Untangling the Associations between Physical Health, Health Care System Distrust, and Self-rated Health for the Elderly: A GWR Approach

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Outline

• Introduction
  – Shortcomings in the literature
  – Theoretical significance and hypotheses
• Research design and methods
  – Methodological significance
  – Data, measures, and modeling
• Spatial and non-spatial analytic results
• Conclusions
Introduction
Shortcomings in the Literature

• Health care system distrust
  – New development in recent years

• Lack of spatial perspective
  – Global and single level models

• Physical health is an imperative but overlooked factor.
Theoretical Significance and Main Hypotheses

- Health care system distrust varies locally and its association with self-rated health varies across space.
- Physical health is a shared determinant of self-rated health and health care system distrust.
Design and Methods

Data: The Philadelphia Health Management Corporation’s 2008 Survey of the elderly

Areas: Bucks, Chester, Delaware, Montgomery, and Philadelphia County.

Total Participants: 3,257
Methodological Significance

Traditional Approach

- **Data Type**: Individual Health Data with Geographic Identifiers
- **Analytic Approaches**: Spatial Analysis with Aggregated Data (zone-based geographic identifiers)
- **Major Pros and Cons**: High Risk of Ecological Fallacy, Capable of Showing Where the Public Health Concerns Are, Incomplete Spatial Coverage, Modifiable Areal Unit Problems

New Approach

- **Non-Spatial Individual Data**
  - ID, Age, Gender, Race, GeoID
  - 1, 26, Male, Black, 1
  - 2, 28, Male, White, 1
  - 3, 49, Female, Black, 2
  - 4, 43, Female, Hispanic, 3

- **Spatial Point Data**

- **Spatial Data**
  - Individual
  - Tract Boundary

- **Spatial Point Data**

- **Spatial Data**
  - Individual
  - Tract Boundary
Measures (I)

• Self-rated health: a dichotomous variable
  – Excellent/good vs. fair/poor

• Health care system distrust: A nine-item scale developed in 2008. The factor score is used in the analysis.

• Demographic variables: gender, age, race, and marital status
Measures (II)

- Socioeconomic variables: poverty, employment status, and educational attainment
- Physical health: chronic diseases, high blood cholesterol, depression (10 items), and instrumental activities of daily living (IADL, 7 items).
Analytic Strategy

- Non-spatial analysis
- Descriptive spatial analysis: cartography
- Global and geographically weighted logistic regression methods:
  - Showing the global model results and mapping the GWR estimates

\[
\log \left( \frac{y_i}{1 - y_i} \right) = \beta_{0i}(u_i, v_i) + \sum_{n=1}^{k} \beta_{ni}(u_i, v_i) x_{ni}
\]
Analytic Results
## Non-Spatial Descriptive Results

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<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
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Spatial Descriptive Results (III)

Distrust
- High: 0.042
- Low: -0.058

Health (Good/Excellent)
- High: 0.775
- Low: 0.681

Depression
- High: 1.445
- Low: 1.191

IADL
- High: 0.534
- Low: 0.378

Bandwidth = 3,000
Auxiliary Findings

• As the bandwidth increased, the highest distrust score intensified along the southeastern edge of the study area along the Delaware River/New Jersey border.

• Health care system was negatively associated with self-rated health.

• Distrust varies across space.
# Global Logistic Models

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<th>VIF</th>
<th>Model II</th>
<th>Model III</th>
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Global AIC: 3885.213, 3792.622, 3576.221, 3032.984
GWR AIC: 3815.938, 3762.772, 3569.546, 3024.295

* p<.05; ** p<.01; *** p<.001
GWR Logistic Map

Distrust Effects
High: 0.088
Low: -0.476
T-Value
County Boundary

Model I

Distrust Effects
High: -0.017
Low: -0.459
T-Value
County Boundary

Model II

Distrust Effects
High: -0.195
Low: -0.325
T-Value
County Boundary

Model III

Distrust Effects
High: -0.069
Low: -0.233
T-Value
County Boundary

Model IV

Replicate Earlier Findings
Southwestern Region Suffers
Distrust Effects Vary across Space
Conclusions and Discussion
Contributions

• We not only replicate the earlier findings but also uncover the role of physical health conditions.
  – Among the elderly, controlling for physical health makes the distrust effect disappear.

• We use spatial randomization to convert non-spatial geocodes into spatial points and implement both traditional and spatial analyses.
Conclusions

• Our study demonstrates the non-stationary associations between health care system distrust and self-rated health.
• Health care system distrust and its effect on self-rated health vary across space.
• Physical health is an antecedent extraneous factor for both health care system distrust and self-rated health.
Caveats

- Longitudinal data are required to further clarify the causality.
- Different measurement of distrust may yield different results.
- More efforts should be made to explore the relationships between distrust and other health outcomes.
- Comparative studies/national data
Thank You!

Questions and Comments