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Environmental Correlates of Walking Adherence in African-American Women

Shannon N. Zenk[a]
JoEllen Wilbur[a]
Nina Savar[a]
Edward Wang[a]
Judith McDevitt[a]
Sue McNeil[b]
Richard Block[c]
Lise Dirks[a]
April Oh[a]
P.S. Sriraj[a]
Hyeongkyeong Lee[a]
Sukyung Ju[a]

[a]University of Illinois at Chicago
[b]University of Delaware
[c]Loyola University, Chicago

Background

- African-American women are less physically active and are at increased risk of obesity and related chronic conditions
- Interventions to increase physical activity have had limited success, including in African-American women
- Most interventions have focused on effects of intra- and inter-personal factors on intervention adherence
  - Very few have examined environmental factors

Purpose

- To examine relationships between aspects of the built and social environment and adherence during the adoption phase (24-weeks) of a home-based walking intervention in midlife African-American women.

Sample

- Women's Walking Program:
  - Eligibility: AA woman, 40-65 years of age, sedentary, contemplation SOC, no major CVD signs or symptoms
  - 252 women participated (adoption: 2002-2005)
  - Two community health centers on Chicago's westside
  - Intervention
    - Both treatment groups:
      - Tailored walking prescription
      - Goal setting
    - Enhanced treatment group:
      - Motivational workshops weeks 1-4
      - Tailored, supportive phone calls weeks 5-23

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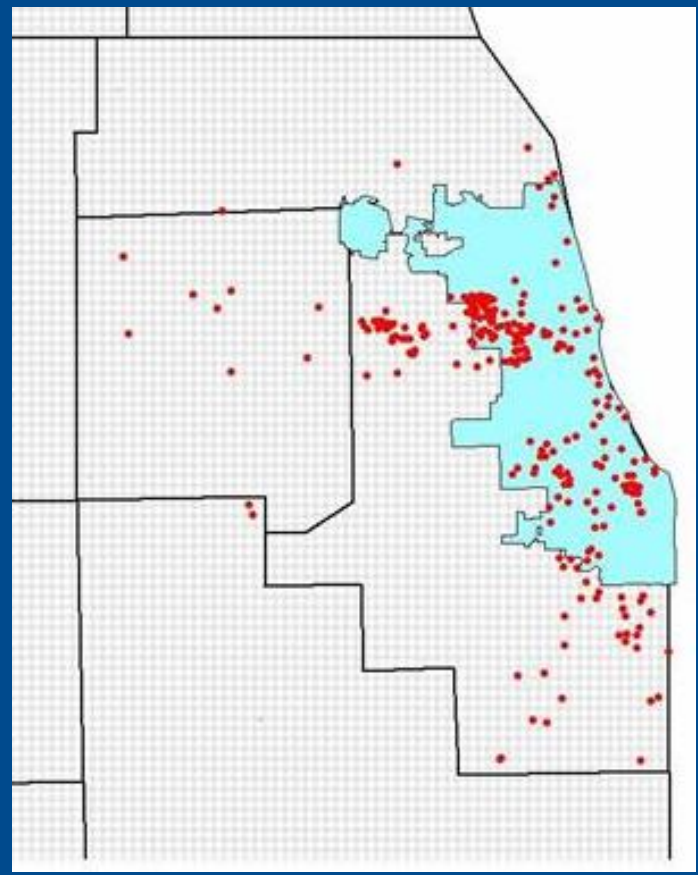
Sample Characteristics at Baseline (n=252)

	Percent
Married	41
At least one child < 18 at home	32
College educated	40
Work full-time	78
Annual household income ≥$50K	43
	Mean
Age (range 40, 65)	49
BMI (range 17, 53)	34
Minutes on treadmill* (range 6, 17)	11.5

*Modified Bruce protocol



Hypotheses

- Walking adherence is positively associated with neighborhood:
  - "Walkability"
  - Aesthetics
  - Spatial accessibility of walking facilities/spaces
  - Safety

- Neighborhood: 1-mile buffer around home address (Rationale: 30-minute walk @ 4 mph)

Measures: Neighborhood environment

- **Walkability**
  - Land use mix: Evenness of distribution of predominately residential, commercial/services, and institutional land uses {Source: 2001 NIPC Land Use Inventory (LUI); Formula: Frank et al. 2004}
  - Street connectivity: Ratio of four-way intersections to all intersections (Source: 2001 NIPC LUI, 2003 TIGER/Line roads; Procedure: Forsyth et al. 2005)

Measures: Neighborhood environment

- **Aesthetics**
  - Physical deterioration: Mean of two items: % vacant housing and % land that is predominately abandoned buildings/rubble lots (Source: 2000 Census, 2001 NIPC LUI)
  - Industrial land use: % land use that is predominately industrial (Source: 2001 NIPC LUI)

