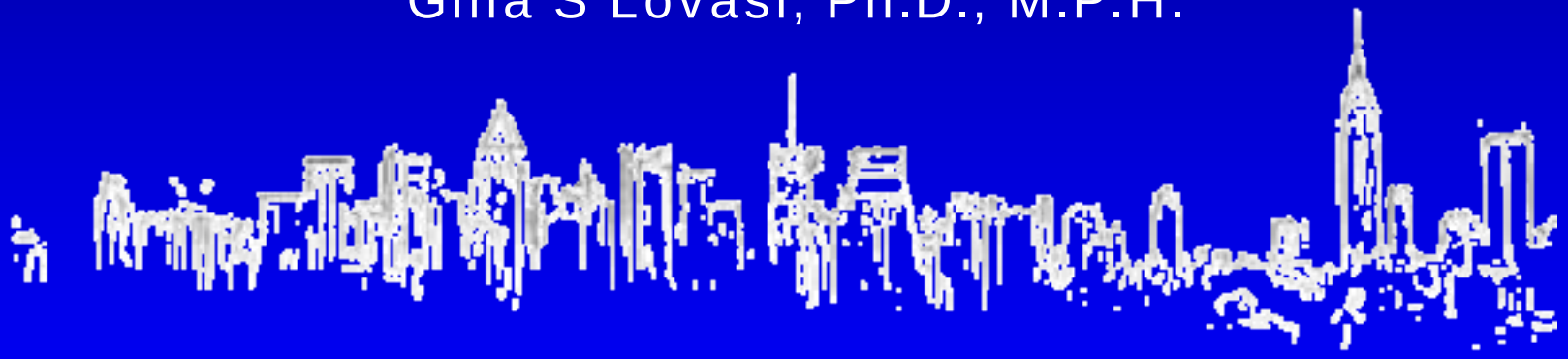
Exploring the inner-city paradox: Poverty, neighborhood walkability, and obesity

Gina S Lovasi, Ph.D., M.P.H.



Robert Wood Johnson Health and Society Scholar
at Columbia University
Mailman School of Public Health
Institute for Social & Economic Research & Policy

