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Luc de Montigny 2008

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Example of Proximity Measure
Measurement

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Neighborhood Centers
Neighborhood Centers

- Retail only (3 minimum within 50 M)
- Retail, Grocery, and Restaurant (1 of each, 3 minimum within 50 M)
Neighborhood Centers

Grocery, Restaurant, Retail

1 Each 50 M
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- Scale & resolution
- Time-space dimensions
- Exposure vs. access/use
- Clustering (people & environment)
References


- de Montigny, L, Vernez Moudon, A., Leigh, B., Young, K. Assessing a Drop Box Programme: A Spatial Analysis of Discarded Needles. (1873-4758 (Electronic)).


References

Objective 4

Learn and discuss about geospatial analyses to measure and model the environment or behaviors
4.1. Predicting behavior based on environmental exposure and access/use
LOCATIONS: 608 random sample of survey respondents in the sample frame

ESTIMATING PROBABILITY OF WALKING: Multinomial logistic regression models were developed to estimate the probability of a “Moderate Walker” (1-149 min per week) or “Sufficient Walker” (>=150 min per week), relative to not walking (0 min walking per week).

VALUES of LOCATIONS: values (probability of walking) are calculated using the regression
WBC Audit Instruments

Methods

- Multinomial logit models estimating
  - odds of walking sufficiently (150+minutes per week, meeting the recommendation for health)
  - moderately (1-149 minutes per week),
  - relative to not walking
- Objective environmental variables that showed statistical significance in the models were translated into audit items.
## Top predictors of walkability

<table>
<thead>
<tr>
<th>Environmental Characteristic</th>
<th>Odds ratio of walking &gt;150 min/week vs. not walking (airline measurement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Shorter distance to closest grocery store (&lt;440 m)</td>
<td>2.257**</td>
</tr>
<tr>
<td>• Fewer grocery stores or markets within buffer (less than 3.7)</td>
<td>1.50*</td>
</tr>
<tr>
<td>• More grocery store/restaurant/retail clusters in 1km buffer (more than 1.8)</td>
<td>1.697**</td>
</tr>
<tr>
<td>• More dwelling units per acre of the parcel where the residence is located (more than</td>
<td>1.959**</td>
</tr>
<tr>
<td>21.7 units/net acre)</td>
<td></td>
</tr>
<tr>
<td>• Fewer educational parcels in 1km buffer (less than 5.1)</td>
<td>1.553*</td>
</tr>
<tr>
<td>• Smaller size of closest office complex (less than 36,659 m² or 9 acres)</td>
<td>1.28*</td>
</tr>
<tr>
<td>• Longer distance to closest office/mixed use complex (more than 544 m)</td>
<td>1.27*§</td>
</tr>
<tr>
<td>• Smaller block size where residence is located (less than 23,876 m² or 5.9 acres)</td>
<td>1.19*</td>
</tr>
</tbody>
</table>

* p < 0.1; **p < 0.05

Adapted from Moudon AV, Lee C, Cheadle A, et al. Attributes of Environments Supporting Walking. Am J Health Promot. 2007;21(5):448-459. *: significant at 0.1 level; **: significant at 0.05 level
WBC Surface modeling

Likelihood of Sufficient Walking for Average Person
Surface Modeling Algorithm
WBC Surface modeling

Likelihood of Sufficient Walking
(>150 minute a week)

Older Adult >65  Younger Adults <35

UW Urban Form Lab  Walk and Bike Communities project

Probability of Walking Sufficiently
(>150 minute a week)
High / Low Reported Income
(>$75,000 vs. <$25,000)
4.2. Maps in GIS can serve as data layers
E. Berke


**Research Goal**

—Evaluate the association of individual-level neighborhood walkability with depression and physical activity in older adults.
E. Berke

Subject Population

• Adult Changes in Thought (ACT) study
  • Group Health Cooperative study - 1994 - present
  • Prospective longitudinal design
  • ≥ 65 y/o
  • ~2500 subjects
  • Surveyed biennially
  • Information on BMI, self-reported walking, depression
  • Chronic dz burden, demographics, health conditions

Neighborhood

• Subjects geocoded at parcel level
  – 100m, 500m, 1000m, buffers
• Walkability score computed for each person at each buffer size
E. Berke

Individual-Level Advantages

- Precise description of habitat immediately around subject’s home
- Not census or other aggregate measure
- Reduced risk of ecologic fallacy
Results Walkability Score and Walking

Older adults (65-97; n = 936)

✓ Higher walkability scores significantly associated with more walking for exercise across buffers of varying radii

(for men, odds ratio [OR]=5.86; CI=1.01, 34.17 to OR=9.14; CI=1.23, 68.11; for women, OR=1.63; CI=0.94, 2.83 to OR=1.77; CI=1.03, 3.04).

✓ A trend toward lower body mass index in men living in more walkable neighborhoods did not reach statistical significance.
Results

Walkability Score and Depression

(n = 740; >65y)


✓ Physical activity known to be inversely related to depression in older persons

✓ Neighborhood Walkability Scores negatively associated with depression in older males [adjusted for individual-level risk factors of income, physical activity, education, smoking status, living alone, age, and chronic disease burden]

✓ OR (interquartile range of walkability score, 25th-75th percentile) = 0.32 to 0.34 for buffer radii of 100, 500, and 1000 m (p = 0.01 to 0.02)
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[Map showing visual exposure and opaque objects]
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