Built Environment and Walking in Adults from Curitiba, Brazil: Does Walkability Matter?

ACTIVE LIVING RESEARCH – ANNUAL CONFERENCE 2013

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Physical Inactivity: a global issue

Men 15yrs or older

Women 15yrs or older

Population in the world: Where people are?

Urbanization in world: Where people live?

Country Income Level
- Low Income
- Lower Middle Income
- Upper Middle Income
- High Income

Environment PA correlates in LMICs: Where is the evidence?

Bauman AE, Reis RS, Sallis JF, Wells JC, Loos RJ, Martin BW. Correlates of physical activity: why are some people physically active and others not? Lancet 2012.
IPEN Studies: International Physical Activity & Environment Network

- Started at ICBM in Mainz Germany in 2004 by: Sallis & Kerr (US) Owen (Australia) DeBourdeaudhuij (Belgium)
- IPEN study funded by NCI 2009—2013: 12 countries
  - Support countries to collect or enhance data according to common protocol
  - Study co-ordination, quality control, & pooled analyses
  - Support the network more widely
  - Advance science through pooled analyses
  - Use results to inform policy internationally

Aims

- Examine the association between walkability and walking for commuting and leisure in adults from Curitiba, Brazil.
- Assess the interactions between income and walkability
METHODS

- The Spaces for Physical Activity in Adults Study (ESPACOS)
- Cross-sectional study
- Curitiba, Brazil (1,746,896 inhabitants (52% women); 8th largest city in the country)
- August and December 2010
- Walkability (residential density, intersection density, and land use mix), obtained through data layers exported into a Geographic Information System.

Methods

- Selected census tracts drawn from 2,125 (~225 households/census tract)
- Average annual income within census tract (national census)
- Walkability index (Residential density, Connectivity, Land use mix (entropy obtained through five land use categories)
- Census tracts ranked according deciles of walkability & income
- 2nd & 3rd deciles: low walkability & low income"
- 8th & 9th deciles: high walkability & high income”
- Eight selected census tracts (total of 32)
METHODS

- 10,063 eligible households (~320 houses/census tract)
  - 22 households systematically sampled

- One adult randomly sampled (N=704; 50% Women)
  - lived in the neighborhood > 1 year
  - Between 18 and 65 years.

- Leisure (walking, moderate and vigorous PA) and transportation (walking)
  - International PA Questionnaire (IPAQ)

- Outcomes: ≥150 min/week versus <149 min/week. Leisure Walking (≥150 min/week versus <149 min/week)
Main effects of walkability and income and their interaction were the main focus of these analyses.

Logistic regressions
- Crude model included walkability (low and high)
- Neighborhood income included as an independent variable
- All individual variables were included in the next model.

Interaction terms between walkability and income (moderating effect of quadrants of income on the walkability PA association)

Analyses adjusted for the clustering effect of census tract.
## RESULTS

| Demographics | Total | Low Income | | High Income | | Low W | High W | Low W | High W |
|--------------|-------|------------|--------------|--------------|--------|--------|--------|--------|
| | n     | %     | n     | %     | n     | %     | n     | %     |
| Sex          |       |        |       |        |       |        |       |        |
| Female       | 369   | 52.9   | 93    | 54.1   | 92    | 52.0   | 94    | 53.7   |
| Male         | 328   | 47.1   | 79    | 45.9   | 85    | 48.0   | 81    | 46.3   |
| Age group    |       |        |       |        |       |        |       |        |
| 18-29        | 169   | 24.3   | 38    | 22.1   | 31    | 17.5   | 43    | 24.6   |
| 30-39        | 161   | 23.1   | 36    | 20.9   | 45    | 25.4   | 40    | 22.9   |
| 40-49        | 159   | 22.8   | 49    | 28.5   | 40    | 22.6   | 38    | 21.7   |
| 50-65        | 208   | 29.8   | 49    | 28.5   | 61    | 34.5   | 54    | 30.9   |
| Education    |       |        |       |        |       |        |       |        |
| 0-8          | 203   | 29.1   | 87    | 50.6   | 79    | 44.6   | 27    | 15.4   |
| 9-11         | 229   | 32.9   | 68    | 39.5   | 69    | 39.0   | 55    | 31.4   |
| Participation rate | 66.4 | 62.3 | 70.9 | 62.6 | 71.2 |

*p<0.05; Chi-square Test*
RESULTS
## Results

<table>
<thead>
<tr>
<th></th>
<th>Walking for Transport</th>
<th></th>
<th>Walking for Leisure</th>
<th></th>
<th>Leisure MVPA</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>CI95%</td>
<td>OR</td>
<td>CI95%</td>
<td>OR</td>
<td>CI95%</td>
</tr>
<tr>
<td>Low walk (ref.) vs. High walk</td>
<td>2.12§</td>
<td>(1.31-3.37)</td>
<td>1.01</td>
<td>(0.63-1.62)</td>
<td>1.57§</td>
<td>(1.06-2.32)</td>
</tr>
<tr>
<td>Low income (ref.) vs. High income</td>
<td>1.25</td>
<td>(0.73-2.15)</td>
<td>1.02</td>
<td>(0.58-1.80)</td>
<td>1.72§</td>
<td>(1.06-2.74)</td>
</tr>
<tr>
<td>Walkability vs. Income (Interaction)</td>
<td>0.91</td>
<td>(0.36-2.32)</td>
<td>0.86</td>
<td>(0.34-2.19)</td>
<td>0.9</td>
<td>(0.41-1.95)</td>
</tr>
</tbody>
</table>

§p<0.05; Chi-square Test

Odds ratio adjusted for area income, sex, age, education, marital status, number the children at living at home, car ownership and time living in the neighborhood.
Translating the results to practice and policy: a remaining challenge

- Concept Mapping approach
- Understand the gaps between ‘researchers’ and practitioners’ research priorities
- Identify useful tools, methods, collaborative strategies and action steps to move the research agenda forward.
- Focus Prompt: “In your opinion, which RESEARCH topic could contribute to help the design of public policies and the planning of environment intervention to physical activity promotion?”

1. Evaluation & Impact of PA Policies

2. Individual & Environmental PA Correlates

3. Effectiveness & Innovation in PA Interventions

4. Promoting PA through Urban Environment, Active Commuting and Social Networks

5. Health & Economic Benefits of PA
Practitioners: Importance (n=18)

- Evaluation & Impact of PA policies: 8.96
- Health & Economic Benefits of PA
- Effectiveness & Innovation in PA Interventions
- Individual & Environmental Correlates of PA
- Promoting PA through Urban Environment, Active Commuting & Social Networks

Researchers: Feasibility (n=18)

- Evaluation & impact of PA policies
- Effectiveness & Innovation in PA Interventions
- Health & Economic Benefits of PA: 7.43
- Individual & Environmental Correlates of PA
- Promoting PA through Urban Environment, Active Commuting & Social Networks: 7.7

$r = -0.94$
Strengths & Limitations

- The first study to examine walkability and income and its association with PA outcomes in a developing country.
- Walkability was assessed through objective GIS-based measures & followed a standardized approach.
- Recruitment and participation rates did not vary significantly across the census tracts.
- Cross-sectional design prevents the determination of causality.
- Walkability index included only a few aspects of the built environment.
- The study was conducted in one single city in Brazil.
Conclusions & Challenges

- Walkability was associated with transport and leisure PA in the Brazilian context.

- Adding the concept of walkability into the urban planning process could help to prevent the increase of physical inactivity in LMICs.

- The gap between research and practice needs to be decreased to promote active behavior through policy and built environment changes.

- It is crucial to provide evidence that is relevant to the region and to developing countries.