Application of a Neighborhood Walkability Index for People with Mobility Disabilities

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Presenter Disclosures

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(1) The following personal financial relationships with commercial interests relevant to this presentation existed during the past 12 months:

No relationships to disclose

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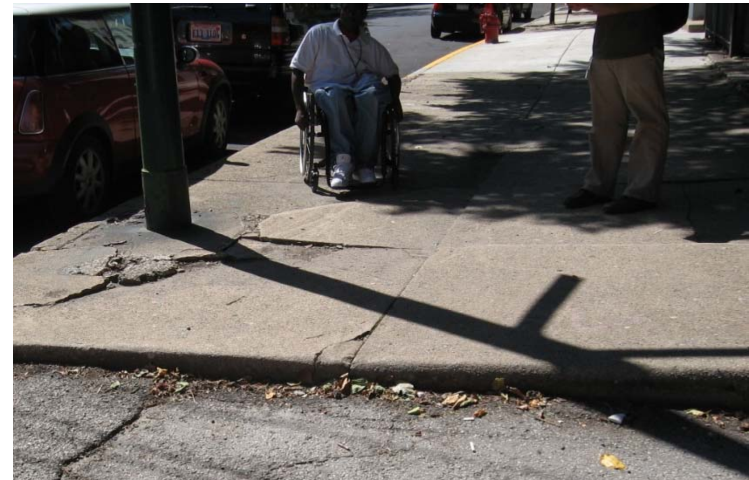
Overview

- Assess the applicability of a walkability index for people with mobility disabilities
- Demonstrate how analytical GIS methods can be used to objectively measure walkability
- Test the relationship between BMI and walkability score

Walkability



Why Walkability?

Background

- Measuring walkability has been used to study the relationship between health and the built environment

- Development of an Index can provide a standard for assessing walkability

Background

- Walkability indices have been created for ambulatory individuals
- No equivalent indices for people with mobility disabilities.

