Neighborhood Effects on Physical activity: The Social and Physical Environment

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Physical Activity and Neighborhood Environment

- The health benefits of physical activity well established.
- A growing recognition that the impact of the built environment on active living can be remarkable and hold the promise of creating long-term change in physical activity.
- Meanwhile, the interest in and the literature on neighborhood effects on health status and behavior have been rapidly growing.
- While the two lines—the impact of the built environment and the social environment on physical activity—have been explored fruitfully, a dialogue between the two has been weak.
Our goal is to study the contextual effects of the built and the social environment of urban neighborhoods on physical activity in adulthood.
Data

- **Neighborhood social environment:** the 1990 Census, the Project on Human Development in Chicago Neighborhoods-Neighborhood Survey (PHDCN-CS) conducted in 1995.

- **Neighborhood-level built environment:** multiple sources, including the Metropolitan Chicago Information Center (MCIC), City of Chicago, Chicago Area Transportation Study (CATS), and Northern Illinois Planning Commission (NIPC).

- **Individual data:** the Metropolitan Chicago Information Center-Metro Survey (MCIC-MS) which is a repeated cross-sectional survey conducted annually.
PHDCN-CS combined the census tracts in the city of Chicago into larger, ecologically meaningful "neighborhood clusters" (NC).

“The overriding consideration in formation of NCs was that they should be as ecologically meaningful as possible, composed of geographically contiguous census tracts, and internally homogeneous on key Census indicators.”  (Sampson, Raudenbush & Earls, 1997)
Measures of Physical Activity

- **Regular exercise over last year:**
  1 = ‘Yes’ to the question “In the past year to stay healthy or improve your fitness did you exercise regularly?”

- **Regular weekly exercise:** 1 = ‘At least once a week’ to the question “How often a week, on average, do you work out or exercise?”

- **Regular weekly exercise:** 1 = ‘At least four times a week’ to the question “How often a week, on average, do you work out or exercise?”
Measures of Neighborhood Deprivation and Social Capital

- **Neighborhood deprivation**: a scale that includes neighborhood-level affluence, poverty, education, percent of female-headed households, percent on public assistance ($\alpha=0.92$)
- **Neighborhood social capital**: neighborly trust, norms of reciprocity, perceived violence, and homicide rate, and combined into a composite index of social capital ($\alpha=0.83$).

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_Ecometric method_ was used to construct these social capital variables except the homicide rate.
Measures of the Built Environment

- **Block density**: The number of blocks per square miles within a neighborhood cluster.
- **Distance to subways**: The flying distance (miles) from a neighborhood centroid to the nearest subway station.
- **Distance to parks**: The flying distance (miles) from a neighborhood centroid to the nearest public park.
- **Land use pattern**: The land use mix (residential, commercial, office)
- **Pedestrian injury rate**: Number of pedestrian injury accidents per square miles
Measures of the Built Environment

- **Access to restaurants and bars**: Percentile in terms of access to eating and drinking establishments based on number of 1-mile buffers drawn around each point included the center of NC divided by the population density.

- **Access to art, culture, leisure, and entertainment facilities**: Percentile in terms of access to facilities (3-mile buffers).

- **Access to social institutions**: Percentile in terms of access to institutions (3-mile buffers).

- **Access to health and human services**: Percentile in terms of access to services (2-mile buffers).
To test our hypotheses, a series of random intercept logit models are fit for the three dichotomous dependent variables.

The models of regular exercise over a year feature 907 individuals living in 242 neighborhoods (MCIC-CS 96; 6 persons per NC on average).

The models of weekly workout or exercise feature 3,530 individuals living in 266 neighborhoods (MCIC-CS 95, 96, 97, 99; 11 persons per NC on average).
Findings: Dependent Variables

Regular exercise over last year: 62.6%
At least once a week exercise: 69.7%
At least four times a week exercise: 24.9%
## Findings: Correlations among Neighborhood Variables

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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<tr>
<td>1. Deprivation</td>
<td>1</td>
<td></td>
<td></td>
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<td>2. Social capital</td>
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<td>3. Distance to subways</td>
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<td>.2*</td>
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<td>4. Distance to parks</td>
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<td>.3*</td>
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<td>5. Land use mix</td>
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<td>-.2*</td>
<td>-.3*</td>
<td>-.1*</td>
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<tr>
<td>6. Pedestrian injury rate</td>
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<td>-.4*</td>
<td>-.4*</td>
<td>-.2*</td>
<td>.2*</td>
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<td></td>
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<tr>
<td>7. Access to amenities</td>
<td>-.1~</td>
<td>.2*</td>
<td>-.2*</td>
<td>-.1*</td>
<td>.4*</td>
<td>-.1*</td>
<td>1</td>
</tr>
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~ p<=0.10; * p<=0.05
Findings: Regular exercise over last year

<table>
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<th>NC Variables</th>
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<tr>
<td>Deprivation</td>
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<td>0.75**</td>
<td>0.73**</td>
<td>0.72**</td>
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<td>Social Capital</td>
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<td>1.32**</td>
<td>1.12</td>
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<td>Restaurants/Bars</td>
<td></td>
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<td>1.24*</td>
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<tr>
<td>Facilities (e.g., arts, leisure)</td>
<td></td>
<td></td>
<td></td>
<td>1.22*</td>
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</table>

N=907 individuals in 242 neighborhoods
Odds ratios are presented.
*significant at 5%; ** significant at 1%
Controlled for age, gender, race/ethnicity, marital status, education, income, and neighborhood age structure.
Findings: Exercise at least once a week

<table>
<thead>
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<th>NC Variables</th>
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<td>Aggregate education</td>
<td>1.11**</td>
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<td>1.12**</td>
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<td>Social Capital</td>
<td></td>
<td>0.96</td>
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<tr>
<td>Block density</td>
<td></td>
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<td>0.94*</td>
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N=3,530 individuals in 266 neighborhoods
Odds ratios are presented.
• significant at 5%; ** significant at 1%
Controlled for age, gender, race/ethnicity, marital status, education, income, and neighborhood age structure
Findings: Exercise at least four times a week

<table>
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<td>Social Capital</td>
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<td>Land use mix</td>
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<td>2.34***</td>
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<td>Health and human services</td>
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<td>1.08~</td>
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*N=3,530 individuals in 266 neighborhoods
Odds ratios are presented.
~ significant at 10%; * significant at 5%; ** significant at 1%
Controlled for age, gender, race/ethnicity, marital status, education, income, and neighborhood age structure
Conclusion

- Neighborhood social and built environments are both important for individual leisure-time physical activity.
- The effect of neighborhood socioeconomic status (SES) seems persistently strong for moderate exercise but weaker for more intensive exercise.
- Different aspects of the built environment matters for different measures of physical activity controlling for neighborhood social environment.
- Neighborhood environment matters for health behaviors in complex ways.
Limitation

- Cross-sectional design
- Self-reported dependent variables
- Spatial dependency not considered
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