

Do racial divisions affect inequities in park access and neighborhood environments? A comparison of neighborhoods on either side of the Delmar Divide in St. Louis, Missouri.

by

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Abstract

While the racial divide on Delmar Boulevard is well documented, its perceptual effect is less understood. This study examined perceptual park access and neighborhood environment to understand better whether Delmar Boulevard affects residents living on contrasting sides of the divide differently. In this study, mixed methods with qualitative cognitive maps and quantitative surveys combined to answer the research questions which include “Do St. Louis citizens on different sides of the Delmar Divide have equitable opportunities for quality public parks? And why?” and “Do St. Louis citizens on different sides of the Delmar Divide perceive the neighborhood environments and barriers that affect their park access differently?”

Cognitive maps were administered to participants to assess perceptual environmental features, landmarks, park access, barriers, and spatial divisions of their city and neighborhood (N=55). A survey enriched the cognitive map responses to further understand park visit frequency, park knowledge, ease of park access, social cohesion, and neighborhood perception (N=76). A series of mean difference t-tests were performed to test the hypotheses. Also, qualitative comparisons were conducted to explore similarities and differences between the sides based on cognitive mapping.

The analysis found a significant difference between participants from the general population north and south of Delmar Boulevard and their comfort in calling a neighbor for help, perception of their neighborhood as a good place to grow old, and their Appleyard map type for prompt two. Focusing on northern African-American/Black and southern White participants revealed significant differences in the perception of issues (such as crime, safety, etc.) inhibiting park access, the amount of neighbors they see or hear from once a month, the comfort in calling on a neighbor for help, satisfaction levels with their quality of life, the presence of interesting

things to look at in their neighborhoods, and the types of cognitive maps created for both prompts. People of color and white analyses found significant differences in park awareness, knowledge of park location, how often participants use transit to ride to parks, the presence of issues in parks, the number of neighbors seen once a month, and the satisfaction with their quality of life. Qualitative study of cognitive maps found differences in parks identified, the effects of Delmar Boulevard, and city amenities important to differing groups.

This study illustrated the changing sentiment surrounding Delmar Boulevard while exposing perceptual differences in park access and neighborhood environment across location and race. Further study is needed to understand the primary force of park access and the changing sentiment surrounding Delmar Boulevard.

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Chapter 1 - Introduction

Delmar Boulevard is a major east-west roadway from downtown St. Louis to the city's first ring of suburbs (Trivers & Rosenthal, 2015). Delmar came to the forefront of discussion and scrutiny in St. Louis after BBC and Washington Post investigations into the racial divisions present at Delmar, leading to the nickname "Delmar Divide" (Baker, 2016; Harlan, 2014; Strasser, 2012). The stark demographic differences manifest into significant racial segregation (99% black in the north and 70% white in the south), lower median home values north of Delmar (39% less), and lower education levels (67% have a bachelor's south of Delmar while only 5% north) (Washington University DEIA Committee, 2023).

This divide has manifested into inequitable park access and usage. While studies have found that minorities and low-income members have lower geographic access to parks (Byrne et al., 2009; Estabrooks et al., 2003; Wang et al., 2015a), some studies have interestingly found that minorities and low-income members have more geographic access to parks but less perceived access to them (Jones et al., 2009; Wang et al., 2015a). This raises the possibility of perceived access being a strong and under-studied indicator of park access, deviating from the industry standard of physical access measurements (Wang et al., 2015a). The unequal access to parks in St. Louis, lack of representation in decision-making, and demographic divide make environmental justice a genuine concern in St. Louis (Groshong et al. 2020; Taylor et al. 2007).

Thus, this study is guided by two research questions: (1) Do St. Louis citizens on different sides of the Delmar Divide have equitable opportunities for quality public parks? And why? (2) Do St. Louis citizens on different sides of the Delmar Divide perceive the neighborhood environments and barriers that affect their park access differently? To answer

these questions further, the research sub-questions and their subsequent hypotheses are established below:

RQ1. Do St. Louis citizens on different sides of the Delmar Divide have equitable opportunities for quality public parks? And why?

Hypothesis 1 (H1). *The difference in perceived neighborhood environments and barriers is associated with the difference in public park access and usage between neighborhoods divided by the Delmar Divide.*

1. Do citizens on differing sides of the Delmar Divide perceive their public park's quality levels differently?
 - a. Hypothesis 1-1 (H 1-1). *Perception of lower public park quality levels inhibits park usage for residents north of the Divide.*
2. What are the alternative recreation and social opportunities that Delmar Divide residents utilize if they do not frequent public parks?
 - a. Hypothesis 1-2 (H 1-2). *Residents on different sides of the Delmar Divide pursue different alternative recreational and social opportunities when not going to public parks.*
3. Does the perception of safety and preferred features in neighborhood public parks differ between residents on the north and south sides of the Delmar Divide?
 - a. Hypothesis 1-3 (H 1-3). *Perceptions of northern St. Louis public parks as poorly programmed and unsafe restrict park usage and frequency.*
4. Do residents on one side of the divide visit St. Louis' public parks more frequently?

- a. Hypothesis 1-4 (H 1-4). *Residents living south of the Delmar Divide visit public parks more often than residents living north.*
- 5. Is there a difference in accessibility to public parks between residents on the north and south sides of the Delmar Divide? (e.g., sidewalk connection, public transportation, car ownership)
 - a. Hypothesis 1-5 (H 1-5). *Superior sidewalk quality and higher car ownership rates allow for increased public park usage south of the Delmar Divide.*

RQ2. Do St. Louis citizens on different sides of the Delmar Divide perceive the neighborhood environments and barriers that affect their park access differently?

Hypothesis 2 (H2). *Racial divisions affect perceptual neighborhood environments and barriers of either side of residents differently.*

- 6. What differences exist between the perceived neighborhood boundaries and the context of residents along the Delmar Divide?
 - a. Hypothesis 2-1 (H 2-1). *Northern St. Louis residents have smaller perceived neighborhoods than southern St. Louisans.*
- 7. Are there disparities in the perceptions of the quality of essential community facilities (school, health, foods) along the Delmar Divide?
 - a. Hypothesis 2-2 (H 2-2). *Citizens north of the Delmar Divide perceive lower quality levels of their essential community facilities.*
- 8. Are there differences in perceived landmarks and features representing civic pride among Delmar Divide community members?

- a. Hypothesis 2-3 (H 2-3). *Differences exist between what St. Louisans on differing sides of the Delmar Divide perceive as landmark features that they associate with civic pride.*
- 9. Do racial divisions along Delmar Boulevard inhibit social cohesion among poorer, minority neighborhoods?
 - a. Hypothesis 2-4 (H 2-4). *Racial division inhibits social cohesion in neighborhoods north of the Delmar Divide.*
- 10. Do Delmar Divide residents perceive the existence of the Divide as a natural division that influences their spatial awareness and mobility?
 - a. Hypothesis 2-5 (H 2-5). *Residents on both sides of the Delmar Divide perceive it as a legitimate barrier that restricts their mobility through the city.*

Chapter 2 - Literature Review

Segregation in St. Louis and Delmar Boulevard

America has a long history of transportation infrastructure acting as racial division lines, beginning with railways (Archer 2020; Badger & Cameron 2015). Today, American cities like St. Louis are dealing with the lasting effects of vehicular infrastructure perpetuating modern segregation. Detroit's 8 Mile Road and Kansas City's Troost Avenue are infamous examples of this trend (Maraniss 2016; Mitchell 2018). Similarly, the Interstate system has divided and segregated American cities. Notable examples include I-94 in St. Paul; I-579 in Pittsburgh; and I-40 in Nashville (Karas 2014; Mohl 1993; Mohl 2014; Ross-Brown 2016). The dividing and destructive nature of vehicular infrastructure is present in St. Louis today in the form of Delmar Boulevard.

The Delmar Divide

St. Louis has had a long history of racial and economic segregation, with Delmar Boulevard playing a critical role in the city's division (Trivers & Rosenthal 2015). Delmar Boulevard is a major east-west roadway from downtown St. Louis to the city's first ring of suburbs (Trivers & Rosenthal 2015). Delmar Boulevard has had a long history of relevance in the St. Louis community, with the "Delmar Loop" portion (situated in both St. Louis and neighboring University City) designated as one of the American Planning Association's Great Streets (APA 2007; Baker 2016). However, Delmar came to the forefront of discussion and scrutiny in St. Louis after BBC and Washington Post investigations into the racial divisions present at Delmar, leading to the nickname of the "Delmar Divide" (Baker 2016; Harlan 2014; Strasser 2012). With the backdrop of the crisis brewing in nearby Ferguson, the divide assumed a new level of criticism and investigation (Baker 2016).

North of the Delmar Divide reside minority (primarily African American) dominated neighborhoods of considerably lower socioeconomic status (Coyles et al., 2023). In stark contrast, south of Delmar Boulevard consists of primarily affluent White neighborhoods with high levels of education, infrastructure, and socioeconomic status. Census data illustrates the partition that Delmar Boulevard delineates. The stark demographic differences manifest into significant racial segregation (99% black in the north and 70% White in the south), lower median home values north of Delmar (397% less), and lower education level (67% have a bachelor's south of Delmar while only 5% north) compared to the southern communities of the city. (Washington University DEIA Committee 2023).

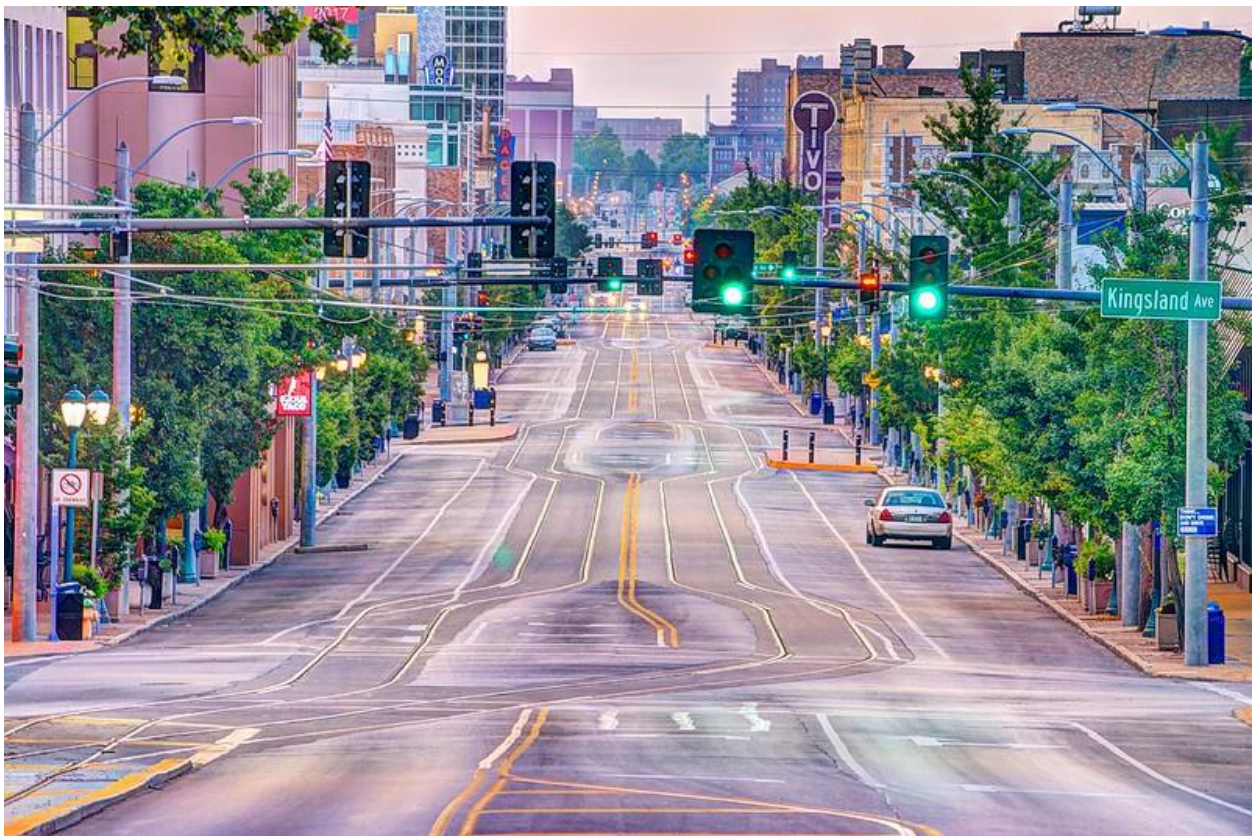


Figure 1: The Delmar Loop (Engler 2017)

Parks' Social Importance and access Inequities

Intergroup Contact

Parks are vital to a community and a city's social cohesion and stability. Increased interaction rates and positive quality interactions have proven to be the most effective in breaking down prejudices (Allport 1954; Hodson & Hewstone 2013; McKeown & Taylor 2017; Priest et al. 2014). Throughout multiple settings, frequent positive interactions have been shown to “increase empathy, reduce prejudice, reduce stereotypes, and increase intergroup trust” (Allport 1954; Freeman, 2012; Hewstone et al. 2006; Hodson & Hewstone 2013; Neal et al. 2015; Powers et al. 2022; Pettigrew & Tropp 2008; Ramiah & Hewstone 2013).

