

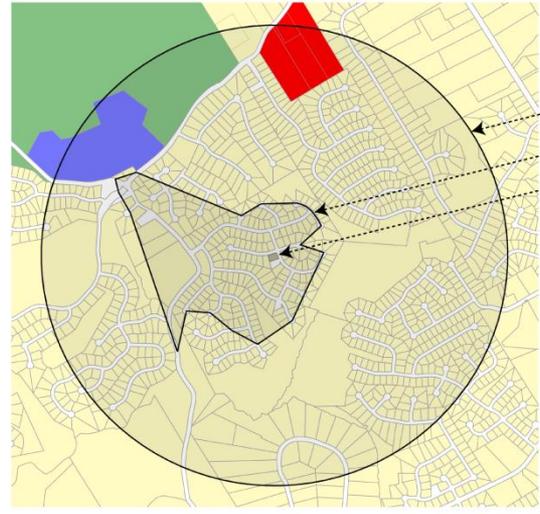
*Built
Environment,
Health, and
How Old You
Are: A View
Across the Life
Span*

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Dr. Lawrence Frank, Professor and Bombardier Chair @ UBC

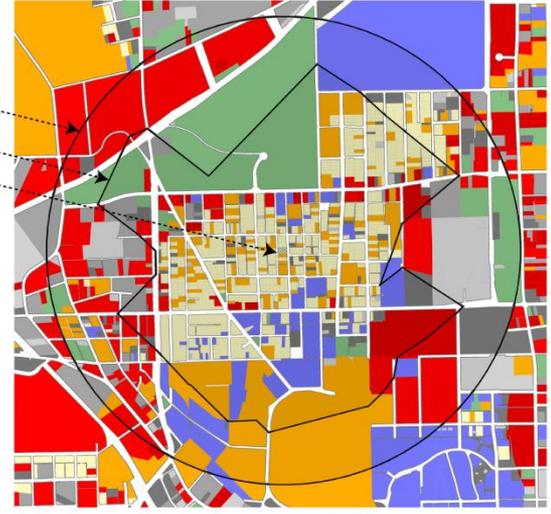
Proximity

Disconnected



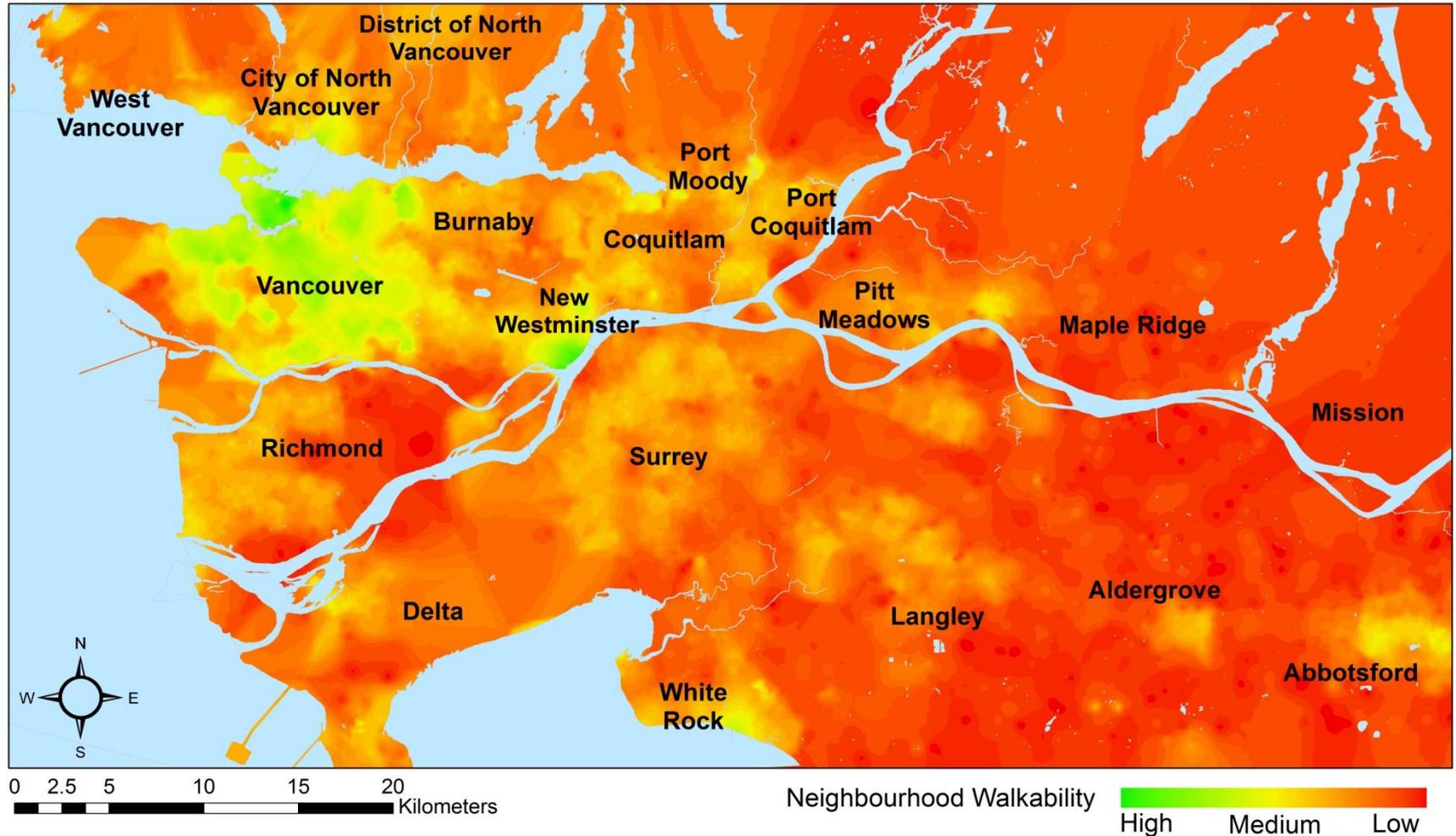
Connected

- Single Family Residential
- Multi Family Residential
- Commercial
- Office
- Industrial
- Institutional
- Greenspace/Recreational
- Parking
- Unknown

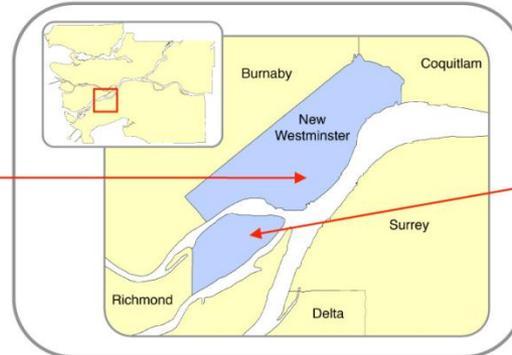


Connectivity

Lower Mainland Walkability Map



Comparing Two Communities



**Uptown
Moody Park**

Queensborough

Net Residential Density
(dwelling units/acre)