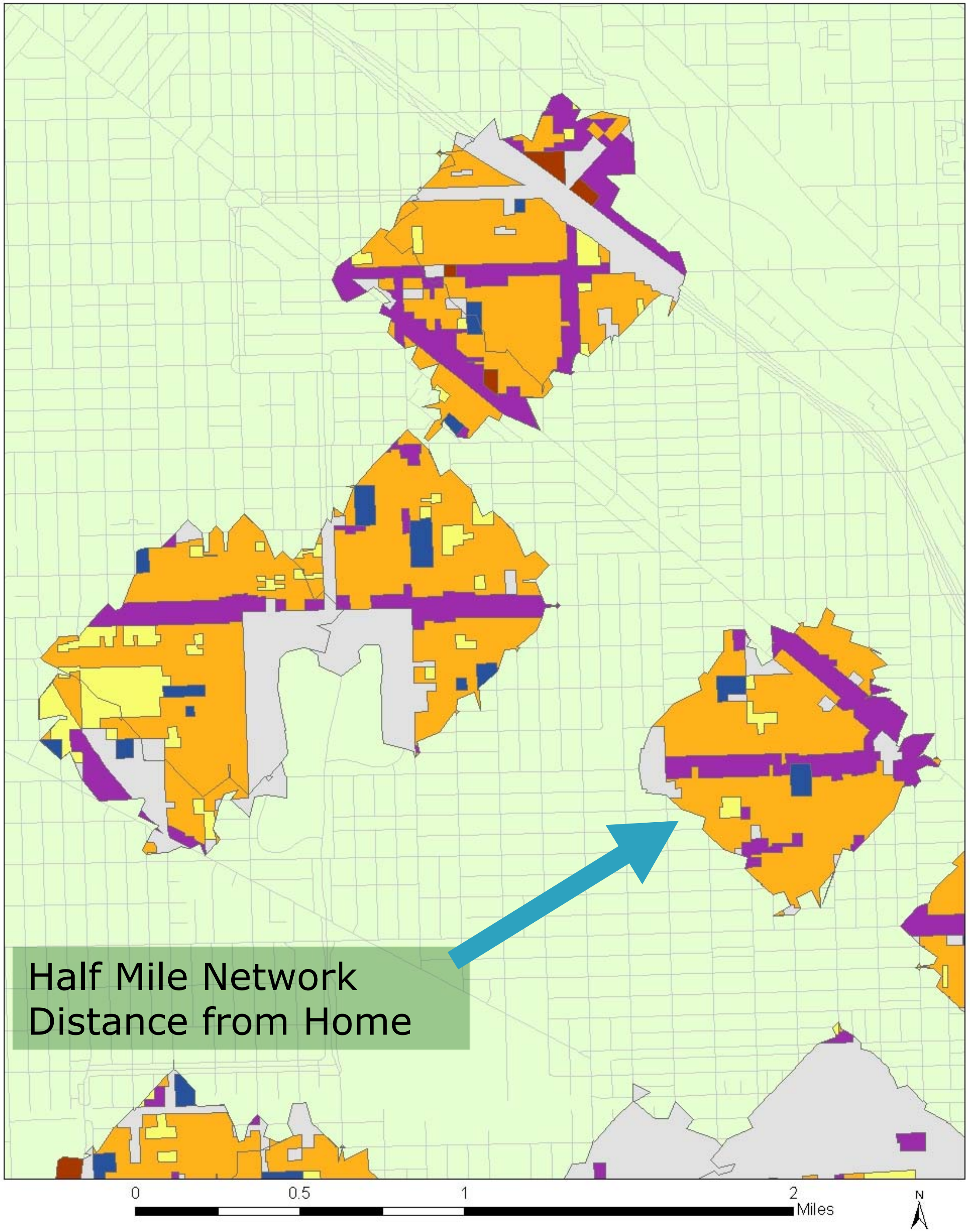
Methods

- Calculate walkability scores in GIS using Frank, et al.,(2006) methodology
  - GIS: Objective approach to neighborhood environmental measurement
- Computed walkability index by summing z-scores from
  - Street Connectivity
  - Land use mix