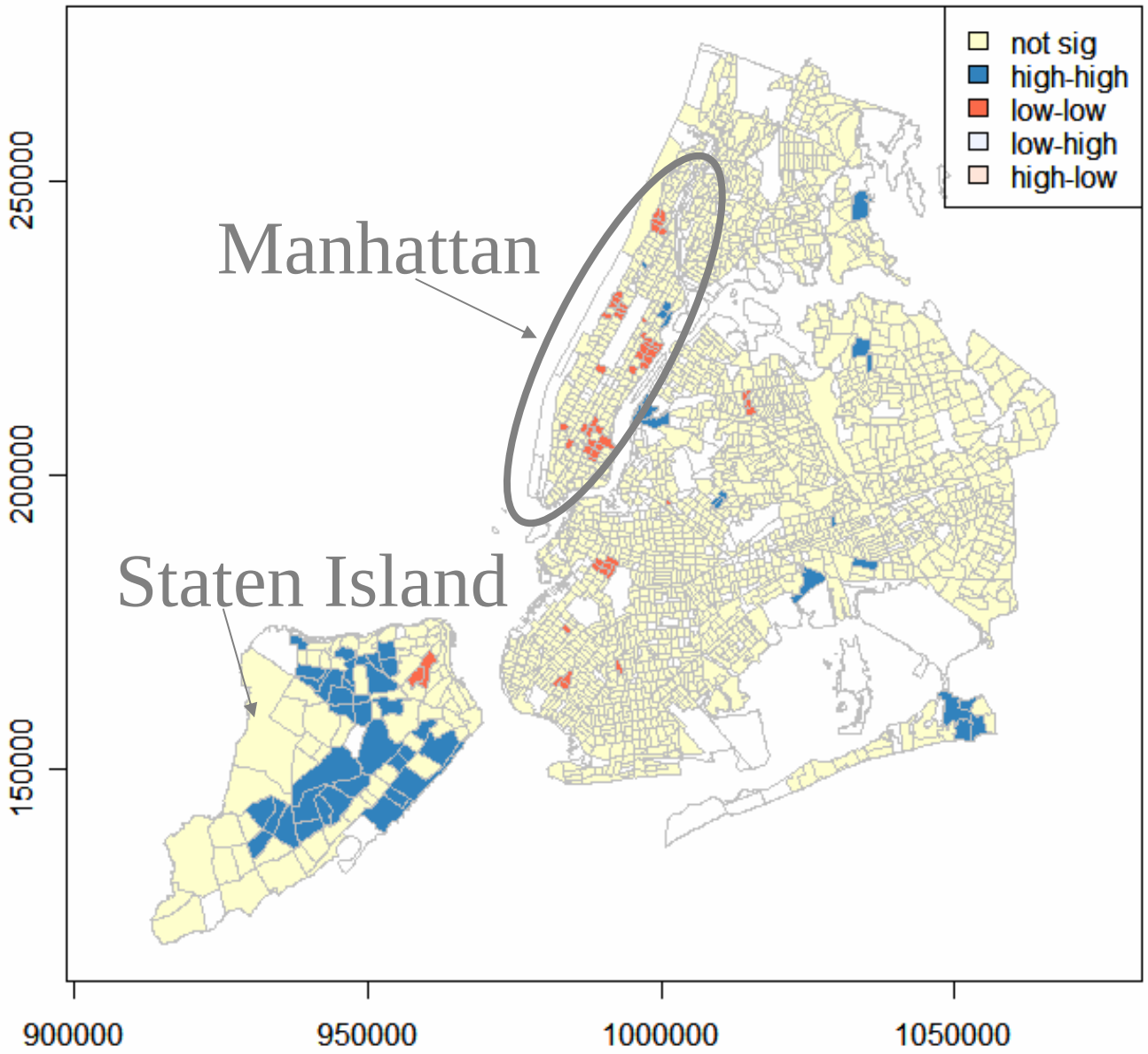
Setting up the paradox

- Walkability (usually measured by density, connectivity, land use mix, & transit access) has been associated with activity and obesity
- Socioeconomically disadvantaged areas have a higher obesity burden

Black JL, Macinko J. Neighborhoods and obesity. Vol. 66 Blackwell Synergy, 2008;2-20.

Setting up the paradox

Does neighborhood walkability play a role in explaining obesity-related health disparities?


not sig
high-high
low-low
low-high
high-low
Manhattan
Staten Island
250000
200000
150000
900000
950000
1000000
1050000

Setting

Example from New York City:

- BMI is lower in areas with higher population density, more mixed land uses, more commercial space, more access to transit (controlling for individual characteristics)

Rundle A, Roux AV, Free LM, Miller D, Neckerman KM, Weiss CC. Am J Health Promot 2007;21(4 Suppl):326-34.

Setting up the paradox

Example from New York:

Neighborhood characteristic	Estimate (95% CI) high poverty areas	Estimate (95% CI) for other areas
Population density		
Land use mix		
Public transit use		
Subway access		
Bus access		

Setting up the paradox

Example from New York:

Neighborhood characteristic	Estimate (95% CI) high poverty areas	Estimate (95% CI) for other areas	Test for interaction
Population density	0.18 (-0.10 to 0.45)	**-0.53 (-0.63 to -0.42)**	**p < 0.001**
Land use mix	-0.68 (-1.68 to 0.32)	**-1.17 (-1.83 to -0.51)**	p = 0.549
Public transit use	1.63 (-0.74 to 3.99)	**-4.75 (-5.86 to -3.64)**	**p = 0.028**
Subway access	-0.08 (-0.27 to 0.12)	**-0.35 (-0.48 to -0.22)**	**p = 0.035**
Bus access	0.01 (-0.03 to 0.05)	**-0.06 (-0.08 to -0.04)**	**p = 0.009**

Setting up the paradox

Does neighborhood walkability play a role in explaining obesity-related health disparities?

Setting up the paradox

Does neighborhood walkability play a role in explaining obesity-related health disparities?

No

Density, land use mix, transit use and transit access are *higher* in disadvantaged areas,

and these are *not* consistently associated with BMI in disadvantaged areas

Papas MA, Alberg AJ, Ewing R, Helzlsouer KJ, Gary TL, Klassen AC. Epidemiol Rev 2007;29:129-43.

Setting up the paradox

Why doesn't walkability seem to have the same benefits in disadvantaged areas?

1 – Other differences may be more important, such as aesthetic features or safety

2 – Disadvantaged populations may not respond to the environment in the same way

(captive walkers?)

Walkability Index

Based on z-scores for census tract characteristics

- Population density: residents/land area
- Intersection density: unique intersections/area
- Subway access: distance to nearest stop
- Retail floor area ratio: floor area/retail land
- Land use mix: an entropy measure

  (residential, retail, office, education, entertainment)

Adapted from Frank L, Sallis JF, Conway JM, Chapman JE, Saelens BE, Bachman W. JAPA 2006;72(1):75-87.

Study Design

- Poor (>20% poverty) and non-poor areas were compared using GIS data and systematic observation
  - GIS analyses: controlled for walkability index
  - Systematic observation: ratings of matched pairs of high walkability commercial streets
- Aesthetic, safety, infrastructure, social characteristics measures

Study Design

- Data sources
  - City agencies (e.g. parks, sanitation, police)
  - Census (poverty, vacancies)
- Data collection
  - 75 mins observation each, 76 commercial block faces
  - Rater perceptions, measured sidewalk width, speed gun traffic speed, pedestrian counts
- Data analysis
  - Quantile regression to predict medians adjusted for walkability, and logistic regression to predict adjusted probabilities, for city wide analyses

GIS measures

Aesthetic features

	Poor
Street trees, count/km^2	508
Park or green street, %	44.8
Landmark buildings, %	15.8
Clean streets (% rated as acceptable)	89.5