40.29

7.73

Mixed Use Index
(range 0 - 1)

0.58

0.09

Intersection Density
(per square km)

70.12

27.91

Retail Floor
Area Ratio

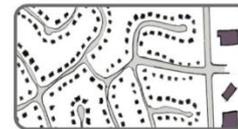
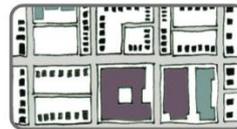
0.64

0.30

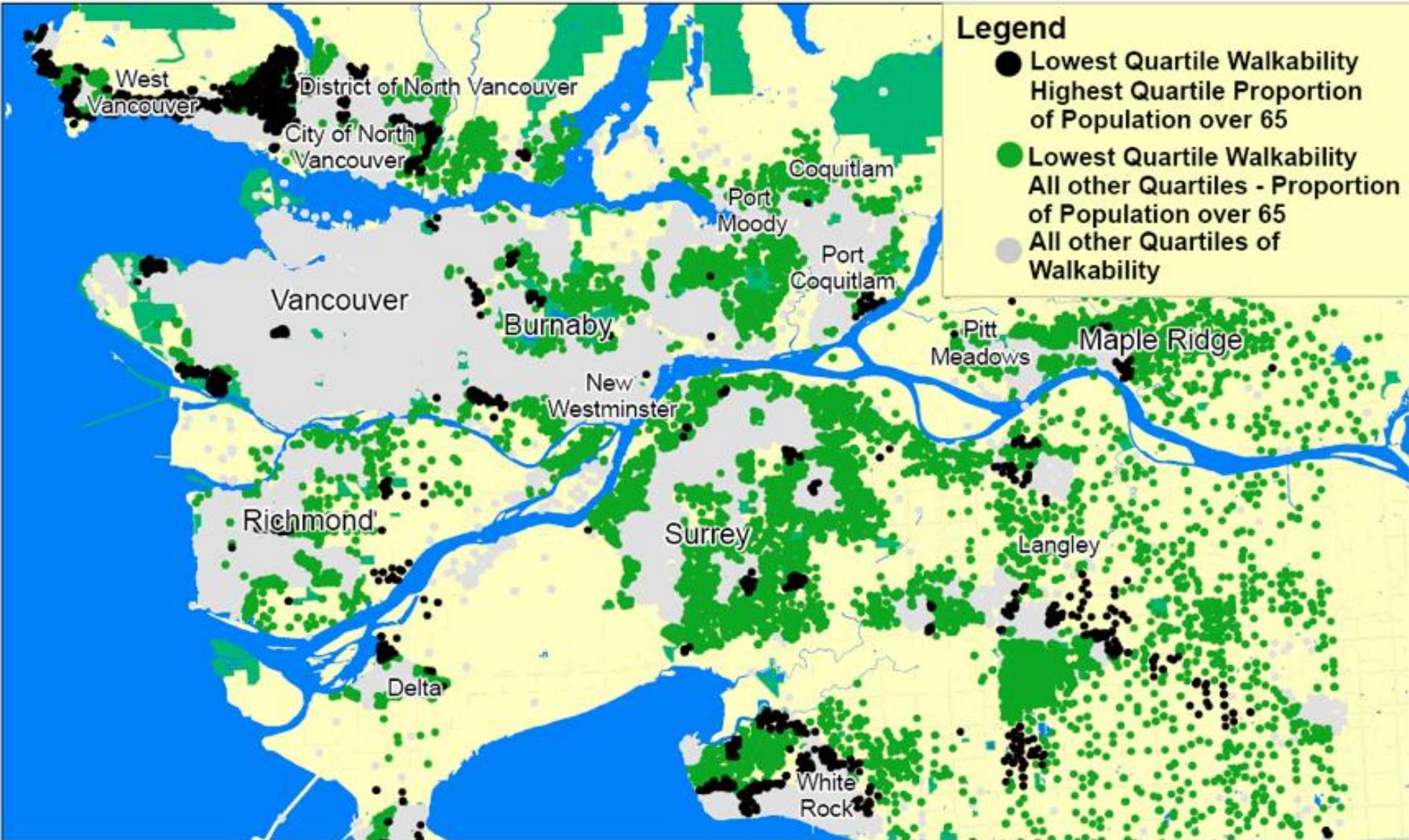
Overall Walkability

4.26

-3.74



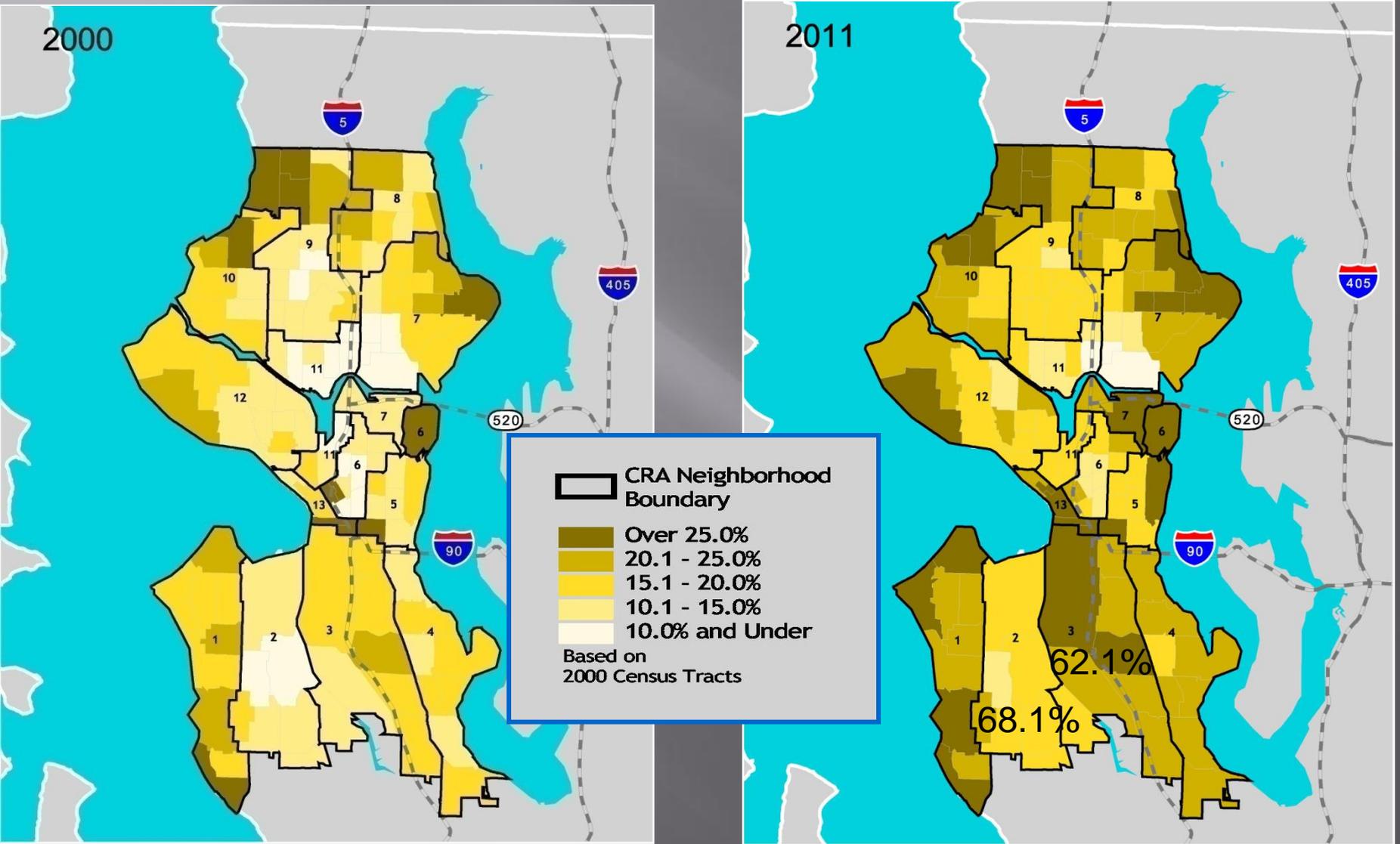
Walkability and Elderly



Changing Demographics

- ▣ California will see its 65-plus population more than double in the next 25 years, from 3.5 million in 2000 (10.6 percent of the state's population) to 8.2 million in 2030 (17.8 percent).
- ▣ Where will the 65-plus population live?
 - Access to services
 - Less reliance on driving for safety reasons
 - Maintaining Independence
- ▣ For elderly, considering cost of service delivery with Aging in Place
 - Suburban Vs Urban setting

Population 2000 and 2011 (projection Age 60 and Over)



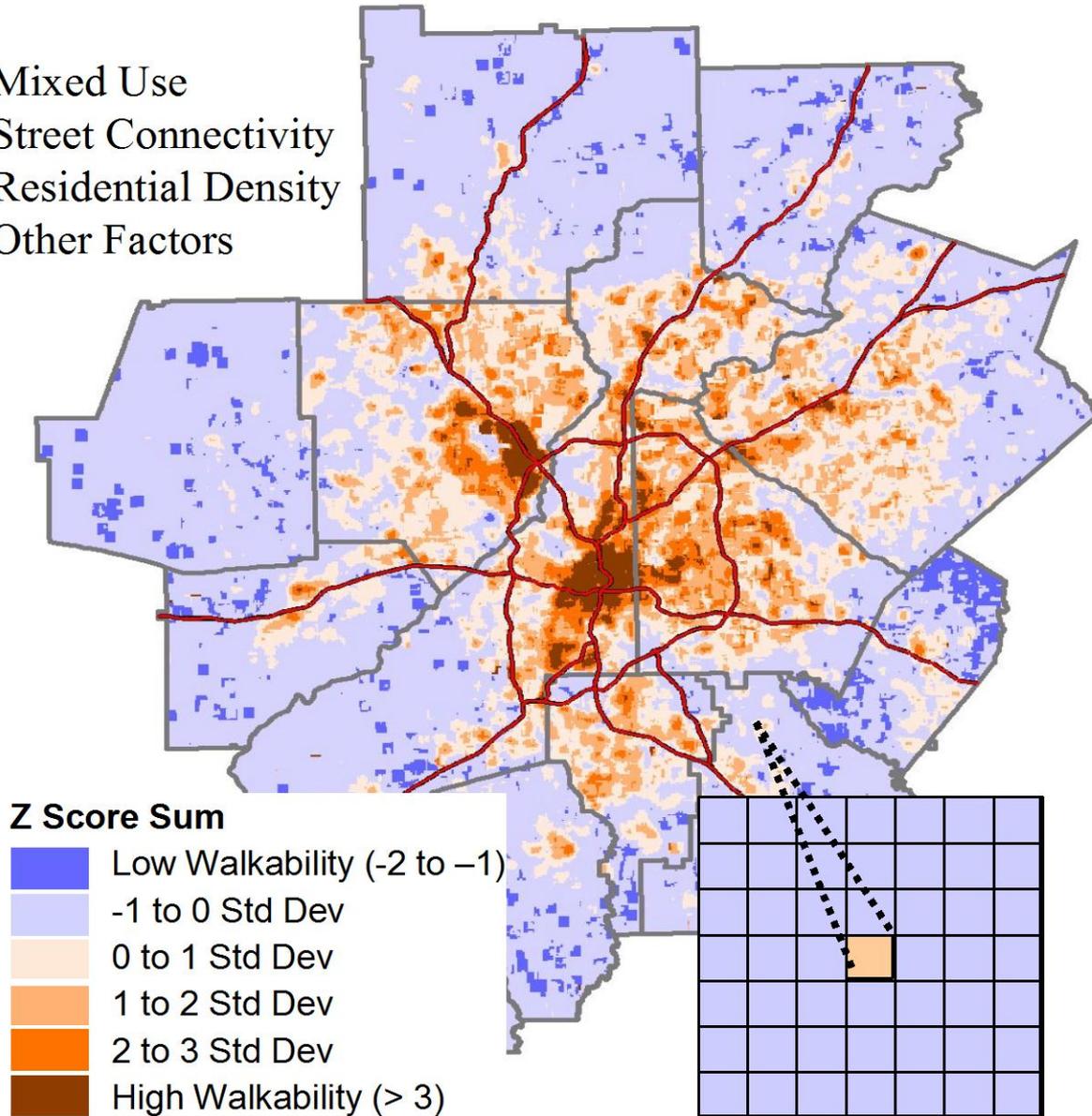
City of Seattle

What is An Age Friendly Environment for Older Canadians

- ▣ Provides Opportunity for Social Interaction
- ▣ Provides Independence and Mobility
- ▣ Distances to Destinations Are Short
- ▣ A Variety of Housing Choices
- ▣ Streets are Interconnected
- ▣ Sidewalks are Even and Street Crossings Are Short
- ▣ Has Parks and Streets With Benches
 - Passive Places to Observe Others
- ▣ Slopes are Not Extreme

200 Meter Walkability Surface

- Mixed Use
- Street Connectivity
- Residential Density
- Other Factors



Methods

- ▣ The analyses presented here used cross sectional travel survey data from the Atlanta based SMARTRAQ study conducted in 2001 to 2002. The current analyses focus on adults aged 65 years or older (n = 1970).
- ▣ Travel survey participants recorded destinations visited, travel mode, trip purpose, and time of day for 2 consecutive days. Data were collected for each day of the week.
- ▣ Participants provided information on household demographics, their height and weight, and their activity levels. General physical activity levels were self reported as part of the travel survey.