Parks present a unique opportunity to facilitate intergroup contact that other settings may not provide (Powers et al. 2022). Unlike other settings, such as workspaces, parks are places people frequent in their leisure time and are not there to fulfill essential needs like work or grocery shopping (Powers et al. 2022). Due to the leisure and recreation activities people pursue at parks, there is an increased opportunity for shared interests, potential collaboration, and interaction (Powers et al. 2022). The theoretically universal access to public parks means they can encourage inter-group contact where group members can break down barriers and work towards a collective shared living (Abdelmonem et al. 2015; Powers et al. 2022)

Physical Park Access

Despite the opportunity for intergroup contact and social cohesion that public parks provide, accessibility disparities limit meaningful and equitable park usage (Wang et al. 2015a; Wang et al. 2015b). Accessibility is one of the critical indicators of park use (Byrne et al. 2009; Wang et al. 2015b). Historically, park access has been quantitatively measured by distance and time through the Location Theory and Central Place Theory (Hass 2009; Marten & Gillespie

1978; Maruani & Amit-Cohen 2017; Wang et al. 2015a; Wang et al. 2015b). Recent developments have expanded the notion of accessibility to include more socio-personal factors such as race, income, ideologies, and perceptions (Aday & Anderson 1974; Bisht et al. 2010; Ferreira & Batey 2007; Pirie 1981; Wang et al. 2015b).

A variety of physical and social conditions prevent meaningful intergroup contact and equitable usage (Abdelmonem & McWhinney 2015; Groshong et al. 2020; Mullenbach et al. 2022; Powers et al. 2022; Rigolon et al. 2018; Wang et al. 2015 (a); Wang et al. 2015 (b)). One especially pertinent barrier is the lack of diversity in many parks due to park use differences and inequities (Powers et al. 2020; Powers et al. 2022; Rigolon 2014; The Trust for Public Land 2020). The legacy of systematic racism strongly persists throughout public parks (Plumer & Popovich 2020; Powers et al. 2022; Schell et al. 2020). Historic residential segregation and redlining, and material deprivation have inhibited park diversity, social capital and support, dictated park quality levels, and constrained feelings of belonging in parks for many minorities (Crawford et al., 1991; Hillier et al. 2016; Kaźmierczak 2013; Keith et al. 2018; Mullenbach et al. 2022; Plumer & Popovich 2020; Powers et al. 2022; Rigolon 2016; Schell et al. 2020). Even within parks that may have higher diversity levels, Mullenbach et al. (2022) argue that intra-park segregation occurs quite regularly (Harris et al. 2020; Mullenbach et al. 2022; Sharaievska et al. 2010; Stodolska & Shinew 2010).



Figure 2: St. Louis' Iconic Forest Park (Engler 2022)

Perception in a Divided City

Perceptual Park Access

As established, minorities and people of lower income are more susceptible to low park access and quality levels (Byrne et al. 2009; Estabrooks et al. 2003; Sister et al. 2010; Wang et al. 2015a; Wolch et al. 2005). While studies have found that minorities and low-income members have lower geographic access to parks (Byrne et al. 2009; Estabrooks et al. 2003; Wang et al. 2015a), some studies have interestingly found that minorities and low-income members have more geographic access to parks but less perceived access to them (Jones et al. 2009; Wang et al. 2015a). This raises the possibility of perceived access being a strong yet under-studied indicator of park access (Wang et al. 2015a).

Citizens perceive different access levels to parks due to space and the built environment being “places of remembrance” that individuals perceive differently based on various factors (Abdelmonem & McWhinney 2015; Bevan 2007). Unsurprisingly, past studies have shown differences between subjectively measured perceived access and quantitatively measured geographic access to public parks (Ball et al. 2008; Hoehner et al. 2005; McCormack et al. 2008; Scott et al. 2007; Wang et al. 2015a). The strong presence of geographic access does not indicate a high level of perceived access (Boehmer et al. 2007; Wang et al. 2015a). As we look to increase park access equity, perceived access has emerged as the primary influence affecting park use, with more research on the topic needed (Wang et al. 2015a).

Perceived Neighborhoods

As we examine St. Louis residents' perceived access to their parks, it is pertinent to understand what residents recognize as their perceived spatial neighborhood. Historically, census and administrative data mandated neighborhood boundaries, but recent critiques of this method have enabled innovative alternative methods to arise (Coulton et al. 2001; Grannis 2009; Pinchack et al. 2020; Sperling 2012). Recent research has attempted to expand from this outdated methodology to instead look at residents' activity spaces and perceived neighborhoods as a better representation of neighborhood boundaries (Browning and Soller 2014; Crawford et al. 2014; Kwan 2009, 2012; Matthews and Yang 2013; Pinchack et al. 2020; Tana et al. 2016; Wang et al. 2018; Zenk et al. 2019). In the few studies that have employed this technique, the perceived neighborhood boundaries varied extensively, revealing exciting insights into residents' perceived understanding of their social environment (Coulton et al. 2001; Pinchack et al. 2020).

The self-understanding of a neighborhood differs based on various factors, such as race, age, gender, economic standing, and length of residence, amongst many others (Charreire et al.

2016; Coulton et al. 2013; Finlay et al. 2023; Lohmann and McMurran 2009; Shmool et al. 2018; Valle'e et al. 2015). Race is a very understudied factor when accounting for perceived neighborhoods (Finlay et al. 2023). Past research has been inconsistent, with some finding that African Americans have larger activity spaces than other races. However, some research has found no conclusive linkage between race, activity space size, and makeup (Finlay et al. 2023; Jones & Pebley 2014). There is a gap in understanding how neighborhood boundaries and perceptions differ based on race and how they interact with an infrastructure barrier such as Delmar Boulevard.

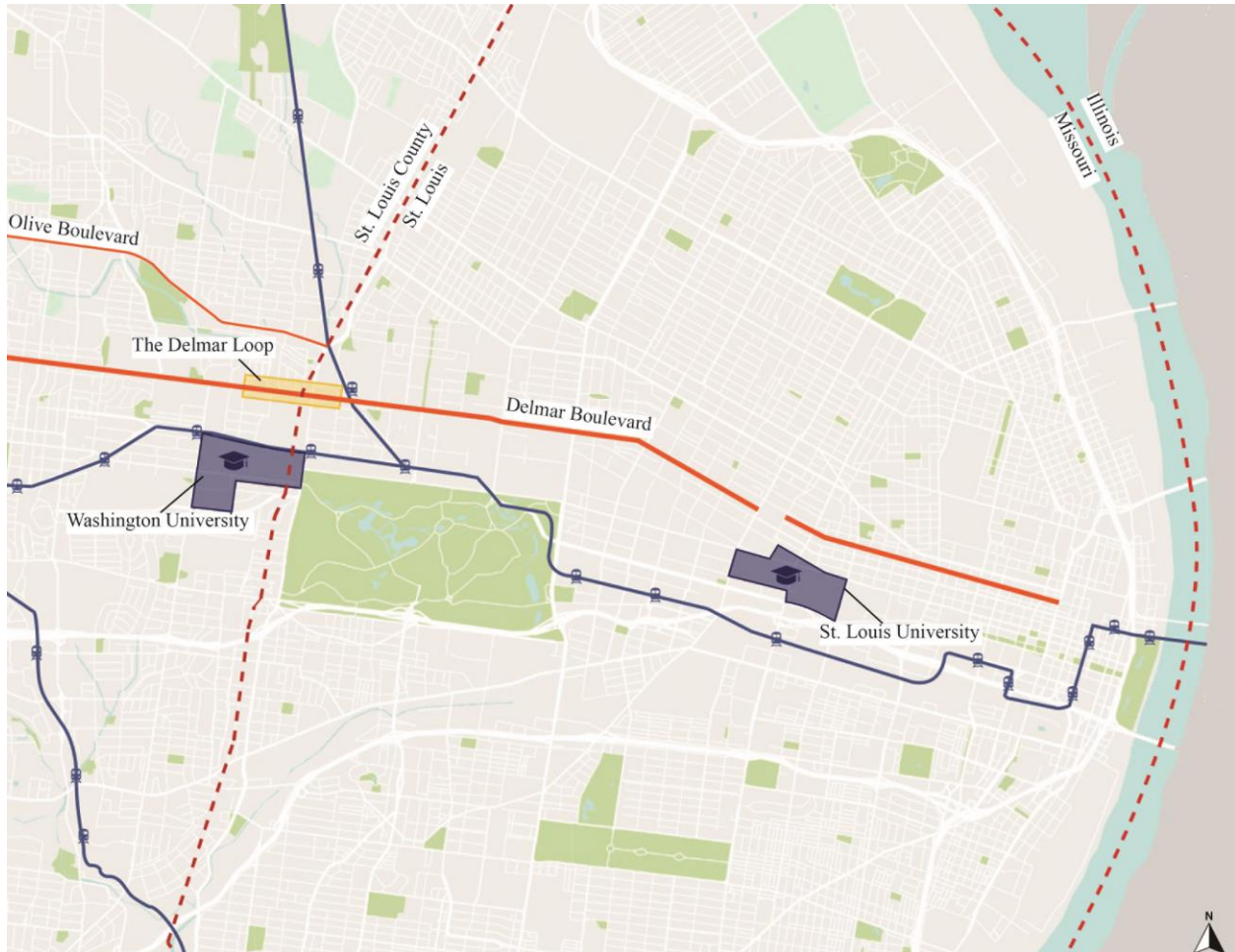


Figure 3: Map of St. Louis with Relevant Features (Odgers 2025)

Health Outcomes

Park Access, Use, and the Issue of Environmental Justice

The combination of unequal access to parks, park use disparities, and historical park underfunding and under maintenance of minority parks creates an issue of environmental justice (Byrne & Wolch 2009; Carnahan et al. 2020; Groshong et al. 2020; Kamel, Ford, & Kaczynski 2014; Rigolon et al. 2018; Rigolon & Flohr 2014; Vaughan et al. 2013; Wang et al. 2015a). Schlosberg and Rigolon define environmental justice as the “fair distribution of environmental hazards and amenities (including parks), as well as inclusive decision-making processes to locate such hazards and amenities” (Schlosberg 2004; Rigolon et al. 2018). Low argues that environmental justice must incorporate the three principles of distributional justice (an “equal distribution of public space”); procedural justice (“negotiation and decision-making processes are conducted fairly”); and interactional justice (“visitors are free from discrimination and harassment”) (Carnahan et al. 2020; Low 2013).

