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

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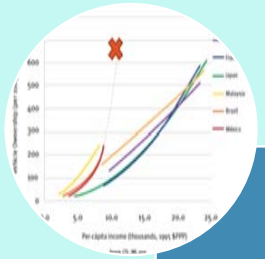
Effective promotion strategies to prevent declines in ACS



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

Increases in motorization 1990-2010

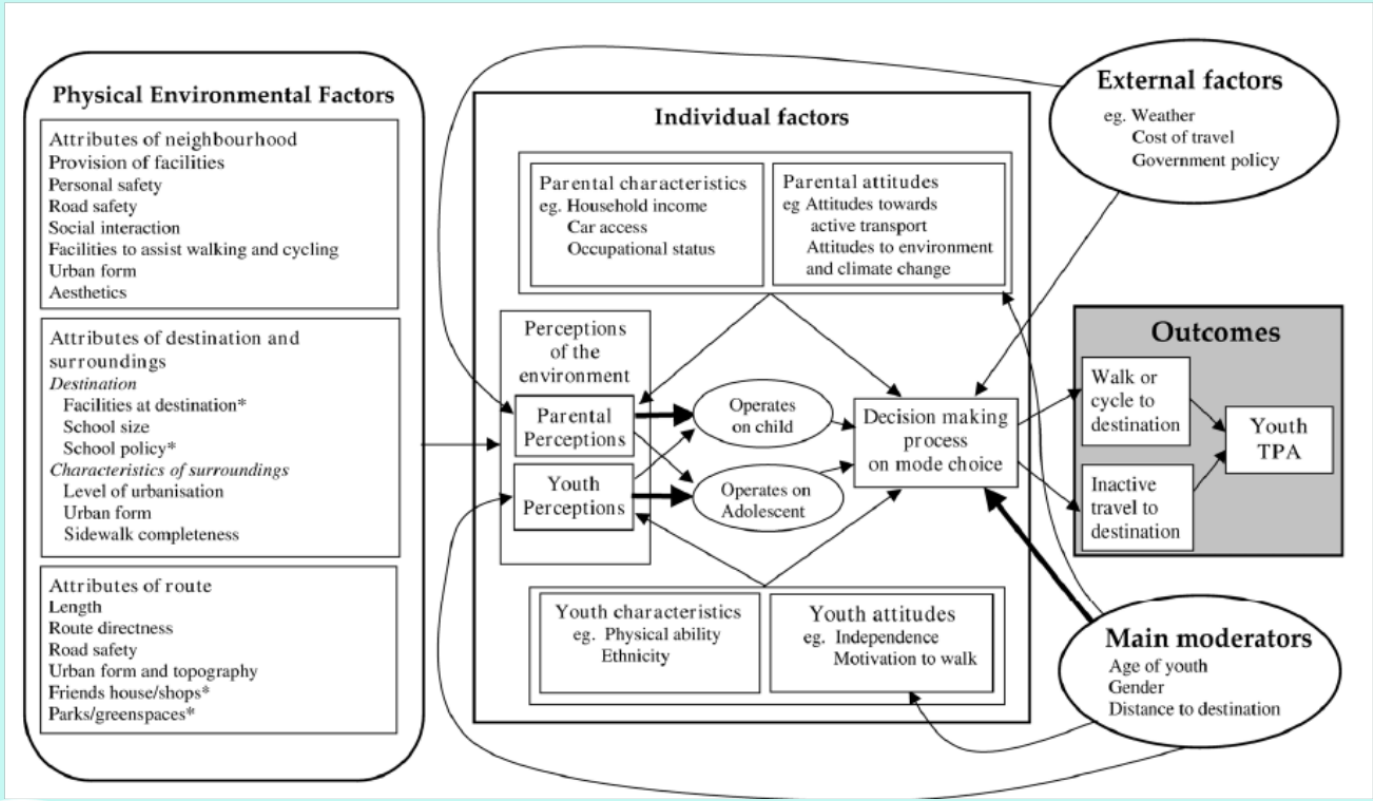
70% of Mexican children engage in ACS

Jáuregui A, et al. ACS in Mexican children. JPAH, 2015
Medina S, et al. Transforming Urban Mobility in Mexico. 2012

Do these relationships hold true for LMIC?

