PBIC Livable Communities Webinar Series

Transit access for pedestrians and bicyclists: A review and a look ahead

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Learning objectives

- Understand importance of good access to transit; for agencies, individuals, and society
- Peek into emerging evidence
- Motivate you to consider access improvements to transit
- Feed desire to collect data about your interventions and evaluate outcomes

Importance of transit access for pedestrians and bicyclists

- Expand transit's reach into local neighborhoods, lower density areas
- By enhancing access, ridership may increase
  - Reduction of VMT/GHG emissions
  - Reduction of cold starts
  - Congestion mitigation –particularly around activity hot-spots

Importance of transit access for pedestrians and bicyclists

- Individual impacts
  - Personal savings of using transit
  - Physical activity
  - Reduced disease burden and costs

What do we know?

- Paucity in literature on micro-level environments
- Density

Density type	Elasticity
Residential	0.07
Job	0.03

What do we know?

- Mixing land uses

Measure of uses	Elasticity
Retail Floor Area	0.18
Jobs-Housing Balance	0.25
Composite Indices	0.10

What do we know?

- Distance to transit stops
  - For a 1% decrease in distance, transit use increases 0.17%

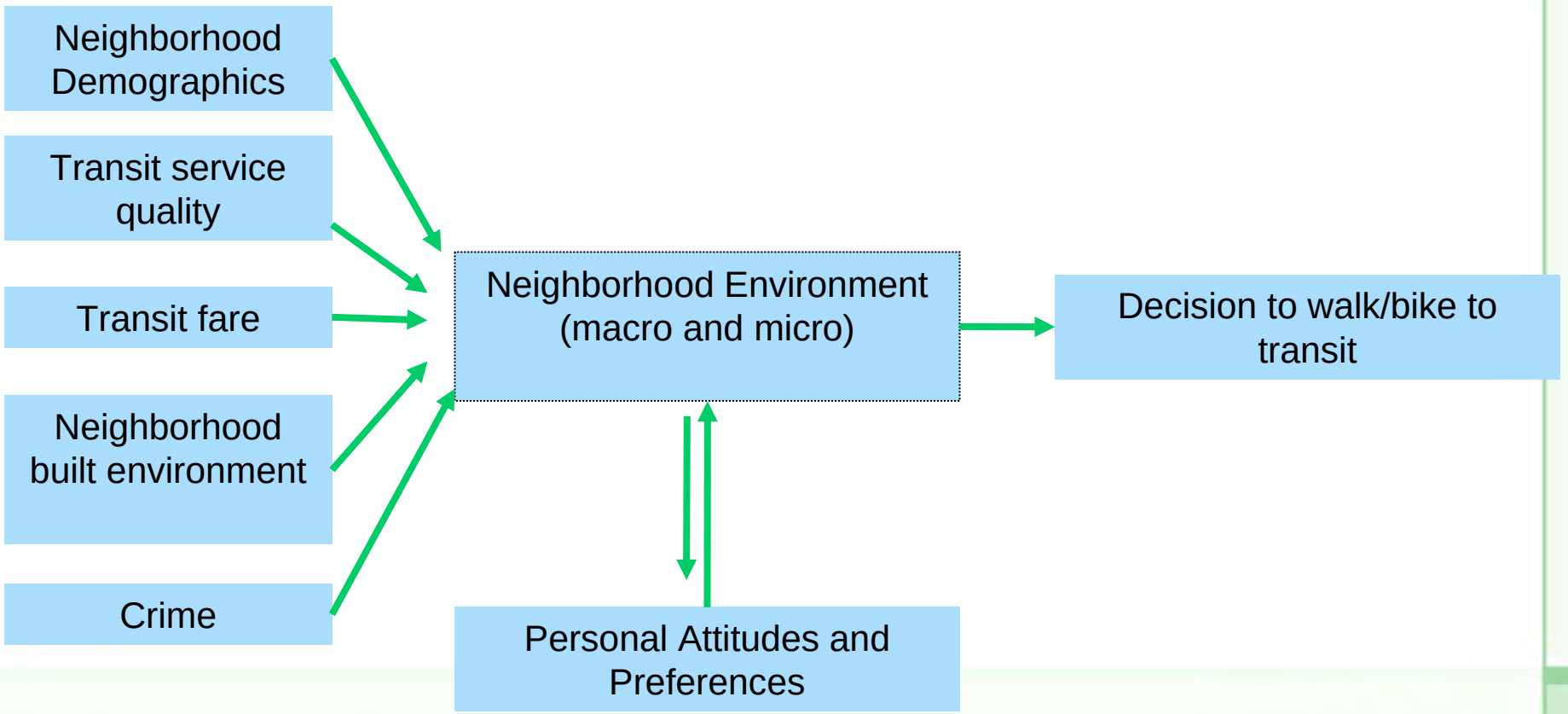
- Street connectivity

Connectivity measure	Elasticity
Intersection density	0.27
% 4-way intersections	0.05

About micro-level built environment?

- Not only salient neighborhood attributes are likely to matter
  - Micro-level features may matter too
    - Stringham (1982), Untermann (1984)
    - Cervero 2001: Sidewalks and street dimensions as supports
    - Loutzenheiser (1997): Parking as a deterrent

Conceptual framework



Adapted from Schwartz et al , 2007

Importance of micro-level built environment for transit access

UNC Planning Workshop, 2006

Importance of micro-level built environment for transit access

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Importance of micro-level built environment for transit access

Source: P. McDonough

Example of micro-level features

- Getting to the stop
  - Quality of sidewalks
  - Pedestrian supports
    - Crosswalks, lights, wayfinding
  - Trees/foliage
  - Lighting
  - Benches
  - Cleanliness
  - Perceived safety and security

Example of micro-level features

- At the stop
  - Landing quality (if present)
  - User supports
    - Wayfinding aids
    - Benches
  - Perceived safety and security
    - Observability, Predictability
  - Lighting
  - Cleanliness
  - ADA compliance

Visual example

Image removed due to copyright

+ sidewalks, trees, lighting, midstreet crosswalk…

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+ re-development at urban center densities

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+ mixed land uses….

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+ infill with mixed uses and wider platform

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Where would you prefer to walk to transit?

