Relationships of Urban Containment Policies to Physical Activity: A Longitudinal Analysis of Large U.S. Metropolitan Areas

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The University of North Carolina, Chapel Hill
In the News…

Smart Growth Makes a Statement with Governors

State governments can either enable or stymie communities that want to plan and invest for a more livable future…

Smart Growth Planning Part of Gov. Spitzer's Goal for Cleaner, Greener New York
Transportation investments must be accompanied by smart-growth planning, which will alleviate environmental degradation, and will make our communities more vibrant places to live.

Smart Growth at the Ballot Box
Governors in at least 13 states were elected or re-elected on platforms with strong calls for moves such as focusing investment on existing cities, towns and suburbs; expanding affordable housing options near job centers; balanced transportation investments.

Smart, Quality Growth – Preparing for Florida’s Future
Urban Containment Policies

- Adopted at the state, metropolitan, county, or municipal levels
- Intended to manage the location, character, and timing of urban growth
  - Goals:
    - Compact development
    - Preservation of open space
    - Efficient use of infrastructure
    - Promotion of social equity
  - Implementation tools:
    - Urban growth boundaries
    - Infrastructure service areas/adequate public facilities ordinances
    - Greenbelts
Background: Previous Studies

- Features of the built environment associated with physical activity
  - Access to parks, open space, recreational facilities
  - Mixed residential and commercial land uses
  - Higher densities
  - Connected multi-modal transportation systems

- Limited research examining the role of macro-level policies that may facilitate development patterns supportive of these attributes
Limitations in Existing Literature

- Few longitudinal studies

- Public health surveillance systems focus on leisure-time physical activity

- Relationships of containment policies to physical activity remain unexplored
Objective

• Examine relationships between urban containment policies, state adoption of growth management legislation, and physical activity
  – 1990-2002
  – 63 large U.S. metropolitan statistical areas (MSAs)
### Data Sources

<table>
<thead>
<tr>
<th>Policies</th>
<th>Daily Vehicle Miles Traveled Per Capita</th>
<th>Net Density Natural Resources Inventory</th>
<th>MSA Socio-demographics</th>
<th>Physical Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Published Studies</td>
<td></td>
<td></td>
<td></td>
<td>Walking &amp; Bicycling to Work: U.S. Census</td>
</tr>
<tr>
<td>(e.g., Wassmer 2006; Rodriguez 2006; Gale 1992; Weitz 1999, Burby &amp; May 1997; Carruthers 2002)</td>
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</tbody>
</table>
Policy Measures

- Urban Containment Policies (UCP)
  - Presence of a formally adopted urban growth boundary, urban service limit, or greenbelt in one or more jurisdictions within the MSA
Urban Containment Policy Classification


Strong

- Incorporate a variety of implementation tools to direct growth toward designated urban areas
  - Rural land policies to prevent low density sprawl
  - Strong housing affordability, infrastructure, and open space policies
  - Strong intergovernmental coordination

Weak

- Lack policies to contain the outward spread of development
- Weak intergovernmental coordination
State Growth Management Legislation

- n=10 states
  - Oregon, RI, Florida, Georgia, Maryland, Washington, Minnesota, Connecticut, Tennessee, Arizona

- 2 Approaches:
  - Enabling Legislation
  - Legislation mandating adoption of Urban Growth Boundaries (UGBs)
MSA Sample

n=63 MSAs (in 31 states)

- No Policies n=33
  - Atlanta
  - Hartford/Middleton
  - Memphis
  - Nashville
  - Providence
  - Phoenix

- State Legislation Only n=6
  - Albuquerque
  - Austin
  - Charlotte
  - Denver
  - Norfolk
  - Philadelphia

- MSA-level Policy Only n=12
  - Riverside-San Bernardino
  - Sacramento
  - San Diego
  - San Francisco
  - San Jose
  - Washington, DC

- State and MSA-level Policies n=12
  - Baltimore
  - Minneapolis
  - Miami
  - Ft. Lauderdale
  - Jacksonville, Tucson
  - Orlando, Tampa
  - Portland, Seattle, Tacoma, Spokane
Statistical Analysis

- Linear mixed models
  - Repeated measurements (level 1) nested within MSA (level 2)
  - Random intercepts; random slopes
  - Covariates
    - Time-varying and baseline (1990)

- Estimated the pattern of change from 1990-2002 in the proportion of the population in each MSA who reported being physically active, given the presence or absence of policies
Results
Percent No Leisure-Time Physical Activity, 1990-2002

Urban Containment Policy (UCP) Classification:

- Nationwide Trend
- No UCP
- Weak UCP
- Strong UCP (Enabling or No State Legislation)
- Strong UCP and State Legislation Mandating UGB
- ---Healthy People 2010 Target