Methods

- ▣ County level Tax Assessor's data, regional land use data, street network data, and census data were used to determine the urban form characteristics within a 1 kilometer street network distance from each participant's household.
- ▣ Measures of land use mix, residential density, and street connectivity were calculated within a 1 kilometer distance from each participant's home. These 3 urban form characteristics were used to calculate a walkability index.

Aging and Travel Patterns

Variables	25 to 64 Years Old	65 - 74 Years Old	75-84 years Old	85+ Years Old
Percent with no driver's license	6.8%	13.5%	23.1%	57.6%
Percent with a medical condition impacting travel	3.6%	12.4%	23.2%	33.6%
Percent with no household vehicles	4.2%	7.9%	16.9%	18.2%
Total trips daily per person (all modes)	3.6	2.8	1.8	1.0
Percent traveling by transit (1+ bus or rail trips over two day survey period)	5.0%	2.2%	1.2%	1.3%
Miles traveled as driver	28.9	17.2	8.8	2.5
Percent people whose willingness to walk is affected "very much" by traffic	28.6%	28.8%	23.6%	22.1%
Percent people whose willingness to walk is affected "very much" by sidewalk availability	35.3%	35.8%	30.6%	46.2%

Table 1 Sample Demographics and Results of Univariate Analyses With Walking, Driving, and Physical Activity Outcomes

	N	Total %	% walk at least once in 2 days		% travel in car over an hour		% meet MVPA 150 min/week guidelines	
65–74 years old	1198	60.8	4.4	***	21.2	***	42.7	
75–84 years old	622	31.6	5.3		10.5		38.0	
85+ years	150	7.6	2.7		1.3		28.8	
Living alone	495	25.1	7.7		9.7	***	32.6	*
Living with others	1475	74.9	3.5		18.5		46.1	
<\$50K income	1089	55.3	5.2		11.5	***	33.9	*
\$50–74K income	578	29.3	4.7		20.4		49.6	
75+K income	303	15.4	2.0		25.7		53.9	
0–1 car	761	38.6	7.8	***	8.8	***	30.6	*
2+ cars	1209	61.4	2.6		21.0		50.0	
Non white	467	23.8	6.6	*	9.2	***	31.4	*
White	1496	76.2	3.9		18.5		43.4	
No degree	1205	62.4	3.9		13.2	***	33.3	*
Degree	726	37.6	5.8		22.2		51.4	
Male	861	43.7	4.2		22.0	***	49.1	*
Female	1109	56.3	4.9		11.9		34.6	
Low walkability	659	33.5	2.7	***	23.2	***	42.7	
Medium walkability	654	33.2	3.7		15.4		42.9	
High walkability	657	33.4	7.3		10.2		36.6	

* $P < .05$, ** $P < .01$, *** $P < .001$.

Summary of Findings

- ▣ Increased walkability was related with more walking (OR 2.02), less time spent traveling in a car (OR .53), and lower odds of being overweight (OR .68).
- ▣ Those with 1 or no cars were more likely to walk (OR 2.9) and spend less time in cars (OR .53); but also less likely to get recommended levels of PA (OR .55).
- ▣ Visiting a fast food outlet was associated with increased odds of obesity (OR 1.81).

Walkability Results

- ▣ age, number of cars, ethnicity, and walkability were significantly related to walking at least once over the two-day diary period.
 - Only 4 percent of the sample reported walking
- ▣ Fifty seven percent of the sample was overweight and 20 percent were obese.
- ▣ those with one or less cars were almost three times more likely to walk, those with a degree were almost twice as likely to walk, and those living in a highly walkable neighborhood were two times more likely to walk than those in a low walkable neighborhood.

Healthy Aging and Time in Cars

- ▣ the youngest group (65-74), and those with a higher household income and a degree were more likely to travel in a car for an hour a day.
- ▣ Those with one car or less, non-whites, and women were significantly less likely to spend an hour a day in a car.
- ▣ Those living in neighborhoods with medium walkability were 35 percent less likely, and those in high walkable neighborhoods were 47 percent less likely, to travel over an hour a day by car.
- ▣ only those with a car were significantly more likely to meet recommended activity levels.

Body Weight

- ▣ Increased walkability was related with lower odds of being overweight (OR .68).
- ▣ those who walked were significantly less likely (OR.51) to be overweight.
- ▣ Women and those with a degree were less likely to be overweight.
- ▣ Younger participants were more likely to be categorized as obese, as were non-whites and those with no college degree.
- ▣ Those who met the physical activity guidelines were 45 percent less likely to be obese but those who visited a fast food outlet at least once in the 2-day survey period were 1.8 times more likely to be obese.

