Geohealth meets Geodesign: multidisciplinary challenges of informing the regional design studio with human health research

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Mapping the landscape of health
Health and Communities

• A fundamental understanding: our environment shapes our health (e.g., Kweon, Sullivan, and Wiley 1998; Burdette and Whitaker 2004)
  – RWJF: “Does where you live affect how long you live?”

• Key dimensions include viewing the landscape as food environment and physical activity environment (e.g. Ohri-Vachaspati et al. 2013)
Mapping the community

- Four New Jersey cities
  - Camden, Newark, New Brunswick, Trenton
- Data from multiple sources – Commercial and public
- Combined and checked with calls, supplemental data
- Food Environment
  - Corner stores, grocery stores, supermarkets, limited service restaurants
- Physical Activity
  - Small parks, large parks, physical activity outlets
Team science results

Table 3
Multivariate logistic regression analysis of the association of proximity to elements of the food and physical activity environment with child’s weight status (n^a = 702).

<table>
<thead>
<tr>
<th>Key geospatial predictor(s)^b</th>
<th>Logit models</th>
<th>Probit models</th>
<th>Heckman-probit models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adjusted odds ratio (95% CI)^c</td>
<td>Marginal effects^d (95% CI)</td>
<td>Marginal effects^dec (95% CI)</td>
</tr>
<tr>
<td>Distance to nearest (miles)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convenience store</td>
<td>0.32 (0.07–1.37)</td>
<td>−0.23 (−0.51, 0.05)</td>
<td>−0.16 (−0.39, 0.07)</td>
</tr>
<tr>
<td>Presence in 1/2 mile radius</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convenience store</td>
<td>1.47 (0.35–6.20)</td>
<td>0.05 (−0.24, 0.34)</td>
<td>−0.08 (−0.35, 0.18)</td>
</tr>
<tr>
<td>Fast-food restaurant</td>
<td>1.41 (0.47–4.28)</td>
<td>0.09 (−0.14, 0.32)</td>
<td>0.13 (−0.08, 0.35)</td>
</tr>
<tr>
<td>Park (1 acre or more)</td>
<td>0.41 (0.021–0.81)**</td>
<td>−0.19 (−0.33, −0.05)**</td>
<td>−0.14 (−0.30, 0.02)^e</td>
</tr>
<tr>
<td>Presence in 1/4 mile radius</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convenience store</td>
<td>1.90 (1.04–3.45)**</td>
<td>0.13 (0.01, 0.25)**</td>
<td>0.13 (0.01, 0.26)^**</td>
</tr>
<tr>
<td>Number in 1/4 mile radius</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convenience store</td>
<td>1.11 (1.00–1.22)**</td>
<td>0.02 (0.002, 0.04)**</td>
<td>0.02 (−0.001, 0.04)^*</td>
</tr>
</tbody>
</table>

^a Unweighted sample size.
^b Multivariate regressions were run for geospatial variables having a significant (p < 0.1) bivariate association with child's weight status (see Table 2).
^c Sample weighted and SE adjusted for complex survey design; each model controlled for child’s age, child’s sex, race/ethnicity, household poverty status, parental nativity, mother’s education level, household language status, parental BMI, median income in the block group of child’s residence, and racial/ethnic composition in the block group of child’s residence.
^d Marginal effects indicate the change in the likelihood of being overweight/obese for individuals with the average value of the remaining covariates in the model.
^e The first-stage selection equation of the Heckman-Probit model was run on an unweighted sample of n = 2200.
** p < 0.05.
^* p < 0.10.
Key findings

• Several patterns, but two key findings
  – We found that after adjusting for covariates, children living within 1/4 mile of a convenience store had nearly twice the odds of being overweight or obese than children living farther away.
  – Children who lived within 1/2 mile of a park had less than half the odds of being overweight or obese compared to children who did not.
  – Different than other cities

Choosing the right models
Residential areas where alcohol is more accessible than fresh produce

Model based on multiple planar geometries
Model based on walking distance or time
Model based on driving time
Models derived from land use and other public data.
Recurring wellness themes

- Food access
- Food education
- Exercise and fitness
- Active lifestyle
- Access to healthcare
- Environmental education
- Mental health and stress
- Wildlife
- Lyme disease
Repetition is a clue

- Student design solutions repeatedly built on hospitals as hubs for access to multiple forms of expertise
- Reaching at-risk populations often featured guerilla designs or pop-up solutions
- Wellness was recognized as benefitting from integrated approaches
- Steps toward wellness were both intimate and regional
- Link between food and community
- Other deserts – park, clinic, nature, physical activity
Alternatives - hubs
Alternatives - food
Alternatives – small solutions
Repeated returns to community
Moving forward
Impacts

- Research team is following children longitudinally (2008-2019)
- Research team is following changing landscape longitudinally (2008-2019)
- Collaboration with farmers market research team
- Somerset County Planning Board is rethinking county health plan
- Middlesex County is pursuing greenway expansions and prescription parks
- Colombian MoH is pursuing NSOAP
Bridging health research and design in studio

• Place really matters
• Volume versus detail
• Translations
  – Goes both ways
• Defensible or inspired?
• Still stumbling over that circle in the middle?
• Finding deeper connections – Surgical landscape as a metaphor
Acknowledgements

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Thank you!

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Thank you