The unequal access levels to parks in St. Louis, lack of representation in decision-making, and safety issues in minority-dominated parks (both perceived and actual) make environmental justice a genuine concern in St. Louis (Groshong et al. 2020; Taylor et al. 2007). Taylor, Floyd, Whitt-Glover, and Brooks reveal that these communities deal with increased health issues compared to their more affluent White peer neighborhoods (Taylor et al. 2007). This is a serious issue facing the St. Louis community that must be addressed.

Past Health Research in Parks

Past research into parks and their associated health outcomes has focused on physical activity (Francis et al. 2022; Fry et al. 2024; Wan & Shen 2015). The limited scope of physical activity fails to account for parks' vital role in mental and psychological health. However,

research is abundant into the attributes of parks that facilitate social interaction (Carr et al. 1992; Francis 2012; Gehl 2006; Jacobs 1962; Lynch 1960). While these groundbreaking studies began shifting attention toward parks' social and mental health aspects, the notion of racial, economic, and perceptual factors affecting health was absent or not emphasized. These studies (apart from Kevin Lynch's innovative cognitive mapping techniques) were primarily personal anecdotes, observations, case studies, and interviews (Francis et al. 2022). The lack of comprehensive research requires a more substantial examination of the perceptual, economic, and racial factors influencing parks' and visitors' social and mental health.

St. Louis' Health Needs

St. Louis is a city where this type of research is acutely needed. Experts have identified the need for further study and a better understanding of the health and well-being of the Black St. Louis community (Hudson et al. 2016; Jones et al. 2023). The division in public park use and access has had severe mental and physical health ramifications for the minority St. Louis community, as parks and public space use promotes active lifestyles while creating an enhanced sense of community and social capital (Francis et al. 2016; Mullenbach et al. 2022; Purnell et al. 2015). This issue has become further entrenched with the legacy of COVID-19, which has further eroded Black spaces and social connections (Carney et al. 2022).

Cognitive Mapping

Cognitive Mapping Background

Cognitive mapping is a mixed research technique that furthers the qualitative understanding of perspectives while enabling quantitative study of trends and themes. Mental maps are “cartographic representations of how people differ in their evaluation of places” in

which people include places that they like and are meaningful in their lives (Madaleno 2010; Smiley 2013; Tuan 1975). Lynch (1960) laid the foundation of the cognitive mapping technique by looking at how people perceive the space around them (Lynch 1960; Catney et al. 2019). He identifies “paths, edges, districts, nodes, and landmarks” that participants include in their cognitive maps that help order the city as they perceive it (Lynch 1960; Catney et al. 2019).

Appleyard (1970) further progressed the value of cognitive maps by attempting to classify different map styles and differences based on demographics. Appleyard’s map categorization style is widely used today. He outlines two broad categories of maps: sequential and spatial (Appleyard 1970). Sequential maps focus more on roads and connections between places. In contrast, spatial maps focus on individual buildings, landmarks, and nodes, with items scattered throughout the maps that contain little to no connections (Appleyard 1970).

Within the sequential style, he has four subcategories: fragmented, chain, branch and loop, and netted. Fragmented is the most simple style, progressing to the more sophisticated network style, which has more complete road systems and reasonably accurate representations of their city (Appleyard 1970).

There are also four subcategories of the spatial style: scattered, mosaic, linked, and patterned (Appleyard 1970). Scattered is the most simple style with buildings drawn without any connecting elements, progressing to the most sophisticated spatial pattern of pattern with the boundaries of areas and rivers as the primary features (Appleyard 1970). Appleyard’s categorizations allow for rich cognitive mapping analysis.

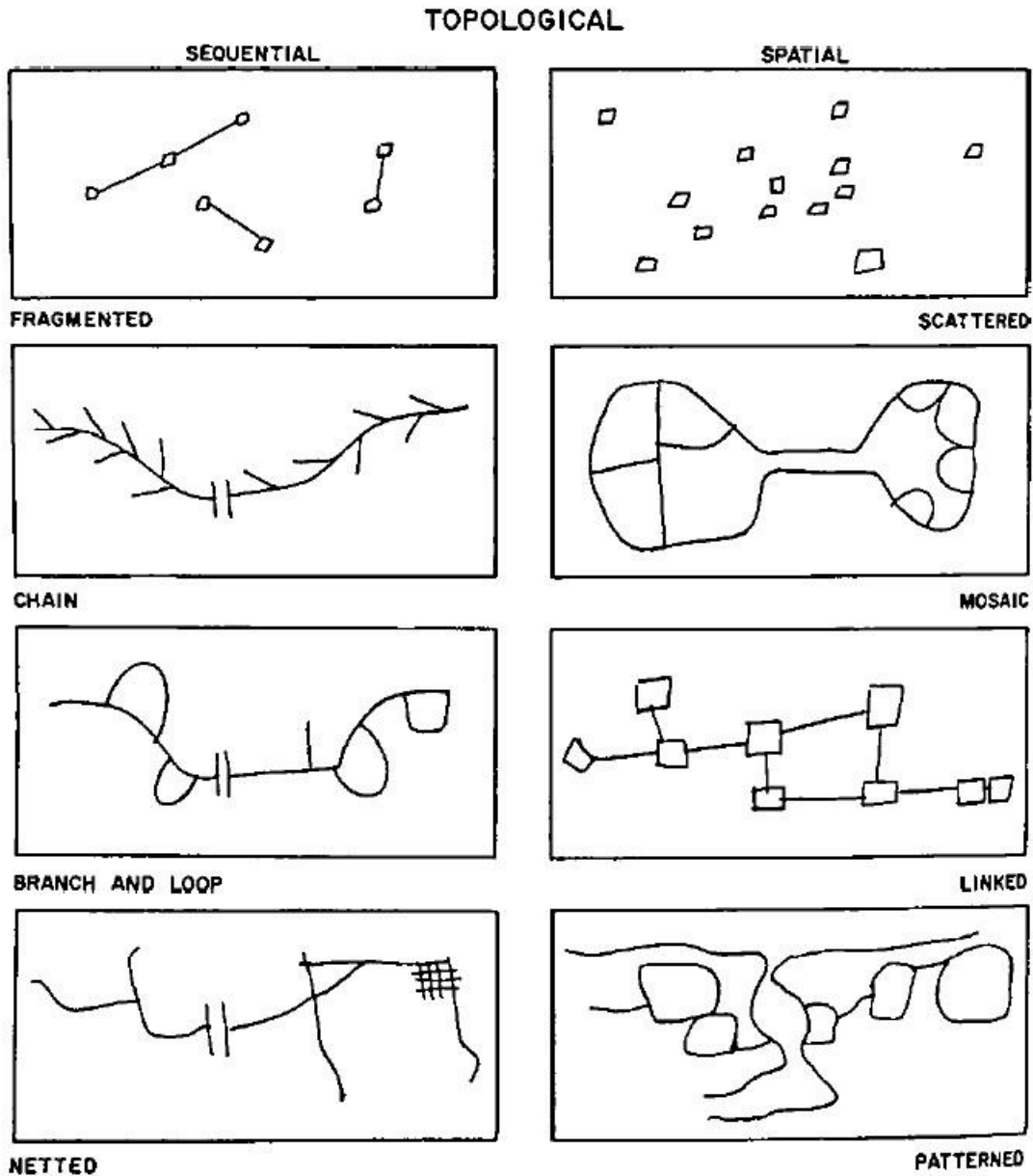


Figure 4: Appleyard's Map Categories (Appleyard 1970)

Cognitive Mapping Benefits

Cognitive maps are incredibly personal and unique to every individual, as various environmental factors influence different interpretations of one's spatial world (Gould 1966; Smiley 2013). Their use emphasizes the human experience and scale present in cities that more quantitative methods tend to overlook (Golledge 1978; Smiley 2013). As study participants

begin to outline their cognitive map, they reveal to the researchers two essential understandings: people include places that are meaningful in their lives while omitting places that are less known or meaningful to them (Smiley 2013). This dynamic is what Soja (1989) identifies as the “socio-spatial dialectic,” which she defines as the interwoven nature of society and space. Cognitive maps enable a personalized and insightful view of an individual’s perceived access to public parks.

Cognitive Mapping and Minority Perspectives

When studying minorities’ perceptions of the space around them, cognitive maps are uniquely posed to allow for deeper understanding than traditional methods (Carney et al. 2022). Cognitive maps act as a protest against the violence and attempted enclosure that maps have represented in the past (Carney et al. 2022; Lebatho King 2019). Using cognitive maps enables minorities to realize the capabilities of maps for self-determination and community progress (Alderman et al. 2021; Carney et al. 2022). This allows cognitive maps to provide inputs into spatial elements and act as a political tool, emphasizing eliminating exclusionary methods and mobility inhibitors (Carney et al. 2022; Cooke 2003). Cognitive maps' multidimensional nature enables them to procure insightful information about minorities’ perceptions of park access in St. Louis.

Chapter Summary

Historical racial segregation of neighborhoods along Delmar Boulevard has led to stark spatial separation, economic divide, and unequal access to public parks in St. Louis, Missouri (Mullenbach et al. 2022). Despite many parks and recreation facilities in St. Louis (108 in the city in 2018), park use is not ubiquitous across racial divides. As a minority health crisis rages in

St. Louis, equitable access to parks must be available (Hudson et al. 2016; Goodman 2016; Jones et al. 2023).

As a result of the hidden nature of the boulevard's widespread division, research on the Delmar Divide and its effect on St. Louis and its citizens is limited. Past studies have focused on physical separation and socio-economic inequalities delineated by the Delmar Divide (Mullenbach et al. 2021; Mullenbach et al. 2022; Trivers & Rosenthal 2015). Residents' perceptual division of Delmar Boulevard as a racial division and their perceptual and behavioral accessibility to public parks are understudied. Additionally, previous studies on park accessibility focus on physical proximity with a limited focus on its perceptual and psycho-social factors (Francis et al. 2012; Groshong et al, 2020; Wang et al. 2015).

Chapter 3 - Research Methods

This study developed a conceptual framework illustrating the relationships between policy interventions (input), socio-environmental changes (output), and short—and long-term perceptual and behavioral changes, which are the hypothesized outcomes of this study (see Figure 5). Combining qualitative and quantitative research, this study attempts to comprehensively understand the differences in perceived access to public parks and neighborhood perceptions in St. Louis. Cognitive mapping and survey techniques were utilized to better understand the differences in St. Louisans' access to and perceptions of public parks. The researcher organized and administered these data collection techniques at key community assets in St. Louis.

