Age Variations in Correlates of Utilitarian Walking among Small Rural Town Residents

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Structure

1. Introduction

- **Physical activity (PA)** can improve **older adults' health and independence.**

- **Walking** is the most **preferred form of PA**, and has the potential to **promote healthy outcomes** as adults age.

- **Only 39.3%** of Americans aged 65 and older **met Healthy People 2010** recommended levels of physical activity (CDC, 2007)

1. Introduction

- Increase in **community-dwelling older adults**.

- **One in four** older adults in the US reside in **small rural towns**; previous studies of walking among older adults have focused on urban communities.

- Many communities, especially **rural communities, in the US lacking supportive features** for walking, such as access to destinations and pedestrian facilities.

[1] http://www.piedmontpark.org/images/walking_path_stroller.jpg
[2] http://ribike.org/wp-content/uploads/South-County-small.png

Pilot Study. Top Environmental Barriers to walking among rural TX town adults (n=161, Lee et al., 2013)

1. bad weather (74.3%)

2. not enough lighting at night (53.8%)

3. no shade from trees or buildings (47.4%)

4. unattended dogs (45.0%)

5. no continuous sidewalks (44.4%)

6. poor walking surfaces (43.9%)

7. no interesting places to walk nearby (40.9%)

8. no benches or places to rest (40.4%)

Photograph by Stephanie Schwindel
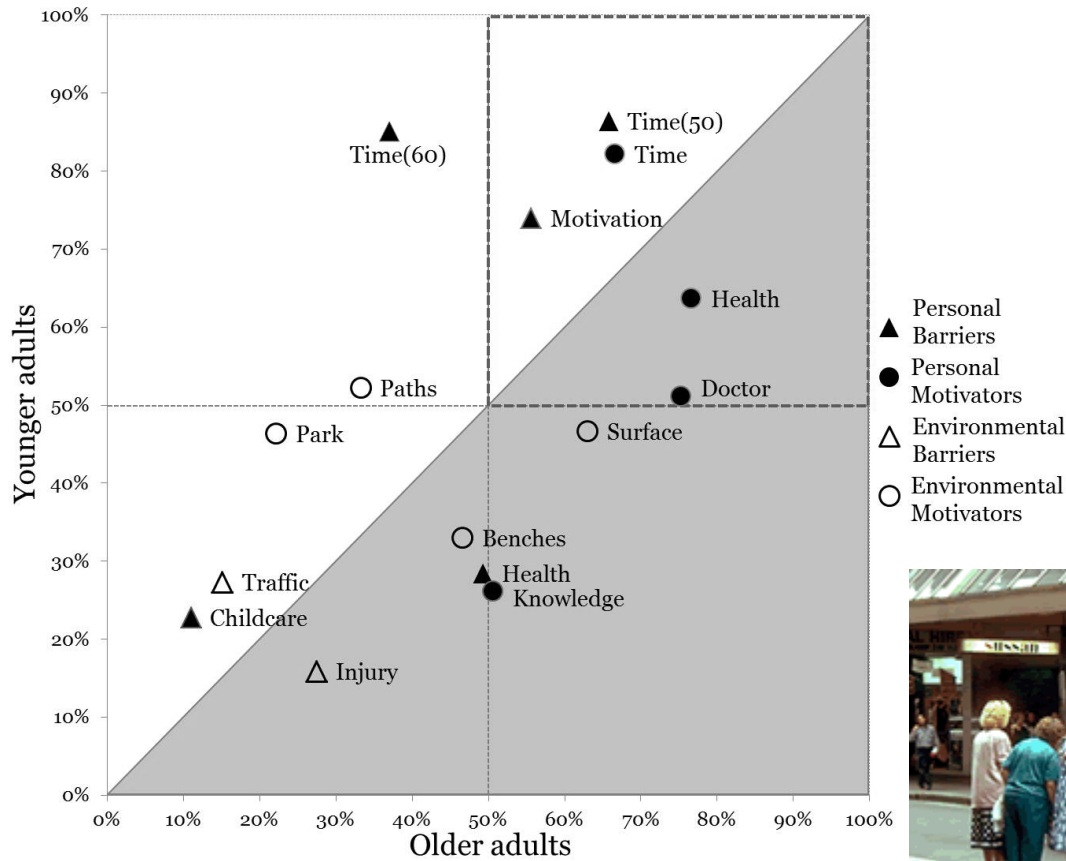
Photograph by Stephanie Schwindel

