The Relationship between Calgary Urban Form and Neighborhood-Based Walking

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BACKGROUND

- Regular physical activity can reduce the risk of cardiovascular disease, hypertension, type II diabetes, hyperlipidemia, osteoporosis, depression, some cancers, and overweight and obesity.[1]

- Higher levels of neighborhood walkability is associated with higher levels of physical activity.[2]

- The combined effects of many, rather than individual environmental attributes, might better explain walking.[3,4]

AIM

- To examine the extent to which neighbourhood walkability was associated with **participation** and the **quantity** of neighbourhood-based walking for transportation and recreation among adults.

METHOD

SAMPLE DESIGN

- **Target population:** urban-dwelling adults residing in Calgary, Alberta, Canada.

- A random cross-sectional sample completed telephone-interviews between July-October, 2007 (n=2199; RR=33.6%) and January-April, 2008 (n=2223; RR=36.7%).

- Telephone-interviews captured physical activity, attitudes, and socio-demographic characteristics.

SURVEY VARIABLES

- **Neighborhood-based walking:** usual weekly minutes of walking undertaken for transportation (WT) and recreational (WR) purposes inside the neighborhood (everywhere within < 15-minute from home).[5]

- **Covariates**: sex, age, education, home ownership, number of children <18 years of age, time residing in neighborhood, reasons for moving to the neighborhood, and attitude towards walking.

OBJECTIVELY-DETERMINED WALKBILITY

- GIS-derived built environment attributes underwent a two-staged cluster analysis which identified three neighborhood types: high walkable (HW); medium walkable (MW); low walkable (LW)
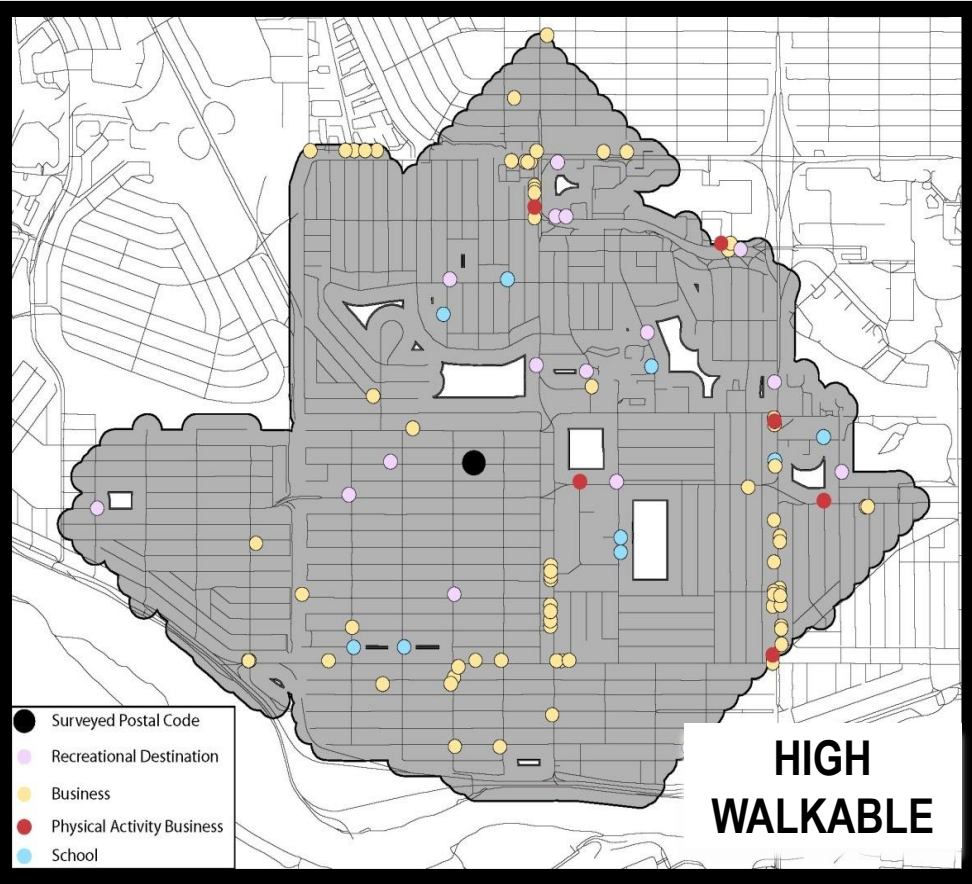
STATISTICAL ANALYSIS

- Generalized Linear Models (binomial distribution and logit link) estimated the relationship between neighborhood type and **participation** in transportation and recreational walking ('any' versus 'no' walking).