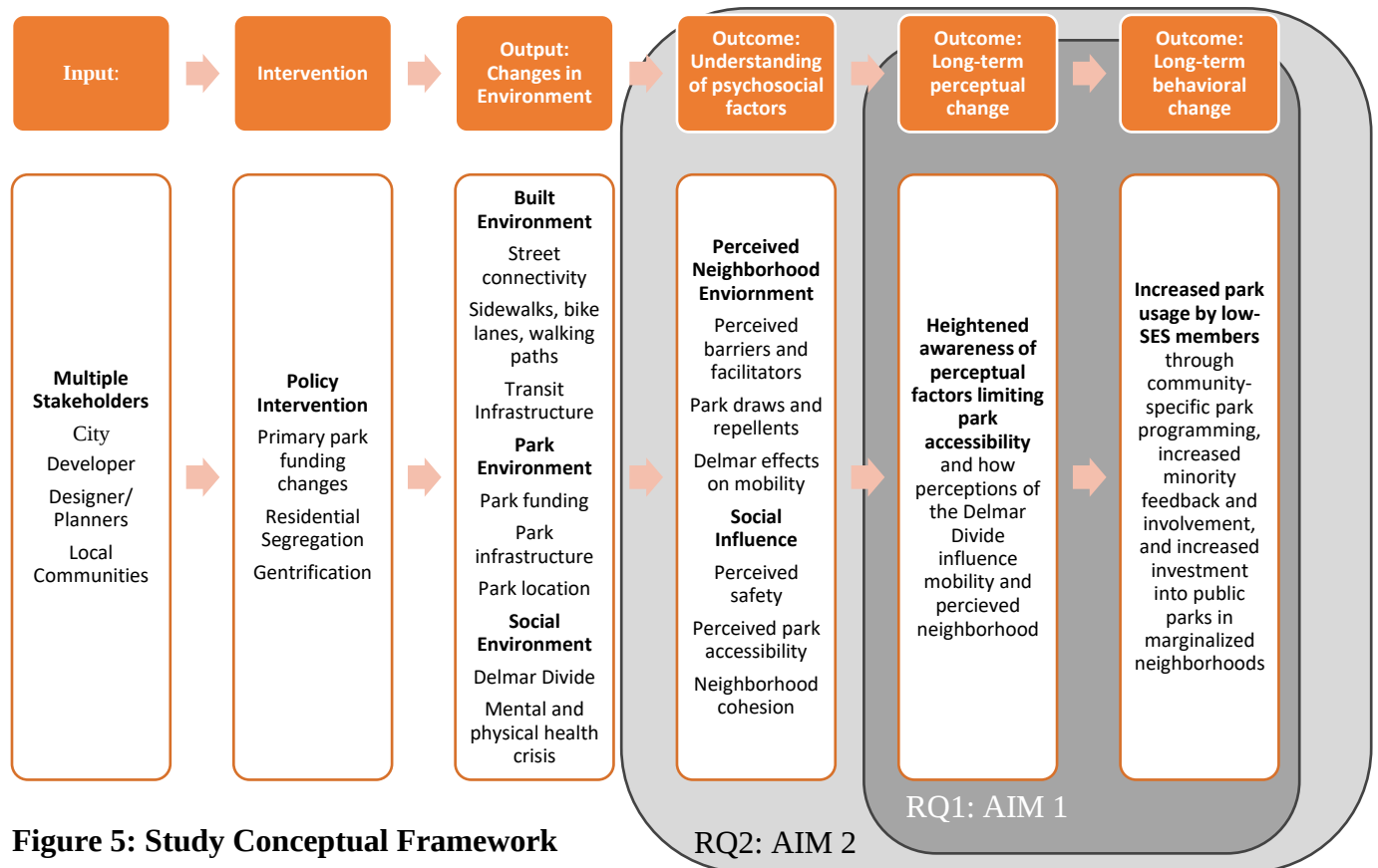


Figure 5: Study Conceptual Framework

Study Setting & Population

Targeting neighborhoods on contrasting sides of the Delmar Divide within and near the Delmar Loop garnered different and unique cognitive maps and survey responses, illuminating potential differences in access and perception (see Figure 3). A thorough examination and identification of neighborhoods with similar characteristics (such as physical size, population, and number of parks) but differing in other key demographic factors (such as race, median age, and median income) occurred. Strategically targeting community assets with high-volume flow rates allowed for the effective recruitment of community members as subjects. This extensive community outreach and collaboration in the Delmar Loop district of St. Louis, Missouri, and the adjacent suburb of University City of St. Louis County produced a sample of N=76 respondents. Of these respondents, fifty-five provided cognitive maps in addition to survey responses, while the remaining nineteen elected to partake only in the survey portion. Based on cognitive mapping analysis and conversations with study participants, thirty-two respondents reside south of Delmar Boulevard, twenty-four north of it, and the remaining nineteen's living location is unknown or unprovided, so they were categorized as unknown spatially. While they do not contribute to a spatial understanding of Delmar Boulevard, they enhance trends and insight into racial differences and response similarities.

Data Collection and Procedure

A combination of physical and perceptual variables were compiled to understand the necessary factors to create cognitive maps and surveys. A variable construct list categorized these variables, examining the independent and outcome variables.

Two cognitive map prompts were administered to participants to assess their perceptual neighborhood boundaries, park access, and spatial division by the Delmar Divide. The prompts included “Draw a map of St. Louis emphasizing the parks you visit” and “Draw your neighborhood emphasizing landmarks important to you.” Pens were provided to facilitate the process.

The supplemental survey questionnaire enriched the cognitive map responses, testing hypotheses related to park visit frequency and park quality levels, social cohesion, and spatial awareness and mobility. A five-point Likert scale was developed, with five equating to strongly agree and one equating strongly disagree. Multi-item scales were created to specify further and clarify survey responses dealing with complex and intricate ideas.

Data Analysis

Cognitive mapping enabled the analysis and categorization of consistent trends and themes present in the maps. Qualitative analysis of the maps examined elements such as territorial space, distinctive features, number of outside landmarks, etc. The categorization of map styles and elements was conducted by referencing Lynch’s five elements and Appleyard’s eight typologies. The quantitative analysis included subjecting maps to a Likert-scale point system, intraclass correlation coefficient (ICC), and examining elements such as map accuracy, richness, etc. The researcher conducted extrapolations and interpretations of narratives, landmarks, and barriers that emerged from the maps in constant collaboration and guidance from advisors and community members. The clarity in the respondents’ meaning was ensured through communication with community members to better understand the place-based perceptions and narratives that informed the cognitive map responses.

Descriptive statistical analysis was performed to understand the survey's demographic makeup and the respondents' cognitive mapping. To answer the three research questions, the categorization of the respondents based on racial demographics, as well as spatial location, was necessary. Social-demographic variables (race, age, etc.) were paired with time spent in their current home to understand the respondents comprehensively. A series of mean difference t-tests were performed to test the hypotheses by comparing two sides of St. Louis. These results were measured for significance at the 0.05 threshold. Qualitative comparisons were conducted to explore neighborhood similarities and differences based on cognitive mapping and other quantitative data.

Chapter 4 - Results

Participants

The participants' racial demographic makeup is predominantly African-American/Black and White, with some other minority representation. White was the most selected category, with 70.9% of southern residents, 54.2% of northern residents, 42.1% of “unknown” locations, and 56.8% of respondents overall selecting White. African-American/Black was the second most common response, consisting of 12.5% of southern responses, 37.5% of northern responses, 31.6% of unknown locations, and 25.7% of responses overall. Mean difference comparisons were made between all participants of the two sides of Delmar (N=55), between white and people of color respondents regardless of spatial situation, and due to the unrepresentative racial demographics collected north of Delmar, subset comparisons between the African-American northern Delmar respondents (N=9) and White southern Delmar respondents (N=22) were performed.

Table 1: Survey Respondents Socio-Demographic Characteristics

South of Delmar (N=32)		North of Delmar (N=24)		Unknown (N=19)	
Variable	%	Variable	%	Variable	%
Race					
African-American/ Black	12.5	African-American/ Black	37.5	African-American/ Black	31.6
White	68.6	White	54.2	White	42.1
Age					
18-24	9.4	18-24	0	18-24	26.3
25-34	21.9	25-34	16.7	25-34	10.5
35-44	18.8	35-44	25	35-44	10.5
45-54	3.1	45-54	4.2	45-54	5.3
55-64	15.6	55-64	20.8	55-64	15.8
65-74	21.9	65-74	16.7	65-74	10.5
Over 74	12.5	Over 74	12.5	Over 74	21.1
Time Lived in Neighborhood					
0-5 years	34.4	0-5 years	37.5	0-5 years	42.1
6-10 years	18.8	6-10 years	8.3	6-10 years	10.5
11-15 years	0	11-15 years	8.3	11-15 years	15.8
16-20 years	3.1	16-20 years	12.5	16-20 years	0
21-25 years	6.3	21-25 years	0	21-25 years	5.3
26-30 years	12.5	26-30 years	12.5	26-30 years	5.3
Over 30 years	25	Over 30 years	20.8	Over 30 years	15.8

The Perceived Division

The overall understanding is that Delmar continues to divide the city, with 54.1% of respondents stating it does. However, the general population living north of Delmar reported a higher perception of Delmar not being a dividing force in the city (29.2%) than those living south of Delmar (12.9%). Despite this, there was no significant difference between where you lived in relation to Delmar and your perception of whether it divided the city ($t(54) = 0.495$, $p = 0.109$) nor between African-American/Black northern respondents and White southern respondents ($t(22) = -0.817$, $p = 0.423$).

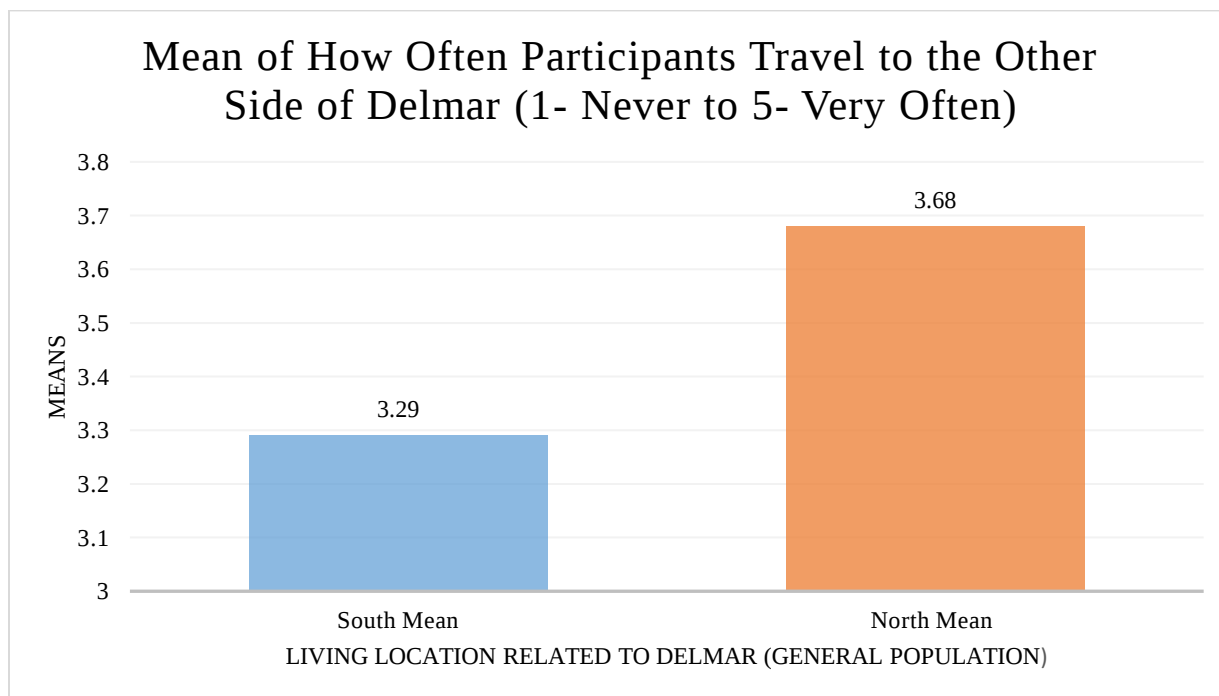


Figure 6: Mean of How Often Participants Travel to the Other Side of Delmar

Racial categorization further underscores the trends showcased in the spatial comparisons examining the perception of the Delmar Divide. 64.3% of people of color respondents believe Delmar divides the city, while 46.5% of White respondents said so. People of color respondents were more likely to “often” (29.2%) and “very often” (33.3%) cross to the other side of Delmar compared to 12.2% and 22.0% of their White counterparts, respectively. Once again, there was no significant correlation between people of color and White respondents and perceptions of Delmar dividing the city ($t(69) = -0.465$, $p = 0.320$).