Pilot Study. Top Environmental Motivators to walking among rural TX town adults (n=161, Lee et al., 2013)

1. pleasant weather (74.5%)
2. good lighting (55.9%)
3. even/smooth walking surface (54.0%)
4. proximity to walking paths/trails (49.1%)
5. more continuous sidewalks (45.3%)
6. more shade (43.5%)
7. proximity to parks (42.2%)
8. cleanness of streets/neighborhoods (39.8%)
9. more benches or other places to rest (39.1%)
10. interesting architecture/landscape to look at (32.9%)

Pilot Study. Barriers and Motivators of walking:
significantly different by younger vs. older adults

Photograph by Susan Rodiek

Mean Streets 2002

Photo by Fred Kent of Project for
Public Spaces (www.pps.org)

2. Objectives

- **To examine what personal and environmental characteristics** are correlated with **utilitarian walking** in neighborhoods among **younger vs. older adults living in small towns** located in three regions of the United States: Washington State, Texas, and the Northeast.

3. Methods: Overview

- **Study Design:** Cross-sectional
- **Data Collection Method:** Telephone interviews (2011)
- **Study Population:**
  - Adults (18+ years)
  - Resided at the current address for 1+ year
  - Able to walk without special equipment for 5 minutes
- **Study Participants:** 2,140 adults
- **Two Age Groups:**
  - Younger Adults (18–64 years, n=1,398)
  - Older Adults (65+ years, n=742)
- **Response Rate:** ~18.8%

3. Methods: Setting

- **Study Settings:** 9 small rural towns in 3 US regions
  - The West: Washington State
  - The South: Texas State
  - Thee Northeast: New Hampshire and New York States

Selection Criteria:

- large enough to contain services for daily living (population between 10,000 and 40,000
- located in counties classified as micropolitan (Census 2000)
- geographically clustered residential areas to permit walking between homes and routine activities
- diversity in racial/ethnic composition and education levels
- larger low-income populations, and
- available geographic information systems (GIS) data.
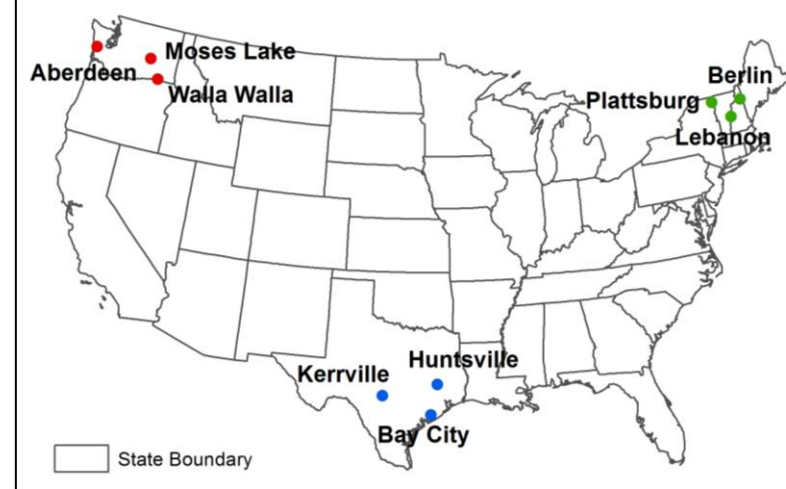
3. Methods: Study Towns

Survey Respondents by Town and by Age Group (Census 2010)

