

# Subjective vs. Objective

**The Divergence between Subjective Walkability  
and Walk Score during the Pandemic**

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# Background

This research on **Subjective Walkability vs. Walk Score** is based on a research project focusing on the recreational trips and change in travel behaviors after the outbreak of Covid-19.

This research project is conducted by a team of interdisciplinary researchers at the University of Oregon collaborated with the City of Eugene.



# Introduction

**Walk Score** is an index measuring how suitable a location is for functional or utilitarian (i.e., destination-driven) walking activities.

It is typically constructed by considering several **built environmental factors**:

- Distance to amenities
- Intersection density
- Block length
- Population density

## 801 Mount Vernon Place Northwest

Mount Vernon Square, Washington D.C., 20001

Commute to **Downtown Washington D.C.**

2 min 15 min 4 min 17 min [View Routes](#)

[Favorite](#) [Map](#) [Nearby Washington D.C. Apartments on Redfin](#)

[Looking for a home for sale in Washington D.C.? ↗](#)

**Walk Score**  
**97**  
**Walker's Paradise**  
Daily errands do not require a car.

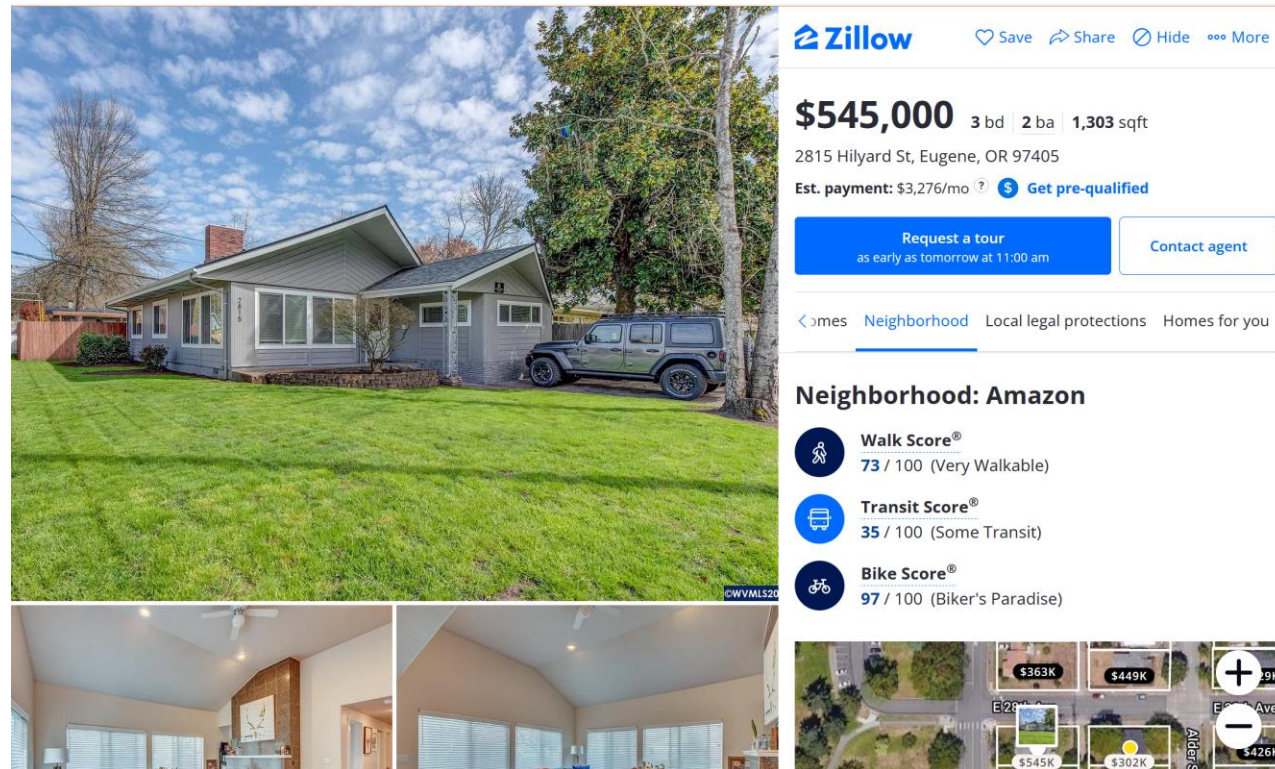
**Transit Score**  
**96**  
**Rider's Paradise**  
World-class public transportation.

**Bike Score**  
**99**  
**Biker's Paradise**  
Daily errands can be accomplished on a bike.

[About your score](#)  
[Add scores to your site](#)

# Introduction : Walk Score's Applications

- Treated as a main environmental factor underlying people's decision-making for walking.
- Used as a main indicator for a place's "walkability" and "livability".
- Adopted as a performance measure for supporting transportation planning and investment decisions.



**Zillow** Save Share Hide More

**\$545,000** 3 bd | 2 ba | 1,303 sqft

2815 Hilyard St, Eugene, OR 97405

Est. payment: \$3,276/mo [Get pre-qualified](#)

[Request a tour](#) as early as tomorrow at 11:00 am [Contact agent](#)

[Neighborhood](#) Local legal protections Homes for you

**Neighborhood: Amazon**

- Walk Score®**  
73 / 100 (Very Walkable)
- Transit Score®**  
35 / 100 (Some Transit)
- Bike Score®**  
97 / 100 (Biker's Paradise)

Map showing surrounding properties with prices: \$363K, \$449K, \$545K, \$302K, \$426K.

# Literature Review

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- Walk Score is associated with factors **hindering** walking:
  - Crime (Carr et al., 2010)
  - Cul-de-sac count (D. T. Duncan et al., 2011)
  - Average speed limit and highway density (D. T. Duncan et al., 2013)
- Walk Score is a surrogate indicator of the **density of a neighborhood**, which can only show the convenience of **utilitarian walking** (Hall & Ram, 2018).
- Walk Score has been **widely used** in the planning practice, because many interdisciplinary studies have examined **the benefits** of high walk score (Hirsch et al., 2014; Chiu et al., 2015; Braun et al., 2016; Méline et al., 2017).
- Only **a few studies** examine the differences between Walk Score and Subjective Walkability (Bereitschaft, 2018). A recent review study also suggests linking **walkability indicators to the Covid-19 pandemic** (Jardim, 2022), as people's active travel behavior changed significantly during the Covid (Hunter, 2021).