Respondents noted a wide range of rationales for crossing, or not crossing Delmar Boulevard. The leading reasons St. Louis residents cross Delmar Boulevard include restaurants, libraries, grocery shopping, and parks. On the contrary, St. Louis residents mostly choose not to cross Delmar because of safety, a lack of food and stores, crime rates, and infrastructure.

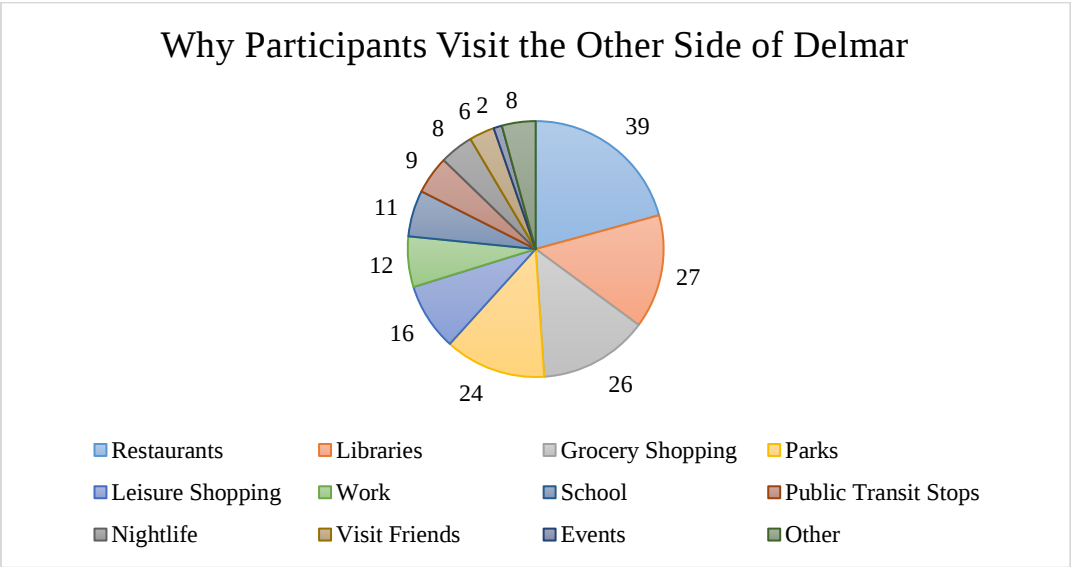


Figure 7: Reasons Why Participants Visit the Other Side of Delmar
**Other includes Black community, daycare, driving through, family, the gas station, swimming pool, volunteer work, and youth sports*

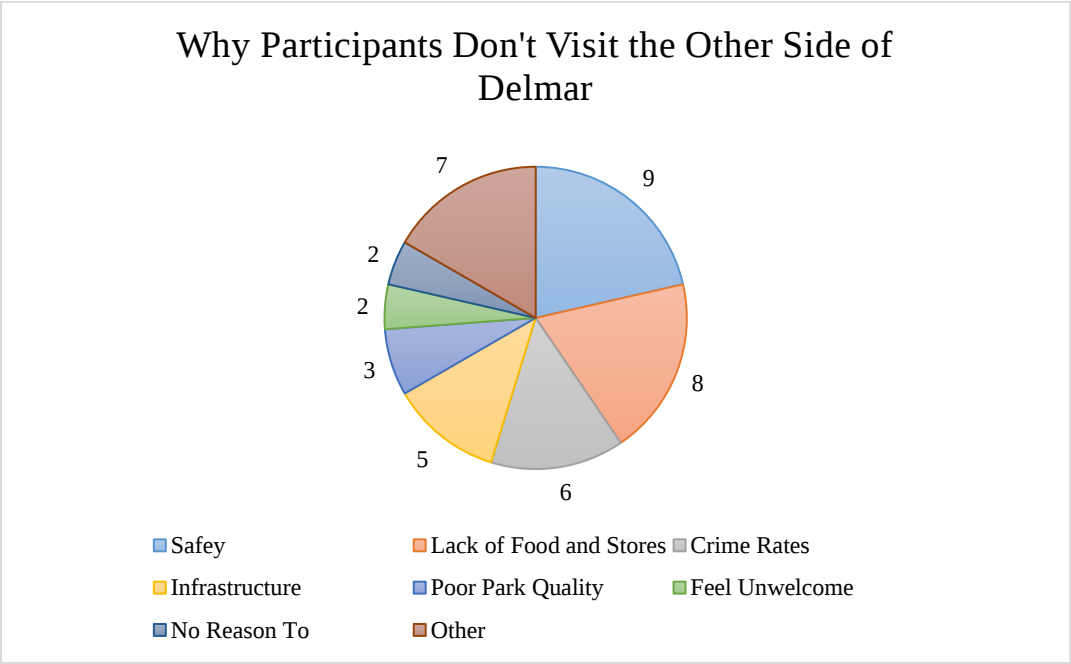


Figure 8: Reasons Why Participants Do Not Visit the Other Side of Delmar
** Other includes anti-social behavior, fear, hostility, never thought to, too far away, and racism*

Park Knowledge

According to an independent T-Test analysis, there was no significant difference between the general population on the two sides of Delmar and the specific African-American/Black north and White south regarding park knowledge. Participants predominantly agreed or strongly agreed that they were highly aware of parks and knew where parks were near them, with no considerable differences. However, there was a near-significant difference between White and people of color participants' awareness of parks ($t(69) = -1.911$, $p = 0.060$) and a significant difference in knowledge of where parks are located near them ($t(36) = -2.238$, $p = 0.031$). While there were significant differences in respondents' awareness of parks and understanding of where parks are located near them, there was no considerable difference in respondents' knowledge of park activities or whether Forest Park belongs to their neighborhood.

Table 2: Independent T-Test Results for Park Knowledge Variables (1- Strongly Disagree to 5- Strongly Agree)

Variables	South of Delmar Mean	North of Delmar Mean	Mean Differences and t-tests	South of Delmar- White Mean	North of Delmar- Black Mean	Mean Differences and t-tests
Awareness of public parks in your neighborhood	4.4375	4.5000	MD: -0.0625 t(54)= -0.292 p= 0.771	4.4545	4.2222	MD: -0.2323 t(29)= -0.816 p= 0.421
Knowledge of where the parks are located in your neighborhood and how to get there.	4.5000	4.5417	MD: -0.0417 t(54)= -0.223 p= 0.825	4.5909	4.3333	MD: -0. 2576 t(29)= -1.296 p= 0.205
Awareness of the activities and programs held in the nearby public parks.	3.3750	3.3750	MD: 0.0000 t(54)= 0.000 p= 1.00	3.5000	3.1111	MD: -0.3889 t(29)= -0.833 p= 0.412
Believe Forest Park belongs to your neighborhood.	3.2188	3.3333	MD:-0.1146 t(54)= -0.327 p= 0.745	3.1818	3.3333	MD: 0.1515 t(29)= 0.300 p= 0.766
Variables	People of Color Mean	White Mean	Mean Differences and t-tests			
Awareness of public parks in your neighborhood	4.2143	4.5814	MD: -0.3671 t(69)= -1.911 p= 0.060			
Knowledge of where the parks are located in your neighborhood and how to get there.	4.2143	4.6512	MD: -0.4369 t(36)= 2.238 p= 0.031*			
Awareness of the activities and programs held in the nearby public parks.	3.1071	3.5581	MD: -0.4510 t(69)= -1.548 p= 0.126			
Believe Forest Park belongs to your neighborhood.	3.3214	3.2326	MD: 0.0889 t(69)= 0.280 p= 0.780			

MD symbolizes "Mean Difference. t(x) symbolizes degrees of freedom. t(x)=y symbolizes t-score. * indicates a significant difference at the 0.05 level.

Physical Park Access

Living on different sides of Delmar did not significantly influence physical park access. 71.9% of southern and 54.2% of northern respondents indicated often or very often visiting public parks in their neighborhood; despite this, a p-value of $t(54) = 0.828$, $p = 0.411$ indicates an insignificant difference between living location and visitation rates. Similar trends were seen, with no significant difference between location and the frequency of walking to parks, driving to parks, using public transit to get to parks, or visiting Forest Park. Comparison of African-American/Black northern respondents and White southern respondents revealed similar trends with no significant differences.

A comparison of people of color and White respondents concerning physical park access revealed a significant difference in participants' tendency to use transit to get to parks frequently. There is a substantial difference between White and people of color participants in their use of public transit to get to parks, with 17% of people of color respondents likely to often or very often use public transit compared to 0% of White respondents ($t(32.519) = 2.423$, $p = 0.021$). The frequency of park usage ($t(69) = 0.933$, $p = 0.217$), walking to parks, driving to parks, and visiting Forest Park do not reveal significant differences in frequency rates between White and people of color respondents.

Table 3: Independent T-Test Results for Physical (1-Never to 5- Very Often) and Perceptual (1- Strongly Disagree to 5- Strongly Agree) Park Access

Variables	South of Delmar Mean	North of Delmar Mean	Mean Differences and t-tests	South of Delmar- White Mean	North of Delmar- Black Mean	Mean Differences and t-tests
Physical Park Access						
Frequency of visiting parks in your neighborhood	3.8125	3.5833	MD: 0.2292 t(54)= 0.828 p= 0.362	3.7727	3.1111	MD: -0.1666 t(29)= -1.575 p= 0.126
Frequency of walking to parks in your neighborhood	3.4688	3.2917	MD: 0.1771 t(54)= 0.523 p= 0.603	3.5455	2.8889	MD: -0.6566 t(29)= -1.259 p= 0.218
Frequency of driving to parks in your neighborhood	3.0000	3.2917	MD: -0.2917 t(54)= -0.970 p= 0.336	2.6818	3.0000	MD: 0.3182 t(24)= 0.927 p= 0.363
Frequency of using public transit to parks in your neighborhood	1.5000	1.5417	MD: -0.0417 t(54)= -0.157 p= 0.876	1.3636	1.7888	MD: 0.4141 T(29)= 1.240 P= 0.225
Frequency of visiting Forest Park	3.4063	3.1250	MD: 0.2813 t(54)= 1.149 p= 0.255	3.2273	3.1111	MD: -0.1162 t(29)= -0.306 p= 0.762
Variables	People of Color Mean	White Mean	Mean Differences and t-tests			
Frequency of visiting parks in your neighborhood	3.3571	3.6977	MD: -0.3405 t(69)= -1.245 p= 0.217			
Frequency of walking to parks in your neighborhood	3.1071	3.3721	MD: -0.2650 t(67)= -0.930 p= 0.356			
Frequency of driving to parks in your neighborhood	3.2500	3.0000	MD: 0.2500 t(69)= 0.905 p= 0.369			
Frequency of using public transit to parks in your neighborhood	1.9286	1.3023	MD: 0.6263 T(33)= 2.423 P= 0.021*			
Frequency of visiting Forest Park	3.3571	3.1395	MD: 0.2176 t(69)= 0.933 p= 0.354			