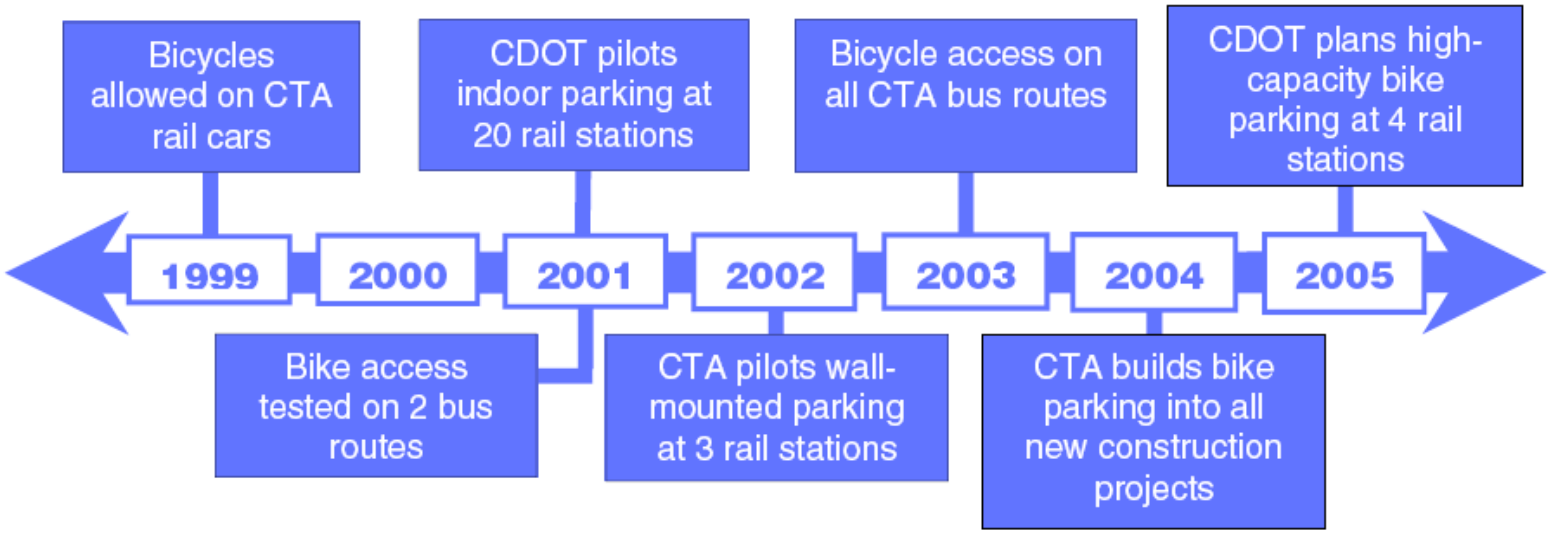
Images removed due to copyright

Case study 1

- Environmental determinants of bicyling to rail stations in Chicago
  - Bike to transit initiatives successful, but understudied
  - More cost effective way to extend transit network?
    - Particularly for low-income populations

Case study, CTA Indoor Bicycle Parking

- Context – part of larger program
- Bikes on buses, bikes on trains, indoor bicycle parking



Source: Schwartz et al, 2007

Our question

- What characteristics are associated with cyling to an “L” station?
  - Built environment
  - Socio-demographic
  - Transit service

Context and variables

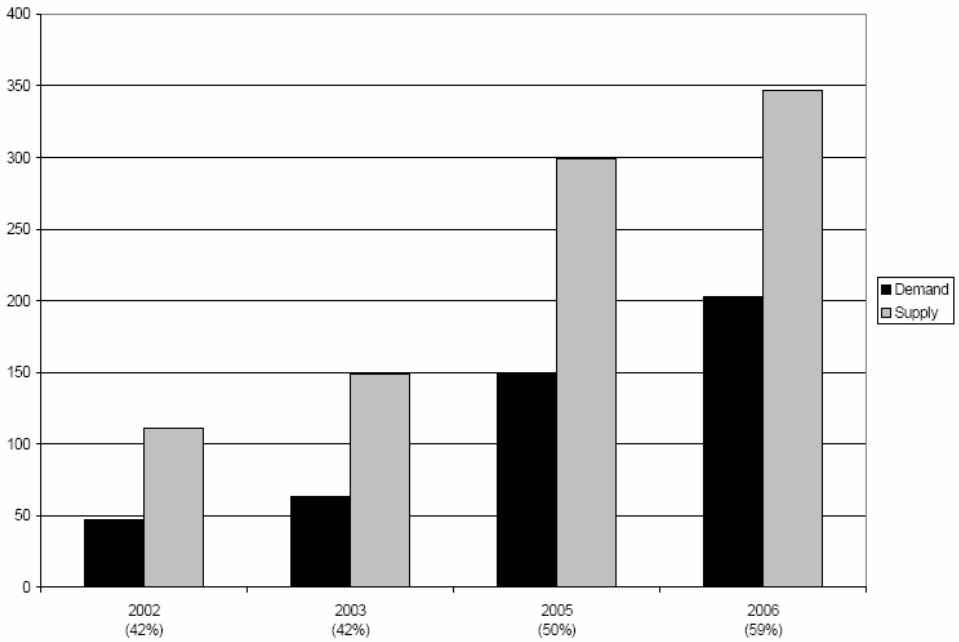
- Outcome: Indoor bicycle parking counts (2002-2006)
  - Demand
  - Percent occupancy
- Input variables – one mile circle around "L" stations
  - Demographics
  - Transit service
  - Land use variables
  - Roads
  - Bicycle lanes
  - Crime
  - Whether station is a terminus or not

