Health, Transportation, and the Built Environment: Building a Roadmap for Change with Smaller Cities

Cynthia Carlson  
*Merrimack College, carlsonc@merrimack.edu*

Semra Aytur

Kevin Gardner

Shannon Rogers

Follow this and additional works at: [http://scholarworks.merrimack.edu/cen_facpub](http://scholarworks.merrimack.edu/cen_facpub)

Part of the Civil Engineering Commons, and the Transportation Engineering Commons

Repository Citation


Available at: [http://scholarworks.merrimack.edu/cen_facpub/6](http://scholarworks.merrimack.edu/cen_facpub/6)

This Conference Proceeding is brought to you for free and open access by the Civil Engineering at Merrimack ScholarWorks. It has been accepted for inclusion in Civil Engineering Faculty Publications by an authorized administrator of Merrimack ScholarWorks.
HEALTH, TRANSPORTATION & BUILT ENVIRONMENT

Building a Roadmap for Change with Smaller Cities

Cynthia H. Carlson, P.E.
Semra Aytur, PhD,
Kevin Gardner, P.E., PhD, Shannon Rogers, MS.
University of New Hampshire, Durham, NH
WALKING IN SMALL CITIES AND TOWNS?

- Important culture (i.e. New England).
- Often originally designed to be walkable – before cars.
- May provide services to region.
- Lots of us live there & like it!
SPRAWL IN SMALL AND LARGE CITIES

2000 Population Density

Density by Zip Code
Pop per acre

0 - 100
100.1 - 500
500.1 - 1000
1000.1 - 5000
5000.1 - 62000
SPRAWL IN SMALL AND LARGE CITIES

2050 Projected Density

Density by Zip Code
Pop per acre

- 0.1 - 100
- 100.1 - 500
- 500.1 - 1000
- 1000.1 - 5000
- 5000.1 - 62000
- Managing growth...
- Encouraging walkability...
- Controlling sprawl...
- Preserving communities...

.... Requires working with smaller cities and towns.
OBJECTIVES

- Examine associations between built environment and personal transportation decisions on a neighborhood-scale;

- Examine whether socio-demographic factors (i.e. age, income) influence decision to walk in different neighborhood contexts;

- Examine how the built environment might be manipulated to remove real or perceived barriers to walking within neighborhoods.
STUDY AREA

Manchester

Population = 107k

Median Income = $41k

Portsmouth

Population = 21k

Median Income = $45k
METHODS

1. Interdisciplinary team,
2. Community-based research (collaborative)
3. Paper/internet survey of residents and observation,
INTERDISCIPLINARY & COLLABORATIVE

- University -
  - Civil Engineers
  - Transportation Planners
  - Public Health Specialists
- State - Dept of Environmental Services
- Regional -
  - Planning agencies: transport, economic development
- Municipal -
  - Health Dept, Planning Dept, Parks & Rec
  - Economic Development
- Local – Neighborhood watch, N’hood activists
Survey in 22 Neighborhoods

2004 surveys distributed
Overall net response rate = 33.9%
TRANSPORT DECISIONS METRICS

- Frequency of walking to destinations
- Sum of places respondents “can” and “do” walk

<table>
<thead>
<tr>
<th>Post Office</th>
<th>Home of a Friend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restaurant</td>
<td>Grocery Store</td>
</tr>
<tr>
<td>Coffee Shop/Café</td>
<td>Bar/Pub</td>
</tr>
<tr>
<td>Shopping Center</td>
<td>Community/Rec Center</td>
</tr>
<tr>
<td>Church</td>
<td>Convenience Store</td>
</tr>
<tr>
<td>School</td>
<td>Natural Space, Park</td>
</tr>
<tr>
<td>Library/Bookstore</td>
<td>Other</td>
</tr>
</tbody>
</table>

Built Upon Method of: Leyden (2003), AJPH 93(9):1546-1551.
OUTCOMES AND ANALYSIS
COLLABORATION OUTCOMES:

- City depts discussed coalescing around one issue (walkability or sustainability) - to avoid duplication and silos.

- There has been a lot of focus on downtown – pleased this study looks more broadly.

- Not all neighborhoods want a sidewalk – requires maintenance & cost.
COLLABORATION OUTCOMES::

- Want to let residents “age in place” rather than moving to Florida.

- Incentives to read with children >> why not also to WALK with children – how to build walking as a social norm.