Region	City	Size (sq.mi)	Pop.	Density (p/sq mi)	Med. Income ($)	Younger Adults Freq.	%	Older Adults Freq.	%	Total Freq.	%
Northwest	Walla Walla, WA	10.82	31,731	2,933	41,236	173	77.6	50	22.4	223	100
	Moses Lake, WA	10.18	20,366	2,001	47,535	148	66.1	76	33.9	224	100
	Aberdeen, WA	10.62	16,896	1,591	39,530	166	68.0	78	32.0	244	100
Northeast	Plattsburgh, NY	5.04	19,989	3,966	35,528	145	66.2	74	33.8	219	100
	Berlin, NH	61.70	10,051	163	38,107	144	66.7	72	33.3	216	100
	Lebanon, NH	40.36	13,151	326	54,969	223	73.8	79	26.2	302	100
South	Kerrville, TX	16.70	22,347	1,338	41,064	99	40.7	144	59.3	243	100
	Huntsville, TX	30.90	38,548	1,248	29,465	138	58.2	99	41.8	237	100
	Bay City, TX	8.49	17,614	2,075	37,601	162	69.8	70	30.2	232	100
Total						**1,398**	**65.3**	**742**	**34.7**	**2,140**	**100**

3. Methods: Survey and Sampling

- **Survey Instrument Development:**

  - Based on existing surveys from peer-review research including IPAQ, WBC and NEWS

  - Refined after a pilot test on 32-randomly sampled participants from the same recruitment pool

- **Spatial Sampling Strategy:**

  - Based on the parcels located in the census blocks which contained top 80% of the population in each town.

  - Each parcel was weighted based on the number of residential units and, in order to oversample Latino residents, the percent Hispanic in each census block.

3. Methods: GIS

- **Protocol and GIS Measure Development:**

  - Detailed definitions and measurement protocols developed to ensure valid and consistent measures across all 9 towns

  - **Buffer** measurements (e.g. total number of banks, average residential unit density) taken from a 1 km street-network "sausage" buffer around each survey respondent's home

  - **Proximity** measures (e.g. distance to the closest park) taken as the shortest distance from home to each target destination along the road network up to 2 km
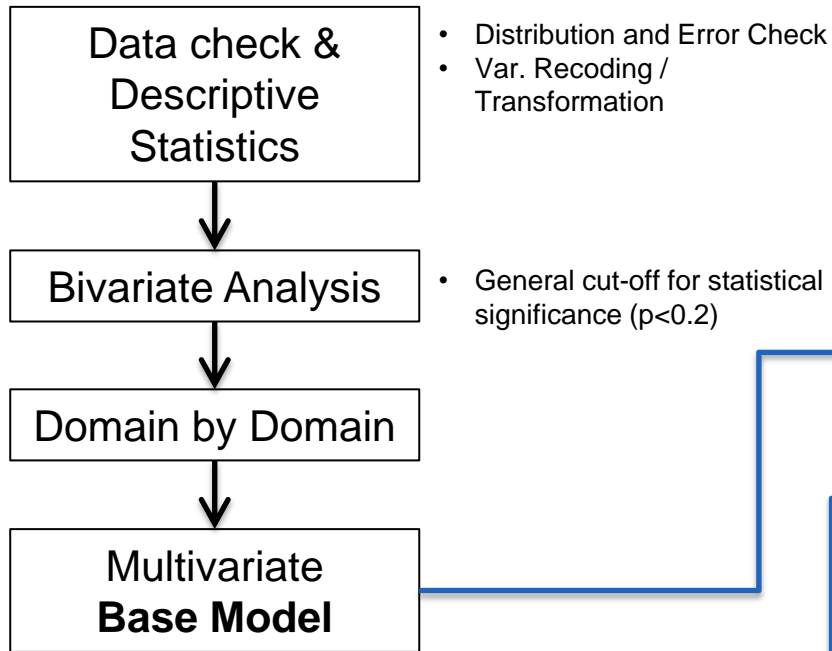
3. Methods: Variables & Analyses

- **Outcome Variable:** Neighborhood utilitarian walking
  - Walker (1+ min/week)
  - Non-walker (0 min/week)