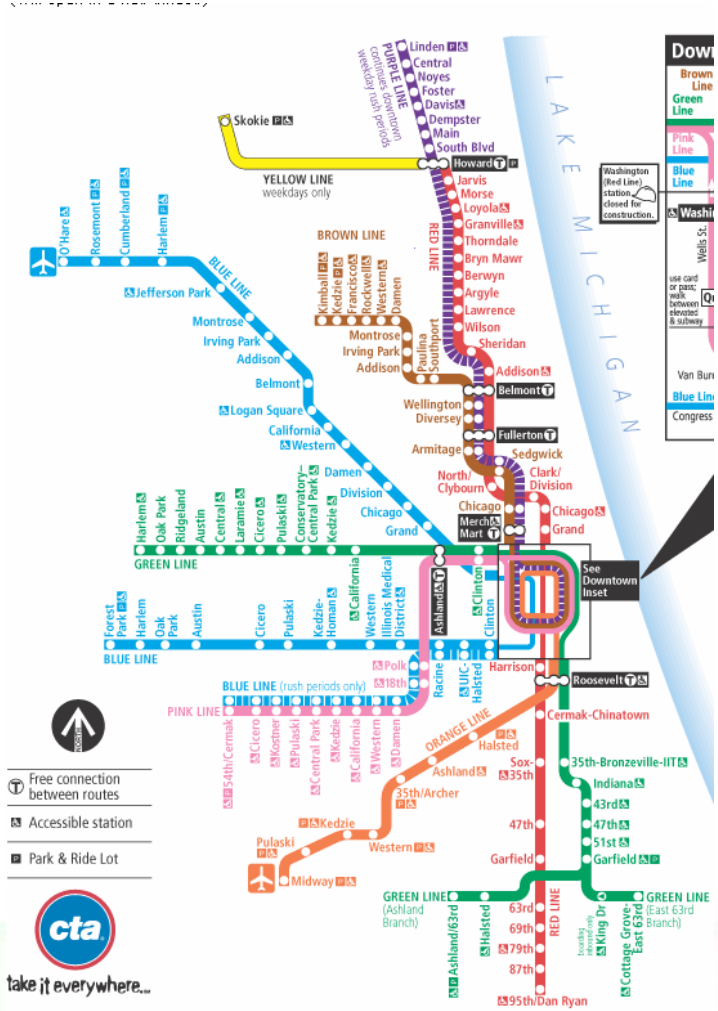
Source: Schwartz et al, 2007

Main findings

- Uneven increases
  - Supply increase: 225%.
  - Demand increase: 400%

FIGURE 2 Number of Interior Bicycle Parking Spaces at CTA Rail Stations and Usage, 2002-2006





