Measuring racial/ethnic inequality of context:

racial residential segregation measures and impacts on health

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Agenda

- Measures for calculating racial separation of neighborhood context
  - Traditional and Adaptations of Racial Residential Segregation Indices

- Examples linking contextual inequality measures with health
Residential Segregation: Dissimilarity vs. Whites. Theoretical range: 0-100

- **2000**
  - **Blacks**: Dissimilarity = 65 (High)
  - **Hispanics**: Dissimilarity = 52 (Moderate)
  - **Asians**: Dissimilarity = 42 (Moderate)

0 = complete integration

**Source:** US Census
Racial residential segregation may be a fundamental cause of racial health disparities

- Associated with worse health among minorities
  - Mortality, infectious disease, birth outcomes, CVD, self rated health, mental health, obesity, physical activity, environmental toxicants (ambient air toxicants)

- Racial Residential Segregation
  - constrains socioeconomic advancement of minorities,
  - Increases exposure of minorities to unfavorable neighborhood environments,
  - Leads to segregation in health care settings, which is associated with disparities in quality of treatment

Residential Segregation: Multilevel Measures of Context

Scale matters: lower/smaller “neighborhood” levels → higher segregation
Ways to Conceptualize Racial Neighborhood Separation: Dimensions of Residential Segregation

• Absolute
  • What are the absolute (average) conditions of neighborhood context for different racial/ethnic groups in different metro areas?
  • Based on Exposure segregation measure:
    ● the average neighborhood racial composition for a certain racial group

• Relative
  • How separate are the distributions of neighborhood context in different metro areas?
  • Based on Evenness segregation measure:
    ● how evenly are different racial groups distributed across neighborhoods in the metro area?
Traditional Segregation Measure Exposure (Isolation Index)

<table>
<thead>
<tr>
<th></th>
<th>Metro 1: High Segregation</th>
<th>Metro 2: Low Segregation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
<td>Minority</td>
</tr>
</tbody>
</table>
| Isolation        |                            |                          | Source: U.S. Census
Adapted Neighborhood Inequality Measure Exposure
(Neighborhood Exposure Index)

<table>
<thead>
<tr>
<th>Neighborhood Quality Scale</th>
<th>Metro 1: Minorities live in worse quality neighborhoods on average</th>
<th>Metro 2: Whites in better quality neighborhoods on average</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>![Grid of neighborhoods with white dots]</td>
<td>![Grid of neighborhoods with white dots]</td>
</tr>
<tr>
<td>Minority</td>
<td>![Grid of neighborhoods with minority dots]</td>
<td>![Grid of neighborhoods with minority dots]</td>
</tr>
</tbody>
</table>
Neighborhood Exposure Measures

- Absolute neighborhood quality for each group for each metro measured
  - Range 1-7; 1=best

<table>
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<tr>
<th>Neighborhood Quality Scale</th>
<th>Metro 1</th>
<th>Metro 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minorities</td>
<td>5.9</td>
<td>2.5</td>
</tr>
<tr>
<td>Whites</td>
<td>3.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Ways to Conceptualize Racial Separation: Dimensions of Residential Segregation

- **Absolute**
  - What are the absolute (average) conditions of neighborhood context for different racial/ethnic groups in different metro areas?
  - Exposure segregation measure:
    - the average neighborhood racial composition for a certain racial group

- **Relative**
  - How separate are the distributions of neighborhood context in different metro areas?
  - Evenness segregation measure:
    - how evenly are different racial groups distributed across neighborhoods in the metro area?
## Traditional Segregation Measure

### Evenness (Dissimilarity Index)

### Metro 1: High Segregation

- **White**
- **Minority**

### Metro 2: Low Segregation

- **White**
- **Minority**

Source: U.S. Census
Adapted Neighborhood Inequality Measure
Evenness
(Neighborhood Dissimilarity)

Metro 1: Minorities live in separate & the entire distribution is “bad” vs. whites

Metro 2: Whites and minorities live in the exact same neighborhoods, so distributions of neighborhood quality are identical
Neighborhood % Overlap & IQR-Overlap Statistic: Racial Overlap of Distributions of Tract % Poverty

- To what extent do neighborhood “quality” distributions overlap for two racial groups?
  - % Overlap: calculated based on inflection point where tails of the distributions are balanced on either side
  - Why segregation matters

Whites

Minorities

Is there distribution overlap?