Variables	South of Delmar Mean	North of Delmar Mean	Mean Differences and t-tests	South of Delmar- White Mean	North of Delmar- Black Mean	Mean Differences and t-tests
Perceptual Park Access						
It is easy to access and get around parks in your neighborhood	4.1563	4.3750	MD: -0.2188 t(54)= -0.920 p= 0.362	4.2727	4.1111	MD: -0.1616 t(29)= -0.456 p= 0.652
There are a sufficient number of parks in your neighborhood	3.8710	4.2500	MD: -0.3790 t(53)= -1.381 p= 0.173	3.8182	4.2222	MD: 0.4040 t(29)= 0.932 p= 0.359
There is so much traffic on the streets that it makes it difficult or unpleasant to visit parks	2.3438	2.1304	MD: 0.2133 t(53)= 0.878 p= 0.384	2.4091	2.3750	MD: -0.0342 t(28)= -0.081 p= 0.936
The walk to public parks is a pleasant experience	3.4516	3.8696	MD: -0.4180 t(52)= -1.646 0.106	3.6190	3.7500	MD: 0.1310 t(27)= 0.346 p= 0.732
There are issues that make you avoid parks	2.3667	2.3182	MD: 0.0485 t(50)= 0.155 p= 0.877	3.1250	2.1429	MD: 0.9821 t(27)= 2.190 p = 0.037*
Variables	People of Color Mean	White Mean	Mean Differences and t-tests			
It is easy to access and get around parks in your neighborhood	4.1071	4.3721	MD: -0.2650 t(69)= -1.298 p= 0.198			
There are a sufficient number of parks in your neighborhood	4.0370	4.0930	MD: -0.5600 t(68)= -0.221 p= 0.826			
There is so much traffic on the streets that it makes it difficult or unpleasant to visit parks	2.3704	2.3023	MD: 0.0680 t(68)= 0.297 p= 0.768			
The walk to public parks is a pleasant experience	3.6296	3.7857	MD: -0.1561 t(44)= -0.628 p= 0.533			
There are issues that make you avoid parks	2.8462	1.9756	MD: 0.8750 t(65)= 3.665 p <0.001**			

MD symbolizes "Mean Difference. t(x) symbolizes degrees of freedom. t(x)=y symbolizes t-score. * indicates a significant difference at the 0.05 level. ** indicates a significant difference at the 0.001 level.

Perceived Park Access

While physical park access produced no significant differences between the two sides of Delmar Boulevard, perceptual park access produced a significant difference. This instance occurred with African-American/Black northern respondents being significantly more likely to avoid parks due to the presence of issues in them ($t(27) = 2.190$, $p = 0.037$). This significant difference did not appear when comparing the means of the general populations on both sides of Delmar Boulevard. This indicates that despite living north of Delmar Boulevard, many White northern respondents do not perceive the parks they frequent to have issues within them prohibiting their park use, while African-American/Black residents do.

People of color and White responses also showed a significant difference in the perception of parks having issues that influence participants to avoid them ($t(65) = 3.665$, $p < 0.001$). With 23.1% of people of color and only 4.9% of White respondents stating they agree or strongly agree to issues in parks that make them avoid them, there is a clear difference in perception of park safety and quality. Additionally, 34.1% of White respondents strongly disagree with the presence of issues in their parks, while 0% of people of color respondents express this, further showcasing the divide in perception.

Neighbor Interactions

Different sides of Delmar, focusing on the general populations, expressed significantly different levels of comfort and trust in calling on neighbors in times of help ($t(53) = 2.384$, $p = 0.024$). 56.3% of southern respondents stated they had three or more neighbors they trusted to call on for help when needed, compared to only 21.6% of northern participants. This significant difference was also present in the examination of African-American/Black northern and White

southern respondents, with African-American/Black northern respondents having fewer neighbors they feel they could call on for help ($t(28) = -3.547$, $p = 0.001$). Additionally, northern African-American/Black respondents had significantly fewer neighbors they see or hear from at least once a month ($t(28) = -2.695$, $p = 0.012$). There was also a significant difference in the number of neighbors that people of color and White participants heard or saw at least once a month ($t(68) = -2.358$, $p = 0.021$), with 67.4% of White participants reporting seeing or hearing from three or more neighbors a month compared to only 40.7% of people of color participants.

Table 4: Independent T-Test Results for Neighbor Interaction Variables (0- None to 5- Nine or More)

Variables	South of Delmar Mean	North of Delmar Mean	Mean Differences and t-tests	South of Delmar- White Mean	North of Delmar- Black Mean	Mean Differences and t-tests
How many neighbors do you see or hear from at least once a month	2.9688	2.5217	MD: 0.4470 $t(53) = 1.163$ $p = 0.250$	3.2273	1.7500	MD: 1.4773 $t(28) = -2.695$ $p = 0.012^*$
How many neighbors do you feel at ease with that you can talk to about private matters	1.6250	1.3913	MD: 0.2337 $t(53) = 0.683$ $p = 0.497$	1.9091	1.0000	MD: 0.9091 $t(28) = -1.802$ $p = 0.160$
How many neighbors do you feel close to such that you can call on them for help	2.4688	1.6522	MD: 0.8166 $t(53) = 2.384$ $p = 0.021^*$	2.6818	1.1250	MD: 1.5568 $t(28) = -3.547$ $p = 0.001^*$
Variables	People of Color Mean	White Mean	Mean Differences and t-tests			
How many neighbors do you see or hear from at least once a month	2.1852	2.9767	MD: -0.7916 $t(68) = -2.358$ $p = 0.021^*$			
How many neighbors do you feel at ease with that you can talk to about private matters	1.2222	1.6744	MD: -0.4522 $t(68) = -1.422$ $p = 0.160$			
How many neighbors do you feel close to such that you can call on them for help	1.8148	2.2326	MD: -0.4177 $t(68) = -1.282$ $p = 0.204$			

*MD symbolizes "Mean Difference. $t(x)$ symbolizes degrees of freedom. $t(x)=y$ symbolizes t-score. * indicates a significant difference*

at the 0.05 level.

Neighborhood Perspectives

Examination of the general populations on the two sides of Delmar Boulevard produced one instance of significant difference in neighborhood perceptions. There is a substantial difference between which side of Delmar one lives on and the perception that their neighborhood is a good place to grow old, with a p-value of $t(52)=0.04$. 84.5% of respondents who live south of Delmar perceive that their neighborhood is a good place to grow old compared to only 59.1% of northern respondents. Analysis of African-American/Black northern and White southern participants revealed two significant neighborhood perceptual differences. Southern white respondents expressed significantly higher satisfaction with their quality of life ($t(28)= -3.373$, $p= 0.002$) and perception of there being interesting things to look at in their neighborhoods ($t(28)= -2.214$, $p= 0.035$). Similarly, people of color and White participants significantly differed in their satisfaction levels with the quality of life in their neighborhood ($t(68)=0.029$), with 74% of people of color respondents agreeing or strongly agreeing that they are satisfied with the quality of life in their neighborhood, compared to 88.4% of White respondents. Analysis of people of color and White responses showcased a near-significant difference in the perception of their neighborhood as a safe place to live ($t(67)=0.072$), their neighborhood containing a transit stop nearby ($t(66)=0.097$), and their neighborhood having interesting things to look at within it ($t(48)=0.073$).

Table 5: Independent T-Test Results for Neighborhood Perception (1- Strongly Disagree to 5- Strongly Agree) Park Access

Variables	South of Delmar Mean	North of Delmar Mean	Mean Differences and t-tests	South of Delmar-White Mean	North of Delmar-Black Mean	Mean Differences and t-tests
You are satisfied with the quality of life in your neighborhood	4.3750	3.9565	MD: 0.4185 t(53)= 1.671 p= 0.101	4.4545	3.2500	MD: 1.2046 t(28)= -3.373 p= 0.002*
Your neighborhood is a good place to raise children	4.0968	3.8571	MD: 0.2396 t(50)= 0.854 p= 0.397	4.0476	3.3750	MD: 0.6726 t(27)= -1.688 p= 0.103
Your neighborhood is a good place to grow old	4.1250	3.6364	MD: 0.4886 t(52)= 2.103 p= 0.040*	4.0909	3.5000	MD: 0.5909 t(28)= -1.701 p= 0.100
Your neighborhood is a safe place to live	4.2813	4.0000	MD: 0.2813 t(53)= 1.514 p= 0.136	3.8889	4.3636	MD: 0.4748 t(29)= -1.728 p= 0.095
Many shops, stores, markets or other places to buy things you need are within easy walking distance of your home	3.5313	3.0417	MD: 0.4896 t(54)= 1.539 p= 0.130	3.5455	3.0000	MD: 0.5455 t(29)= -1.101 p= 0.280
It is within a walkable distance to a transit stop from your home	4.0333	4.0000	MD: 0.0333 t(46)= 0.138 p= 0.891	4.1429	3.6667	MD: 0.4762 t(28)= -1.144 p= 0.262
There are many interesting things to look at while walking in your neighborhood	3.9677	3.8750	MD: 0.0927 t(53)= 0.376 p= 0.708	4.0476	3.2222	MD: 0.8254 t(28)= -2.214 p= 0.035*
There are networks of support for individuals and families during times of stress and need	3.1852	3.1000	MD: 0.0852 t(45)= 0.274 p= 0.785	3.0556	3.0000	MD: 0.5556 t(25)= -0.126 p= 0.900
All individuals and groups have the opportunity to contribute to and participate in the neighborhood's quality of life	3.2903	3.5238	MD: -0.2335 t(50)= -0.829 p= 0.411	3.4286	3.4444	MD: -0.0159 t(28)= 0.040 p= 0.968
All residents perceive that they — individually and collectively — can make the neighborhood a better place to live	3.5357	3.3333	MD: 0.2024 t(47)= 0.816 p= 0.419	3.4211	3.1111	MD: 0.3099 t(26)= -0.719 p= 0.479
There is an active sense of civic responsibility and engagement in my neighborhood	3.6207	3.5217	MD: 0.0990 t(50)= 0.384 p= 0.703	3.5000	3.2222	MD: 0.2778 t(27)= -0.673 p= 0.507
There is an active sense of civic pride in my neighborhood	3.7931	3.5417	MD: 0.2514 t(51)= 1.020 p= 0.313	3.7000	3.4444	MD: 0.2556 t(27)= -0.600 p= 0.554

Variables	People of Color Mean	White Mean	Mean Differences and t-tests
You are satisfied with the quality of life in your neighborhood	3.8519	4.3256	MD: -0.4737 t(68)= -2.231 p= 0.029*
Your neighborhood is a good place to raise children	3.7308	4.0488	MD: -0.3180 t(65)= -1.288 p= 0.202
Your neighborhood is a good place to grow old	3.7778	4.0238	MD: 0.2166 t(67)= -1.136 p= 0.260
Your neighborhood is a safe place to live	3.9286	4.2927	MD: -0.3641 t(67)= -1.826 p= 0.072
Many shops, stores, markets or other places to buy things you need are within easy walking distance of your home	3.5000	3.4524	MD: 0.0476 t(68)= 0.157 p= 0.876
It is within a walkable distance to a transit stop from your home	3.7778	4.1707	MD: -0.3930 t(66)= -1.684 p= 0.097
There are many interesting things to look at while walking in your neighborhood	3.6071	4.0732	MD: -0.4660 t(48)= -1.833 p= 0.073
There are networks of support for individuals and families during times of stress and need	3.2308	3.0571	MD: 0.1736 t(59)= 0.622 p= 0.536
All individuals and groups have the opportunity to contribute to and participate in the neighborhood's quality of life	3.1481	3.5500	MD: -0.4019 t(65)= -1.519 p= 0.134
All residents perceive that they — individually and collectively — can make the neighborhood a better place to live	3.5926	3.4359	MD: 0.1567 t(64)= 0.681 p= 0.499
There is an active sense of civic responsibility and engagement in my neighborhood	3.5185	3.5897	MD: -0.0712 t(64)= -0.304 p= 0.762
There is an active sense of civic pride in my neighborhood	3.6296	3.6410	MD: -0.0114 t(64)= -0.049 p= 0.961

Map Types

Donald Appleyard's (1970) categorization of cognitive map types provides a strong basis for examining the maps (see Figure 4). The first cognitive map prompt ("Draw a map of St. Louis emphasizing the parks you visit") evoked maps that had sequential networks as the most common, with thirteen maps. Outside of the Appleyard categorization, there were three responses that, despite the researcher's instructions, chose to display their perception of St. Louis in perspective form.