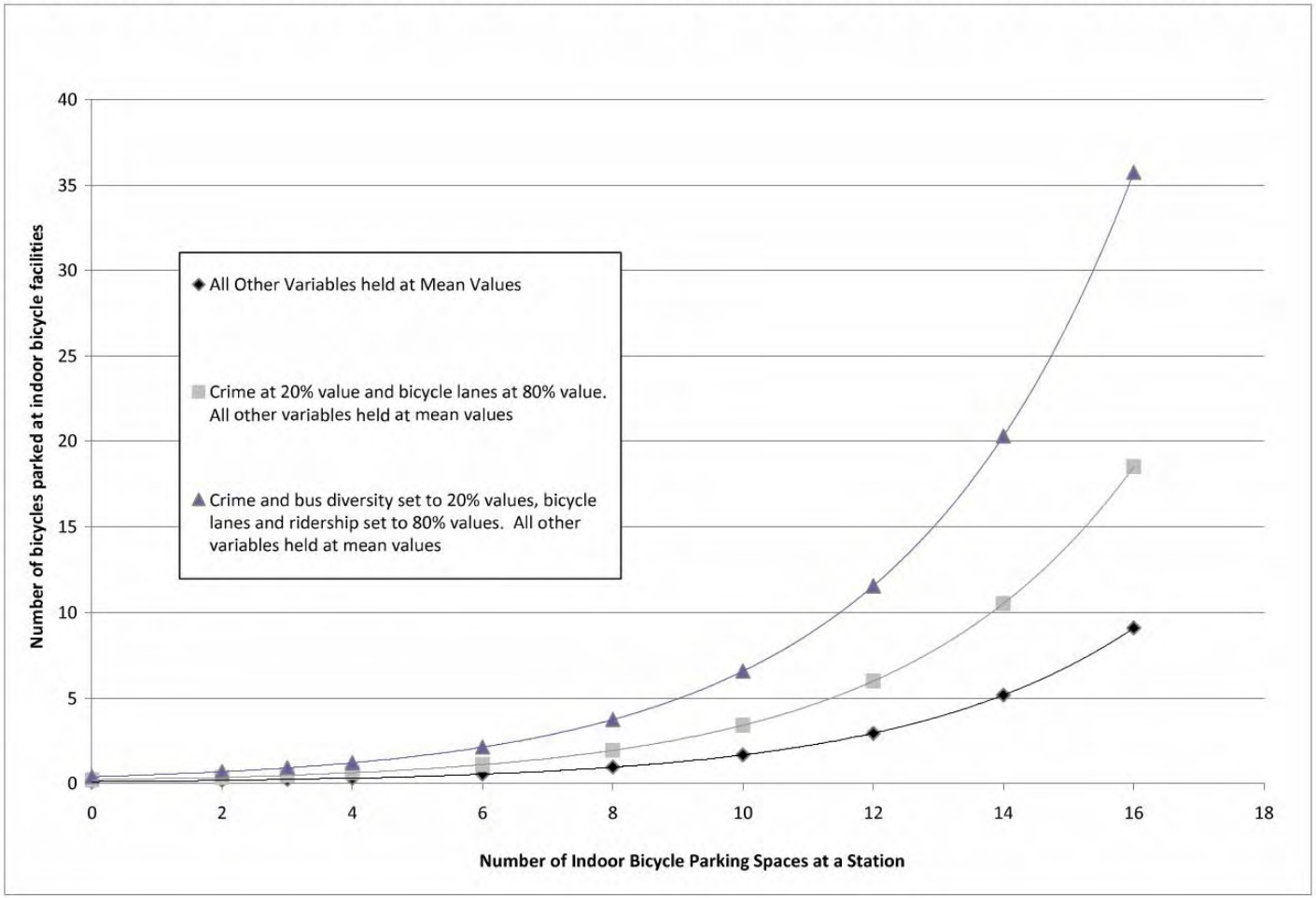
Source: Schwartz et al, 2007

Main findings

- Lower bicycle demand at stations related to:
  - Socio-demographics
    - % Black Americans in census block
    - Median income of block group
  - More bus routes serving area around station
  - Higher crime in area around station
- Parking supply and higher ridership stations had higher bicycle parking demand

Main findings

FIGURE 3 Negative Binomial Regression Estimation of Number of Bicycles Parked at CTA Rail Stations Based on Supply



Source: Schwartz et al, 2007

Policy Implications

