Can Built and Environmental Factors Encourage Walking among Individuals with Negative Walking Attitudes?

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- Architects and urban designers
  - Creating a "sense of community" and "sense of place"
- Transportation planners
  - Reduce vehicle miles traveled

- Environmental planners
  - Improve air quality, reducing GHG emissions
  - Reduce transportation's impact on the environment
- Public health professionals
  - Improve health through increased physical activity

- Researchers and practitioners have largely focused on the relationship between urban form and walking

- While the built environment impacts walking behavior, social environmental factors and attitudes tend to be overlooked

- Despite the broad ranging consensus about the positive effects of walking, the factors that promote walking in neighborhoods is still not well understood

RESEARCH QUESTIONS

- Is it the built environment, social environment, or lifestyle attitudes that can explain why some individuals walk more than others?

- Can physical design of neighborhoods encourage people to walk even if they hold negative attitudes towards walking?
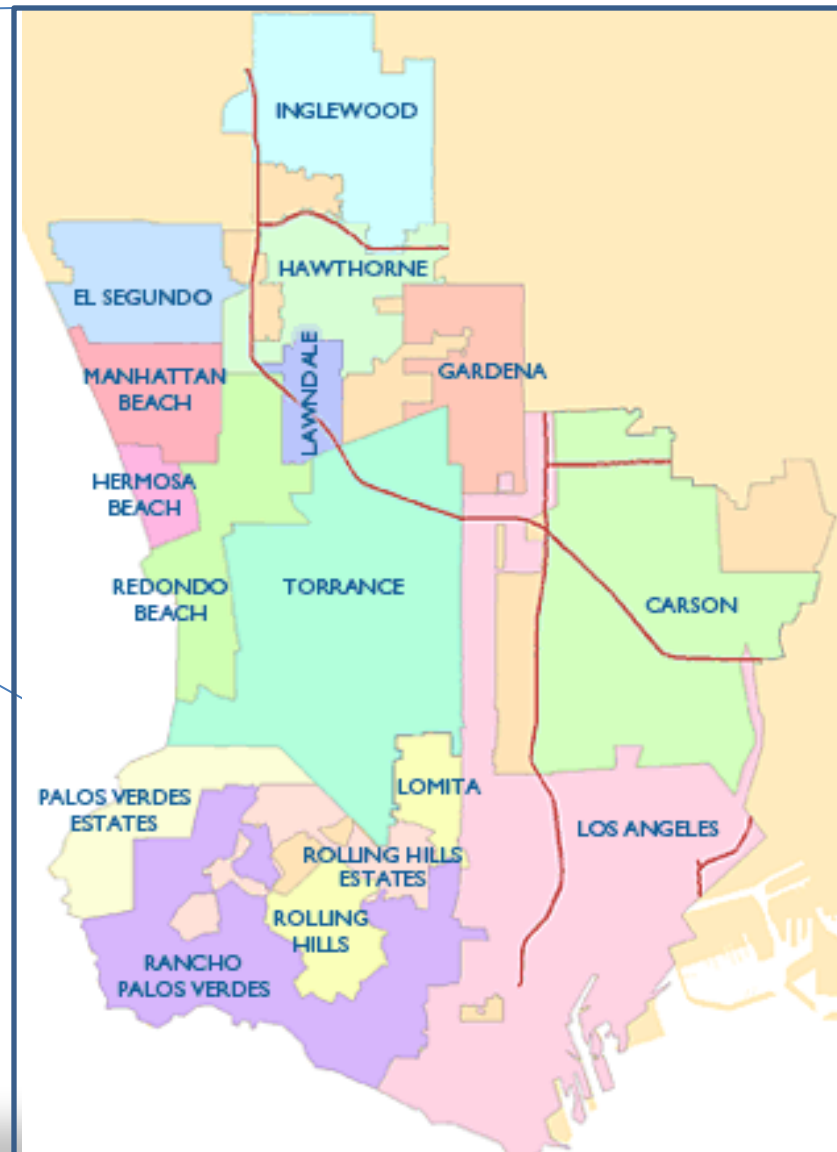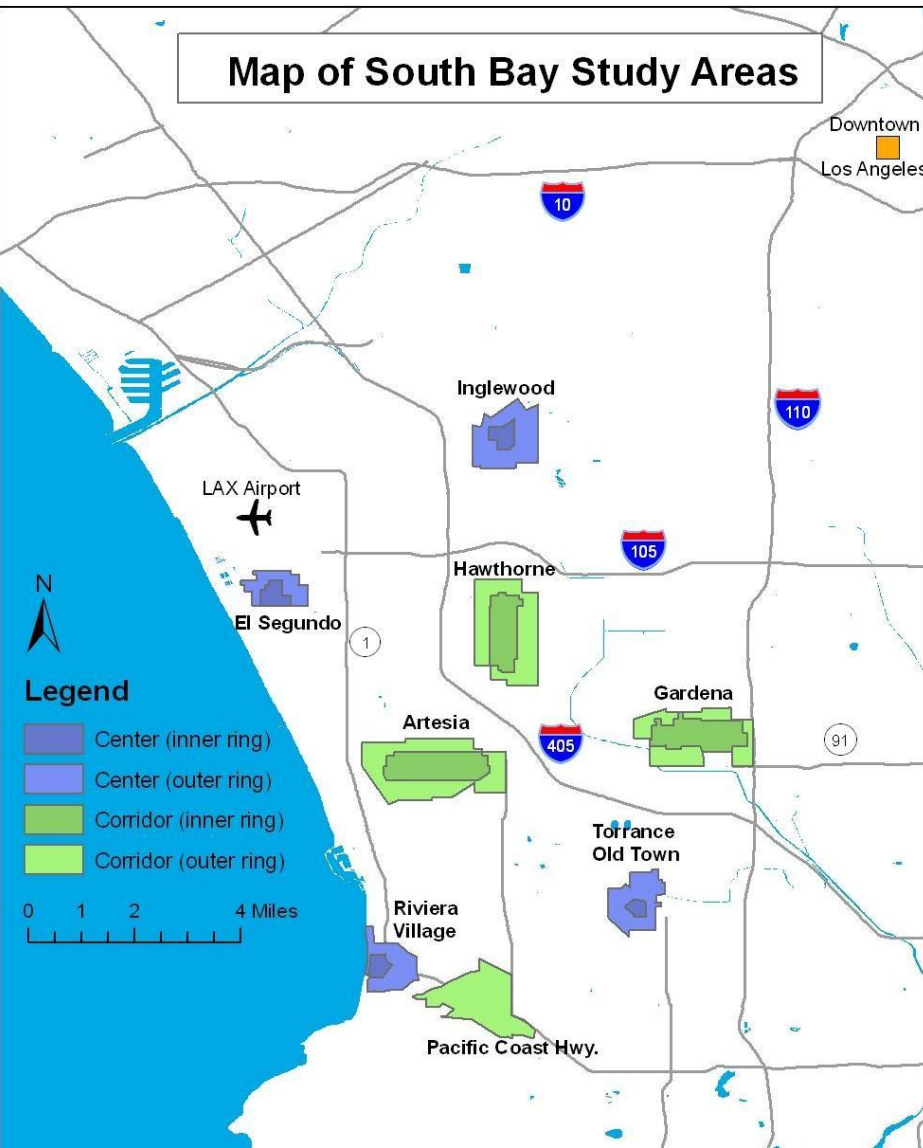
Incorporated Communities in the South Bay Area of Los Angeles