Measures: Neighborhood environment

- **Spatial accessibility of walking facilities/spaces**
  - Parks: Number of "primarily recreation open spaces" that intersect neighborhood (Source: 2001 NIPC LUI)
  - Public recreation facility: Presence of facility with indoor track or treadmill in neighborhood (Source: 2006 Municipal park and recreation departments)
  - Indoor shopping mall: Presence of mall (500K ft^2 GLA) within 5 miles (Source: 2003 NRB/NIPC)

Measures: Neighborhood environment

- **Safety**
  - Robbery: Annual number of police-reported robbery incidents* (Source: Richard Block/Chicago Police Department 2002-2005; IL Annual Uniform Crime Report 2002-2004)
    - (Also examined homicide, aggravated assault, criminal sexual assault, total violent crimes)

*For neighborhoods entirely inside Chicago, we used exact counts.
For neighborhoods fully outside Chicago, we applied crime densities (number per unit land area) from municipalities, weighted according to proportion of the neighborhood in each municipality.
For neighborhoods partially inside and outside Chicago, we combined exact counts for Chicago portion and weighted counts for suburban portion.

Measures: Walking adherence

- Walking adherence during adoption phase (24-weeks)
  - Obtained via:
    - Heart rate monitors*
    - Exercise logs
    - Telephone response system
  - Measured as:
    - % of prescribed walks (68 walks over 24 weeks)

*Heart rate monitor and exercise log data correlated at 0.83 for walking frequency.

Data analysis

- Ordinary least squares regression
- Adherence had non-normal distribution
  - Used logarithm transformation
- Covariates: age, education, income, enhanced-standard treatment group, city-suburb

Results

	Participants' neighborhoods	Metropolitan Chicago*
	Mean	Mean
% Residential land use	54.7	46.3
% Commercial land use	10.2	8.0
% Park/recreational land use	3.8	2.9
% Industrial land use	8.8	7.0
% Vacant buildings/rubble lots	3.1	1.0
% Vacant housing	7.8	5.4
Robbery (per 100,000 population)	674	295
% African-American residents	75.1	22.6
% Residents below poverty	19.5	12.1

*Cook and DuPage Counties

Results

	Model 1		Model 2	
	Coeff.	*p*	Coeff.	*p*
Land use mix	-.78	*.23*		
Street connectivity	-.01	*.14*		
Physical deterioration			-.04	*.11*
Industrial land use			.02	*.12*
Parks				
Recreation facility or shopping mall				
Recreation facility and shopping mall				
Robbery (10s)				
Adjusted R^2	.06		.07	

Adjusted for age, income, education, enhanced-standard treatment group, city-suburban residence

Results

	Model 3		Model 4	
	Coeff.	*p*	Coeff.	*p*
Land use mix				
Street connectivity				
Physical deterioration				
Industrial land use				
Parks	**-.04**	***.04***		
Recreation facility or shopping mall	**.41**	***.04***		
Recreation facility and shopping mall	**.55**	***.01***		
Robbery (10s)			**-.01**	***.05***
Adjusted R^2	.09		.07	

Adjusted for age, income, education, enhanced-standard treatment group, city-suburban residence

Results

	Model 5	
	Coeff.	*p*
Land use mix	-1.47	*.06*
Street connectivity	-.01	*.12*
Physical deterioration	.01	*.82*
Industrial land use	.02	*.09*
Parks	-.03	*.24*
Recreation facility or shopping mall	**.54**	***.01***
Recreation facility and shopping mall	**.72**	***.002***
Robbery (10s)	-.01	*.34*
Adjusted R^2	.12	

Adjusted for age, income, education, enhanced-standard treatment group, city-suburban residence

Sensitivity and other analyses

- Alternative neighborhood definitions (0.25, 0.5 miles)
- Alternative measures of environmental indicators
- Alternative measures of adherence, as well as baseline physical activity and fitness
- Stronger effects for environmental indicators than cognitive factors (knowledge, outcome expectations, decisional balance, self-efficacy)
- Interactions with city-suburb and enhanced-standard treatment group

Limitations

- Environmental measures
  - Temporal mismatch with adherence data
  - Comparable city-suburb data
  - Limited measures of environmental “quality”

- Adherence measure may better capture walking for exercise than walking for transport

Discussion

- More robberies was negatively related to walking
- More parks was negatively associated with walking
- Having a public recreation facility in the neighborhood and shopping mall within a reasonable distance was positively associated with walking
  - Presence of these facilities overcame negative effects of neighborhood robbery and parks on adherence
  - Having a safe indoor location to walk nearby – and especially more than one option – may promote adherence

Implications for research

- In urban/suburban midlife African-American women, examine effects of the built and social environment on physical activity, especially safety

- Examine objective measures of crime when possible

Implications for policy and programs

- Enhance infrastructure in neighborhoods where African-American women live:
  - Build community centers and exercise facilities
  - Make exercise equipment available

- Create safer environments for African-American women to engage in physical activity
  - Change community design
  - Support community policing and violence reduction programs
  - Promote sense of community by creating block clubs and neighborhood associations
  - Increase opportunities for employment within low income communities in particular

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