- Targeted bicycle initiatives complemented by other policies may work best
- Bicycles as access modes in low density, low bus-service areas
- Possible critical mass factor in success of bicycle parking programs
- Importance of separating walking and cycling for research

Adapted from Schwartz et al, 2007

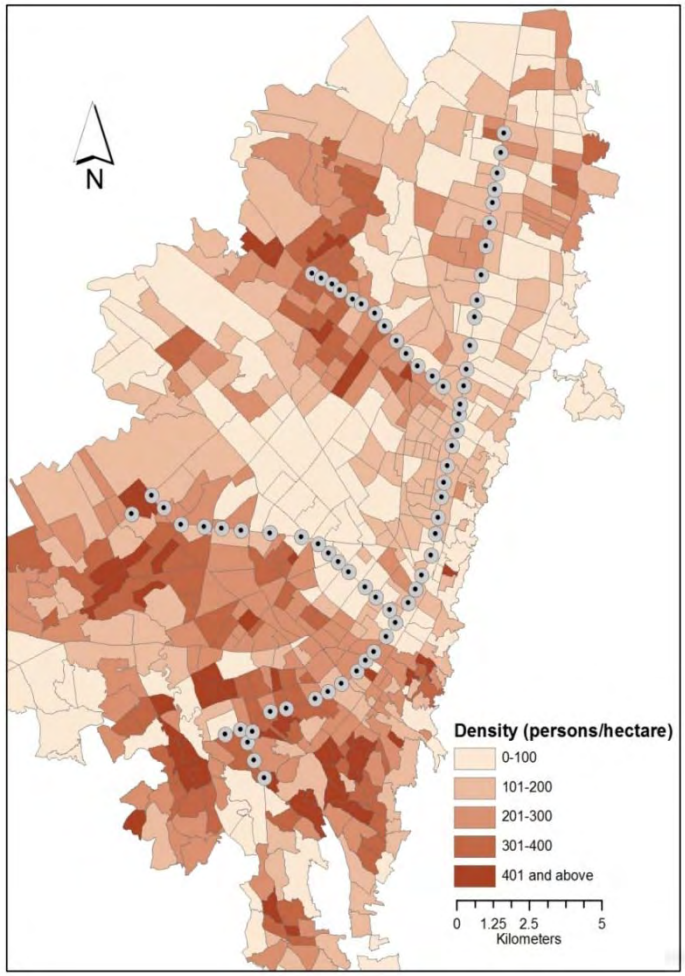
Case Study 2

- Relationship between the built environment and station boardings for Bogotá's BRT
  - Successful BRT system with significant environmental upgrades around stations
  - Paucity of research discussed before