Greater Los Angeles Metropolitan Area

South Bay Study Area

Map of South Bay Study Areas

Study Area	Description
Torrance Old Town	Centered on the historic civic center in downtown Torrance (Torrance Blvd. and Van Ness Ave.)
Inglewood	Centered on the civic center in downtown Inglewood (Manchester Blvd. and La Brea Ave.)
Riviera Village	Seaside neighborhood in Redondo Beach (Pacific Coast Highway and Palos Verdes Blvd.)
El Segundo	Centered on civic center in downtown El Segundo (Main St. and Grand Ave.)
Pacific Coast Highway (PCH)	Within City of Torrance, centered on commercial strip along Pacific Coast Hwy between Hawthorne Blvd and Calle Mayor
Hawthorne	Within City of Hawthorne, centered on commercial strip along Hawthorne Blvd between Rosecrans Ave. and El Segundo Blvd.
Artesia	Within City of Redondo Beach, centered on commercial strip along Artesia Blvd., between Aviation Blvd. and Inglewood Ave.
Gardena	Within City of Gardena, centered on commercial strip along Gardena Blvd., between Van Ness Ave. and Vermont Ave.

South Bay Travel Survey

- Conducted in 3 phases from 2005-2007

- 2,125 respondents from eight neighborhoods

- 155-question mail and web-based survey

- Included a one-day travel diary which included questions about trip purpose, mode choice, and trip distance

- Included questions about attitudes toward walking and driving preferences, as well as opinions about neighborhood amenities, schools, fear of crime, and a range of hypothetical policy changes

- Testing for differences in individual walking trip rates between individuals with **"high walk"** and **"low walk"** attitudes

- Controlling for sociodemographic factors, do the impacts of the social environment, built environment, and distance differ for high walk and low walk respondents?

- Stratified into 2 samples:
  - High Walk Respondents (n = 1,045)
  - Low Walk Respondents (n = 897)

- A walking attitude index was constructed based on a additive measure of three attitudinal questions on the South Bay survey

- For each question, respondents were asked to rate on a 5 point ordinal scale (1 = not at all important; 2 = rather unimportant; 3 = neutral; 4 = important; 5 = very important)

- The median attitude index value of 10 was used as the threshold for stratifying the sample into high-walk and low-walk groups (10 or higher = high walk; 9 or lower = low walk)

METHODOLOGY - Variables

Variable	Variable Coding
Dependent Variable:	
Individual walking trips	Actual counts of walking trips taken by the respondent to the neighborhood center as reported in the one-day travel diary
Independent Variables:	
Sociodemographic	
Race/ethnicity	
Hispanic	Hispanic = 1; else = 0
Asian	Asian = 1; else = 0
African-American	African-American = 1; else = 0
Other	Other Race = 1; else = 0[a]
Gender	1 = female; 0 = male
Age	
<26 years	<26 years = 1; else = 0
26-40 years	26-40 years = 1; else = 0
41-65 years	41-65 years = 1; else = 0[b]
Household income	
Low income	<$35,000 = 1; else = 0
Moderate income	$35,000-$75,000 = 1; else = 0[c]
Employment status	1 = employed; 0 = unemployed
Household with children	1 = at least one child in household; 0 = no children in household
Foreign-born status	1 = born outside of the U.S.; 0 = born in the U.S.

METHODOLOGY - Variables

Social Environment	
Violent crime rate	Number of violent crimes per 100,000 persons for the city where the study area is located
Neighborhood safety attitude	1 = not at all important; 2 = rather unimportant; 3 = neutral; 4 = important; 5 = very important
Built Environment	
Neighborhood business concentration	The number of neighborhood businesses per acre in the study area, defined by 6-digit NAICS codes
Intersection density	The number of intersections divided by the land area for each study area
Four-way intersections	The percentage of intersections within each study area that are four-way intersections
Control	
Inner ring	1 = resident lives in the inner ring; 0 = resident lives in the outer ring

[a] Non-Hispanic whites were treated as a reference category and thus omitted.
[b] The "older than 65" group were treated as a reference category and thus omitted.
[c] The "high income" (>$75,000) group were treated as a reference category and thus omitted.