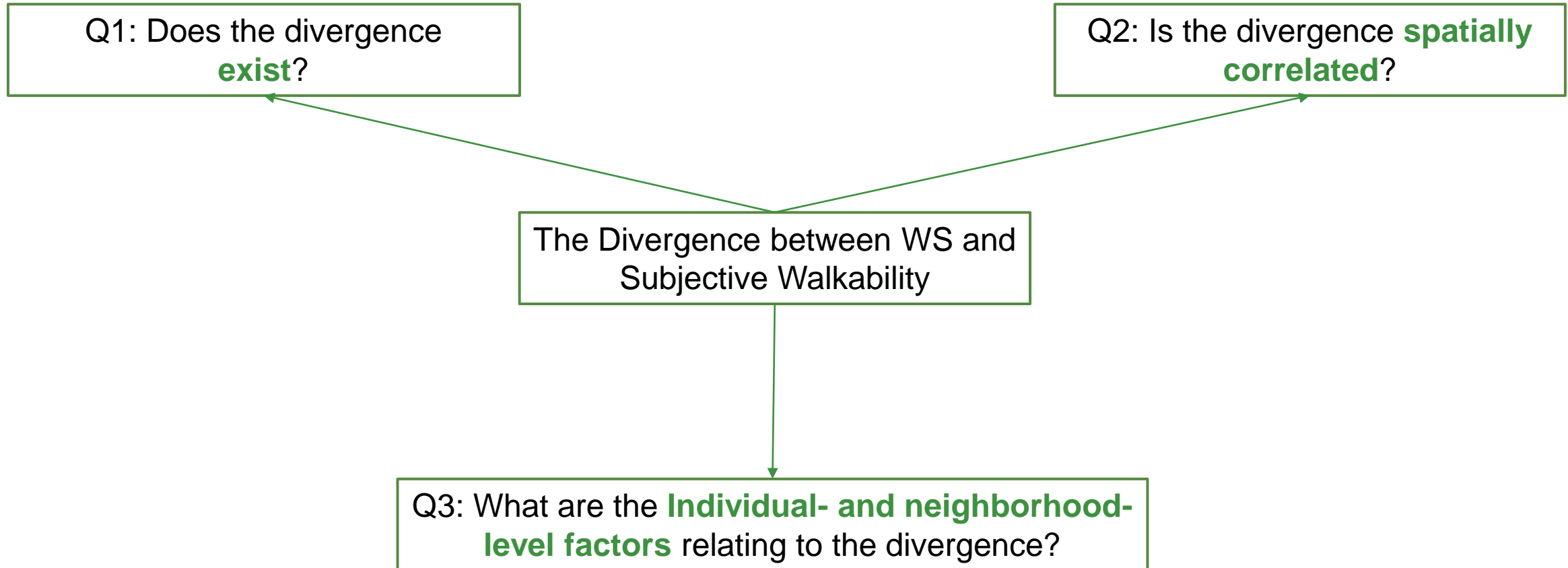
# The Problem

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- Walk Score is **narrowly defined** and may not adequately measure “walkability”, a concept whose formulation varies by professional and academic fields.
- Perceived or subjective walkability and its measures **may play a greater role** in affecting people’s walking behavior.
- The divergence between Walk Score and subjective walkability **reduces the utility of Walk Score.**
- We need to study **why** and **how** the divergence exists.