Published in *Transportation Research Part A*, 2008

Context and variables

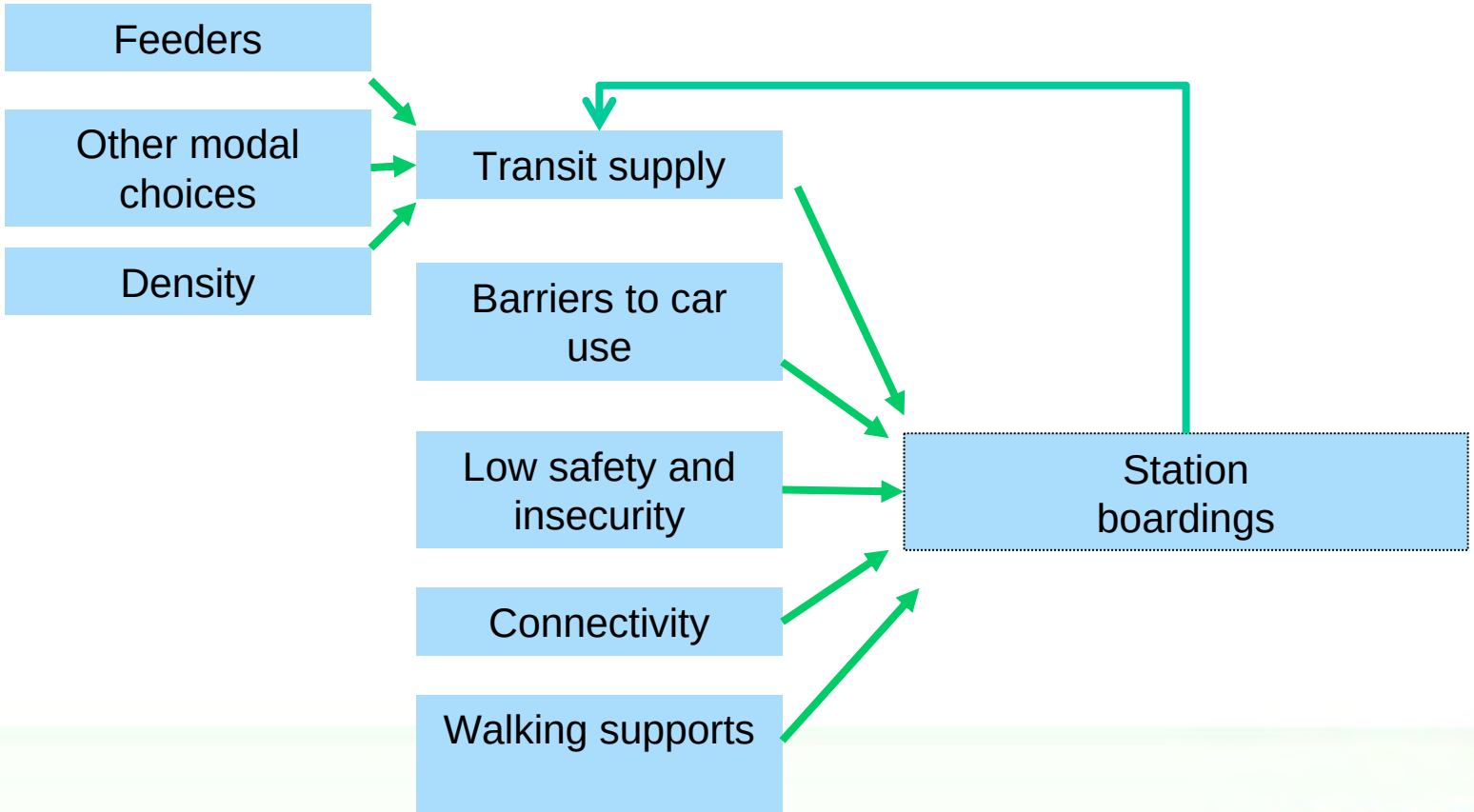
- 71 of 79 Bus Rapid Transit (BRT) stations in Bogotá
  - 3-5 segments within a 250-meter circle of each station were audited by trained staff
  - 338 segments with complete data



