Urban Form Relationships With Walk Trip Frequency and Distance Among Youth

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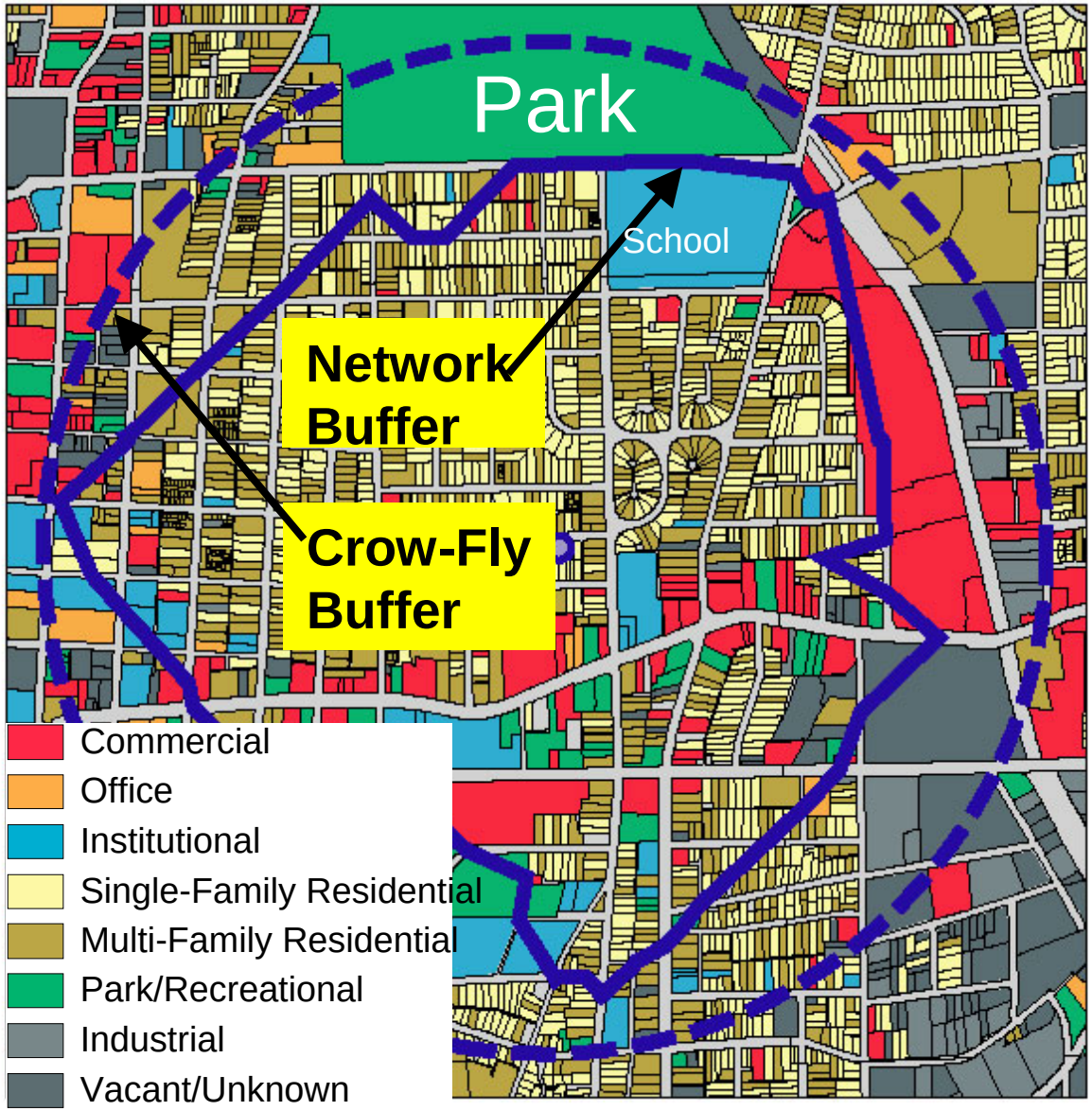
Lawrence Frank, Jacqueline Kerr, James Sallis

Study Design

- Purpose: To assess the relationship between objectively measured urban form and levels of reported walking for youth of varying age when adjusting for demographic factors.

- Method: Cross-sectional analyses of self report travel diary data mapped against urban form characteristics within a 1km buffer of participant residences.

Observation-Specific Buffers



Approach

- Setting: The Atlanta region with recruitment of (3161) 5-20 year olds stratified by income, household size and residential density and over sampling of ethnic minorities.
- Measures: Walking distances were calculated from a two-day travel diary. Residential density, intersection density, land use mix, commercial and recreation space were assessed within a 1km network distance around residences.
- Analysis: Logistic regression analyses were performed for each urban form variable by age groups controlling for the demographic variables. All variables were then entered simultaneously into an analysis of the whole sample.