Poor Neighborhood Quality (e.g. tract % poverty)


Evenness: Racial Neighborhood Inequality (100 Largest MSAs; 2000)
Traditional & Adapted Residential Segregation Measures

• Adapted segregation measures used
  • To understand why residential segregation matters
    ♦ Social determinants of health
  • To monitor residential inequality
    ♦ To what extent does separate remain unequal?
    ♦ www.diversitydata.org indicator website of racial inequality across metropolitan regions, including neighborhood inequality

• Both traditional and adapted segregation measures used
  • As exposure variables to predict health outcomes in multilevel, multiple regression models
  • Along with other mediators of interest
1. First select a state.
2. Then, select a metropolitan area.

Share of Children Living in Low-Income Neighborhoods by Race/Ethnicity

For year: 2000; Data for: Non-Hispanic Black

- 72.7% - 87.7%
- 61.6% - 72.6%
- 53.4% - 61.2%
- 19.5% - 53.2%

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Spotlight

- Disparities in Neighborhood Poverty of Poor Black and White Children -- download a PDF of the first diversitydata brief, May 2007
- Children Left Behind: How Metropolitan Areas Are Failing America's Children -- download a PDF of the first in a series of reports from DiversityData.org, January 2007
- Chartbook -- download a PDF of the tables and charts related to Children Left Behind: How Metropolitan Areas Are Failing America's Children, January 2007
Traditional & Adapted Residential Segregation Measures

- Adapted segregation measures used
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Another Mexican Birthweight Paradox? The Role of Residential Enclaves and Neighborhood Poverty in the Birthweight of Mexican Origin Infants.

Example 1: Metropolitan Residential Segregation

Immigrant Enclaves & Health

• Is residence in an immigrant or ethnic enclave beneficial for birth weight?
  • Immigration sociologists have long highlighted the role of immigrant enclaves in facilitating successful immigrant adaptation
    ★ Social networks
    ★ Lower communication costs
    ★ Cultural goods
• Immigrants encounter structural inequality associated with receiving context, and racial group membership (segmented assimilation theory)
  ★ enclaves are high poverty

Portes & Stepick, 1993; Wilson & Portes, 1980; Fernandez Kelly 1996; Zhou 1996; Portes 2006
Hypothesized Pathways: Racial Residential Segregation, Neighborhood Enclaves, & Health

Metropolitan Area
Racial Residential Segregation

Residential Enclaves

Immigrant Enclaves
Ethnic Enclaves

Social Networks; Social Capital
Urban Design
Neighborhood Poverty
Violence
Fear for Safety

SES/Social Mobility
Housing Quality
Psychosocial factors (discrimination, depression, social support)

Adverse behaviors (smoking, alcohol, drugs)
Neuroendocrine paths
Depressed immune functioning & susceptibility to infection

Behavioral & Biological Pathways

Health (Birth Weight)

Predictor of Interest: Enclaves
(Exposure Measures of Metropolitan Segregation of Mexican-born, & US-born Mexican-origin residents)

- Provides a metropolitan-level summary measure (mean) of the average neighborhood (tract) environment for any specific group

\[ \sum_{i=1}^{n} \left[ \left( \frac{x_i}{X} \right) (C_i) \right] \]

\( i = \) tract (based on tract data)
\( x_i = \) number of a certain group (e.g. Mexican Immigrants) in tract \( i \)
\( X = \) total population of a certain group (e.g. Mexican Immigrants) in the metro area
\( C_i = \) a tract-level summary measure (e.g. % Mexican Immigrants)

Example: Enclave Predictor Measure: Theoretically Derived Metropolitan Area Segregation Measures

- Calculate 6 residential segregation “Exposure” measures using Census 2000 tract-level data
- Group-specific measures

Interpreted as the average neighborhood environment for the average group member
E.g. The average neighborhood % Mexican Immigrant for the average Mexican Immigrant

<table>
<thead>
<tr>
<th>Neighborhood Context</th>
<th>Mexican Immigrants</th>
<th>US-Born Mexican Origin Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Immigrant Enclaves</strong> (Tract % Mexican Immigrants)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Ethnic Enclaves</strong> (Tract % US Born Mexican Origin)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td><strong>Poverty</strong> (Tract % Poverty)</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Mexican segregation may be both harmful and beneficial for birthweight, depending on nativity of neighbors.