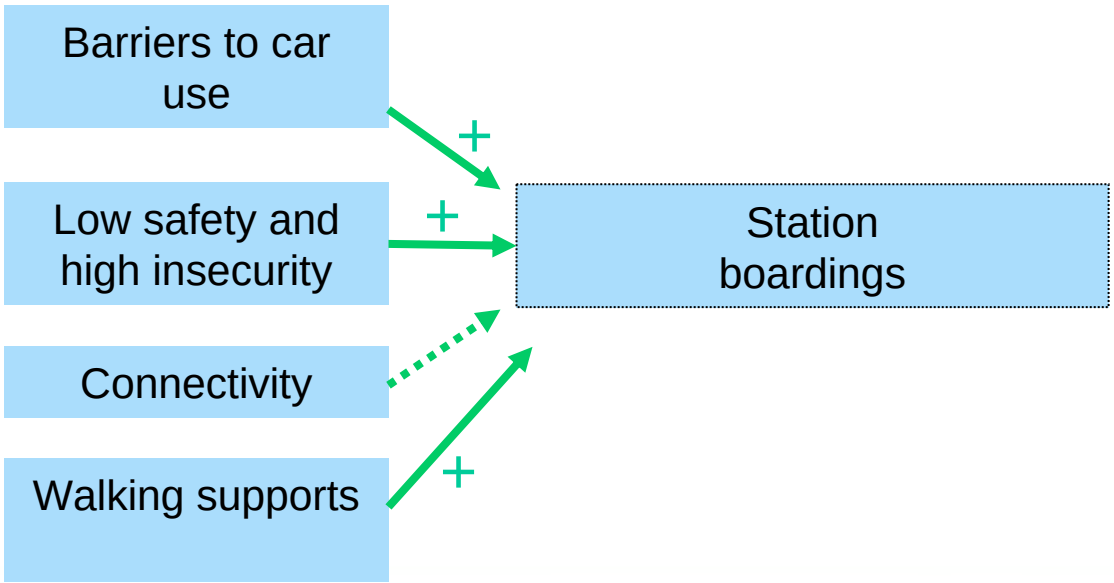
Variable	Description
Boardings by station	2005 and 2006
Station characteristics	
Feeder	Presence of a bus feeder service (0 or 1)
# Routes	Number of routes serving station
Size	Station size (1-5)
Transit supply	Number of vehicles per day per station (in both directions)
Physical Attributes	
Bikepath	Presence of bike path (0 to 1)
LU-mix	Land use index (0 to 100)
Side_buffer	Buffer width between sidewalk and road (0 to 3)
Traffic_control	Traffic control index (0 to 100)
Side_cont	Sidewalk continuity (0 to 3)
Side_width	Sidewalk width (0 to 3)
Side_quality	Sidewalk quality (0 to 1)
Amenities	Index of amenities (0 to 100)

Variable	Description
Perceived characteristics	
Safety	Perception of safety (crime) (0 to 3)
Clean	Perception of cleanliness (0 to 3)
Overall perceptions	Overall perception (0 to 3)
Neighborhood attributes	
Density	Density (persons per hectare)
Stratum	Socio-economic stratum of neighborhood (from 1 to 6)
Road density	Road density (linear kilometers in buffer)
Intersections	Sum of three way and four way intersections (sum in buffer)
NBI	Unsatisfied Basic Needs Index (from 0 to 1)
Schooling	Average years of schooling (from 0 to 17)
Unemployment	Unemployment rate (%)
Crashes	Number of vehicle accidents (per 1,000 inhabitants)
Thefts	Number of thefts (per 1,000 inhabitants)

Data reduction



Results


Barriers to car use
Low safety and high insecurity
Connectivity
Walking supports
+
+
+
Station boardings

Implications

- Confirmed importance of micro-level built environment for BRT use
- Beyond diversity, streets, and density
  - Pedestrian supports matter!

The beginning, at the end

- Understand importance of good access to transit; for agencies, individuals, and society
- Peek into emerging evidence
- Motivate you to consider access improvements to transit
- Feed desire to collect data about your interventions and evaluate outcomes

Acknowledgements

- Michael Schwartz for his work with CTA
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