SMARTRAQ **Travel Survey**

8000 Households

3161 YOUTH

Stated Preference

Land Use Database

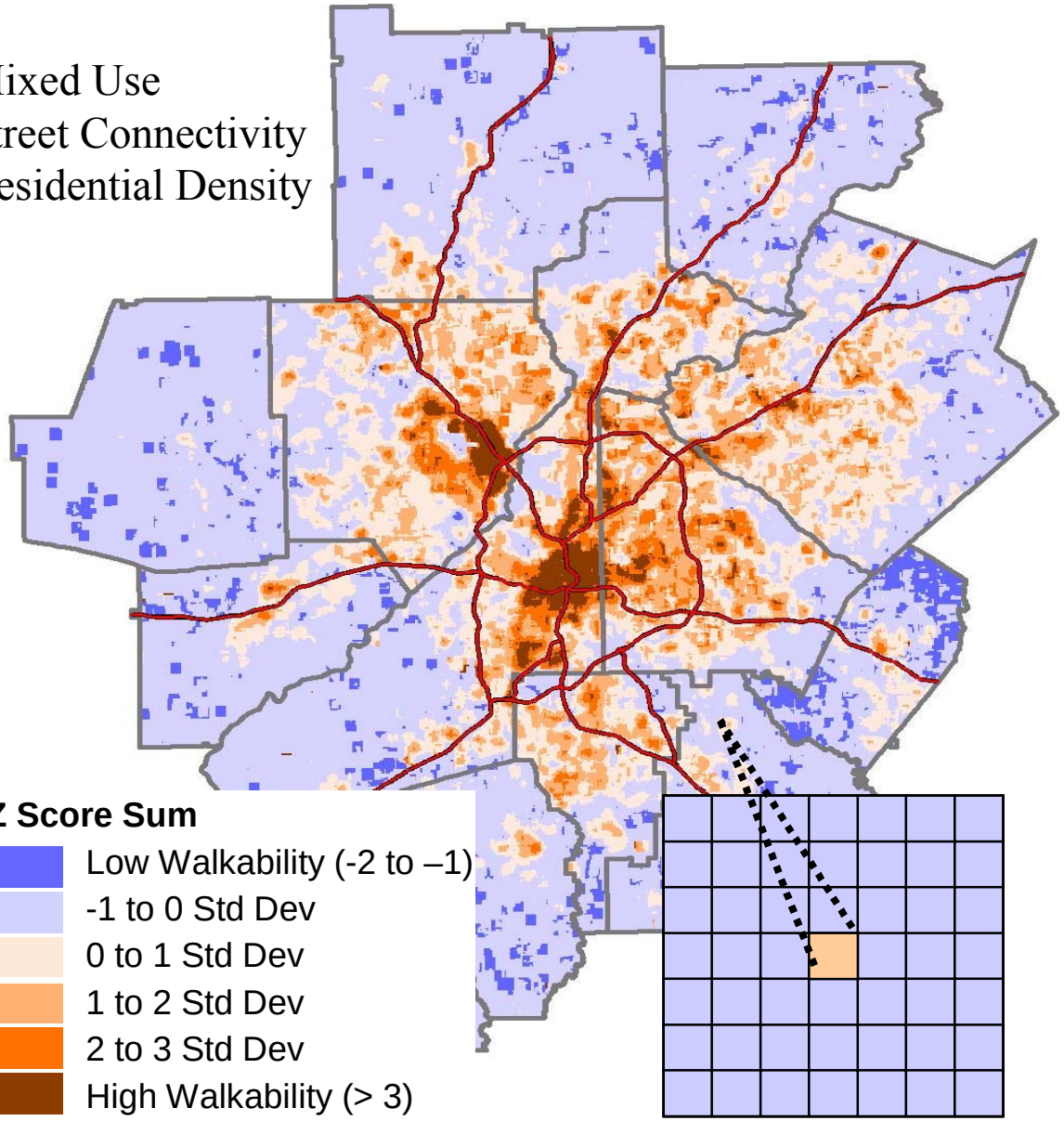
Physical Activity

OUTREACH PROGRAM

Developers, Lenders & Local Government

200 Meter Walkability Surface

- Mixed Use
- Street Connectivity
- Residential Density
- (



Participant demographics and Univariate logistic regression analyses (Total n = 3161)

