Contributions of neighborhood street scale elements to physical activity in Mexican school children

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Acknowledgements

- The authors wish to thank the numerous students, trainees and staff for their time in data collection, entry and cleaning.
- Funded in part by a grant from the National Cancer Institute (1R13CA162816) and a Fulbright García Robles award to Dr. Lee
Purpose

• Investigate relationship of walkability and street-scale elements to physical activity in Mexican children
  – We expected that neighborhood safety and walkability would be associated with outdoor play, and access to recreation facilities would be associated with participation in sports and other organized physical activities.
Cross sectional design. Puerto Vallarta, Guadalajara, and Mexico City.

Individual children and neighborhood surrounding schools.

32 public schools

- Guadalajara \( (n = 11) \)
- Puerto Vallarta \( (n = 7) \)
- Mexico City \( (n = 14) \)
Defining Neighborhoods

- Radial buffer
  *búfer radial*
- All arterial streets
  *Todas las calles arteriales*
- 25% of residential streets
  *25% de calles residenciales*
- Street segments
  *Segmentos de calle*

McMillan TM, Cubbin C, Parmenter B, Medina AV, Lee RE. Neighborhood sampling: how many streets must an auditor walk? 2010, 7:20 http://www.ijbnpa.org/content/7/1/20
Individual Measures

- 1,509 Mexican school children
  - 3\textsuperscript{rd}, 4\textsuperscript{th}, and 5\textsuperscript{th} grade
  - Ambulatory & Healthy

- School Physical Activity and Nutrition (SPAN) survey
  - Demographics, nutrition, physical activity, food behaviors
Neighborhood Measures

- Pedestrian Environment Data Scan (PEDS)
  - Pedestrian facilities (sidewalks, path obstructions, path condition, pedestrian amenities, and pedestrian traffic buffers)
  - Street attributes (posted speed limits, traffic control devices, traffic volume, and number of traffic lanes)
  - Number of land uses in the segment, including presence of recreation facilities
  - Street cleanliness (absence of litter, graffiti and poor building maintenance)
Neighborhood Measures

• Neighborhood SES—Urban Poverty Index
  – National Council of Population
  – Educational attainment, household income, household size, and population density

• Walkability
  – Land use density (3-category land use entropy score, adapted from Frank et al; PEDS)
  – Connectivity (Number of intersections per kilometer squared, Federal Electoral Institute)
  – Residential Density (number of households per kilometer squared, National Institute of Geography and Statistic of Mexico)
Analyses

- Variables analyzed descriptively by frequency or mean
- Two-phase modeling analysis
  - Preliminary covariate-adjusted, single-environmental variable, multi-level logistic regression models explored associations between neighborhood-level variables, and physical activity outcomes
  - Adjusted for city, socio-economic status, and individual demographic covariates
  - Full models included all environmental variables and interactions associated with a p<0.20 in the covariate-adjusted single-environmental models for each of the two physical activity outcomes
- Separate models were run for full sample and subsample adjusted for individual income
## Sample Demographics

<table>
<thead>
<tr>
<th></th>
<th>Mean or n</th>
<th>IC95% or %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>9.63</td>
<td>9.57, 9.68</td>
</tr>
<tr>
<td>Female</td>
<td>695</td>
<td>52.6</td>
</tr>
<tr>
<td>&lt; $5,000.00</td>
<td>386</td>
<td>50</td>
</tr>
<tr>
<td>$5,000.00 - $9,999.99</td>
<td>255</td>
<td>33</td>
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<tr>
<td>$10,000.00 or more</td>
<td>131</td>
<td>17</td>
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<tr>
<td># Children in the house</td>
<td>2.5</td>
<td>2.41, 2.54</td>
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<tr>
<td>Outdoor play</td>
<td>1001</td>
<td>75.8</td>
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<tr>
<td>Sports participation</td>
<td>575</td>
<td>47.4</td>
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<tr>
<td>Organized activities</td>
<td>523</td>
<td>40.9</td>
</tr>
</tbody>
</table>
Neighborhood Characteristics

- Less than 1/3 met “highly walkable” definitions for high income countries
- Poor or fair cleanliness ratings in 75%
- 20% access to recreational facilities
- 55% of neighborhoods rated very low to low SES (high poverty)
Results – Outdoor play

• Preliminary models showed walkability score, path condition, path obstructions, amenities, and recreation facilities, were associated with outdoor play

• In the final full models... having street segments with fewer path obstructions, greater pedestrian amenities and lower walkability was associated with more outdoor play

• Having low traffic volume roads associated with outdoor play outdoor for boys

• Similar relationships in full sample
Results – Sports and Organized Physical Activities

• Preliminary models showed walkability, sidewalk availability, sidewalk buffer, path obstructions, traffic control devices, cleanliness, number of traffic lanes, and amenities were associated with participation in sports or other organized physical activities

• Full sample walkability score negatively associated with participation

• More pedestrian amenities, more street cleanliness was associated with less participation

• More path obstruction was associated with greater participation

• No gender or income differences
Discussion
Gracias!