  - Net residential density
- Examined relationship of index scores to BMI
  - convenience sample of 196 people with mobility disabilities

GIS analysis

Land Use Mix

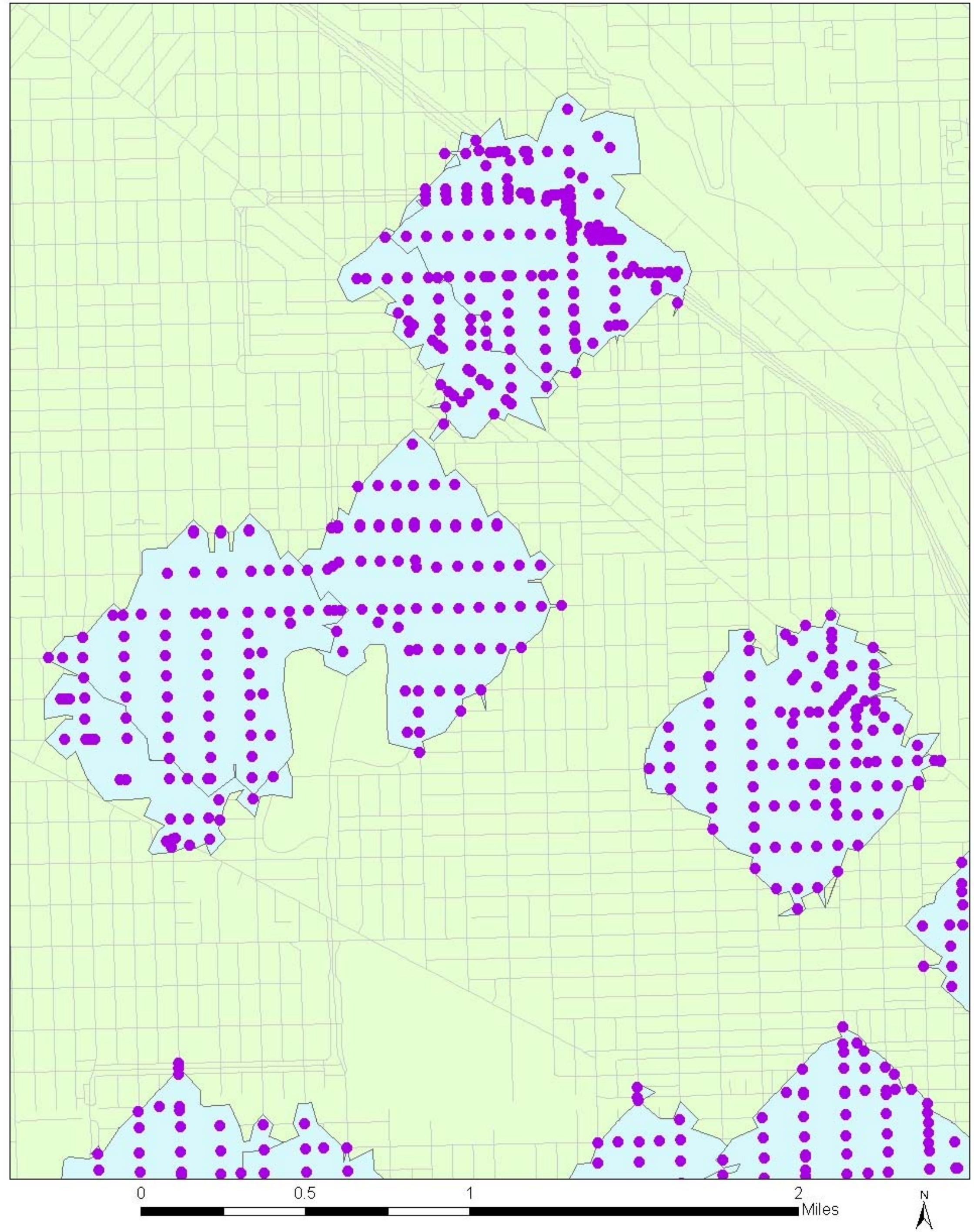
- Retail
- Single Family
- Multi-Family
- Office
- Entertainment
- Education