- Generalized Linear Models (gamma distribution and identity link) estimated the relationship between neighborhood type and **minutes** of transportation and recreational walking.

- All models were adjusted for covariates.

TABLE 1. ENVIRONMENTAL ATTRIBUTES BY NEIGHBORHOOD TYPE

	Neighborhood built environment profile					
	Low walkable N(neighborhoods)=2064		Moderate walkable N(neighborhoods)=1330		High walkable N(neighborhoods)=263	
Environmental attribute	Mean ± SD	CV	Mean ± SD	CV	Mean ± SD	CV
Environmental attribute based on area within 1.6 km of respondents home						
Walkshed area (km²)	2.15 ± 0.69	0.32	3.36 ± 0.85	0.25	3.70 ± 1.07	0.29
# of businesses/km²	11.95 ± 11.49	0.96	32.65 ± 22.16	0.68	142.87 ± 119.12	0.83
# of bus stops/km²	11.06 ± 4.38	0.40	14.30 ± 4.10	0.29	29.87 ± 33.42	1.12
Mix of park types/ km²	0.57 ± 0.56	0.99	0.29 ± 0.31	1.09	0.34 ± 0.46	1.33
Mix of recreational destinations/km²	0.24 ± 0.27	1.14	0.64 ± 0.41	0.64	0.48 ± 0.32	0.67
Sidewalk m/km²	13958.02 ± 24440.46	0.17	19565.06 ± 2513.46	0.13	17255.24 ± 3601.15	0.21
Environmental attribute based on administrative boundary in which respondents home was located						
Total population/km²	2826.07 ± 920.33	0.33	2680.18 ± 925.01	0.35	7451.57 ± 2364.48	0.32
% of green space area	19.00 ± 9.00	0.46	17.00 ± 11.00	0.66	15.00 ± 14.00	0.90
Paths/cycleway m/km²	2742.63 ± 1167.85	0.43	1845.47 ± 10005.27	0.54	3507.57 ± 3185.74	0.91

SD: Standard deviation. CV: Coefficient of variation. Differences among neighborhood profiles all statistically significant (p<0.05).

EXAMPLES OF LW AND HW NEIGHBORHOODS

LOW WALKABLE

Legend:
- Surveyed Postal Code
- Recreational Destination
- Business
- Physical Activity Business
- School

HIGH WALKABLE

Legend:
- Surveyed Postal Code
- Recreational Destination
- Business
- Physical Activity Business
- School

PARTICIPANT CHARACTERISTICS BY NEIGHBORHOOD TYPE

	LW n=2322	MW n=1418	HW n=294
Age in years (mean±SD)	45.9 ± 15.1	49.6 ± 16.1	44.5 ± 14.8
Sex (women: %)	60.2	60.0	54.4
Highest education achieved (%)			
High school diploma or less	30.7	34.9	27.9
College or technical college	26.7	25.4	24.1
University degree	42.5	29.7	48.0
Number of children (none: %)	56.2	70.0	78.6
Season (%)			
Summer	12.0	15.2	13.3
Autumn	37.4	35.9	34.0
Winter	25.3	24.4	24.1
Spring	25.3	24.5	28.6
Home ownership (owners: %)	87.0	77.4	57.1
Neighborhood tenure (mean±SD)	9.4 ± 9.2	14.8 ± 13.6	7.9 ± 8.2
Any recreational walking (%)	76.1	73.6	72.1
Any transportation walking (%)	53.1	64.8	79.3