METHODOLOGY – Regression Analysis

- Six negative binomial regressions models were constructed (3 for high walk, 3 for low walk)

  - First model: sociodemographic only

  - Second model: sociodemographic + social environment (SE)

  - Third model: socio. + SE + built environment

- Distinction between center and corridor neighborhoods were not made in the regression analysis since the focus is on examining crime, attitude, and BE factors across all neighborhoods

Walking Trip Rates by Study Area

RESULTS

Walking Trip Rates by Study Area
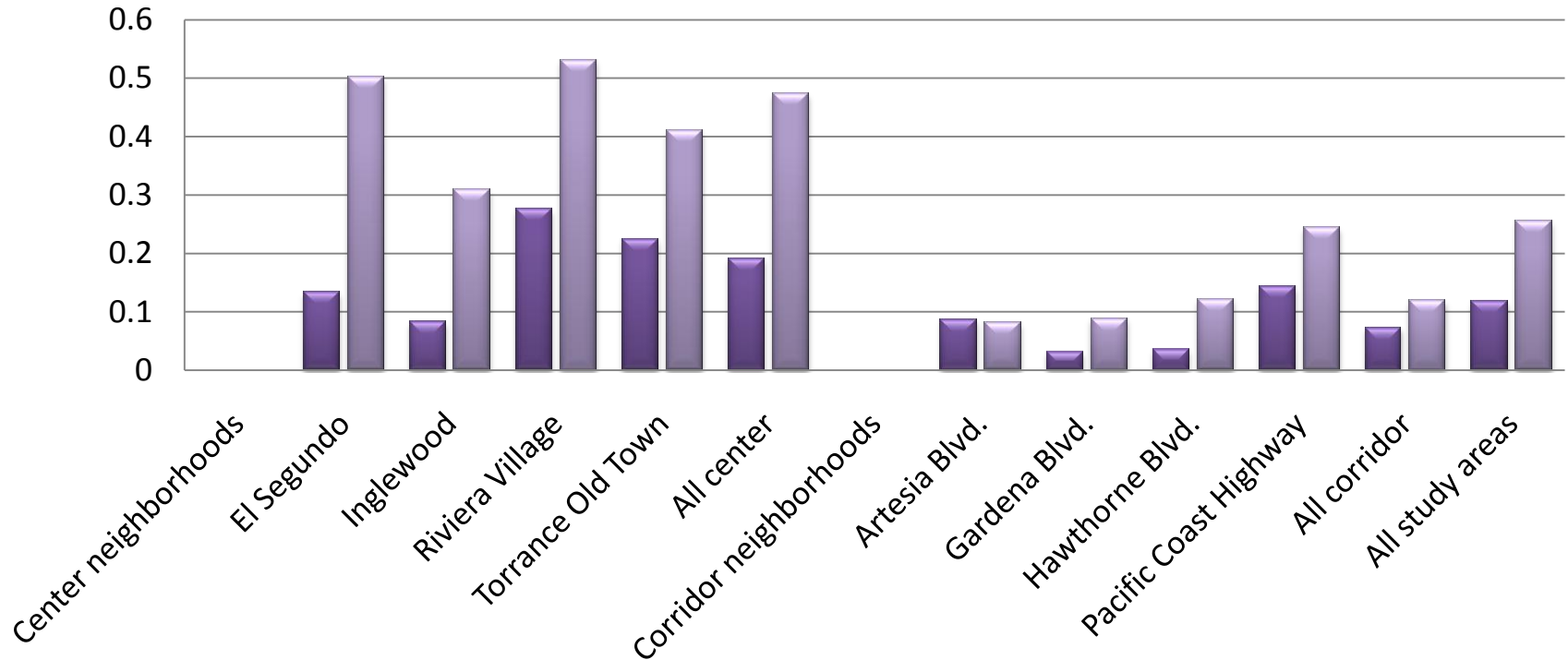
Study Area	Per person walking trips per day	% of respondents who usually walk to neighborhood center	No. of responses
Center Neighborhoods			
El Segundo	0.133	50.16%	324
Inglewood	0.083	30.88%	72
Riviera Village	0.276	53.13%	239
Torrance Old Town	0.225	41.07%	178
All Center	**0.191**	**47.32%**	**813**
Corridor Neighborhoods			
Artesia Blvd.	0.087	8.18%	526
Gardena Blvd.	0.032	8.85%	285
Hawthorne Blvd.	0.036	12.21%	278
Pacific Coast Highway	0.143	24.41%	223
All Corridor	**0.073**	**11.97%**	**1,312**
ALL STUDY AREAS	**0.119**	**25.49%**	**2,125**