Source: Chicago Metropolitan Agency for Planning

GIS analysis

Street Connectivity

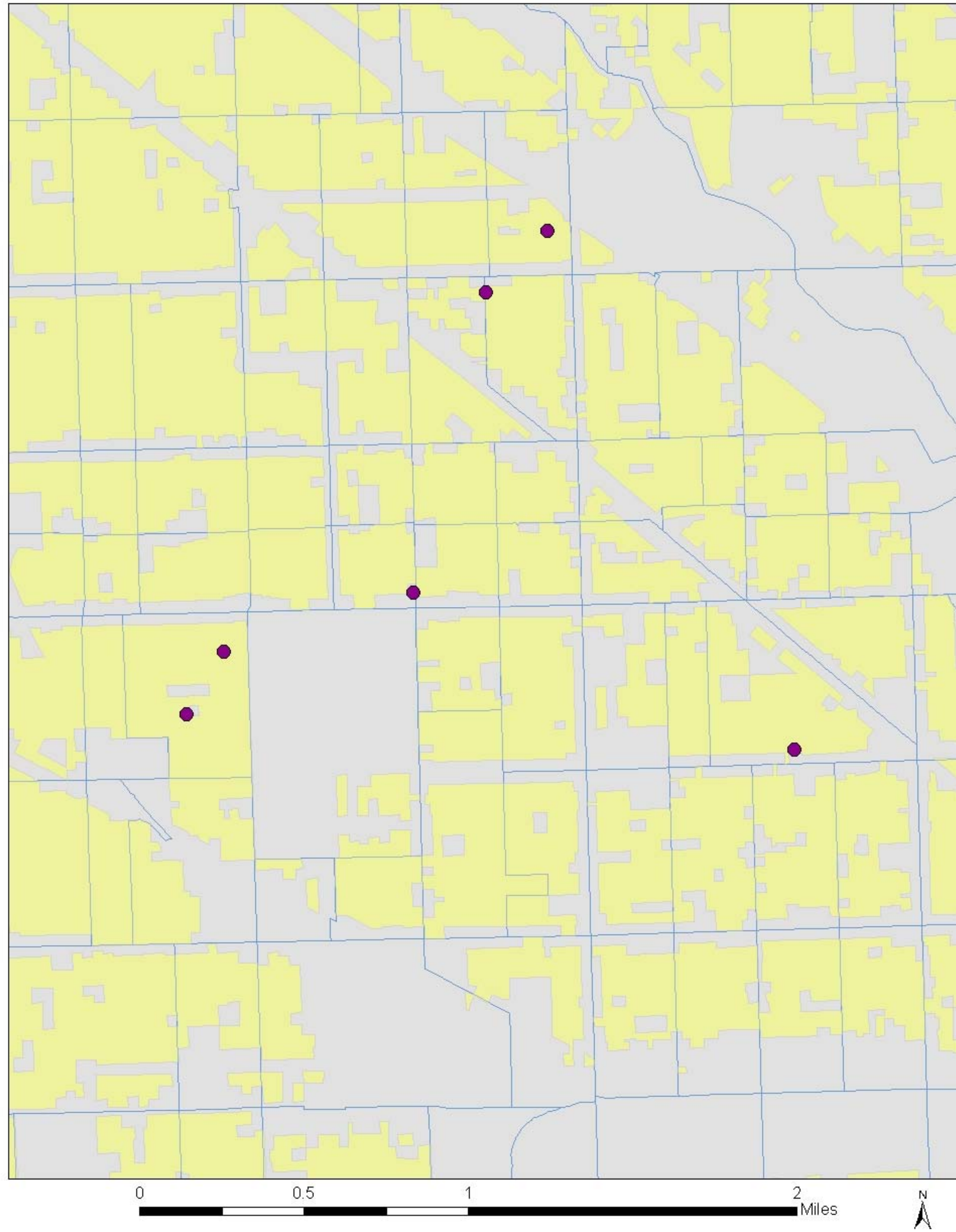


Source: City of Chicag
Street Centerlin

GIS analysis

Net Residential Density

- Subject
- Residential Land Use
- Chicago Streets



Source: Census 2000 Households/Census Tract

Demographics: Manual Wheelchair

	Total Sample (N=56)	
	Mean	**SD**
Age (yr)	48.05	16.04
Self-Report BMI (kg/m^2)	30.64	11.08
	n	**%**
Gender		
Male	19	33.9
Female	37	66.1
Race		
African American	34	60.7
White	13	23.2
Hispanic	6	10.7
Other	3	5.4
Employment Status		
Employed	5	8.9
Not employed	51	91.1

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Demographics: Other Assistive Device

	Total Sample (N=140)	
	Mean	**SD**
Age (yr)	58.01	11.15
Self-Report BMI (kg/m²)	36.86	13.77
	n	**%**
Gender		
Male	48	34.8
Female	90	65.2
Race		
African American	123	90.8
White	11	8.0
Hispanic	2	1.4
Other	2	1.4
Employment Status		
Employed	9	6.4
Not employed	131	93.6

		Street connectivity	Net residential density	Land use mix	Walk. Index
Manual wheel chair BMI	Pearson's correlation	-0.197	-0.267	-0.112	-0.244
	sig.	0.174	0.062	0.442	0.090
	n	49	49	49	49
Other Assistive Device BMI	Pearson's correlation	-0.020	-0.096	0.004	-0.048
	sig.	0.817	0.267	0.955	0.572
	n	135	135	135	135

* $p < .05$
** $p < .01$

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Regression Models

Manual Wheelchair	Model 1		Model 2	
	β	p	β	p
Demographics				
Age	.211	.182	.242	.133
Gender (Female vs. Male)	-.149	.322	-.152	.310
Employed (Yes vs. No)	-.009	.949	.003	.984
NH-White (vs. AA)	-.275	.067	-.193	.251
Hispanic (vs. AA)	.082	.583	.073	.626
Built Environment				
Walkability Index	-		-.166	.300
R^2	.206		.226	
R^2 Change	-		.020	

* $p < .05$, ** $p < .01$

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Regression Models

Other Assistive Device	Model 1		Model 2	
	β	p	β	p
Demographics				
Age	-.145	.102	-.150	.096
Gender (Female vs. Male)	-.117	.182	-.127	.169
Employed (Yes vs. No)	-.163	.070	-.168	.066
NH-White (vs. AA)	-.028	.758	-.030	.739
Hispanic (vs. AA)	-.054	.539	-.063	.493
Built Environment				
Walkability Index	-		.033	.726
R^2	.053		.054	
R^2 Change	-		.001	