- **Predictor Variables:**
  - Personal variables: 4 domains
  - Environmental variables: 2 domains

- **Analytical Methods:**
  - Mixed effect multivariate logistic regression model
  - Statistical significance based on $p < 0.10$
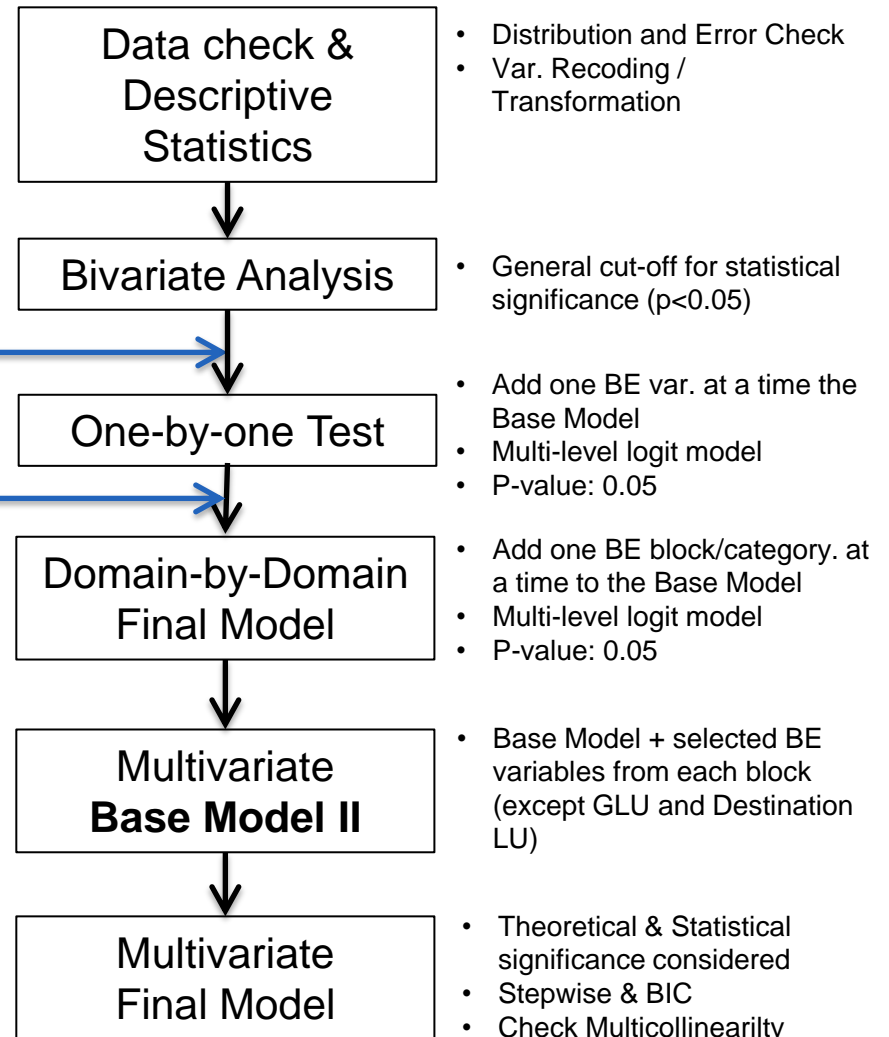
3. Methods: Analytical Process

Survey Variables

Data check & Descriptive Statistics
- Distribution and Error Check
- Var. Recoding / Transformation

↓

Bivariate Analysis
- General cut-off for statistical significance (p<0.2)

↓

Domain by Domain

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Multivariate Base Model

Selection from each BE block/category considering:
1. Data
2. Statistical
3. Theory/Literature

BE Variables

Data check & Descriptive Statistics
- Distribution and Error Check
- Var. Recoding / Transformation

↓

Bivariate Analysis
- General cut-off for statistical significance (p<0.05)