High Walk and Low Walk Respondents by Study Area
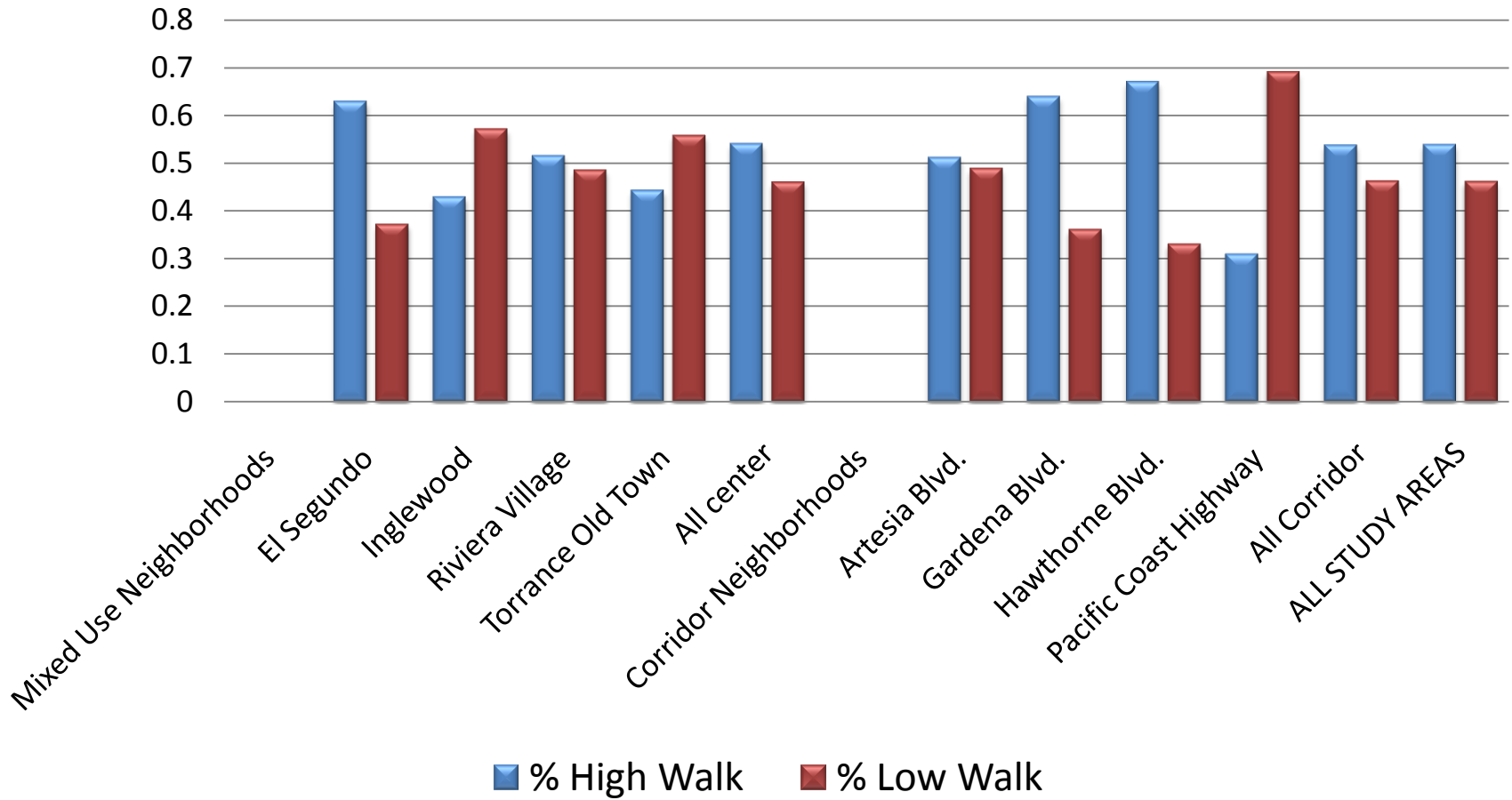
High Walk and Low Walk Respondents by Study Area