Policy Implications

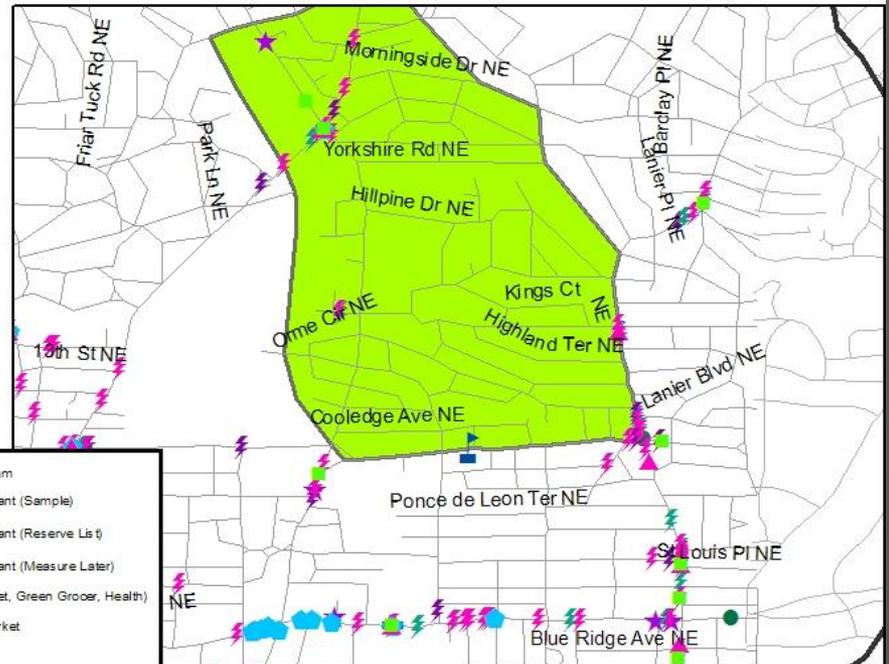
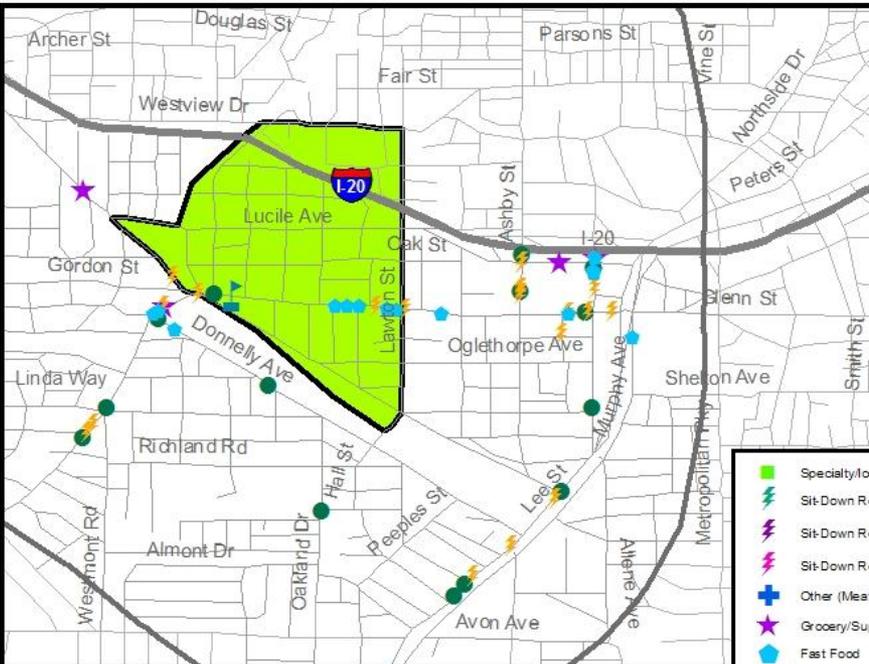
- ▣ Policies are needed to bring older Americans closer to shops and services and healthy food outlets as a means of encouraging regular walking and healthy body weight.
- ▣ Incentives to encourage neighborhood grocery stores and affordable housing in central areas along with regulatory reform through zoning can encourage PA and healthy body weight in the elderly.



WHAT ABOUT WHERE OLDER AMERICANS GO FOR FOOD?

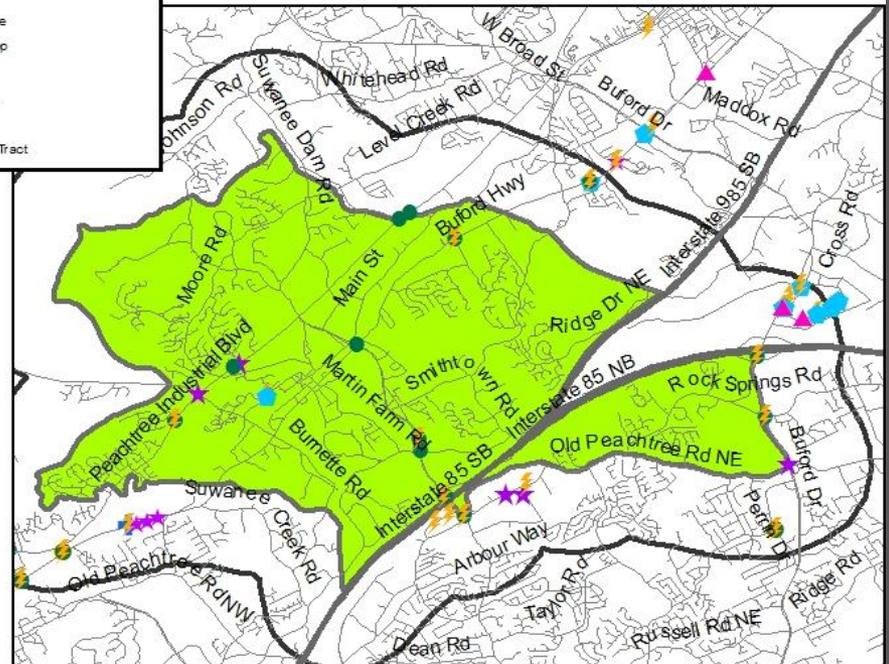
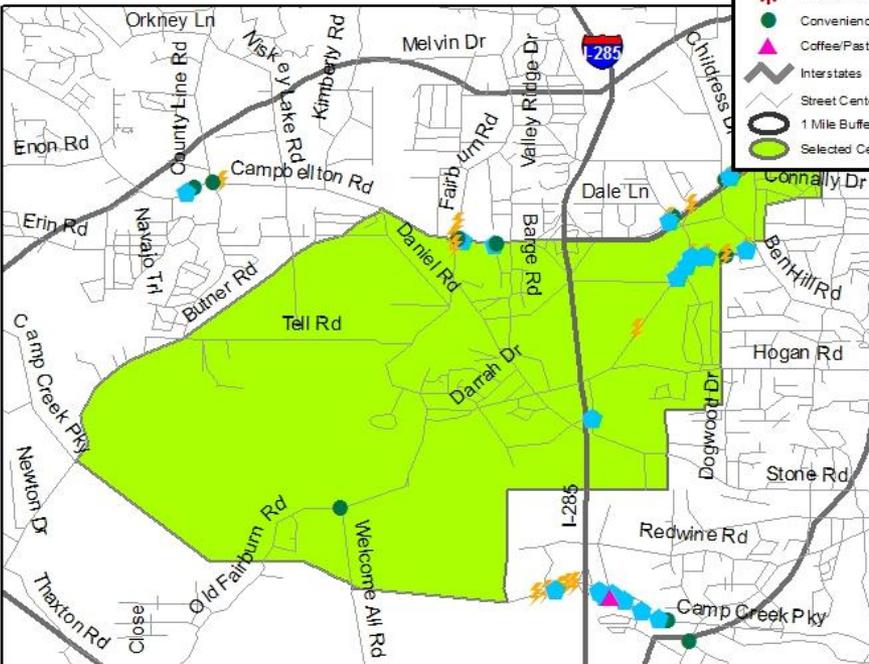
UBC Active Transportation Lab