GIS measures

Aesthetic features

	Nonpoor	Poor	
Street trees, count/km^2	1006	508	***
Park or green street, %	39.3	44.8	*
Landmark buildings, %	21.5	15.8	**
Clean streets (% rated as acceptable)	93.4	89.5	***

Statistical significance of difference

+ p < 0.1 * p < 0.05 ** p < 0.01 *** p < 0.001

GIS measures

Aesthetic features

Street trees, count/km^2

Park or green street, %

Landmark buildings, %

Clean streets
(% rated as acceptable)

Observer ratings

Aesthetic features

	Nonpoor	Poor	
Natural features, %	68.4	52.6	
Natural features, count	5.8	2.9	*
Architectural detail, %	39.5	18.4	*
Public art or banners, %	18.4	34.2	
Excessive noise, %	39.0	62.9	*
Unpleasant odors, %	45.4	61.9	
Disorder or disrepair, %	2.3	3.9	***

Statistical significance of difference

+ p < 0.1 * p < 0.05 ** p < 0.01 *** p < 0.001

GIS measures

Safety-related features

	Nonpoor	Poor	
Average speed limit	26.9	27.2	**
Average street width, m	50	57	***
Pedestrian-auto injuries (accidents per km^2)	17.8	24.1	***
Felony arrests/100,000	1531	1885	***
Narc. arrests/100,000	222	930	***
Vacant dwellings, %	4.4	5.1	***

Statistical significance of difference

+ $p < 0.1$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Observer ratings

Safety-related features

	Nonpoor	Poor	
Street width, # of lanes	5.6	4.4	**
Average traffic speed	23.1	19.2	**
Police on street, %	57.9	52.6	
Hostile behavior or fights observed, %	0.0	10.5	*

Statistical significance of difference

+ p < 0.1 * p < 0.05 ** p < 0.01 *** p < 0.001

GIS measures

Infrastructure for active transport

	Nonpoor	Poor	
Bike lane/greenway, %	27.6	35.7	***
Subway stop, % (w/in 0.8 km)	49.5	72.4	***
Bus stops/km^2	0.54	0.54	
Sidewalk cafes, %	9.1	1.9	***

Statistical significance of difference

+ $p < 0.1$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

GIS measures

Observer ratings

Infrastructure for active transport

	Nonpoor	Poor	
Bicycle racks, %	23.7	2.6	**
Bus stop, %	39.5	44.7	
Subway stop, %	29.0	26.3	
Sidewalk width (total)	17.5	18.6	
Sidewalk width (unobst)	10.5	12.5	+
Sidewalk cafes, %	15.8	2.6	*
Any seating, %	47.4	42.1	

Statistical significance of difference

+ p < 0.1 * p < 0.05 ** p < 0.01 *** p < 0.001

Observer ratings

Social and commercial activity

	Nonpoor	Poor	
Sidewalk vendors, %	29.0	47.4	+
Distributing flyers, %	2.6	18.4	*
Sidewalk shoppers, %	10.5	39.5	**
Standing in groups, %	86.8	89.5	
Sitting alone, %	36.8	50.0	
Sitting in groups, %	21.1	39.5	+
Pedestrian count	72.0	55.8	

Statistical significance of difference

+ $p < 0.1$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Observer ratings

Social and commercial activity

Observer ratings

Project for Public Spaces Place Audit

	Nonpoor	Poor	
Potential for varied use	14.1	12.7	+
Pedestrian comfort	19.5	16.3	***
Access & convenience	30.6	28.9	
Support for socializing	21.4	20.0	

Statistical significance of difference

+ p < 0.1 * p < 0.05 ** p < 0.01 *** p < 0.001

Conclusions

- After controlling for “walkability”, poor areas of New York had
  - More transit infrastructure and sidewalk commerce
  - Less attractive natural/architectural detail
  - Worse traffic/crime danger, physical disorder
- These patterns were corroborated by both GIS data and data from a systematic observation

Setting up the paradox

Why doesn't walkability seem to have the same benefits in disadvantaged areas?

1 – Other differences may be more important, such as aesthetic features or safety

2 – Disadvantaged populations may not respond to the environment in the same way

(captive walkers?)

Conclusions

- Removing social and safety barriers may be important to promoting activity
- Disadvantaged neighborhoods may have untapped active living potential, but also competing uses for sidewalks
- We need a better understanding of whether *changes* to the built environment would help to reduce obesity and related health problems, especially for disadvantaged groups

Collaborators:

Kathy Neckerman
Eric Feder
Marnie Purciel
Andrew Rundle
Ben Wasserman
Nakita Raghunath
James Quinn
Chris Weiss

Funding:

National Institute of Environmental Health Sciences

Robert Wood Johnson Foundation Health & Society Scholars Program

Summary

Poor areas were different in terms of

• Aesthetics	Fewer natural features
	Less detailed architectural
	More noise, odors, disorder
• Safety	More traffic hazards
	More crime
	More hostile behavior
• Infrastructure	More subway access
	Fewer sidewalk cafes
• Social/Commercial	More commercial activity
• Public Spaces	Less “access and comfort”