- Want to find the best pay off for efficiency, health, etc. – not just the squeaky wheel.
Cluster Modeling, Bi-Level Modeling
Cluster Modeling, Bi-Level Modeling

<<How many places “DO” you walk?>>

» Explanatory Variables (p<0.05)

- Age
- Body Mass Index
- Mentions distance to services
- Maximum time willing to walk
- Household Income
- Frequency you exercise for 15 min
- Sidewalks in the neighborhood
- Intersections
Cluster Modeling, Stratified

<<How many places “DO” you walk?>>

<table>
<thead>
<tr>
<th></th>
<th>Low Income</th>
<th>High Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Neg</td>
<td>Neg</td>
</tr>
<tr>
<td>BMI</td>
<td>Neg</td>
<td>Neg</td>
</tr>
<tr>
<td>Mention dist to services</td>
<td>Neg</td>
<td>Neg</td>
</tr>
<tr>
<td>Max time to walk</td>
<td>-</td>
<td>Pos</td>
</tr>
<tr>
<td>Household Income</td>
<td>-</td>
<td>Pos</td>
</tr>
<tr>
<td>Exercise 15 min</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sidewalks</td>
<td>-</td>
<td>Pos</td>
</tr>
<tr>
<td>Intersections</td>
<td>Pos</td>
<td>Pos</td>
</tr>
</tbody>
</table>
SUMMARY

- Small cities & towns have unique transportation and planning needs.

- Bringing decision makers together to discuss walkability was valuable for everyone.

- ‘Walkable’ looks different for different people and places >> no blanket solutions.
Thank you

QUESTIONS?
87% of municipal governments have less than 10,000 residents.
US MUNICIPAL GOVERNMENTS BY POPULATION

- **Towns with less than 10,000 people**: 16% of US pop
- **10,000 to 24,999 people**: 16%
- **25,000 to 49,999**: 14%
- **50,000 to 99,000**: 14%
- **100,000 to 299,999**: 14%
- **300,000 or more**: 27%

Brennan & Hoene – For National League of Cities, Research Brief 2003; 1997 Data
**Walking and Sidewalks – Ave by Nhood**

$$y = 5.66x + 0.63$$

$$R^2 = 0.68$$
**WALKING, SIDEWALKS, & INCOME**

**Lower income**

- Equation: $y = 1.23x + 2.11$
- $R^2 = 0.090$

**Higher income**

- Equation: $y = 6.25x + 0.64$
- $R^2 = 0.81$
## Cluster Modeling, Stratified

<<How many places “DO” you walk?>>

<table>
<thead>
<tr>
<th></th>
<th>Portsmouth</th>
<th></th>
<th>Manchester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low In.</td>
<td>High In.</td>
<td>Low In.</td>
<td>High In.</td>
</tr>
<tr>
<td>Age</td>
<td>Neg</td>
<td>Neg</td>
<td>Neg</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>Neg</td>
<td>Neg</td>
<td>Neg</td>
<td></td>
</tr>
<tr>
<td>Mention dist to</td>
<td>Neg</td>
<td>Neg</td>
<td></td>
<td>Neg</td>
</tr>
<tr>
<td>services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max time to walk</td>
<td></td>
<td></td>
<td>Pos</td>
<td></td>
</tr>
<tr>
<td>Household Income</td>
<td></td>
<td></td>
<td>Pos</td>
<td></td>
</tr>
<tr>
<td>Exercise 15 min</td>
<td>Pos</td>
<td></td>
<td>Neg</td>
<td></td>
</tr>
<tr>
<td>Sidewalks</td>
<td>Pos</td>
<td></td>
<td>Pos</td>
<td></td>
</tr>
<tr>
<td>Intersections</td>
<td>Pos</td>
<td></td>
<td>Pos</td>
<td></td>
</tr>
</tbody>
</table>
Cluster Modeling, Stratified

<<How many places “DO” you walk?>>

<table>
<thead>
<tr>
<th></th>
<th>Portsmouth</th>
<th></th>
<th></th>
<th>Manchester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low In.</td>
<td>High In.</td>
<td>Low In.</td>
<td>High In.</td>
<td>Low In.</td>
</tr>
<tr>
<td>Observations</td>
<td>103</td>
<td>272</td>
<td>141</td>
<td>184</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2.27</td>
<td>5.34</td>
<td>3.41</td>
<td>2.95</td>
<td></td>
</tr>
<tr>
<td>Std Deviation</td>
<td>2.62</td>
<td>3.77</td>
<td>2.98</td>
<td>2.95</td>
<td></td>
</tr>
</tbody>
</table>
## Cluster Modeling, Stratified

<<How many places “DO” you walk?>>

<table>
<thead>
<tr>
<th></th>
<th>Portsmouth</th>
<th></th>
<th>Manchester</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Younger</td>
<td>Older</td>
<td>Younger</td>
<td>Older</td>
</tr>
<tr>
<td>Observations</td>
<td>127</td>
<td>248</td>
<td>103</td>
<td>222</td>
</tr>
<tr>
<td>Mean</td>
<td>5.82</td>
<td><strong>3.82</strong></td>
<td>2.79</td>
<td><strong>3.32</strong></td>
</tr>
<tr>
<td>Std Deviation</td>
<td>3.80</td>
<td>3.54</td>
<td>2.90</td>
<td>2.99</td>
</tr>
</tbody>
</table>