

# Spatial Profiling

## A latent profile analysis of obesogenic activity spaces and adult BMI

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# Background

- Built environment may contribute to obesity by influencing costs of healthy choices
  - Local parks ↔ excess weight
  - Fresh foods ↔ lower weight
- Obesogenic factors in the built environment are often co-located

# Unresolved Methodological Issues

1. Appropriate operational definition of “neighborhood”
2. How to deal with clusters of co-located factors in the environment

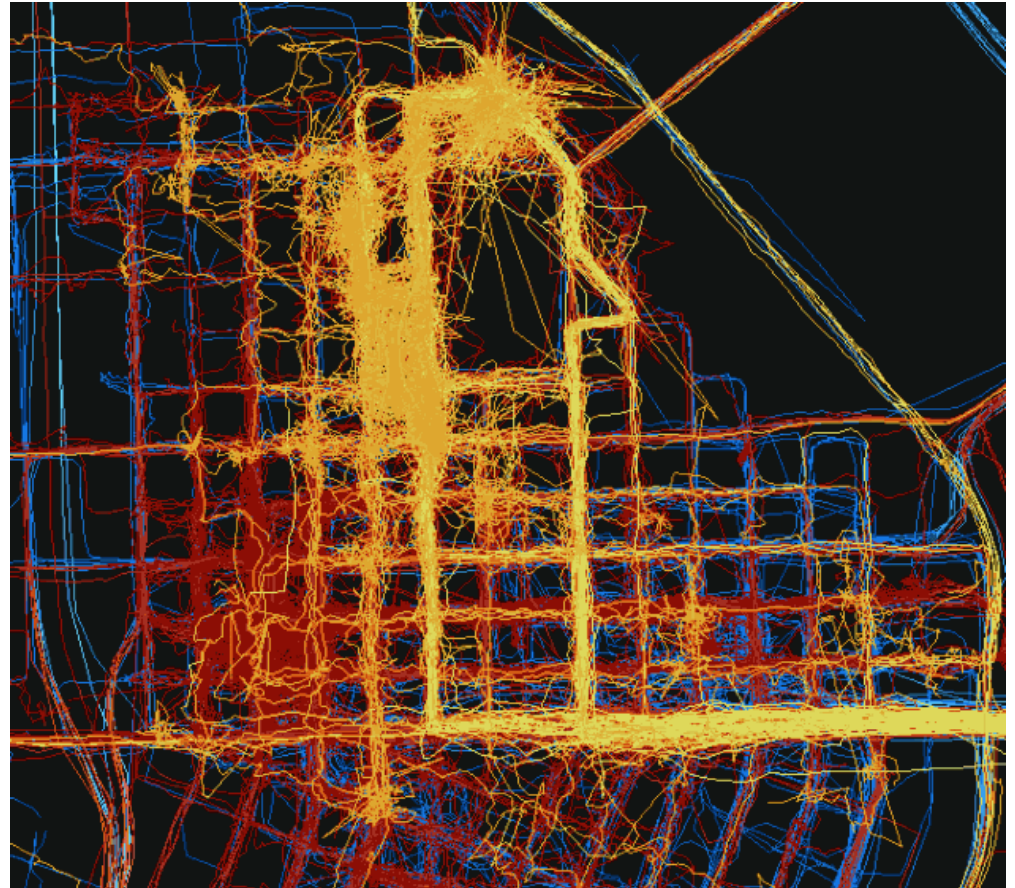
# Solution 1: Activity Spaces

- What is the appropriate operational definition of “neighborhood”?
    - Most people do not spend all their time at home
    - Is home address the best measure of a person’s geospatial exposure?
- We use “activity spaces”



# Activity Spaces

The unique set of places where a person routinely spends time.