# Research Questions

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# Study Design

## ○ Study Area

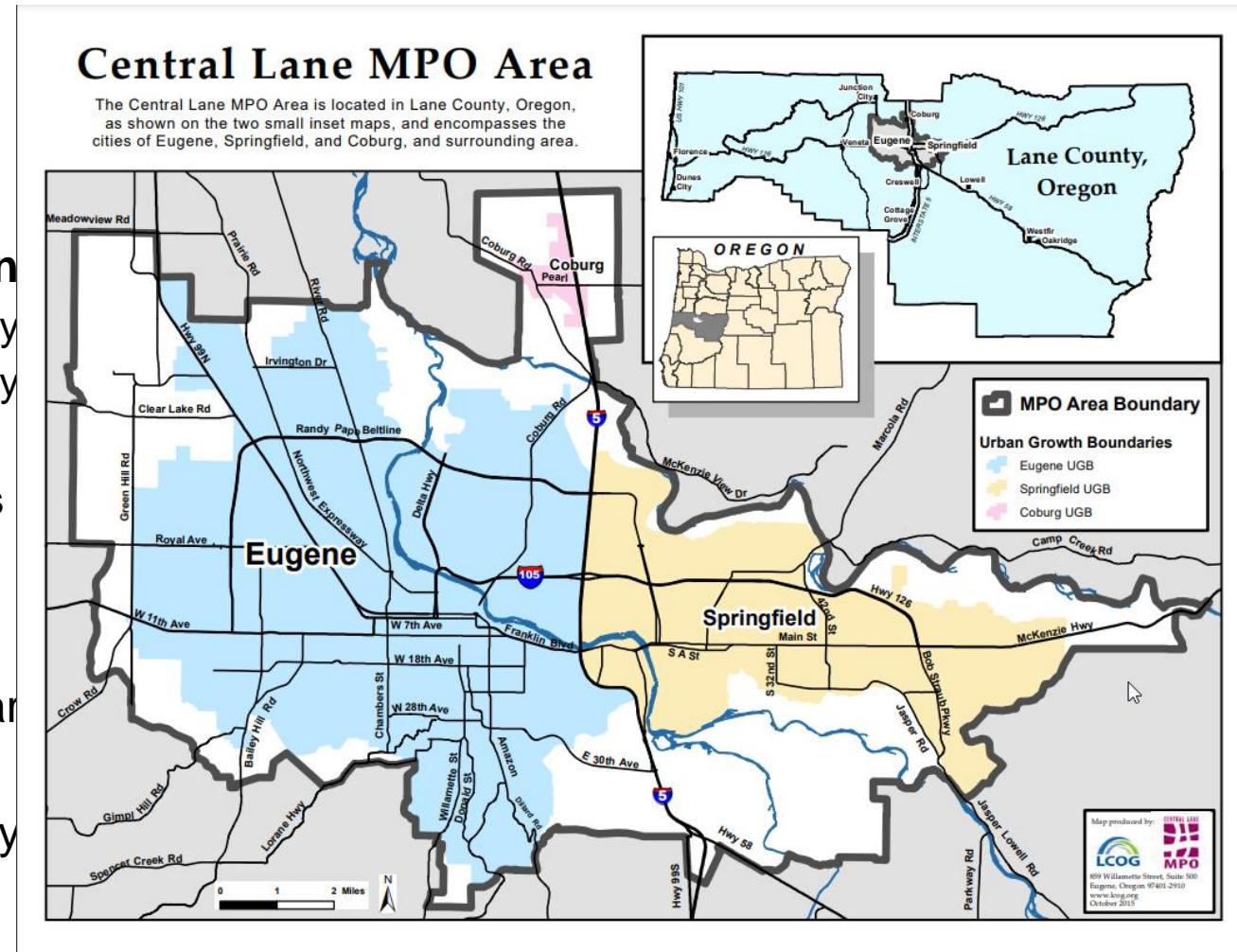
- Eugene-Springfield Metropolitan Area

## ○ Survey

- Subjective evaluation of walkability **during**
  - Questions regarding walking accessibility
  - Questions regarding walking accessibility
- Socio-demographic information
  - The nearest intersection to respondent's

## ○ Convenience Sampling:

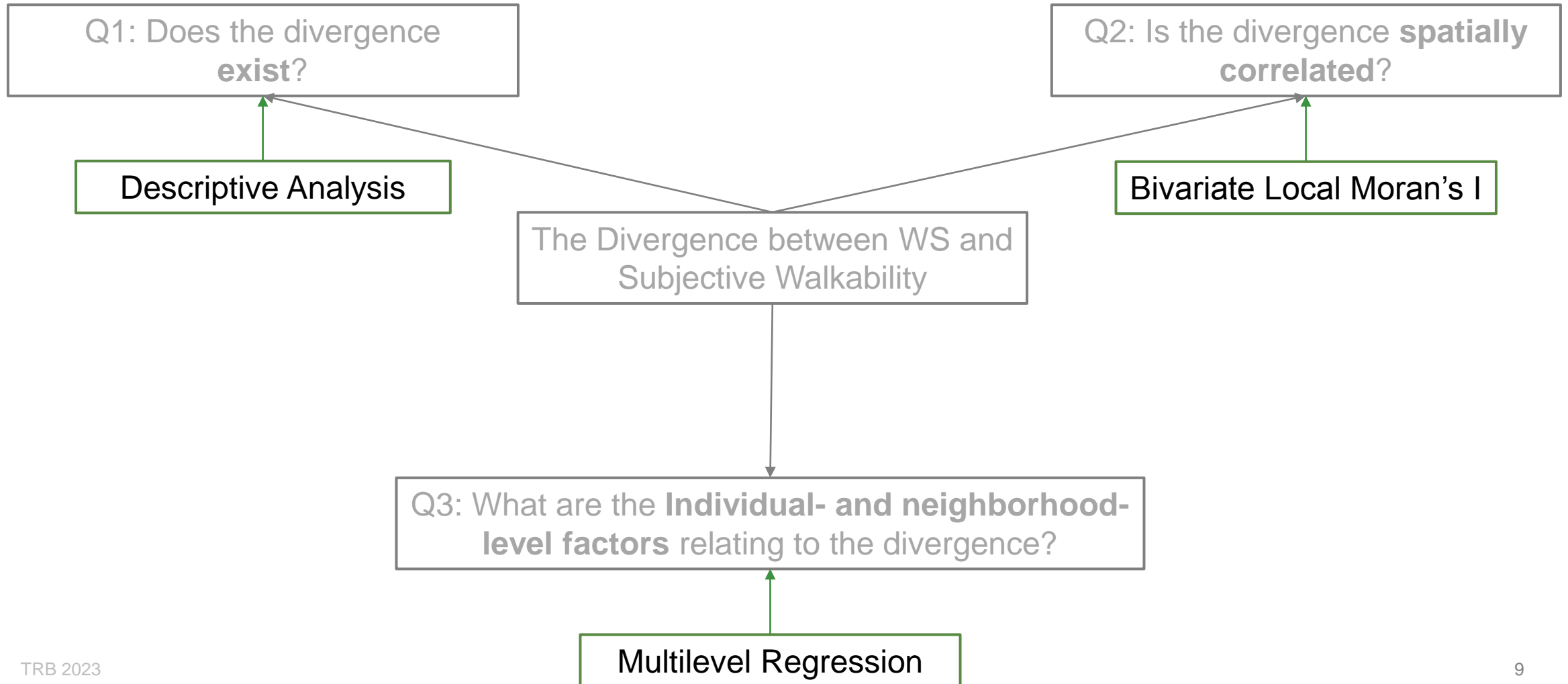
- by Listservs and Social Media
- Any resident of the Eugene/Springfield area since at least January 2020.
- The survey was open from June 3 to July





