>-1.483**</td>
<td>0.153**</td>
<td>0.264**</td>
</tr>
<tr>
<td>95% CI</td>
<td>(-2.07,-0.89)</td>
<td>(0.40)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Housing Choice Vouchers</td>
<td>-0.117</td>
<td>0.984</td>
<td>1.089</td>
</tr>
<tr>
<td>95% CI</td>
<td>(-0.79,0.56)</td>
<td>(0.51,2.04)</td>
<td>(0.73,1.67)</td>
</tr>
<tr>
<td>Multifamily Housing</td>
<td>-0.252</td>
<td>0.729</td>
<td>1.260</td>
</tr>
<tr>
<td>95% CI</td>
<td>(-1.07,0.54)</td>
<td>(0.31,1.61)</td>
<td>(0.55,2.78)</td>
</tr>
</tbody>
</table>
### Other Outcomes – Asthma

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>Model 2 (Demographics)</th>
<th>Model 3 (Health Care Access)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Est. 95% CI</td>
<td>Est. 95% CI</td>
<td>Est. 95% CI</td>
</tr>
<tr>
<td><strong>All Eligible Children</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever Had Asthma</td>
<td>0.0 [-4.2, 4.3]</td>
<td>-2.7 [-7.2, 1.9]</td>
<td>-2.8 [-7.3, 1.8]</td>
</tr>
<tr>
<td>Asthma Attack, 12m</td>
<td>-1.1 [-4.4, 2.1]</td>
<td>-1.6 [-5.2, 2.1]</td>
<td>-1.5 [-5.1, 2.1]</td>
</tr>
<tr>
<td>ER Visit for Asthma, 12m</td>
<td>-2.5 [-4.7, -0.2]</td>
<td>-2.4 [-4.9, 0.2]</td>
<td>-2.5 [-5.0, 0.1]</td>
</tr>
<tr>
<td><strong>Among Those With Asthma History</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma Attack, 12m (Ever Asthma)</td>
<td>-4.6 [-14.4, 5.2]</td>
<td>-3.8 [-14.5, 6.9]</td>
<td>-4.6 [-14.4, 5.2]</td>
</tr>
<tr>
<td>ER Visit for Asthma, 12m (Attack in 12m)</td>
<td>-16.3 [-30.7, -1.9]</td>
<td>-19.4 [-32.0, -6.8]</td>
<td>-19.1 [-31.2, -7.1]</td>
</tr>
</tbody>
</table>