Study Area	High Walk (N)	% High Walk	Low Walk (N)	% Low Walk
Center Neighborhoods				
El Segundo	189	62.79%	112	37.21%
Inglewood	24	42.86%	32	57.14%
Riviera Village	105	51.47%	99	48.53%
Torrance Old Town	69	44.23%	87	55.77%
All Center	**387**	**53.97%**	**330**	**46.03%**
Corridor Neighborhoods				
Artesia Blvd.	256	51.10%	245	48.90%
Gardena Blvd.	166	63.85%	94	36.15%
Hawthorne Blvd.	172	66.93%	85	33.07%
Pacific Coast Highway	64	30.92%	143	69.08%
All Corridor	**658**	**53.71%**	**567**	**46.29%**
ALL STUDY AREAS	**1,045**	**53.81%**	**897**	**46.19%**

RESULTS

Negative Binomial Regressions

	High Walk Respondents			Low Walk Respondents		
	M1: Socio. +D	M2: Socio. +SE+D	M3: Socio. +SE+BE+D	M1: Socio. +D	M2: Socio. +SE+D	M3: Socio. +SE+BE+D
Hispanic						
African American	(-) p<0.05					
Asian	(-) p<0.05	(-) p<0.10	(-) p<0.10			
Other Race				(-) p<0.05	(-) p<0.05	(-) p<0.05
Female				(-) p<0.05	(-) p<0.10	(-) p<0.05
Low Income (<$35k)						
Moderate Income ($35-$75k)						
Employed				(-) p<0.05		
Household with Children	(-) p<0.05	(-) p<0.05	(-) p<0.05	(+) p<0.10	(+) p<0.10	
Age						
<26				(-) p<0.05		(-) p<0.05
26-40				(+) p<0.05	(+) p<0.10	(+) p<0.05
41-65						
Foreign Born				(-) p<0.05		
Inner Ring	(+) p<0.10	(+) p<0.10				(+) p<0.10
Violent Crime Rate	(not incl.)	(-) p<0.05		(not incl.)	(-) p<0.05	
Neighborhood Safety Attitude	(not incl.)	(-) p<0.05	(-) p<0.10	(not incl.)		
Businesses Per Acre	(not incl.)	(not incl.)	(+) p<0.05	(not incl.)	(not incl.)	
Four-way Intersections	(not incl.)	(not incl.)		(not incl.)	(not incl.)	
Intersection Density	(not incl.)	(not incl.)		(not incl.)	(not incl.)	(-) p<0.05
No. of observations	828	825	825	609	605	605
Pseudo R-squared	0.037	0.053	0.064	0.037	0.049	0.067

Legend:
- : (+) Coefficient (p<0.05) — dark green
- : (-) Coefficient (p<0.05) — dark red
- : (+) Coefficient (p<0.10) — light green
- : (-) Coefficient (p<0.10) — light pink

SUMMARY OF RESULTS

- In terms of built environment effects, having nearby destinations to walk to (i.e., neighborhood businesses) generates increased walking trips among those with positive attitudes, but does not have a significant impact for those with negative attitudes

- In terms of social environment effects, walking trip rates for high-walk individuals were less affected by violent crime rates than low-walk individuals

CONCLUSIONS

- Built environment appears to matter more for those with positive attitudes towards walking

- For those with negative attitudes, the focus should be on changing attitudes to emphasize the benefits of physical activity and to encourage walking

- Therefore, the built environment is likely to have a greater impact on walking as we see a shift towards more positive attitudes

ACKNOWLEDGEMENTS