# Data Analysis

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# Variables

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- **Dependent Variable**

- Divergence score = |Walk Score – Subjective Walkability|

- **Independent Variables**

- **Individual-level variables**

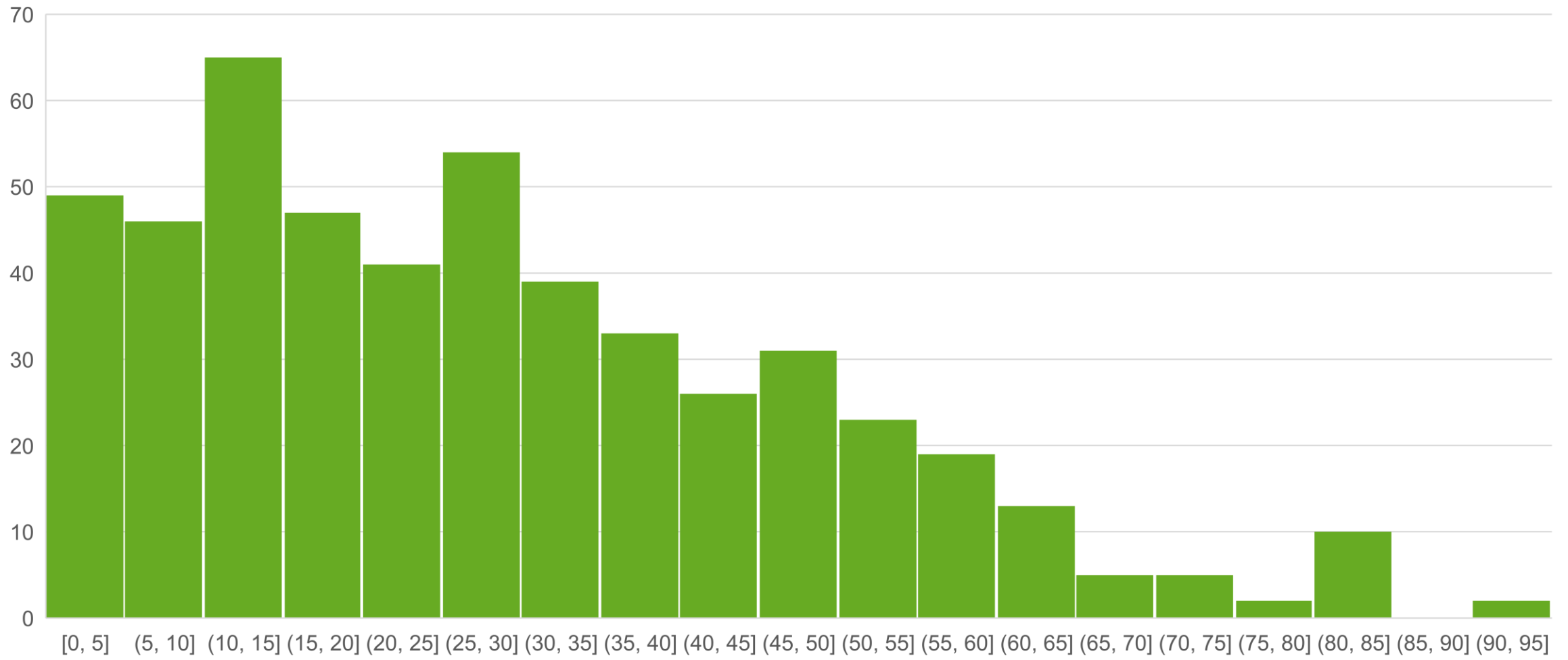
- Age, Gender, Race/Ethnicity, Income, Education, Time in Eugene, Pre-Covid Routine Active Trips, Belief in Environmental Policy

- **Neighborhood-level variables**

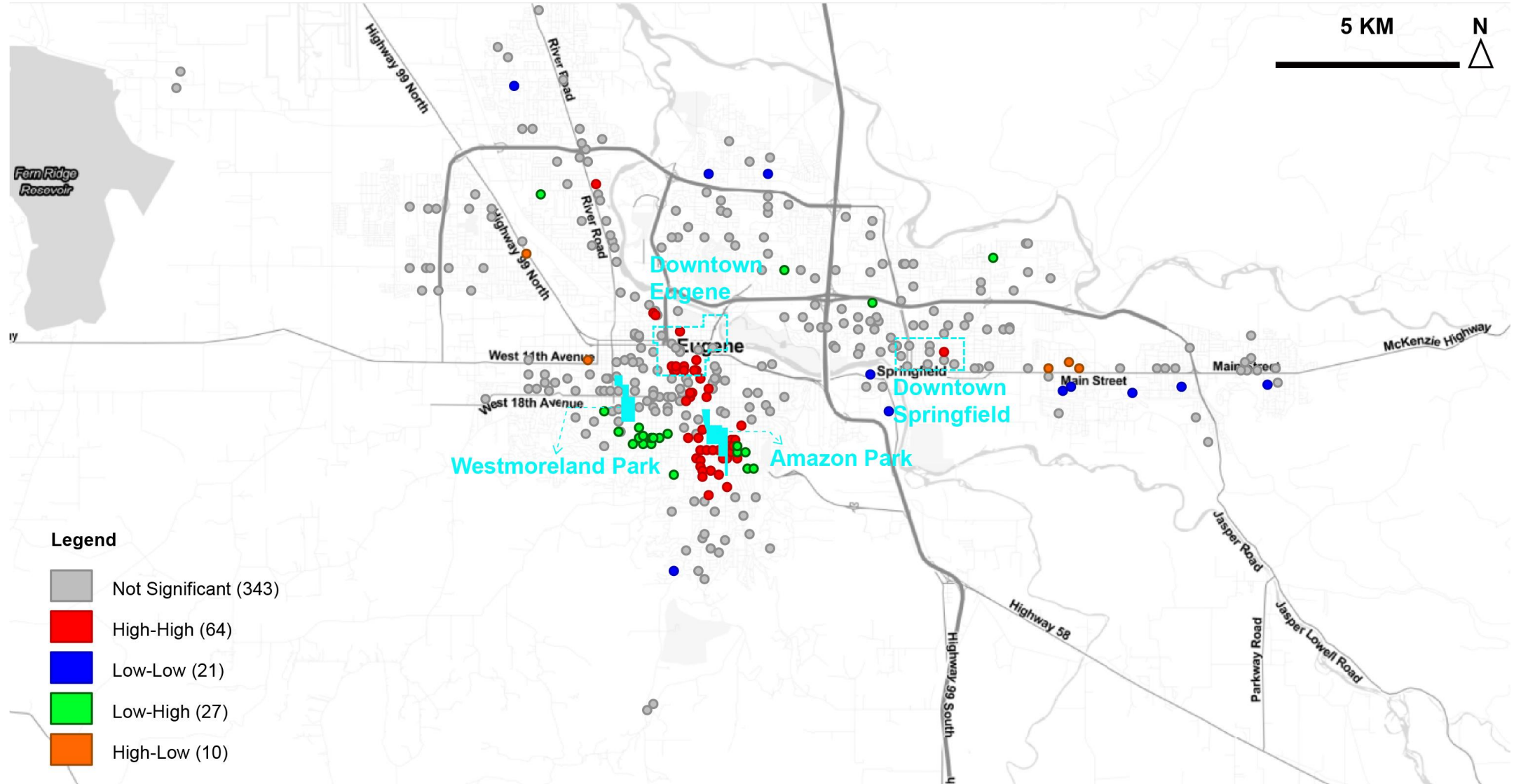
- Population density, Commercial area, Median Year Built, Transit stops, Parks, Grocery stores, Bike lane, Elderly(%), Bachelor(%), Zero-car household (%), Non-Hispanic White (%), Median household Income, Neighborhood safety