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One-by-one Test
- Add one BE var. at a time the Base Model
- Multi-level logit model
- P-value: 0.05

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Domain-by-Domain Final Model
- Add one BE block/category. at a time to the Base Model
- Multi-level logit model
- P-value: 0.05

↓

Multivariate Base Model II
- Base Model + selected BE variables from each block (except GLU and Destination LU)

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Multivariate Final Model
- Theoretical & Statistical significance considered
- Stepwise & BIC
- Check Multicollinearilty

4. Respondent Characteristics

- **Two Age Groups: Younger Adults (18–64yrs) / Older Adults (65+yrs)**

	Younger Adult	Older Adult	Total
Non-walker	287 (50.1% / 20.5%)	286 (49.9% / 38.5%)	573 (100% / 26.8%)
Walker	1,111 (70.9% / 79.5%)	456 (29.1% / 61.5%)	1,567 (100% / 73.2%)
Total	1,398 (65.3% / 100 %)	742 (34.7% / 100%)	2,140 (100% / 100%)

Freq (Row % / Column %)

4. Respondent Characteristics

Variable		Full Data		Younger Adults		Older Adults	
		Freq. or Mean	%* or S.D.	Freq. or Mean	%* or S.D.	Freq. or Mean	%* or S.D.
Gender	Male	823	38.46	531	37.98	292	39.35
	Female	1,317	61.54	867	62.02	450	60.65
Age (continuous)		57.60	15.50	48.85	11.09	74.10	6.67
BMI	14.8 – 25.0	753	37.30	463	35.48	290	40.62
	25.1 – 30.0	800	39.62	501	38.39	299	41.88
	30.1+	466	23.08	341	26.13	125	17.51
Household Income ($)	Less than 25,000	392	21.1	237	19.1	155	25.1
	25,001 – 50,000	483	26.0	261	21.1	221	35.8
	50,001 – 75,000	414	22.3	298	24.0	116	18.8
	75,001 – 100,000	289	15.6	211	17.0	78	12.6
	100,001 or more	280	15.1	233	18.8	47	7.6

4. Respondent Characteristics

Variable		Full Data		Younger Adults		Older Adults	
		Freq. or Mean	%* or S.D.	Freq. or Mean	%* or S.D.	Freq. or Mean	%* or S.D.
Education	Some high school or less	152	7.11	111	7.94	41	5.52
	High school graduate	452	21.13	278	19.90	174	23.45
	Some college/ associate degree	597	27.91	400	28.63	197	26.55
	College graduate	521	24.36	363	25.98	158	21.29
	Graduate school or more	417	19.5	245	17.54	172	23.18
Difficulty in walking	Not at all	1,958	91.50	1,321	94.49	637	85.85
	Have a problem	182	8.50	77	5.51	105	14.15
Recreation walking (hr/week)		3.091	1.851	3.182	1.812	2.920	1.912
Weekly hours of screen time		16.83	13.57	15.60	12.90	19.21	14.50
Lack of time as a barrier to walking	Yes	951	44.59	782	56.10	169	22.87
	No	1,182	55.41	612	43.90	570	77.13

4. Findings from Multivariate Analysis

Personal variables (Survey)

Domain	Variable	Older OR	Older P	Younger OR	Younger P
Demographics	Gender (female vs. male-ref.)	0.513	0.003	0.527	0.000
	Age (years)			0.974	0.001
Health status and SES	Education (7 ordinal categories)	1.332	0.004		
	Income (9 ordinal categories)	0.850	0.026	0.920	0.057
	Difficulty in walking (yes, no/a little-ref)	0.273	0.000		
Behavior	Recreational walking (7 ordinal categories based on hrs/week)	1.342	0.000	1.467	0.000
	Screen time (hrs/week)	0.978	0.004		
Walking barrier	Lack of time (yes, no-ref.)	2.254	0.002		
Residential self-selection	Residential self-selection: considered ease of walking to retail and services and transit when selecting current residence (yes, no-ref.)	1.735	0.033		