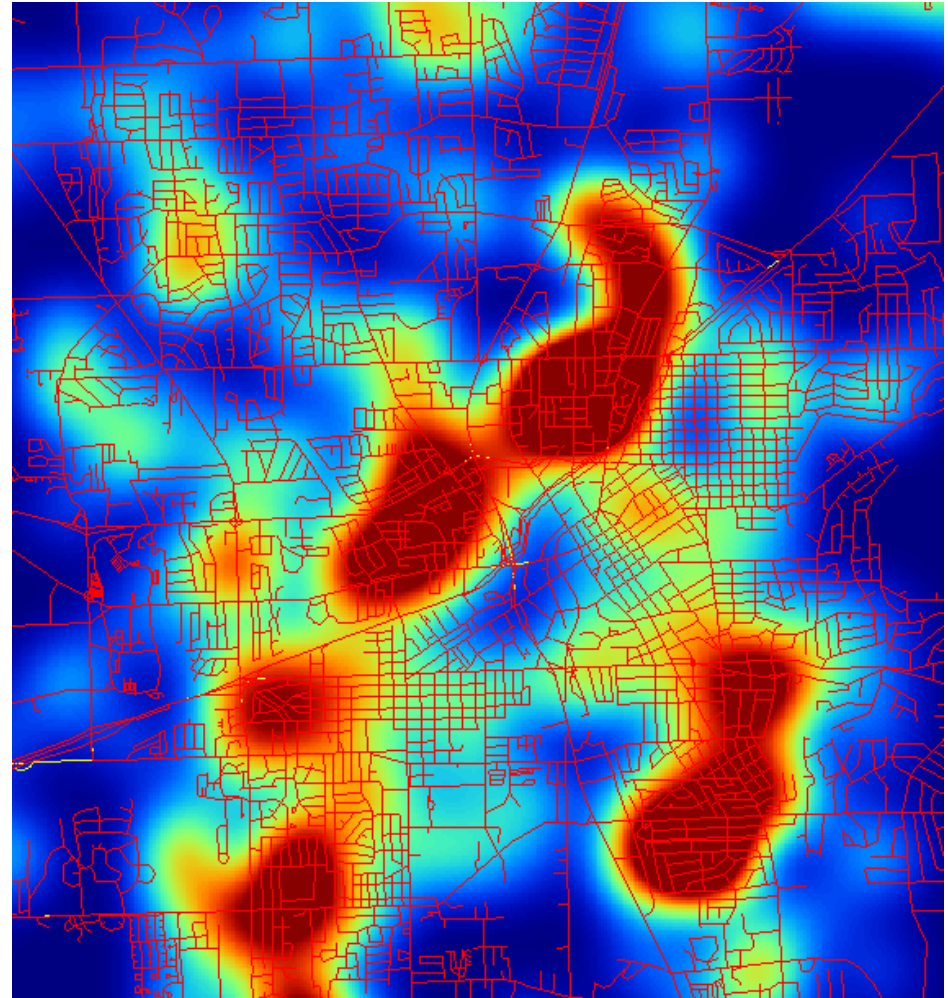
"Everywhere I've Been"  
© 2012 Aaron Parecki

# Solution 2: Latent Variable Modeling

- How can we deal with multiple co-located factors in the neighborhood simultaneously?
    - Reductive strategies ignore clustering, interactive effects
- We use latent profile modeling

# Latent Profile Analysis

Finds latent “types” of areas where obesogenic features are co-located in space.