Variable	N	%	Walked at least once a day OR (95% CI)	Walked ≥ 0.5 miles per day OR (95% CI)
Gender				
Male	1591	50.3	Referent	Referent
Female	1570	49.7	1.0 (0.8-1.3)	1.1 (0.8-1.5)
Age (in years)				
5-8	847	26.8	Referent	Referent
9-11	632	20.0	(40%) 1.4 (1.0-1.8)*	1.3 (0.8-2.1)
12-15	867	27.4	(50%) 1.5 (1.1-1.9)**	(80%) 1.8 (1.2-2.8)**
16-20	815	25.8	1.0 (0.7-1.3)	(80%)1.8 (1.2-2.8)**
Ethnicity				
White	1961	62.0	Referent	Referent
Non white	1200	38.0	(60%) 1.6 (1.3-1.9)***	(90%)1.9 (1.4-2.6)***

Participant demographics and Univariate logistic regression analyses (Total n = 3161)

Variable	N	%	Walked at least once over 2 days OR (95% CI)	Walked ≥ 0.5 miles per day OR (95% CI)
Income ($)				
≥ 60,000	1505	47.6	Referent	Referent
30-59,000	1010	32.0	1.0 (0.8-1.3)	1.0 (0.7-1.6)
< 30,000	646	20.4	(170%) 2.7 (2.1-3.4)***	(200%) 3.0 (2.1-4.2)***
Household size				
≥ 4 residents	2022	64.0	Referent	Referent
≤ 3 residents	1139	36.0	(30%) 1.3 (1.1-1.6)**	(70%) 1.7 (1.3-2.4)***
Number of cars per household				
≥ 3 cars	990	31.3	Referent	Referent
2 cars	1464	46.3	(40%) 1.4 (1.1-1.9)**	1.3 (0.9-2.0)
1 car	556	17.6	(160%) 2.6 (1.9-3.5)***	(120%) 2.2 (1.4-3.5)***
No car	151	4.8	(670%) 7.7 (5.2-11.4)***	(580%) 6.8 (4.0-11.4)***

*p<.05, **p<.01, ***p<.001

(5 to 20 YEAR OLDS) CONTROLLING FOR DEMOGRAPHICS (n=3161)

	Walked at least once a day OR (95% CI)	Walked ≥ 0.5 miles per day OR (95% CI)
Street connectivity		
Intersection 1st tertile	Referent	Referent
Intersection 2nd tertile	1.3 (1.0-1.7)	1.3 (0.9-2.1)
Intersection 3rd tertile	(70%) 1.7 (1.3-2.2)***	(80%) 1.8 (1.2-2.7)**
Residential density		
Density 1st tertile	Referent	Referent
Density 2nd tertile	1.4 (1.0-1.9)*	1.6 (1.0-2.7)
Density 3rd tertile	(140%) 2.4 (1.8-3.2)***	(170%) 2.7 (1.7-4.4)***
Land use		
No mixed land use	Referent	Referent
Mixed land use	(140%) 1.8 (1.4-2.3)***	(140%) 1.9 (1.3-2.9)***
No commercial land use	Referent	Referent
Commercial land use	(80%) 1.8 (1.4-2.3)***	(140%) 1.8 (1.2-2.7)**
No recreation and open space land use	Referent	Referent
Recreation and open space land use	(110%) 2.1 (1.7-2.6)***	(110%) 2.1 (1.5-2.9)***

*p<.05, **p<.01, ***p<.001

Logistic regression analyses predicting the odds of WALKING AT LEAST ONCE OVER 2-DAYS

Age Range	5-8 years OR (95% CI)	9-11 years OR (95% CI)	12-15 years OR (95% CI)	16-20 years OR (95% CI)
	N=847	N=632	N=867	N=815
Intersection highest tertile (vs lowest)	1.7 (1.0-2.9)	1.3 (0.8-2.3)	1.7 (1.1-2.8)*	2.0 (1.1-3.6)*
Density highest tertile (vs lowest)	1.8 (1.0-3.1)	2.3 (1.2-4.3)**	3.7 (2.2-6.4)***	2.0 (1.0-4.1)
Mixed land use (vs no mix)	1.5 (0.9-2.4)	1.5 (0.9-2.5)	2.5 (1.6-3.8)***	1.9 (1.0-3.2)*
At least 1 commercial land use (vs 0)	1.5 (0.9-2.4)	1.6 (1.0-2.5)	2.6 (1.7-4.0)***	1.7 (1.0-3.1)
At least 1 recreation/open space land use (vs 0)	2.1 (1.3-3.4)***	1.8 (1.1-2.9)*	2.5 (1.7-3.6)***	1.8 (1.1-2.9)**

controlling for socio-demographics and stratified by age group
(Averaged over a two day period)