Blue: positive effect / Red: negative effect

4. Findings from Multivariate Analysis

Environment Variables – Neighborhood Perception (Survey)

Domain	Variable	Older		Younger	
		OR	P	OR	P
Neighborhood Perception (Survey)	Unattended dogs are problems in my neighborhood (yes, no-ref.)	3.071	0.002		
	My neighborhood is well lit at night (yes, no-ref.)	1.648	0.029		
	There are crosswalks and pedestrian signals (yes, no-ref.)	1.806	0.012	1.713	0.002
	There are sidewalks or shoulders (yes, no-ref.)	1.486	0.098		
	The speed of traffic on most nearby streets is usually slow (yes, no-ref.)			1.537	0.016

Blue: positive effect / Red: negative effect

4. Findings from Multivariate Analysis

## Environment Variables – Objective Built Environment (GIS)

Domain	Variable	Older OR	Older P	Younger OR	Younger P
Generalized Land use	Resource production/extraction area within buffer				
	>0 – 3% (ref.: 0%)			0.590	0.010
	3+% (ref.: 0%)			0.355	0.000
	Cultural, Entertainment and recreational area within buffer				
	>0-1.5% (ref.: 0%)			1.538	0.058
	1.6-4.0% (ref.: 0%)			2.058	0.004
	4.1+ % (ref.: 0%)			1.589	0.083
Transportation	Presence of intercity transit stops within buffer			3.498	0.011
Destination	Shortest distance to the closest religious institution (>1,000 vs. ≤1,000-ref.)	0.521	0.009		
	Total number of schools within buffer			1.224	0.007
	Presence of all malls within or touching the buffer			0.601	0.022
Natural Environment	Mean slope within buffer (>8.33 vs. ≤ 8.33-ref.)	0.334	0.049		

Blue: positive effect / Red: negative effect

5. Discussion: Age variation

Older adults

–Neighborhood Perception: **Unattended dog (+); Well-equipped light (+); Crosswalk & pedestrian signals (+); Sidewalk or shoulder (+)**

–Destination: **Shortest distance to the religious institution (-)**

–Natural Environment: **Mean Slope (-)**
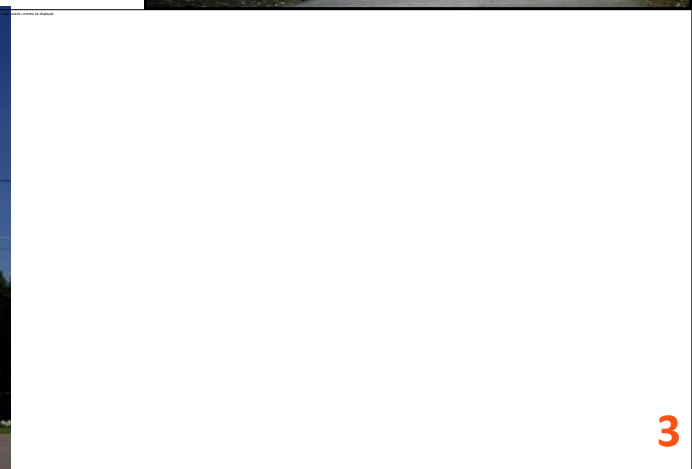
5. Discussion: Age variation

Younger adults

- Neighborhood Perception: **Crosswalk & pedestrian signals (+); Slow traffic speed (+)**

- Destination: **Total number of schools (+); Presence of mall (-)**

- GLU: **Resource production/extraction area (-); Cultural, Entertainment and recreational area (+)**

- Transportation: **intercity transit stops (+)**

5. Conclusion

■ Despite the differences, neighborhood environments appear important in promoting utilitarian walking among both older and younger adults in small rural towns.

■ Objectively measured environmental characteristics are more closely linked with younger adults' utilitarian walking, while more personal and perceived environmental factors were found important among older adults.

■ Especially for older adults, several feasible environmental interventions including lighting, crosswalks, pedestrian signals, and sidewalks/shoulders appear promising.

Acknowledgments

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