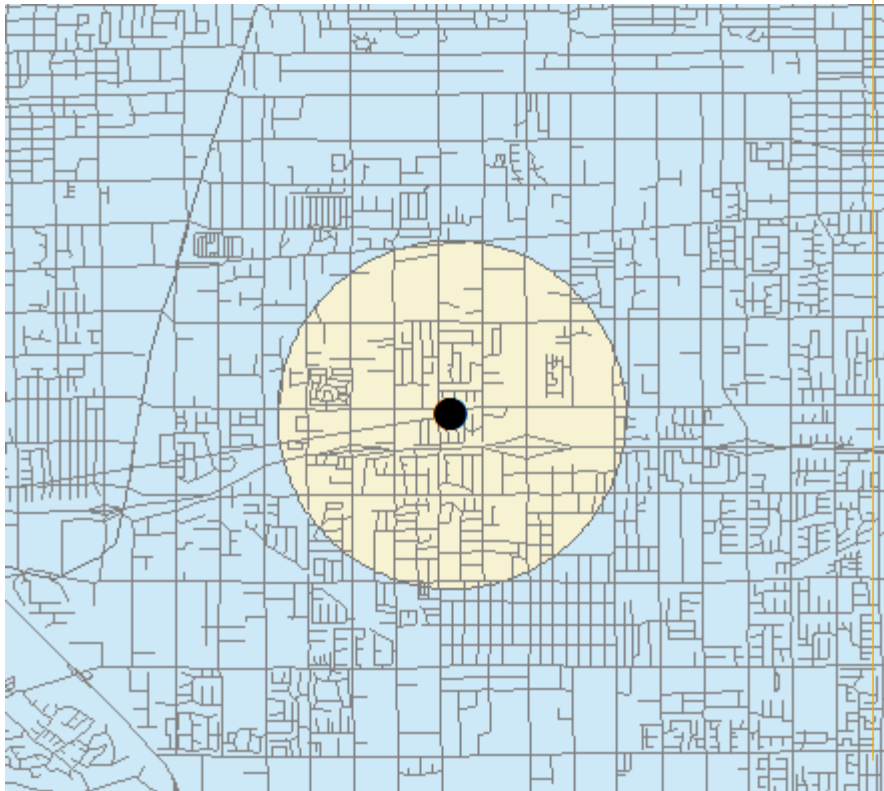
# Methods

- 460 adults from the Healthy PLACES study, their home addresses, and their children's school addresses
- 7 Obesogenic features of neighborhood entered into latent profile analysis
  1. Index of greenness
  2. Parks/square mile
  3. % of total land commercial
  4. % of land residential
  5. Ped/cyclist accidents
  6. Intersections/square mile
  7. Fast food restaurants/square mile