*Unadjusted for SES
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Adjusted Estimate</th>
<th>Model 2 Adjusted Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Proportion No LTPA in 1990)</td>
<td>25.35****</td>
<td>25.74****</td>
</tr>
<tr>
<td>Year</td>
<td>0.94****</td>
<td>0.98****</td>
</tr>
<tr>
<td>Year Sq</td>
<td>-0.07****</td>
<td>-0.08****</td>
</tr>
<tr>
<td>State Legislation (Referent=None)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enabling</td>
<td>1.13</td>
<td>2.03***</td>
</tr>
<tr>
<td>Mandate UGB</td>
<td>-3.28**</td>
<td>-1.81</td>
</tr>
<tr>
<td>MSA Urban Containment Policy (Referent=None)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weak</td>
<td>-</td>
<td>-1.80*</td>
</tr>
<tr>
<td>Strong</td>
<td>-</td>
<td>-2.40***</td>
</tr>
<tr>
<td>% Between-MSA Variance Explained</td>
<td>75%</td>
<td>78%</td>
</tr>
</tbody>
</table>

****p≤0.001; ***p≤0.01; **p≤0.05; *p≤0.10

Adjusted for median household income, percent ≥ high school, percent black in 1990, percent ≥ Age 65 in 1990
## Mean Minutes Leisure Physical Activity Per Week, 1990-2000

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Estimate (Adjusted)</th>
<th>Model 2 Estimate (Adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Mean Minutes Leisure PA/week 1990)</td>
<td>178.20****</td>
<td>175.86****</td>
</tr>
<tr>
<td>Year</td>
<td>0.92</td>
<td>0.76</td>
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<tr>
<td><strong>State Legislation</strong> (Referent=None)</td>
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<td></td>
</tr>
<tr>
<td>Enabling</td>
<td>-4.26</td>
<td>-12.47</td>
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<tr>
<td>Mandate UGB</td>
<td>53.45***</td>
<td>41.16**</td>
</tr>
<tr>
<td><strong>MSA Containment Policy</strong> (Referent=None)</td>
<td></td>
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</tr>
<tr>
<td>Weak</td>
<td>-</td>
<td>18.36*</td>
</tr>
<tr>
<td>Strong</td>
<td>-</td>
<td>21.09**</td>
</tr>
<tr>
<td>Daily VMT per Capita (slope)</td>
<td>-4.50**</td>
<td>-4.21**</td>
</tr>
<tr>
<td>% Between-MSA Variance Explained</td>
<td>61%</td>
<td>69%</td>
</tr>
</tbody>
</table>

****p≤0.001; ***p≤0.01; **p≤0.05; *p≤0.10

Adjusted for median household income, percent ≥ high school, percent black in 1990, percent ≥ Age 65 in 1990, daily VMT per capital in 1990.
<table>
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<th>Model 2 Adjusted Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept (Percent Walk/Bike to Work, 1990)</td>
<td>3.21****</td>
<td>3.18****</td>
</tr>
<tr>
<td>Year</td>
<td>-0.09****</td>
<td>-0.09****</td>
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<tr>
<td><strong>State Legislation</strong> (Referent=None)</td>
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<tr>
<td>Enabling</td>
<td>-0.10****</td>
<td>-0.09****</td>
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<tr>
<td>Mandate UGB</td>
<td>0.65</td>
<td>0.60</td>
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<tr>
<td><strong>MSA Urban Containment Policy</strong> (Referent=None)</td>
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<tr>
<td>Weak</td>
<td>-</td>
<td>0.06</td>
</tr>
<tr>
<td>Strong</td>
<td>-</td>
<td>0.09***</td>
</tr>
<tr>
<td>Daily VMT per capita in 1990</td>
<td>-0.14****</td>
<td>-0.14***</td>
</tr>
<tr>
<td>Density</td>
<td>0.39****</td>
<td>0.40****</td>
</tr>
<tr>
<td>% Between-MSA Variance Explained</td>
<td>60%</td>
<td>60%</td>
</tr>
</tbody>
</table>

Adjusted for median household income, percent ≥ high school, percent black in 1990, percent ≥ Age 65 in 1990
Limitations

• Self-report of physical activity
  – Lack of detailed transportation-PA data

• Lack of cohort data

• Potential misclassification of policies

• Time lag between policy adoption and implementation
  – Mechanism not determined
Strengths

- Longitudinal design
- Combination of data sources
- Large sample of diverse metropolitan areas
- Measurement of both state and MSA policies
Conclusions

• Metropolitan areas with strong urban containment policies have maintained higher population levels of leisure-time physical activity and active commuting from 1990-2002
  – Role of state, MSA, and local policies
  – Future studies:
    • Explore policy processes
    • Examine health and equity implications in diverse communities
Acknowledgements

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Questions?

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