Socioeconomic, cultural and structural differences

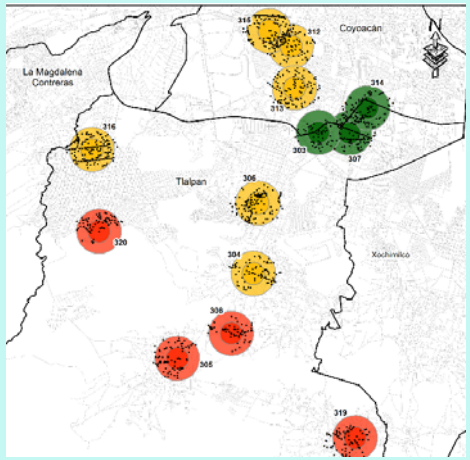
Negative relationship between the walkability index and total physical activity in Mexican adults



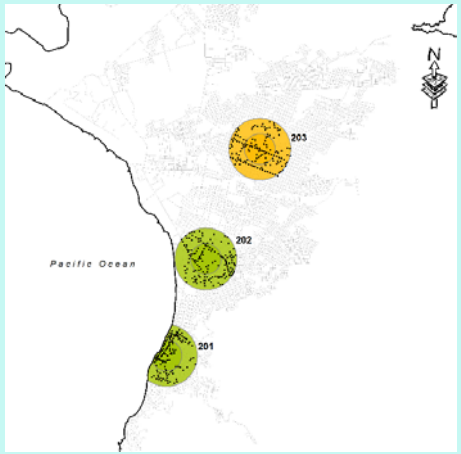
Panter, et al. Environmental determinants of active travel in youth: A review and framework for future research. IJBNPA, 2008, 5:34
Salvo D, et al. Characteristics of the Built Environment in Relation to Objectively Measured Physical Activity Among Mexican Adults, 2011." Prev Chronic Dis

Objective

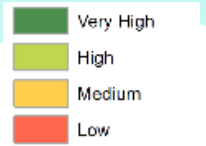
To examine individual and environmental correlates of ACS in a sample of school-age children in three Mexican urban cities

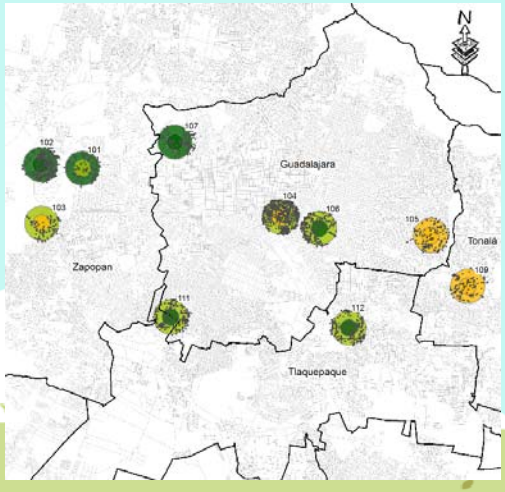


Mexico City (n=13)



Puerto Vallarta (n=3)





Guadalajara (n=10)

Cross sectional design

- 26 schools
- All SES levels

- Grades 3-5
- 1192 Children

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

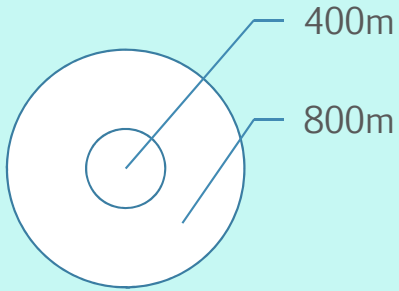
SPAN survey

- 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.