High



Walkability

- Specialty Ice Cream
- ⚡ Sit-Down Restaurant (Sample)
- ⚡ Sit-Down Restaurant (Reserve List)
- ⚡ Sit-Down Restaurant (Measure Later)
- + Other (Meat Market, Green Grocer, Health)
- ★ Grocery/Supermarket
- ⚡ Fast Food
- ✳ Exclusions
- Convenience Store
- ▲ Coffee/Pastry Shop
- Interstates
- Street Centerlines
- 1 Mile Buffer
- Selected Census Tract



Low

Income

High

BODY MASS INDEX ACROSS GENDER

	Women		Men	
	T	P value	t	P value
Block 1 - % variance explained	12.7		5.5	
Age	5.6	0.001*	3.7	0.001*
Race	-9.9	0.001*	-3.0	0.001*
Education	-4.9	0.001*	-4.0	0.001*
Income	-6.1	0.001*	-1.6	0.12
Number in household	4.5	0.001*	4.2	0.001*
Number of vehicles in household	-0.9	0.79	3.3	0.001*
Two or more children in household	-3.2	0.002*	-1.6	0.11
Employment	1.1	0.27	-1.6	0.10
Block 2 - % variance explained	0.0		0.5	
Walkability of home	0.5	0.60	-3.4	0.001* ★
Block 3 - % variance explained	0.6		0.1	
Ate at fastfood restaurant	3.5 ★	0.001*	0.6	0.57