* $p < .05$, ** $p < .01$

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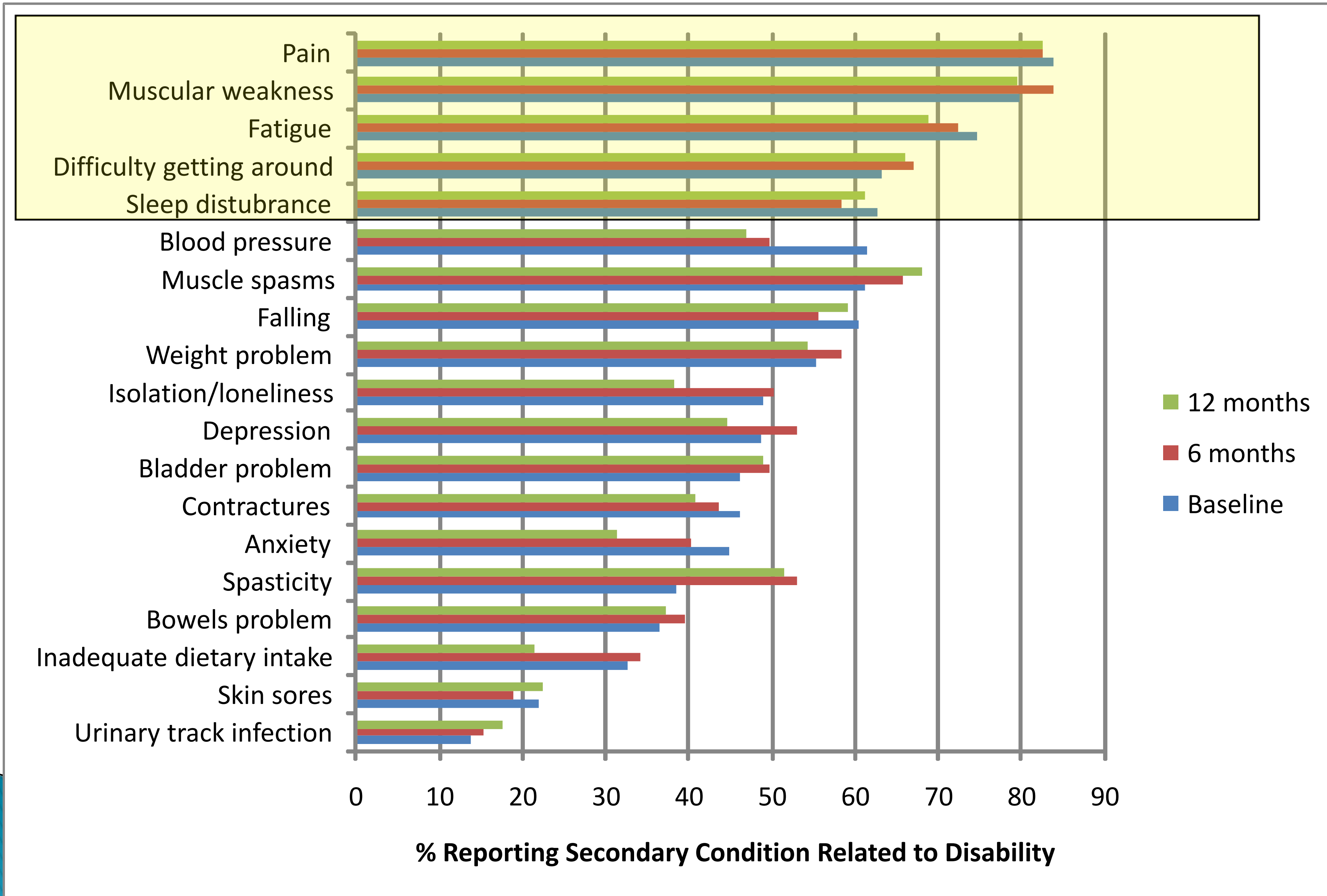
Previous Studies with Non-Disabled Populations

- Walkability was highly predictive of BMI

- Frank, L. et al.,(2006)
  - Greater walkability score predictor of lower BMI (b=-3.898, p<.0001)
- Smith, K. et al., (2008)
  - Greater walkability measure predictor of lower BMI
  - (b=-5.376, p<.0001)

Secondary Conditions



Conclusions/Limitations

- GIS Methodology
  - GIS provides an objective, efficient measure of walkability
- This walkability index was not effective in predicting the BMI in people with mobility disabilities
- Additional rollability factors are needed to make the walkability index more sensitive and be able to predict BMI for people with mobility disabilities
- Other factors are limiting people’s ability to leave home
  - May be related to Secondary Conditions
- Limitations
  - Small sample size
  - Very homogeneous group

Future Research

- Future research should develop a rollability index to further explore the causal relationship between the built environment and BMI for wheelchair users

- Wheelchair users may be impacted by other factors
  - sidewalk complaints,
  - local transportation
  - availability of disability resources,
  - stop light timing

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Future Research

- Examine additional outcomes for a rollability index
  - Ability to get around
  - Physical activity
  - Community participation

Thank you!!!!

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