$$y_{ij} = \beta_0 + \{\beta_1^P x_{1ij}^P + \dots + \beta_p^P x_{pij}^P\} + \{\beta_1^N x_{1ij}^N + \dots + \beta_n^N x_{nij}^N\} + \mu_j + \epsilon_{ij}$$

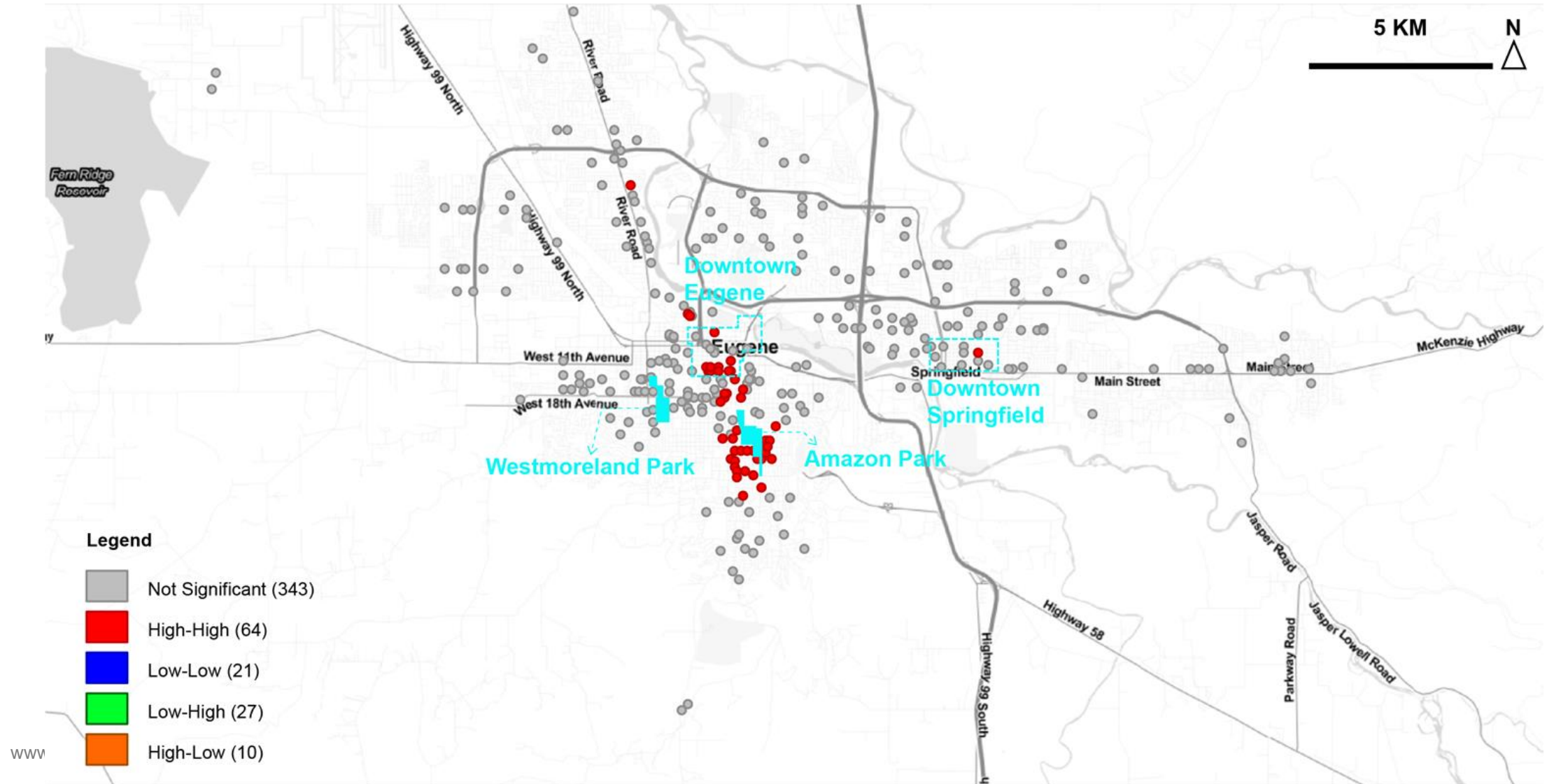
# The Histogram of Divergence Score



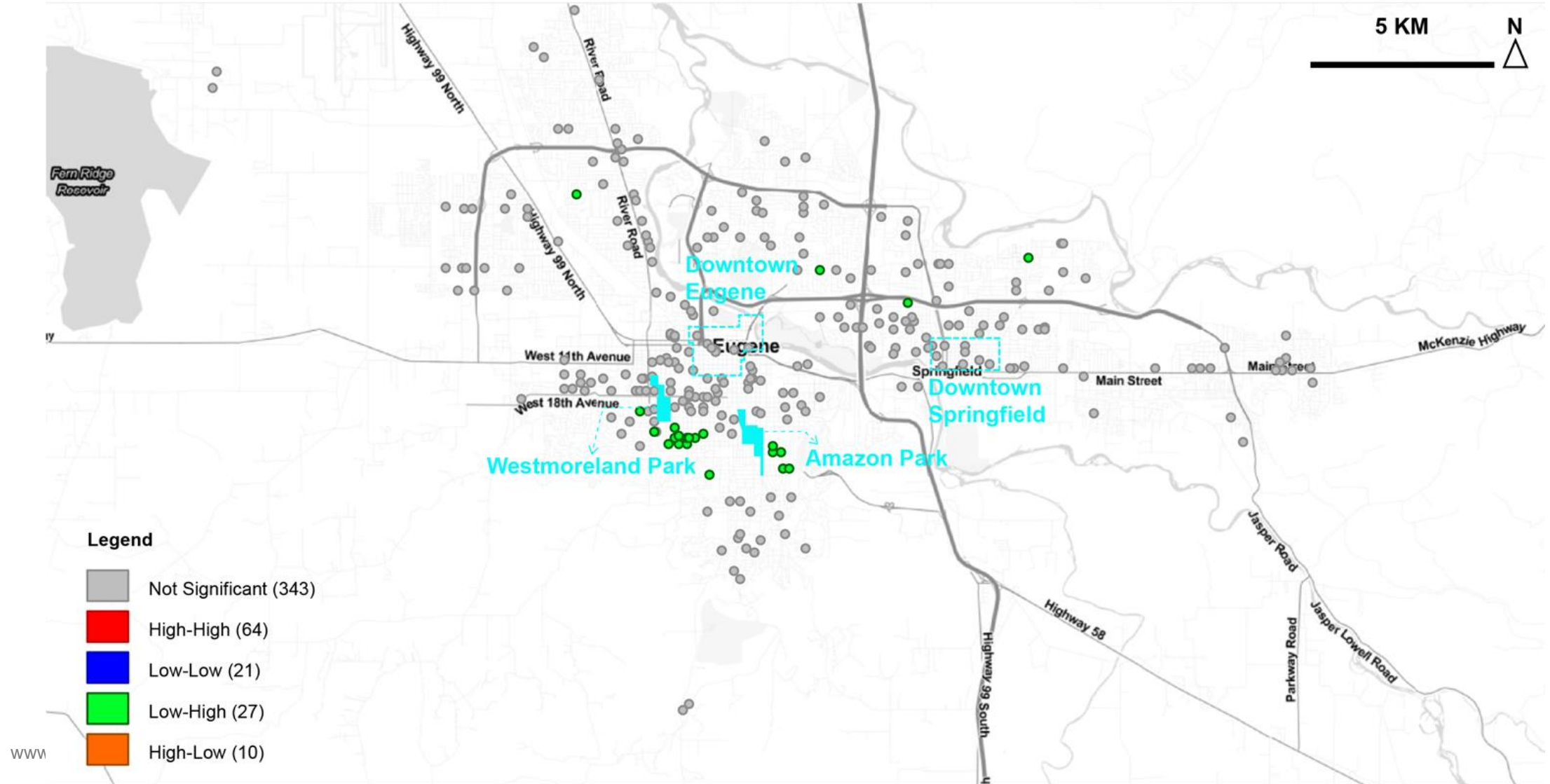
# Results of Spatial Analysis: Walk Score vs. Subjective Walkability