The second cognitive map prompt ("Draw your neighborhood emphasizing landmarks important to you") again produced a sequential network as the most popular map type, with fourteen maps. Two additional responses came in perspective form from respondents who also used perspective on prompt one.

Analysis of the general populations on the two sides of Delmar Boulevard showed that they drew significantly different types of maps for prompt two ($t(43) = 2.496$, $p = 0.016$). The southern mean of 4.5 indicates that most maps were spatial, emphasizing scattered landmarks, buildings, etc. The northern mean of 3.0 shows that most northern maps were sequential, focusing on road networks and connections.

Cognitive Map Common Themes

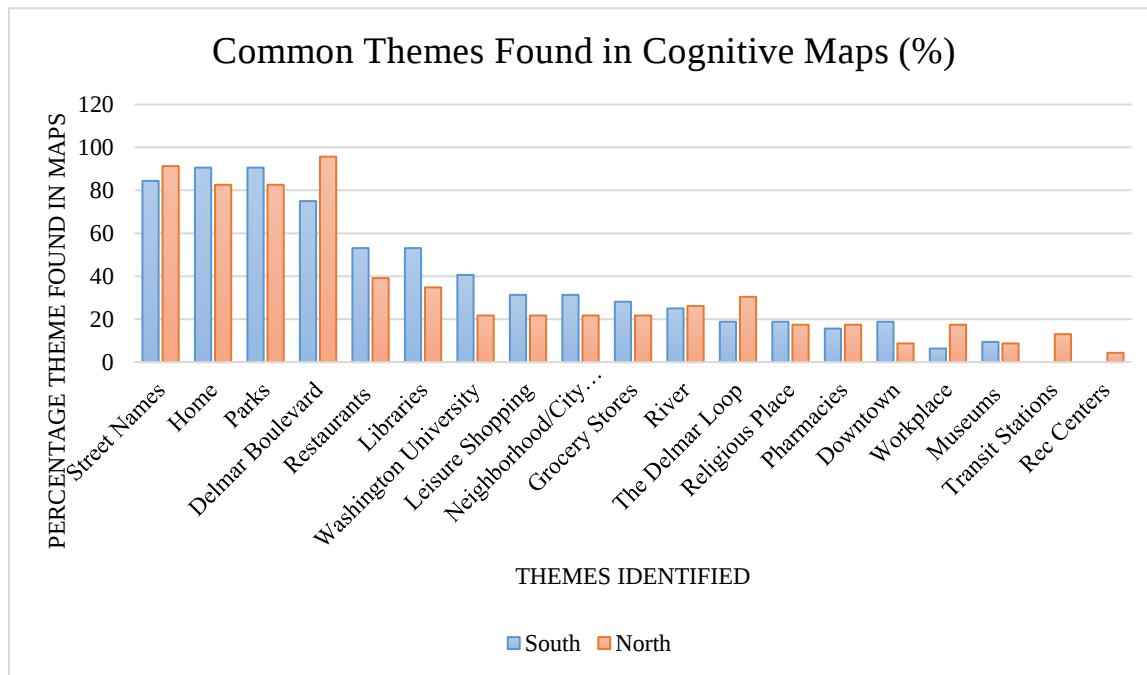


Figure 9: Themes Identified in Cognitive Maps

This project produced fifty-five cognitive maps in various styles with different important places identified and focus areas displayed. Examining cognitive maps led to establishing common themes seen throughout many maps. The most common themes respondents drew in their maps were street names (84.4% of southern and 91.3% of northern maps), their homes (90.6% of southern and 82.6% of northern maps), and parks (90.6% of southern and 82.6% of northern maps). Delmar Boulevard was marked in 75% of southern and 95.7% of northern maps, which is unsurprising given that the map prompts instructed the respondents to draw it, but interesting that considerably less southern respondents included it.

Other notable trends include southern respondents (40.6%), marking Washington University more often than northern respondents (21.7%). Maps delineating Downtown St. Louis

were also more common among southern residents (18.8%) than northern residents (8.7%). Inversely, northern residents marked their workplaces (6.3% of southern and 17.4% of northern maps), transit stations (0% of southern and 13% of northern maps), and recreation centers (0% of southern and 4.3% of northern maps) more than their southern counterparts (Figure 4).

Parks Identified

Parks were among the most common themes identified in cognitive maps. A wide range of parks and park classifications were noted throughout the responses. The city of Spokane, Washington's park classification system was used to organize the parks into eight distinct categories- community parks, golf courses, natural lands, neighborhood parks, parkways, pocket parks, regional parks, and special use parks. Regional parks were the most common, identified in maps forty-one times. The other most frequent park categories were community parks, with twenty-three, and neighborhood parks, with twenty-one.

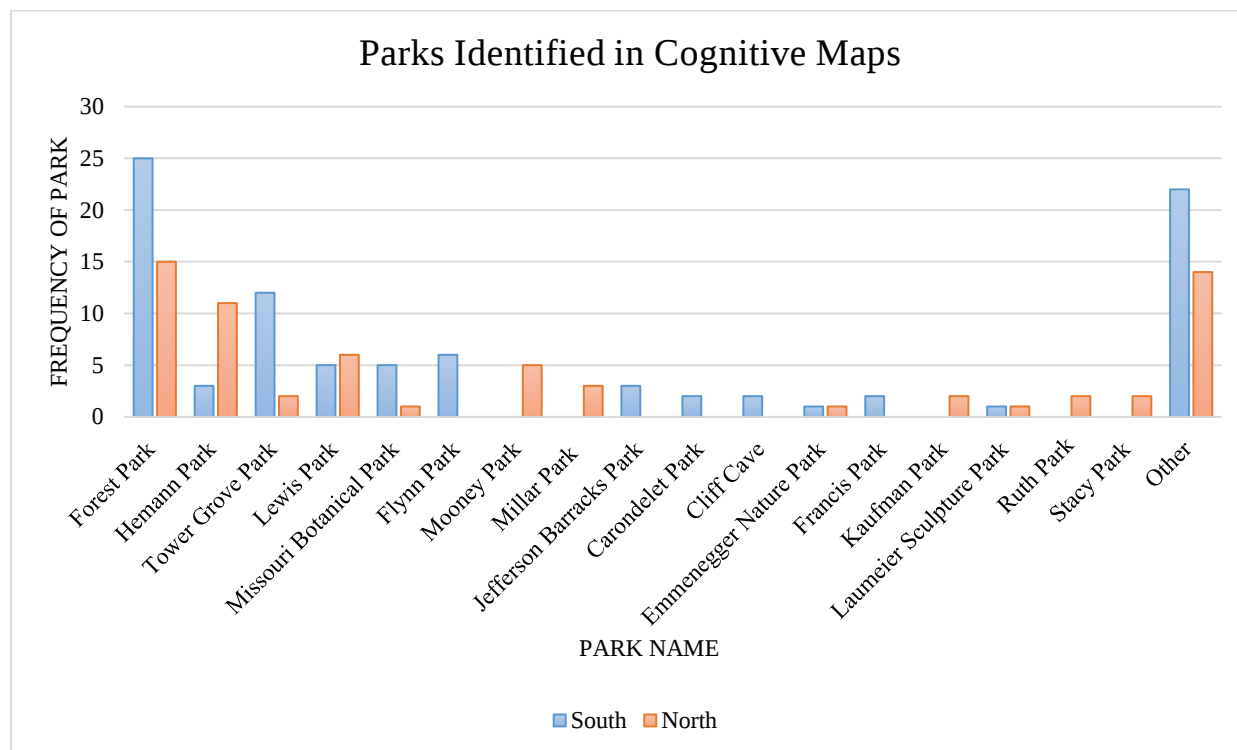


Figure 10: Parks Identified in Cognitive Maps

* Other includes Bee Tree Park, Castlewood Park, Creve Coeur Golf Course, Fogerty Park, Fountain Park, Grant Trail, Greg Freeman Park, Irv Zeid Citizen's Park, Joseph L. Adam's Park, Katy Trail, Kingsbury Park, Kirkwood Park, Koch Park, Lafayette Square Park, Lone Elk Park, Longview Farm Park, Malcolm Terrace Park, Oak Knoll Park, O'Fallon Park, Pershing State Park, Powder Valley Conservation Center, Ryan Hummert Memorial Park, Riverfront Trail, Shaw Park, St Ferdinand Park, Sublette Park, Sunset Park, Taylor Park, Vago Park, and Venable Park

Forest Park is the most frequently drawn park on the maps, identified in forty. After Forest Park, there is a steep drop in frequency levels to Hemann Park and Tower Grove Park with fourteen. Both are of note as they are strongly frequented by residents who live on one side of Delmar Boulevard. Similar trends were seen in the Missouri Botanical Garden and Flynn Park, which had high levels of majority southern respondents, and Mooney and Millar Park, which had high levels of northern respondents. These parks display a lack of movement fluidity for residents across Delmar Boulevard when frequenting parks. A high number of parks were only noted in one response, with 67% of the parks identified only being in one cognitive map.

