A multi-site study of environmental correlates of active commuting to school in Mexican children

Alejandra Jáuregui
Centro de Investigación en Nutrición y Salud
Instituto Nacional de Salud Pública de México
70% of Mexican children engage in ACS

Increases in motorization 1990-2010

Car ownership projected to be similar to those in HIC by 2030

Effective promotion strategies to prevent declines in ACS

Do these relationships hold true for LMIC?

Socioeconomic, cultural and structural differences

Negative relationship between the walkability index and total physical activity in Mexican adults

Objective

To examine individual and environmental correlates of ACS in a sample of school-age children in three Mexican urban cities.
Cross sectional design

- 26 schools
- All SES levels
- Grades 3-5
- 1192 Children

Mexico City (n=13) Puerto Vallarta (n=3) Guadalajara (n=10)
Outcome – Active commuting to school

- 4th grade School Physical Activity and Nutrition (SPAN) survey
- Adapted for a Mexican audience.

“On most days, how does your child get to school?”

a) Walk,
b) School bus,
c) Family car with only your family,
d) Bike,
e) City bus,
f) Carpool with children from other families.
Exposure

Individual
SPAN survey
- Age
- Gender
- Adults living in the home
- Children living in the home
- Family income*

Environmental
PEDS + GIS
- Sidewalk
- Buffer
- Path obstructions
- Posted speed limits
- Traffic control devices
- Crossing aids
- Graffiti
- Broken Windows
- Boarded Windows
- Disorder
- Path condition
- Street cleanliness
- Walkability index

PEDS: Pedestrian Environment Data Scan
GIS: Geographic Information Systems
Data analysis

Multilevel logistic regression models were run for 400m and 800m buffers separately.

Empirical and theoretical criteria

- Individual variables introduced in multivariate models
  - p < 0.05
  - Gender, age and perceived parental school safety

- Environmental variables introduced one at a time in single-environment variable models
  - p < 0.05
  - Walkability index

- Interactions between gender and environmental attributes
  - p < 0.05

Same modelling strategy in sub-sample with available income information – similar results
Results
# Results

<table>
<thead>
<tr>
<th>Correlates</th>
<th>Individual</th>
<th>400m buffer</th>
<th>800m buffer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Age category</td>
<td>Sidewalk &gt;70% of segments</td>
<td>Crossing aids &gt;6% of segments</td>
</tr>
<tr>
<td></td>
<td>+6 adults in the household</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>Family SES**</td>
<td>Posted speed limits</td>
<td>Posted speed limits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Walkability index</td>
<td></td>
</tr>
</tbody>
</table>

* Full models adjusting for relevant individual & environmental variables, neighborhood socioeconomic status and city  
** Subsample with available income data
Main discussion points

- Engagement in ACS was associated with individual and environmental variables.
- More proximal school environment
  - Sidewalk.
  - Walkability index
- Sidewalks
  - Non-linear relationship
  - >70% availability

Counterintuitive results

- Posted speed limits and crossing aids
  - Most neighborhoods (24/26) with <20% of segments with posted speed limits
  - Positive relationship with ACS reported when >50% of streets have these pedestrian safety features

- Walkability index
  - Z-score variable – based on the data distribution of the sample and not standardized criteria
  - A low walkability score in a Mexican city may be equivalent to what for a US city is classified as high walkable
  - Neighborhoods that are too dense, mixed and connected may represent a barrier for walking.

Gropp, K. M., et al. Multi-level examination of correlates of active transportation to school among youth living within 1 mile of their school.” 2012, IJBNPA
Implications

Individual level
Engage adults to escort small groups of children, on foot or bicycle, to and from school each day.
E.g. The Walking School Bus

Environmental level
Walking infrastructure
E.g. Safe Routes to School

El Bici-Bus
Program developed by “Arbol y Movilidad”, a civil society organization, in the City of Querétaro.

Decreasing automobile speed
Improvements in cycling & walking infrastructure
Provision of bicycles
Engaging school community to escort small groups of children on foot & bicycle
Safety workshops
Conclusion

- By examining multiple factors at multiple levels of environment, this study provided context-specific evidence on individual and environmental correlates of ACS in Mexican children.

- Findings support the notion that findings from HIC should be taken with caution when translating evidence from HIC to LMIC, such as Mexico.

*What is a walkable environment in Mexico?*

*Where should new schools be located in order to promote ACS?*
Thanks!

- Co-authors
  Lucy Hernández
  René Santos
  Lucie Lévesque
  Erica Soltero
  Simón Barquera
  Edtna Jáuregui
  Juan López-Taylor
  Luis Ortiz

- Secretaría de Jalisco
- Secretaría de Educación
- Students and trainees in the US and Mexico who helped in data collection, entry, and processing

Special thanks to Rebecca Lee

- Photographs provided by
  Bárbara Jacob, Director of “Árbol y Movilidad”

- My mail:
  alejandra.jauregui@insp.mx