Shopped at grocery store	-2.5 ★	0.01*	-1.2	0.22
Block 4 - % variance explained	1.1		0.7	
Meeting guidelines for MVPA	-5.4	0.001	-2.7	0.007
Walked at least once over 2 days	-1.1	0.27	-2.8	0.005
Total variance explained	14.4		6.8	

* p<.05 in final block

Residential Density and Mix of Housing Type



If I were to move, I'd like to find a neighborhood ...

A. that is a lively and active place, even if this means it has a mixture of single family houses, townhouses, and small apartment buildings that are close together on various sized lots.

or

B. with single family houses farther apart on lots 1/2 acre or more, even if this means that it is not an especially lively or active place.

Prefers a Walkable
Community Design

Maximum

1

2

Preferences

Built Environment

Low Walkability

High Walkability

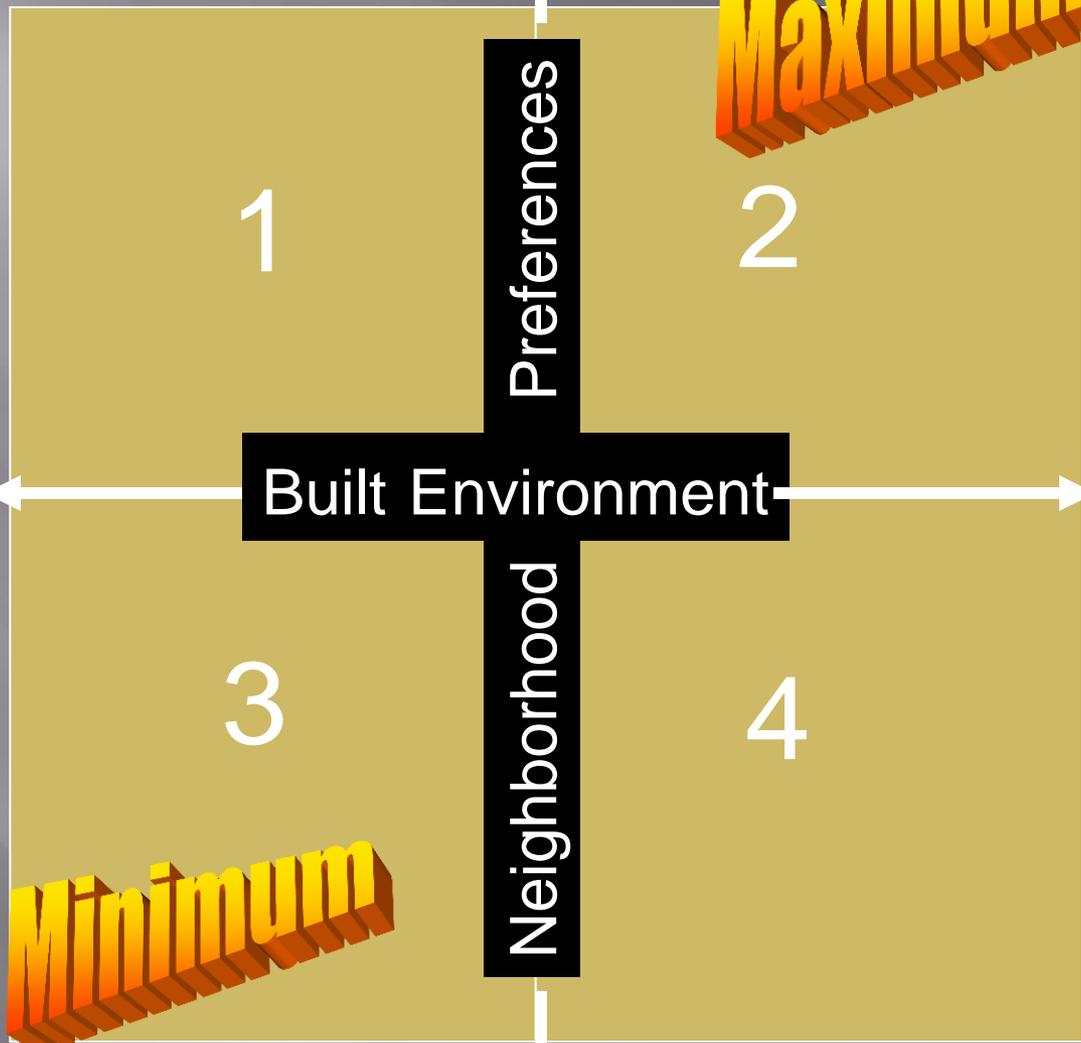
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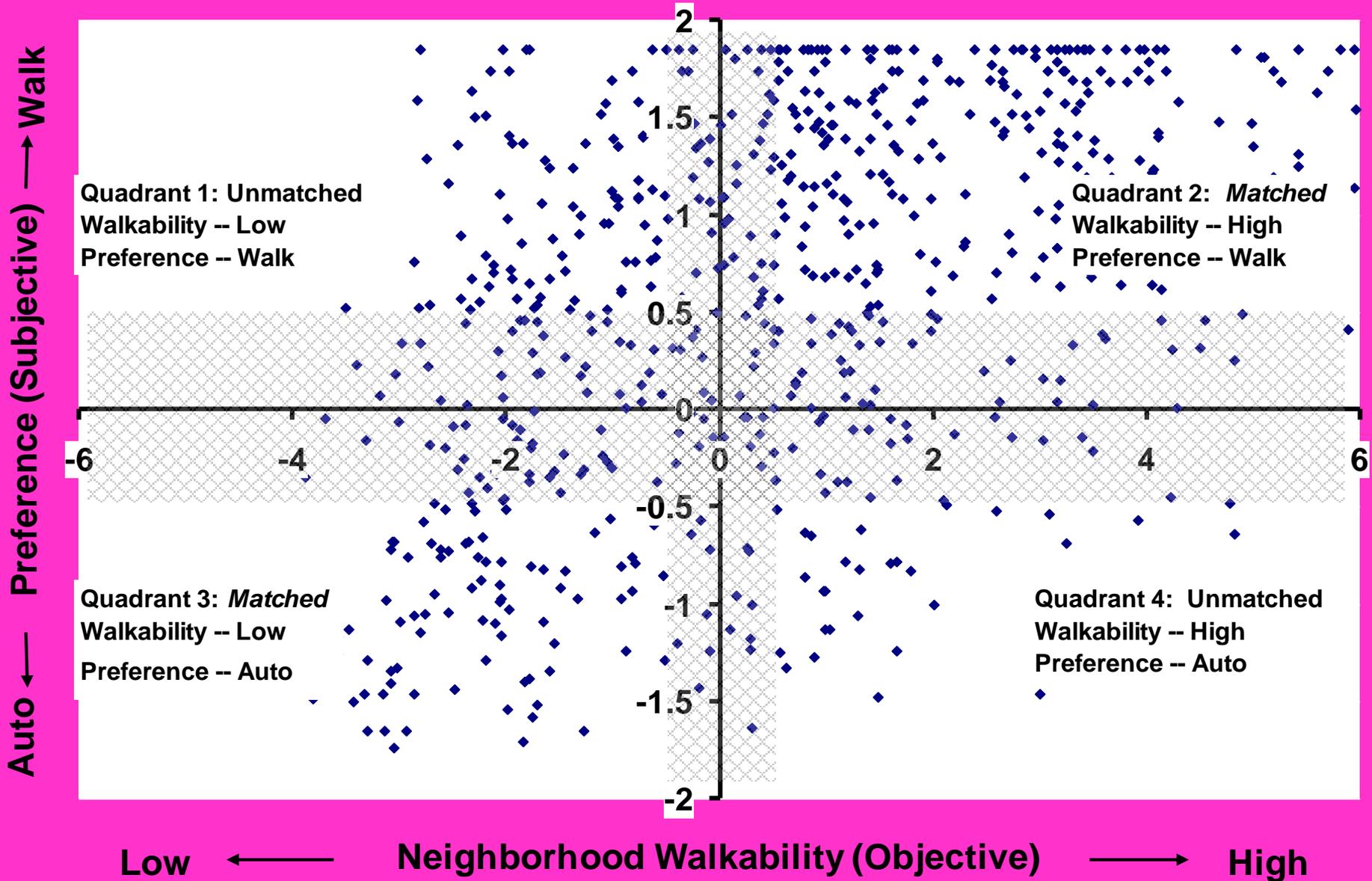
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Neighborhood