(multivariate adjusted multilevel model)

Exposure to USB Mex

Exposure to FB Mex

“Are Immigrant Enclaves Healthy Places to Live? The Multi-ethnic Study of Atherosclerosis”

Example: Neighborhood Effects

Do residents in immigrant enclaves exhibit better health behaviors?

- What specific social and structural features of neighborhoods may mediate the associations between immigrant enclaves and health?

Hypothesized Pathways: Racial Residential Segregation → Health for Latinos

Metropolitan Area Racial Residential Segregation

Immigrant Enclaves (% Tract Latin-American Immigrant)

Neighborhood Stressors or Resources

(Tract Level Ecometric Scales & Indices, from Surveys; Tract % Poverty)
Social Networks; Social Capital
Neighborhood Poverty
Fear of Violence
Food Stores

Individual Level Stressors

Individual Level Survey Variables
Social Class
Psychosocial stressors
Acculturation (Language)

Individual Level Survey Responses
(Physical Activity)

Health & Health Behaviors

Methods: Ecometrics

Perceived Neighborhood Quality Measures

- MESA questionnaires, residential informants
- 4 scales and 2 indices
  - Multi-item scales and indices
    - Scales: 4 or 5 point Likert scales, mean values used, internal consistency reliability acceptable
  - Scales: social cohesion, safety, healthy food availability, walking environment
  - Indices: neighborhood-based social capital, recreational facilities availability.
  - Derived from published work including from prior MESA analyses
Data and Measures

• Multiethnic Study of Atherosclerosis (MESA) 10-year longitudinal study of risk factors for atherosclerosis

• MESA cohort is 6814 men and women aged 45-84 and free of clinical cardiovascular disease at baseline 2000-2002

• Today: Restricted to Latino participants
Analytic Methods

• Creation of neighborhood exposure values
  • Country-specific immigrant enclave variables
  • Ecometric methods to create perceived neighborhood quality

• 2-level hierarchical multiple linear regression models
  • Model 1: Age-Gender Adjusted % Immigrant Quartiles
  • Models 2-5: Add Nativity, SES, Neighborhood SES, Acculturation
  • Model 6: Add neighborhood mediators

\[
y_{(\text{physical activity})ij} = \\
B_0j + B_1(\text{Neighborhood Immigrant Enclave, indicator var})_j + \\
B_2(\text{Neighborhood Perceived Environment, Ecometric})_j + \\
B_3(\text{Neighborhood Poverty})_j + \\
[\text{vector of individual level variables}]_{ij}
\]

• Tested enclave linear trends
Adjusted Mean Differences in mean weekly physical activity (METS) by tract % Latin Immigrants (immigrant enclaves) for Hispanics. MESA Data.

Unadjusted Adjusted ^ After Neighborhood Mediation (Walkability) After Neighborhood Mediation (Civic Partic)

Q4: high tract % latin immigrants
Q3: moderate-high tract % latin immigrants
Q2: low-moderate tract % latin immigrants
Q1: low tract % Latin immigrants (REF)

^ Models adjusted for age, sex, nativity, SES, neighborhood poverty, acculturation
Trend test: *** p<.001 **p<.01 *p<.05 #p<.10

Conclusions

• Are immigrant enclaves health promoting because of social environments?
  • Our findings do not support this;
  • We found worse social environments for immigrant neighborhoods

Conclusion

- Social determinants patterned by place matter for health
- Different metro areas offer different distributions of “opportunity” neighborhoods on absolute & relative basis
- High racial segregation:
  - Separate but also unequal contexts
  - Quantifiable in absolute and relative terms using traditional & adapted segregation measures of racial inequality of neighborhood “quality”
- Place & Race-Based Exposure Assessment
  - Conceptualizing “place” exposures using social theory

Thank you!