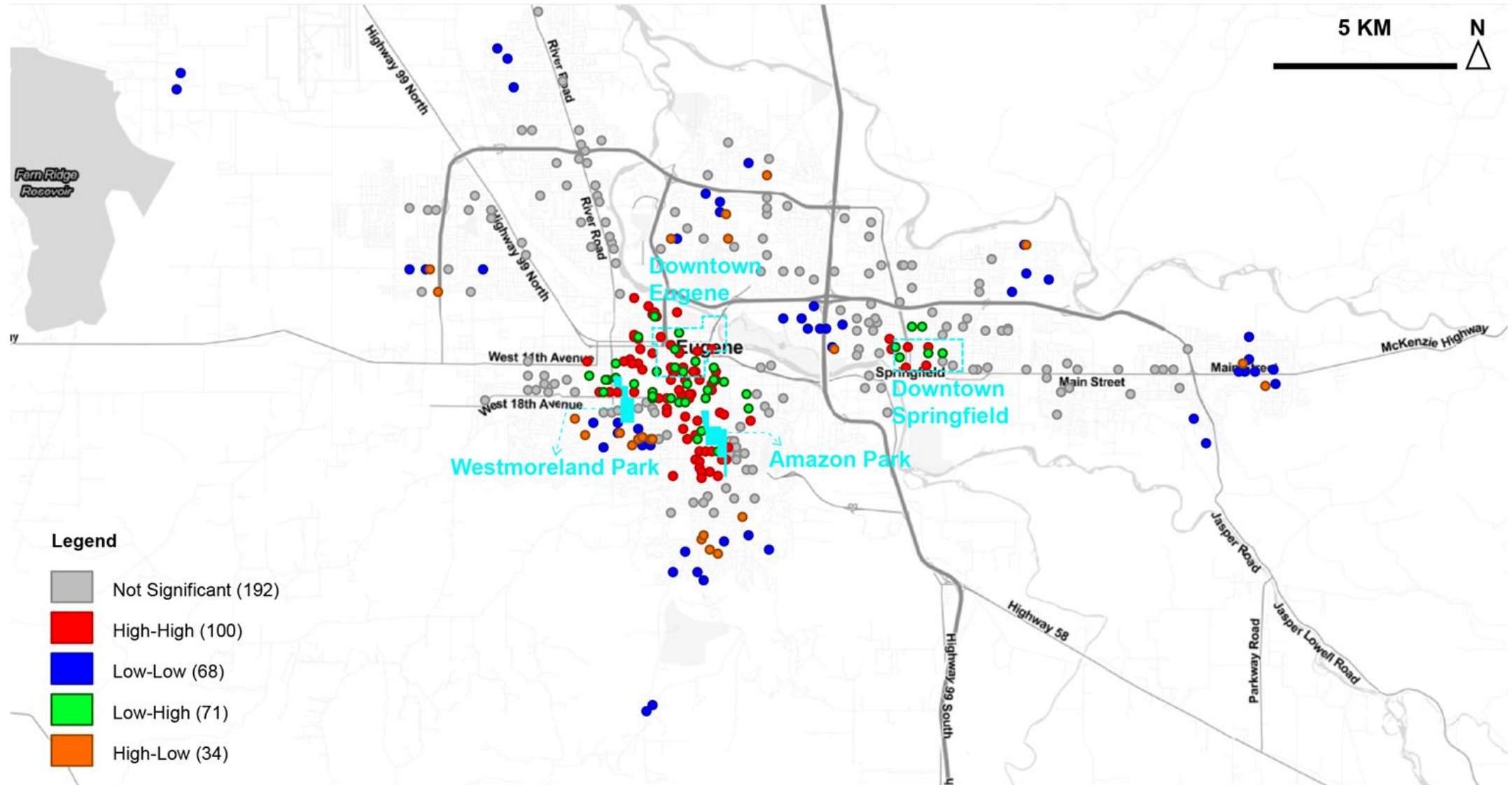
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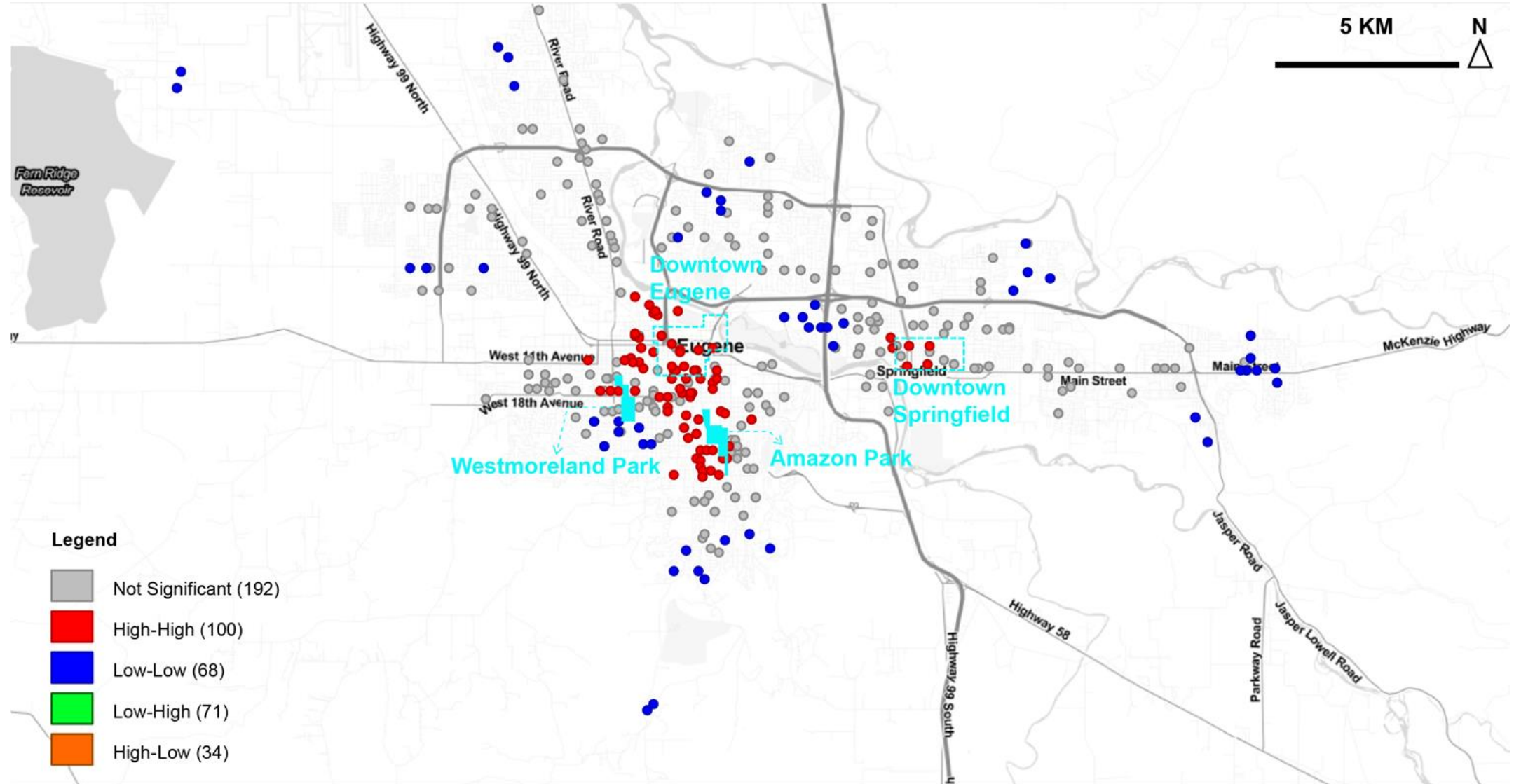
# Results of Spatial Analysis: Walk Score vs. Subjective Walkability