WEEKLY PARTICIPATION IN NEIGHBORHOOD-BASED WALKING BY NEIGHBORHOOD TYPE
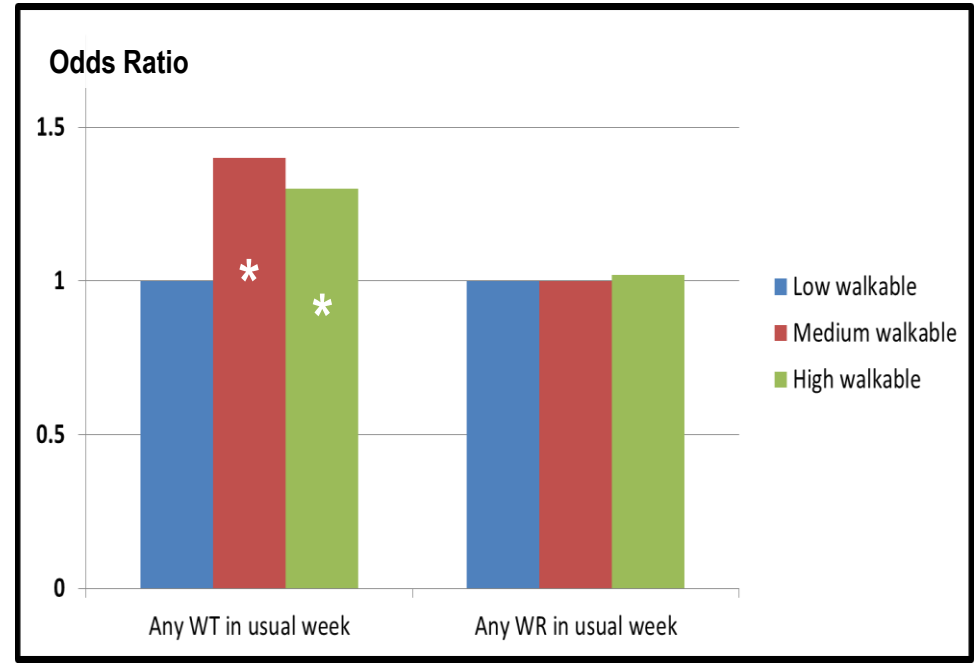
* Significantly different (p<.05) from LW neighborhoods. Results adjusted for covariates.

WEEKLY MINUTES OF NEIGHBORHOOD-BASED WALKING BY NEIGHBORHOOD TYPE
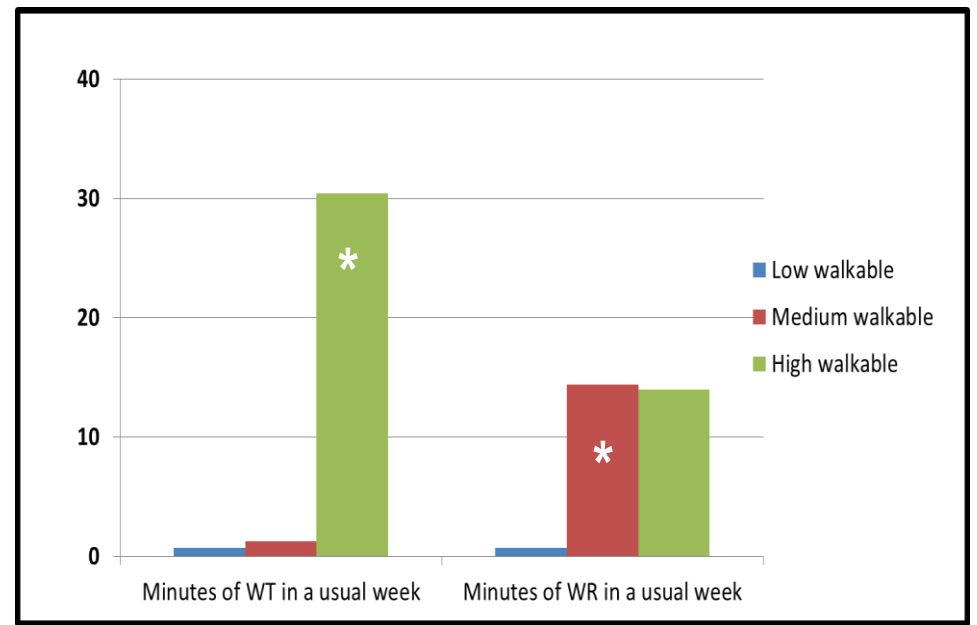
* Significantly different (p<.05) from LW neighborhoods. Results adjusted for covariates.

CONCLUSIONS

- In support of previous research, our findings suggest that there appears to be three main types of neighbourhood in Calgary based on levels of walkability.[6]

- Within the Calgary context neighborhood walkability may be more important for encouraging and supporting transportation-related walking than for recreational walking.

- Creating neighborhoods with highly connected pedestrian networks, a large mix of businesses, high population densities, high access to sidewalks/pathways, and many bus stops within walking distance of home may support and encourage higher levels of physical activity.

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