Minimum

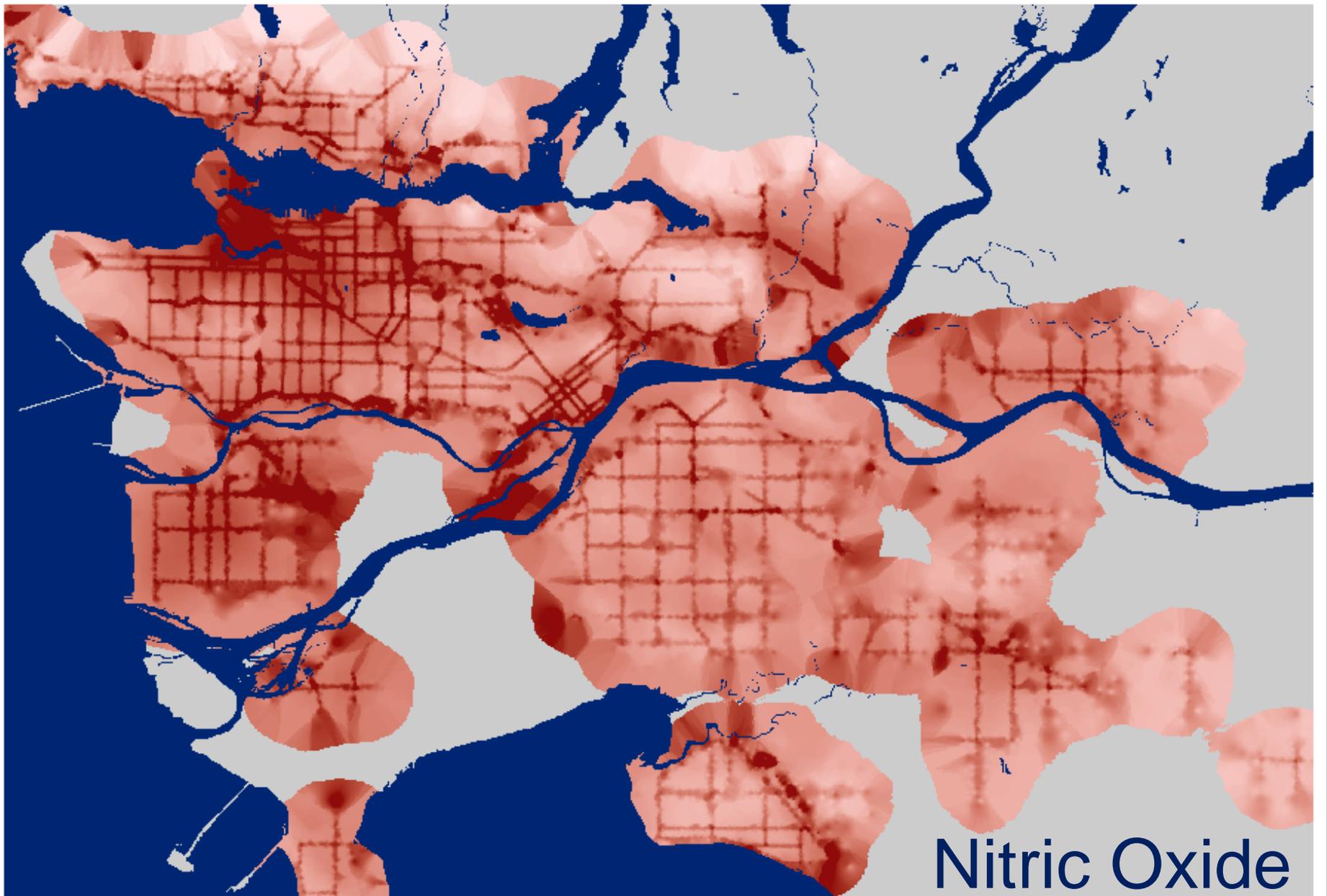
Prefers Auto - Based
Community Design





PREFERENCE VS NEIGHBORHOOD DESIGN

Walkability & Preference Groups		Percent Taking a Walk Trip (n)	Average Daily Vehicle Miles Traveled (n)
	Preference for Neighborhood Type	Walkability of Current Neighborhood	
I	High	Low	16.0% (188) 36.6 (188)
II	High	High	33.9% (446) 25.8 (446)
III	Low	Low	3.3% (246) 43.0 (246)
IV	Low	High	7.0% (43) 25.7 (43)



Marshall, Brauer, and Frank 2008

Recent Vancouver BC Study

- Assessment of Travel Patterns to School for 10 year olds
- Conducted in field micro Scale Assessment of Pedestrian Route (home-school) for completeness, and crossing safety
- When adjusting for demographics and macro urban form features (mix, density, and connectivity)
 - the Odds of walking was related pedestrian environment
 - BUT ONLY FOR KIDS WITHIN ½ A KM TO SCHOOL
- Forthcoming Paper by Niece and Frank

LOGISTIC REGRESSION ANALYSES PREDICTING THE ODDS OF WALKING AT LEAST ONCE OVER 2-DAYS

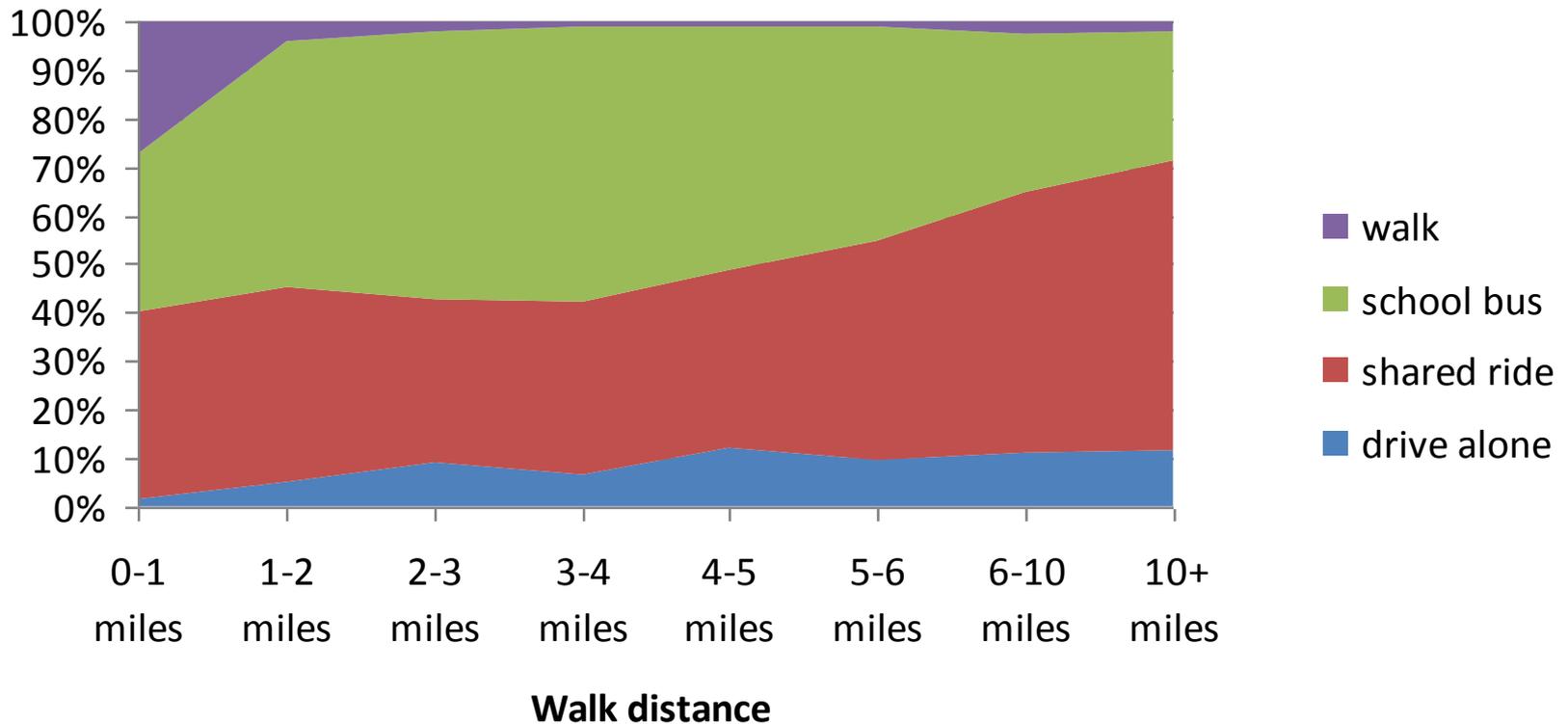
YOUTH Age Range	5-8 years OR (95% CI)	9-11 years OR (95% CI)	12-15 years OR (95% CI)	16-20 years OR (95% CI)
	N=847	N=632	N=867	N=815
Intersection highest tertile (vs lowest)	1.7 (1.0-2.9)	1.3 (0.8-2.3)	1.7 (1.1-2.8)*	2.0 (1.1-3.6)*
Density highest tertile (vs lowest)	1.8 (1.0-3.1)	2.3 (1.2-4.3)**	3.7 (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

Short Distances are crucial to encouraging walking to school.

Mode to school by walk distance





*CHANGE IS INEVITABLE. IN A
PROGRESSIVE COUNTRY CHANGE IS
CONSTANT.
BENJAMIN DISRAELI, 1867*

**“Nothing Great Was Ever Achieved Without
Enthusiasm”**

Ralph Waldo Emerson

