Telomere Length and Neighborhood Characteristics: Race and Regional Differences in US Midlife and Older Adults

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This research was supported by NIA 5 T32 AG000029.
Neighborhoods and Social Stratification of Health

Neighborhood characteristics associated with health

• Socioeconomic opportunities/resources
• Exposure to environmental stressors
• Social capital andembeddedness
Neighborhoods and Health: Biosocial Pathways

Neighborhood disadvantage as a chronic stressor impacting health

- Socioeconomic Inequality
- Residential Segregation

Neighborhood Disorder → Unhealthy Behaviors

Allostatic Load → Limited Social Support

Chronic Disease Morbidity/Mortality
Telomere Length (TL): A Biomarker of Aging

- Repetitive DNA-protein complexes serving as protective caps at ends of chromosomes
- Shorten during replication, with cells having finite number of times for replication
- Linked to aging-related health conditions and premature mortality
- Sensitive to exposure to chronic stress

Cawthon et al., 2003; Epel et al., 2004; Fitzpatrick et al., 2007; Kimura et al., 2008; Révész et al., 2014; Rode et al., 2015; Tomiyama et al., 2012
Telomere Length, Neighborhood Characteristics, and Aging

• Few studies assessed relationship between TL and neighborhood characteristics\(^1\)

• Neighborhood characteristics contextualize aging and health\(^2\)

• Gap in understanding regional differences in neighborhood impacts on TL across race in midlife and older adults

\(^1\)Gebreab et al., 2016; Massey et al., 2018; Needham et al., 2014; Park et al., 2015; Theall et al., 2013

\(^2\)Beard et al., 2009; Burdette & Needham, 2012; Diez-Roux et al., 1997; Echeverria et al., 2008; Mujahid et al., 2011
Research Questions

• Is TL associated with neighborhood characteristics (safety, cleanliness, and social cohesion) in white and black midlife and older US adults?

• Does the relationship between TL and neighborhood characteristics vary by race?

• Does the relationship between TL and neighborhood characteristics vary by US region?

• Is the association between TL and neighborhood characteristics explained by individual-level SES, health, and behavioral factors?
Data Set

The Health and Retirement Study (HRS)

• Longitudinal survey of demographic, psychosocial, health, and biomarker data
  • Salivary TL in 2008 wave
  • Nationally representative of US adults >50 years old
• Oversamples of racial/ethnic minorities
Measures: Neighborhood Characteristics

Disorder

• Safety
  • Problems with vandalism and graffiti
  • Feel unsafe walking alone at night

• Cleanliness
  • Area not kept clean
  • Vacant houses or storefronts
Measures: Neighborhood Characteristics

Social (Dis)Cohesion

• Feel not a part of the area
• People can’t be trusted
• People are not friendly
• No one to help you
Measures

Dependent Variable

• Salivary TL (T/S ratio)

Controls

• Age, gender
• Education, income, wealth, marital status
• Obesity, number of health conditions, CES-D
• Smoking, alcohol use, physical activity
Methods

- Linear regression models of log TL with each neighborhood characteristic
  - HRS survey weights applied
  - Stratified by race
  - Interactions with US region and each neighborhood characteristic
  - SES, health status, and behaviors added sequentially
# Descriptive Statistics by Race

<table>
<thead>
<tr>
<th></th>
<th>Whites (n=3,489)</th>
<th>Blacks (n=541)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telomere Length (logged)</td>
<td>0.11</td>
<td>0.15*</td>
</tr>
<tr>
<td>Age</td>
<td>67.2</td>
<td>64.6*</td>
</tr>
<tr>
<td>Woman</td>
<td>53.3%</td>
<td>55.4%</td>
</tr>
<tr>
<td>Married/Partnered</td>
<td>67.9%</td>
<td>42.6%*</td>
</tr>
<tr>
<td>Education (years)</td>
<td>13.4</td>
<td>12.2*</td>
</tr>
<tr>
<td>Income</td>
<td>$75,235</td>
<td>$40,971*</td>
</tr>
<tr>
<td>Wealth</td>
<td>$595,927</td>
<td>$138,045*</td>
</tr>
<tr>
<td>Obese</td>
<td>31.4%</td>
<td>46.7%*</td>
</tr>
<tr>
<td>Number of Conditions</td>
<td>1.9</td>
<td>2.2*</td>
</tr>
<tr>
<td>CES-D Score ≥ 3</td>
<td>17.5%</td>
<td>30.1%*</td>
</tr>
<tr>
<td>Current Smoker</td>
<td>12.8%</td>
<td>20.9%*</td>
</tr>
<tr>
<td>Heavy Drinker</td>
<td>9.3%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Never Moderate-Vigorous Activity</td>
<td>15.6%</td>
<td>25.0%*</td>
</tr>
</tbody>
</table>