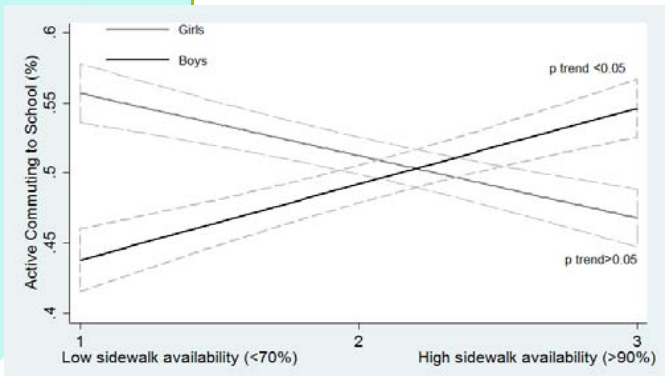
- $p<0.05$

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

Results

Results*

Correlates	Individual	400m buffer	800m buffer
Positive	Age category +6 adults in the household	Sidewalk >70% of segments	
Negative	Family SES**	Crossing aids >6% of segments Posted speed limits Walkability index	Crossing aids >6% of segments Posted speed limits
		Gender X Tertiles of sidewalk availability Boys: Positive Girls: Non significant	Gender X Tertiles of sidewalk availability Boys: Non significant Girls: Non significant



* Full models adjusting for relevant individual & environmental variables, neighborhood socioeconomic status and city

** Subsample with available income data

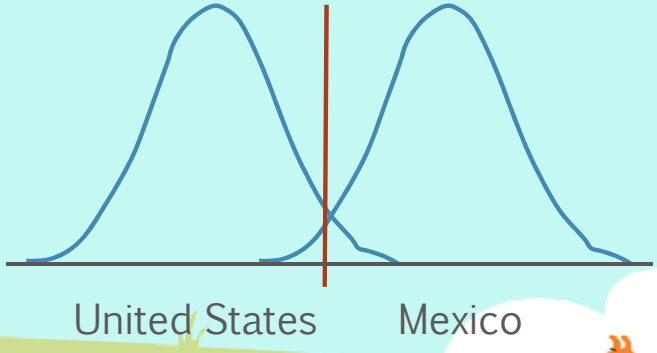
Main discussion points

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

Mammen, G., et al. "Understanding the drive to escort: a cross-sectional analysis examining parental attitudes towards children's school travel and independent mobility." 2012. BMC Public Health

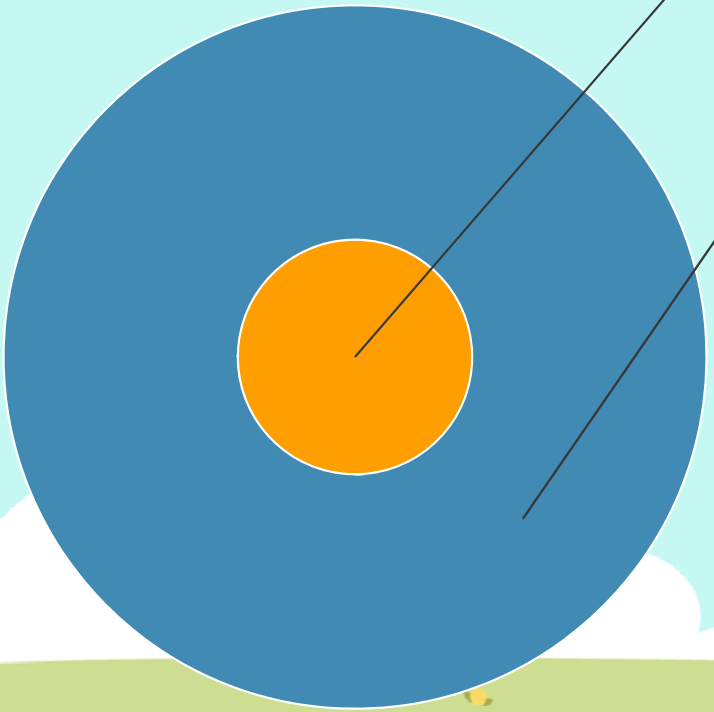
Counterintuitive results

- 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
Salvo D, et al. Characteristics of the Built Environment in Relation to Objectively Measured Physical Activity Among Mexican Adults, 2011." Prev Chronic Dis

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

ÁRBOL Y MOVILIDAD

El Bici-Bus

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

Decreasing automovile 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”

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