*p<.05, **p<.01, ***p<.001

Logistic regression analyses predicting the odds of WALKING > .5 MILE PER DAY

Age Range	5-8 years OR (95% CI)	9-11 years OR (95% CI)	12-15 years OR (95% CI)	16-20 years OR (95% CI)
	N=847	N=632	N=867	N=815
Intersection highest tertile (vs lowest)	1.2 (0.5-2.7)	1.0 (0.4-2.7)	2.4 (1.1-5.1)*	3.1 (1.3-7.4)**
Density highest tertile (vs lowest)	1.3 (0.5-3.5)	2.7 (0.8-9.2)	4.9 (2.1-11.4)***	3.2 (1.1-9.1)*
Mixed land use (vs no mix)	1.9 (0.8-5.0)	1.3 (0.5-3.0)	2.7 (1.4-5.3)**	1.8 (0.9-3.9)
At least 1 commercial land use (vs 0)	2.0 (0.8-5.1)	1.1 (0.5-2.5)	2.7 (1.4-5.4)**	1.6 (0.8-3.4)
At least 1 recreation/open space land use (vs 0)	2.4 (1.2-5.1)*	1.7 (0.7-3.7)	2.4 (1.3-4.2)**	2.1 (1.1-3.7)*

controlling for socio-demographics and stratified by age group

*p<.05, **p<.01, ***p<.001

Logistic regression analyses for acreage and number of recreation and open spaces

Recreation and open space	All age groups	5-8 years OR (95% CI)
	N=3161	N=847
Acreage		
No space	Referent	Referent
1-5 acres recreation/open space	2.2 (1.6-2.9)***	2.2 (1.2-4.1)**
6+ acres recreation/open space	1.1 (0.7-1.6)	1.4 (0.6-3.1)
Number		
No space	Referent	Referent
1 recreation/open space	1.7 (1.3-2.4)***	2.2 (1.2-4.0)**
2-3 recreation/open spaces	2.5 (1.8-3.5)***	2.6 (1.3-5.3)**
4+ recreation/open spaces	2.1 (1.5-2.9)***	1.4 (0.6-3.5)

controlling for socio-demographics and stratified by age group

*p<.05, **p<.01, ***p<.001

Logistic regression analyses for acreage and number of recreation and open spaces

Recreation and open space	9-11 years OR (95% CI)	12-15 years OR (95% CI)	16-20 years OR (95% CI)
	N=632	N=867	N=815
Acreage			
No space	Referent	Referent	Referent
1-5 acres recreation/open space	1.4 (0.8-2.6)	2.2 (1.3-3.7)**	2.6 (1.5-4.6)***
6+ acres recreation/open space	1.6 (0.7-3.9)	1.0 (0.5-2.1)	0.9 (0.4-1.9)
Number			
No space	Referent	Referent	Referent
1 recreation/open space	1.3 (0.6-2.5)	2.1 (1.2-3.6)**	1.4 (0.7-3.0)
2-3 recreation/open spaces	2.0 (0.9-4.2)	3.2 (1.8-5.7)***	2.1 (1.1-3.9)*
4+ recreation/open spaces	2.6 (1.3-5.4)**	2.3 (1.2-4.3)**	1.9 (1.0-3.8)

controlling for socio-demographics and stratified by age group

*p<.05, **p<.01, ***p<.001

multivariate model with density, connectivity, land use mix and recreation space entered simultaneously along with sociodemographic variables

	Walked at least once over 2 days OR (95% CI)	Walked ≥ 0.5 miles per day OR (95% CI)
No car (vs 3+)	3.7 (2.3-6.0)***	2.6 (1.3-4.9)**
At least 1 recreation/open space (vs 0)	1.9 (1.3-2.3)***	1.7 (1.2-2.4)**
1 car (vs 3+)	1.7 (1.2-2.4)**	NS
Residential density 3rd tertile (vs 1st)	1.7 (1.1-2.3)**	1.8 (1.0-3.1)*
9-11 years (vs 5-8)	1.5 (1.1-2.1)**	NS
12-15 years (vs 5-8)	1.5 (1.1-2.0)**	1.8 (1.2-2.9)**
$30,000 income (vs $60,000+)	1.5 (1.1-2.1)*	NS
Non white (vs white)	1.4 (1.0-1.8)*	NS

*p<.05, **p<.01, ***p<.001

Average Walk Trip Distance

FOR THOSE WHO WALKED		AVERAGE WALK TRIP DISTANCE
5-8 year olds	N Mean	(102) 0.58
9-11 year olds	N Mean	(100) 0.57
2-15 year olds	N Mean	(144) 0.63
16+ year olds	N Mean	(98) 0.82
Total average distance	Mean	0.65

Conclusions

- **Results:** All five urban form variables were related to walking. Recreation space was the only variables associated with walking across the four different age groups. All the urban form variables were related to walking in 12-15 age cohort. In the whole sample analysis, number of cars, recreation space and residential density were most strongly related to walking.

- **Conclusion:** Access to recreation or open space was the most important urban form variable related to walking for all age groups. Residential density also appeared to be important. Children aged 12-15 may be particularly influenced by urban form.

“Nothing Great Was Ever Achieved Without Enthusiasm”

Ralph Waldo Emerson