# Results of Spatial Analysis: Subjective Walkability vs. Walk Score

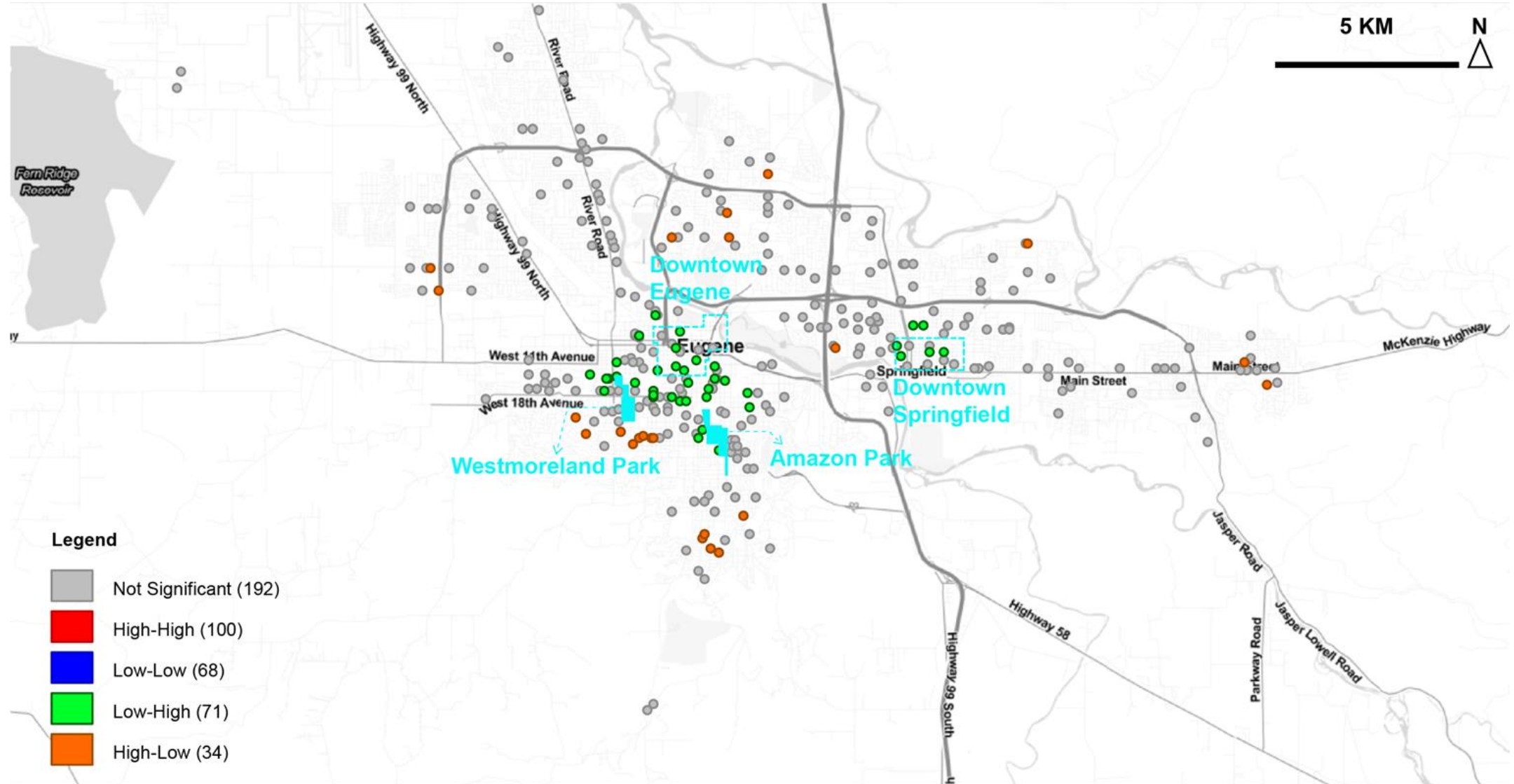


# Results of Spatial Analysis: Subjective Walkability vs. Walk Score





# Results of Spatial Analysis: Subjective Walkability vs. Walk Score



# Results of Regression Analysis

Variables	Model 1		Model 2		Model 3	
	Coef.	St.Err.	Coef.	St.Err.	Coef.	St.Err.
<b>Individual Factors</b>						
Age	.068	.049	.04	.049	.05	.048
Gender	-.042	.101	-.053	.099	-.054	.098
Race	.006	.116	-.043	.114	-.052	.113
<b>Income</b>	<b>.083*</b>	<b>.048</b>	<b>.082*</b>	<b>.048</b>	<b>.075</b>	<b>.048</b>
<b>Education</b>	<b>.135</b>	<b>.101</b>	<b>.166*</b>	<b>.101</b>	<b>.151</b>	<b>.099</b>
Time in Eugene	.014	.047	.041	.045	.042	.045
<b>Belief in envir policy</b>	<b>-.11**</b>	<b>.05</b>	<b>-.099*</b>	<b>.053</b>	<b>-.096*</b>	<b>.052</b>
Pre routine trip	-.016	.047	-.019	.046	-.02	.046
<b>Neighborhood Socio-demographics</b>						
Housing value			.026	.059	.055	.064
<b>Elderly</b>			<b>.004</b>	<b>.062</b>	<b>-.14**</b>	<b>.064</b>
Bachelors			.076	.07	.051	.063
<b>Zero-car household</b>			<b>-.184**</b>	<b>.082</b>	<b>-.22***</b>	<b>.076</b>
Non-Hispanic white			-.021	.066	.007	.06
Drive alone			.079	.081	-.035	.077
Median household income			.095	.098	.03	.094
Poverty			.015	.11	.021	.102
Safety			-.059	.046	-.038	.045
<b>Neighborhood Built Environment</b>						
<b>Population density</b>					<b>-.14**</b>	<b>.06</b>
Commercial					-.054	.061
Transit stops					.012	.057
Grocery store					.04	.047
Parks					-.018	.047
Bike lane					-.005	.052
<b>Median year built</b>					<b>.268***</b>	<b>.065</b>
<b>Model Statistics</b>						
	Number of obs	447	Number of obs	414	Number of obs	411
	Prob > chi2	0.075	Prob > chi2	0.000	Prob > chi2	0.000
	AIC	1264.397	AIC	1134.585	AIC	1116.681

\*\*\* p<.01, \*\* p<.05, \* p<.1

# Conclusions

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- Characteristics of both **people** and **places** affect the subjective-objective walkability divergency.
- Respondents with **lower household income** and **education level** and **greater beliefs in environmental policies** evaluate walkability in a better alignment with Walk Score.
- Respondents tend to better match their subjective walkability with the Walk Score when they **live in more centrally located neighborhoods** (e.g., downtown), with **greater densities, more old buildings, and higher proportions of the elderly and zero-car households.**
- Future research and practice should consider incorporating **neighborhood-level social and built environment factors** into the measurement of Walk Score.

**Thank you!**  
**Any question?**

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