*p<0.05
Regional Distribution of Sample by Race

- White: 19.4%
  Black: 9.00%

- White: 30.8%
  Black: 18.7%

- White: 34.5%
  Black: 62.3%

- White: 15.1%
  Black: 10.1%
Regional Distribution of Average Perceived Neighborhood Characteristics by Race

<table>
<thead>
<tr>
<th>Region</th>
<th>Blacks</th>
<th>Whites</th>
</tr>
</thead>
<tbody>
<tr>
<td>West</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>South</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Levels of significance indicated by asterisks.*
Regional Distribution of Average TL by Race

Blacks

- West: 0.13
- NE: 0.17
- MW: 0.14
- South: 0.20

Whites

- West: 0.11
- NE: 0.12
- MW: 0.13
- South: 0.12
### Table 3: Linear regression model for log TL: White HRS participants

<table>
<thead>
<tr>
<th>Region</th>
<th>Discohesion b (SE)</th>
<th>Unclean b (SE)</th>
<th>Unsafe b (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>0.006 (0.006)</td>
<td>0.004 (0.005)</td>
<td>0.006 (0.005)</td>
</tr>
<tr>
<td>Midwest</td>
<td>-0.0003 (0.005)</td>
<td>-0.0004 (0.004)</td>
<td>0.0003 (0.003)</td>
</tr>
<tr>
<td>South</td>
<td>0.001 (0.006)</td>
<td>-0.001 (0.004)</td>
<td>-0.001 (0.004)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.101 (0.04)*</td>
<td>0.098 (0.04)*</td>
<td>0.099 (0.04)*</td>
</tr>
<tr>
<td>R–squared</td>
<td>0.032</td>
<td>0.032</td>
<td>0.032</td>
</tr>
</tbody>
</table>

+p<0.1  *p<0.05  **p<0.01  ***p<0.001
Table 3: Linear regression model for log TL: Black HRS participants

<table>
<thead>
<tr>
<th>Region</th>
<th>Discohesion b (SE)</th>
<th>Unclean b (SE)</th>
<th>Unsafe b (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northeast</td>
<td>-0.027 (0.01)+</td>
<td>-0.030 (0.01)**</td>
<td>-0.027 (0.01)+</td>
</tr>
<tr>
<td>Midwest</td>
<td>-0.028 (0.01)*</td>
<td>-0.040 (0.01)**</td>
<td>-0.035 (0.01) *</td>
</tr>
<tr>
<td>South</td>
<td>-0.033 (0.01)*</td>
<td>-0.043 (0.01)***</td>
<td>-0.033 (0.01)*</td>
</tr>
<tr>
<td>Constant</td>
<td>0.335 (0.10)**</td>
<td>0.306 (0.09)**</td>
<td>0.333 (0.10)**</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.067</td>
<td>0.081</td>
<td>0.074</td>
</tr>
</tbody>
</table>

*p<0.1  *p<0.05  **p<0.01  ***p<0.001
Discussion

• Unique histories of segregation and socioeconomic hardship lived by blacks in MW and South may be captured in TL
  • Creation of geographically isolated neighborhoods
  • Declines in industry with lack of financial investment

• Increased exposure to discrimination
  • Everyday discrimination associated with shorter TL in blacks in the HRS\(^1\)

• Regional patterns in health-related behaviors
  • Higher rates of smoking in blacks in Midwest\(^2\)

\(^1\)Liu & Kawachi, 2017; \(^2\)King et al., 1999
Future Directions

• Longitudinal measures of TL to assess change over time

• Duration lived in current neighborhood, assess neighborhood characteristics at different points of the life course

• Additional measures of social disadvantage
  • Neighborhood-level SES
  • Racial segregation
  • Availability of resources
Acknowledgements

• Duke University Center for the Study of Aging and Human Development (NIA 5 T32 AG000029)

• Duke University Population Research Institute

• Duke University Department of Sociology
THANK YOU!