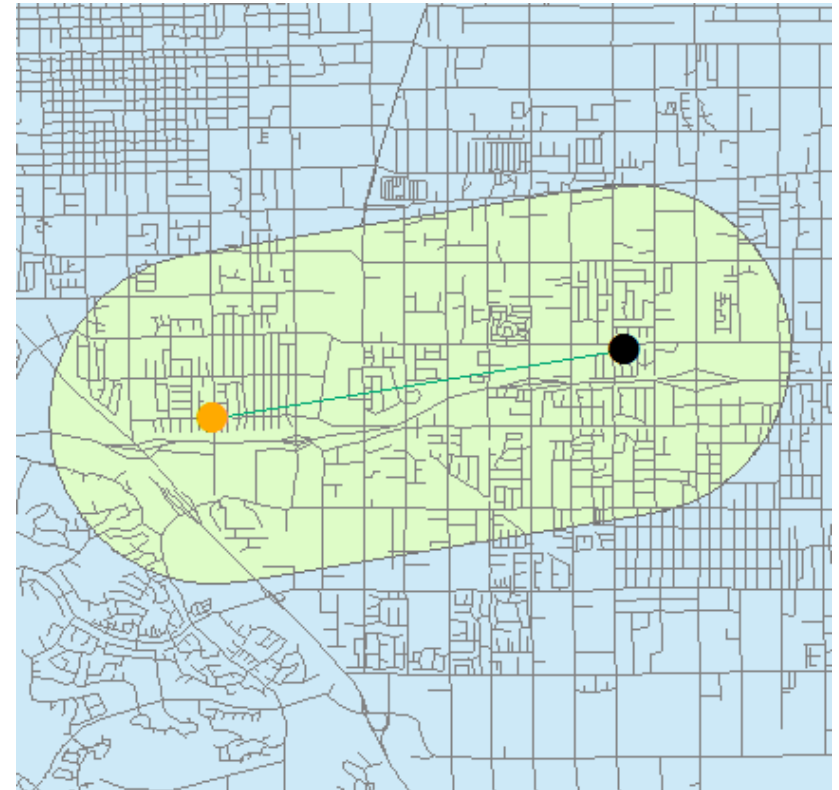


# 2 measures of neighborhood

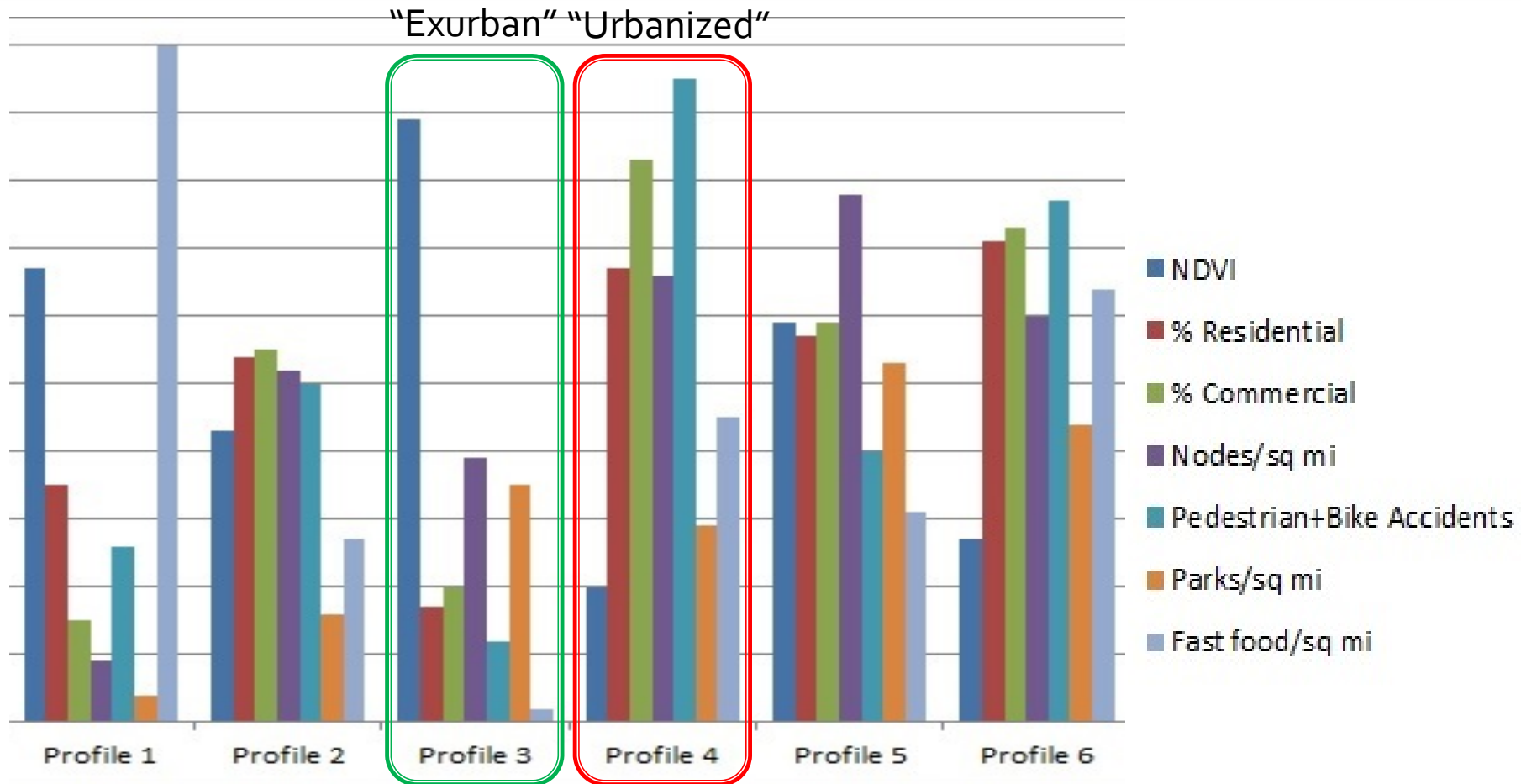
1-mile buffers around respondents' home address



1-mile buffers around the line connecting respondent homes and their children's school



# Results of LPA for Residential Areas



Mean BMI by Profile Membership

27.7

29.2

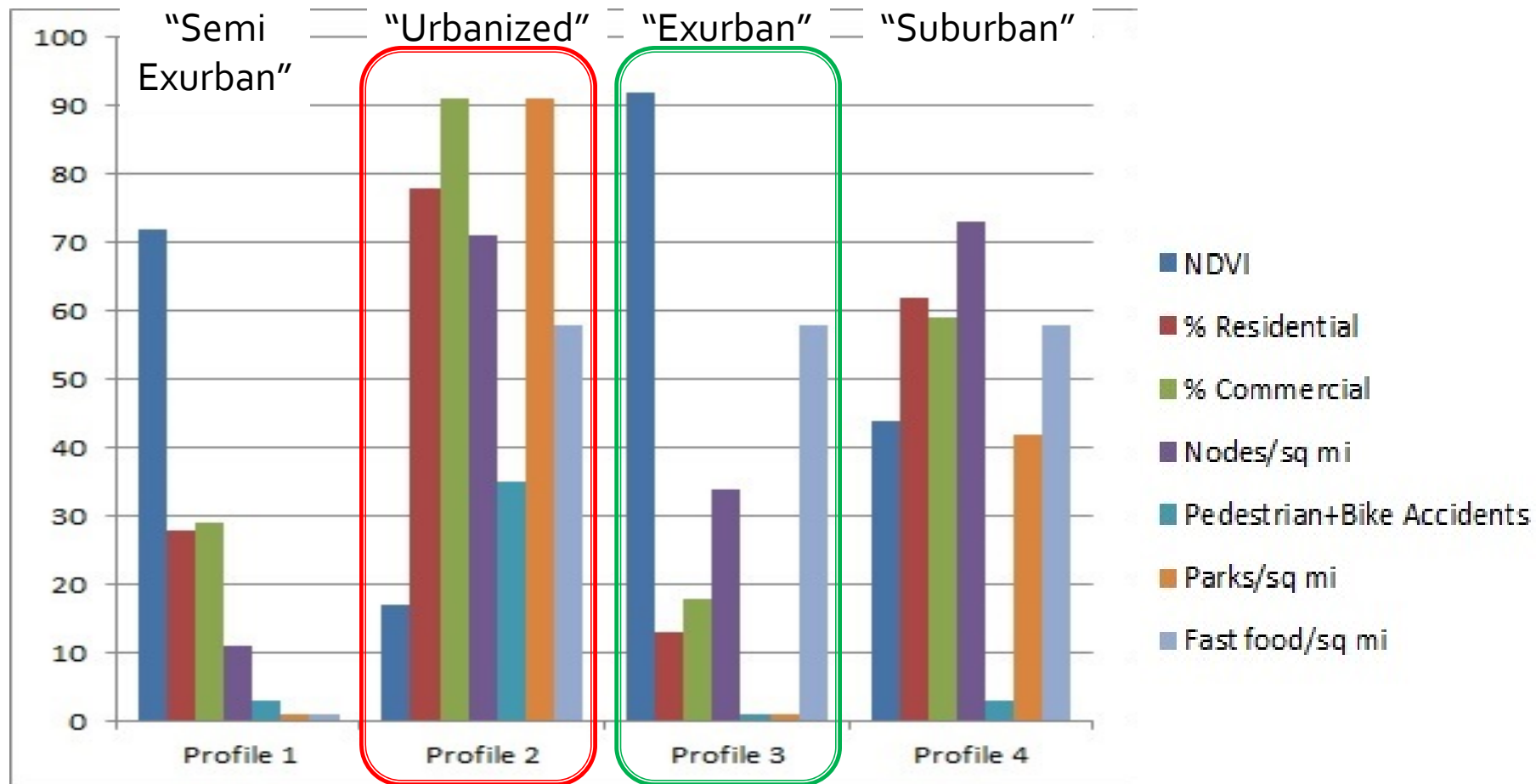
27.7

32.0

28.7

30.1

# Results of LPA for Activity Spaces



Mean BMI by Profile Membership

28.6

30.2

27.6

29.4

# Multivariate Results

	LPA for Residential Areas		LPA for Activity Spaces	
	Unadjusted	Adjusted <sup>a</sup>	Unadjusted	Adjusted <sup>a</sup>
P1	-4.29 *	-2.85		
P2	-2.55	-1.21		
P3	-4.33 *	-2.69		
P4	Ref	Ref		
P5	-3.28	-1.77		
P6	-1.89	-1.21		
P1			-1.63	-0.91
P2			Ref	Ref
P3			-2.66 **	-1.69
P4			-0.79	-0.04
R-2-a	0.02	0.03	0.02	0.03

<sup>a</sup> Adjusted models control for age, gender, and education.

# Discussion

- Activity spaces did not perform better than residential areas
- LPA did identify distinct contextual profiles (or “types” of neighborhoods)
- These were predictive of BMI in expected directions in unadjusted models
  - Compared to a conventional index approach, LPA profiles explained marginally more BMI variance
- Unobserved factors more strongly predict adult BMI than anything in our models

# Strengths & Limitations

## STRENGTHS

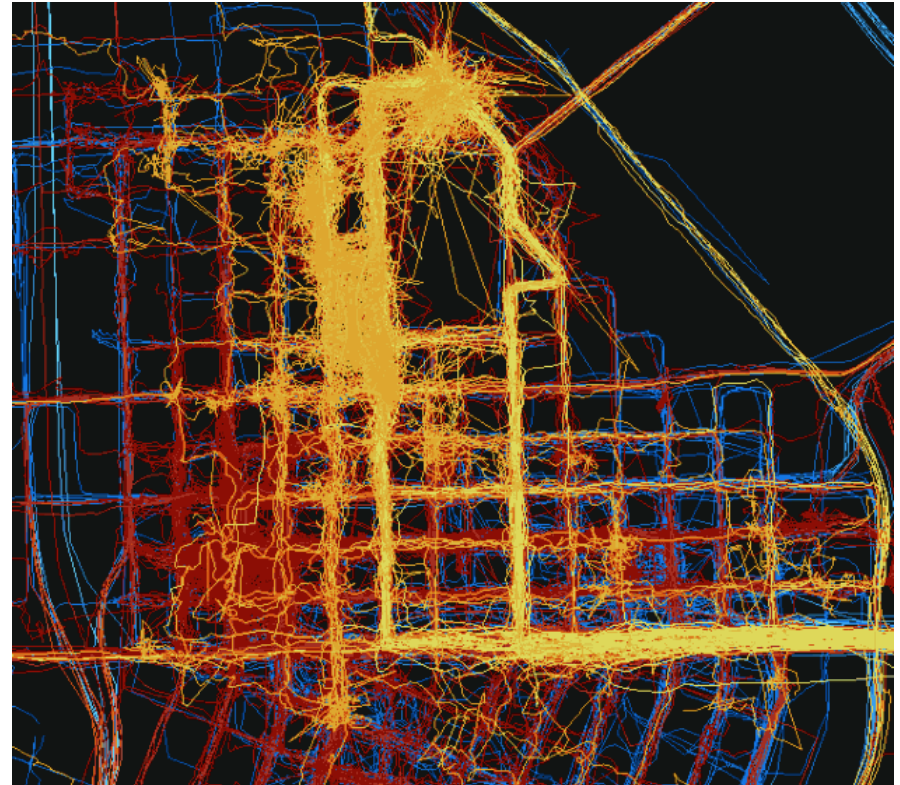
- We used a unique method of identifying co-located clusters of obesogenic features
- LPA models converged and identified high-risk areas for individual-level obesity

## LIMITATIONS

- Our activity space measure is a poor proxy for where people really go
- Limited sample size = limited ability to find significant results\*
- Overall, we explained little individual level variation in BMI

# Next Steps

- Audience for this work?
- GPS data to identify “true” activity spaces



**Thank you!**

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# Extra slides

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# Characteristics of places used in LPA

		Mean (median)	SD
N of households		460	
NDVI	A measure of live, green vegetation.	-0.11	0.11
% Residential Land Use	A measure of land use.	33%	14%
% Commercial Land Use	A measure of land use.	5%	4%
Pedestrian/Bike Accidents per square mile	Count of traffic accidents between 2000 and 2008 which involved a pedestrian or cyclist, per square mile within the buffer area. #	14	16
Fast Food outlets per square mile	Count of fast food outlets per square mile within the buffer area.	0.7	5
Parks per square mile	Count of parks per square mile within the buffer area.	0.5	3