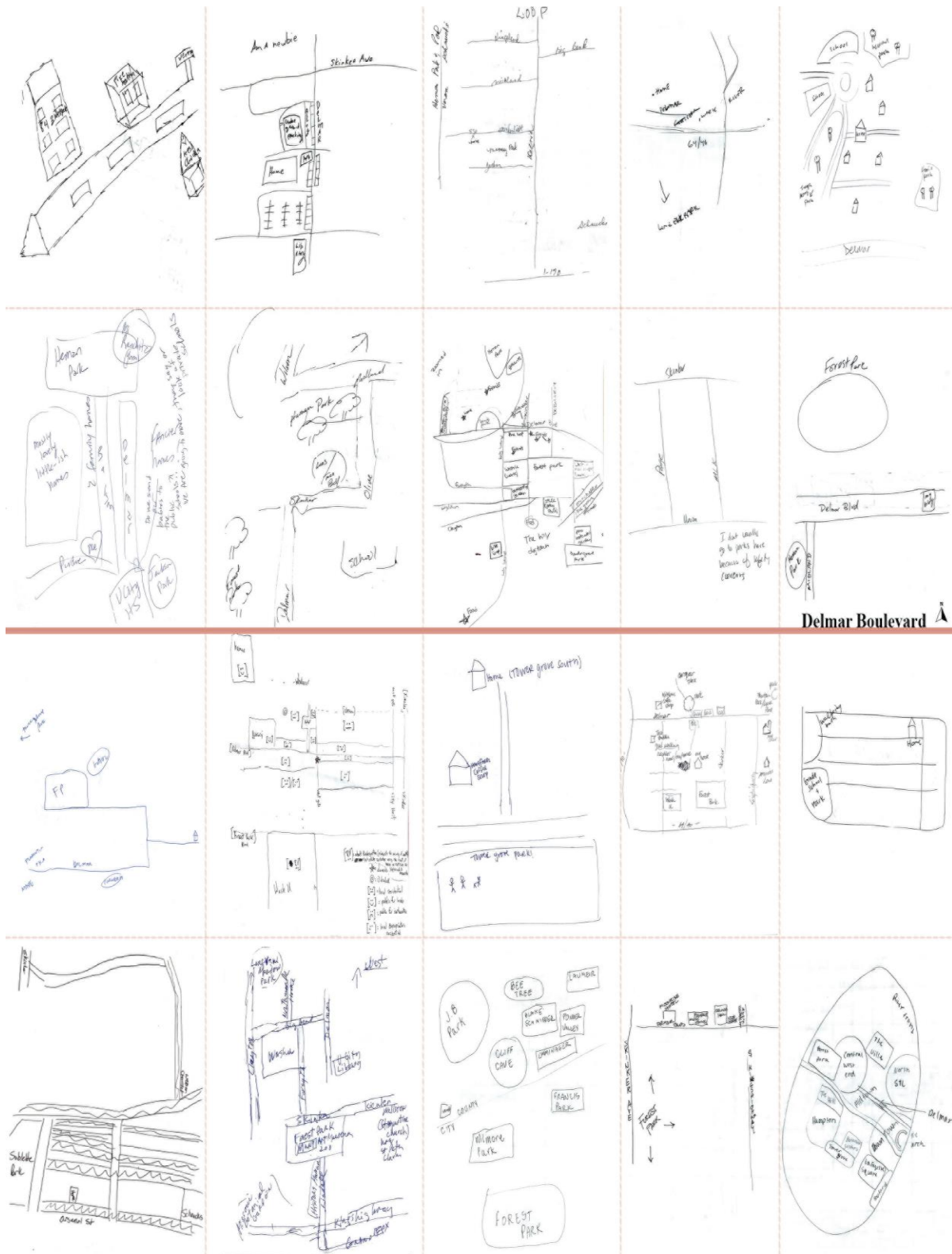


Figure 11: Cognitive Map Samples

Qualitative Map Analysis

Cognitive maps were analyzed to decipher participants' richness of information, visual diversity, map accuracy, and range of activity space. An inter-rater consistency test was used to determine the alignment of the two researchers' scoring (primary researcher and thesis advisor) with both researchers' grading maps on a five-point Likert scale. The intraclass correlation coefficient (ICC) tested the interrater reliability and variation between two raters who measured the same objects (Koo & Li 2016). A standard evaluation of ICC scores outlines 0.5-0.75 as moderate reliability, 0.75-0.90 as strong reliability, and 0.90 scores and over as excellent reliability (Koo & Li 2016). An average interrater correlation coefficient of 0.83 indicates strong consistency in both researchers' scoring and evaluation of each cognitive map.

Richness of Information

The richness of information was analyzed based on the sophistication of information, the number of elements drawn, and the variety of elements drawn. Maps with high levels of richness were understood to have strong spatial awareness and understanding of elements in their neighborhood and city, with a high count and wide variety of elements drawn. Once judged upon these criteria through the five-point Likert scale, it was understood that the general population south and north of Delmar had similar levels of richness in their drawings overall, with means of 2.53 (south) and 2.44 (north) for their drawings of the city and 2.5 (south) and 2.55 (north) for their neighborhoods. With no significant difference, the maps had a similar level of richness. Northern responses had a slightly higher proportion of maps that scored a five, which indicates incredibly high levels of richness, with 3.1% of responses compared to 3.3% of northern responses. Inversely, southern responses had a lower proportion of maps that scored a one, an

incredibly low level of richness, with 18% of responses compared to 25% of their northern counterparts.

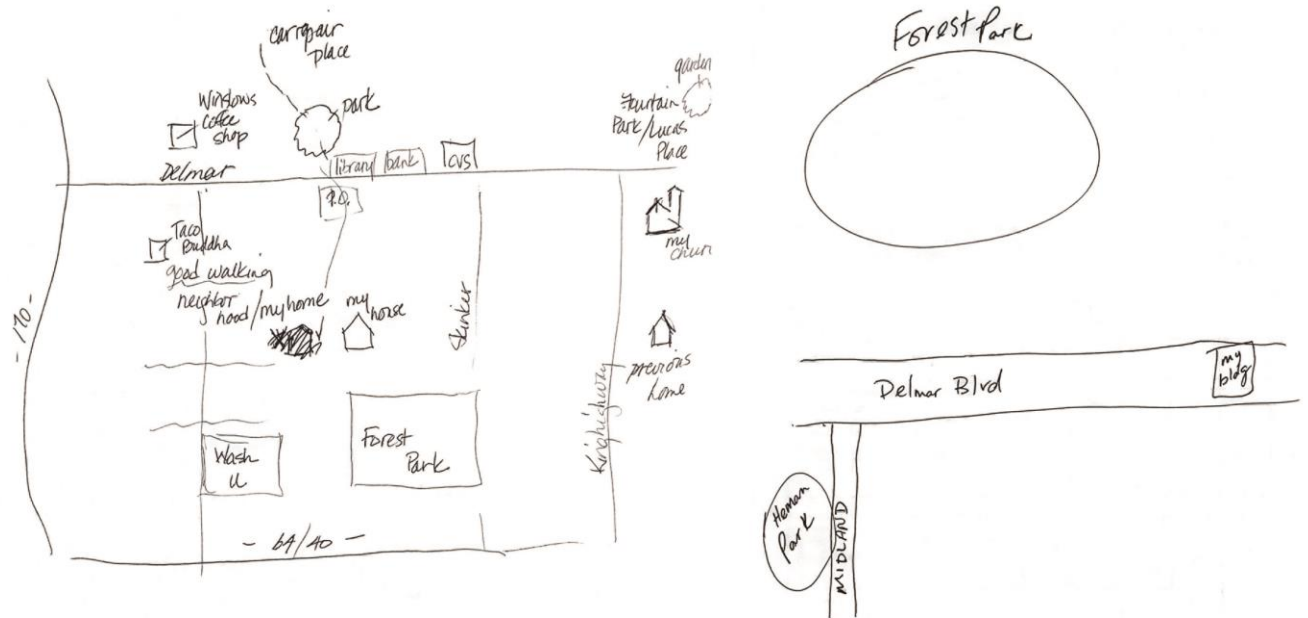


Figure 12: Map From South of Delmar that Scored a Five and a Map from the North that Scored a One

Visual Diversity

Visual diversity was scored by examining the artistic sophistication and diversity of the maps' drawing styles. Maps with high visual diversity were understood to have artistic representations of buildings, parks, etc., and a strong artistic style that expands beyond rudimentary two-dimensional drawings that rely on square and rectangle representations of elements. Once again, there was no significant difference between the visual diversity levels of maps from the South and North of Delmar, with means of 2.4 and 2.35 for the city maps, respectively, and means of 2.5 and 2.25 for the neighborhood maps, respectively. Southern responses have a higher proportion of maps that scored a five with 4.7% compared to 0%. Also,

southern responses had a lower frequency of scoring one with extremely low levels of visual diversity (22.7% compared to 28.3%, respectively).



Figure 13: Map from South of Delmar With Low Visual Diversity and a Map from the North of Delmar with High Visual Diversity

Map Accuracy

Cognitive maps were judged based on their spatial accuracy by examining spatial relationships, general locations of elements, and road connectivity and locations. No significant differences exist between southern and northern maps, with city map means of 2.56 for southern maps, 2.49 for northern maps, and 2.66 and 2.63 for neighborhood maps, respectively. Map accuracy scores featured 0.8% of southern responses scoring fives and none among northern responses. Southern maps had a much higher proportion of maps that scored a one, with 16.4%

of maps scoring one compared to 14.1% of northern maps.

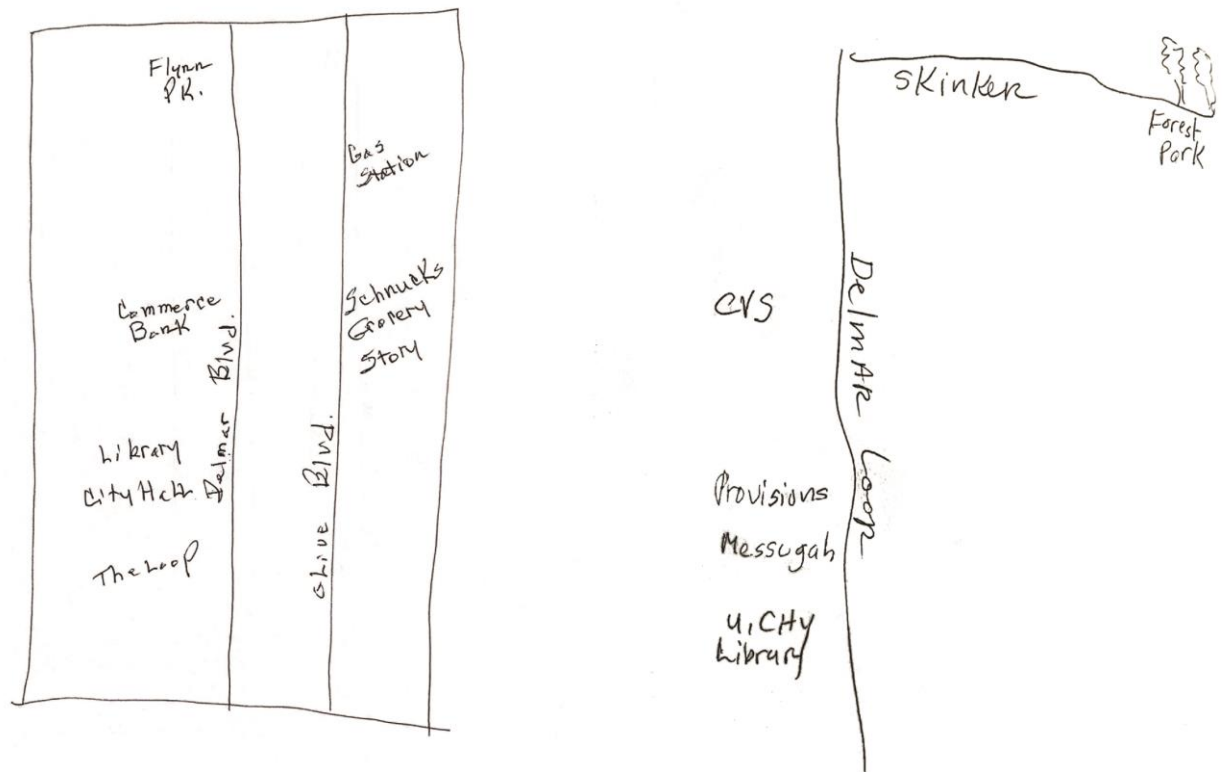


Figure 14: Maps from Both Sides of Delmar Displayed Very Low Map Accuracy at Times

Range of Activity Space

Analysis of the range of activity space examined the physical range of elements that participants noted in their city and neighborhood maps. Maps with a high score on the range of activity space noted elements spread throughout the city and showcased large perceived neighborhoods. Once again, there was no significant difference between the average range of activity space for respondents from south and north of Delmar Boulevard, with means of 2.88 (south) and 2.87 (north) for the maps of the city and means of 3.0 (south) and 2.73 (north) for the neighborhood maps. Southern maps were more likely to be scored a five with an ample activity space, with 10.94% scoring a five compared to only 8.70% of northern maps. Additionally, only

11.72% of southern maps scored a one compared to 15.3% of northern maps.

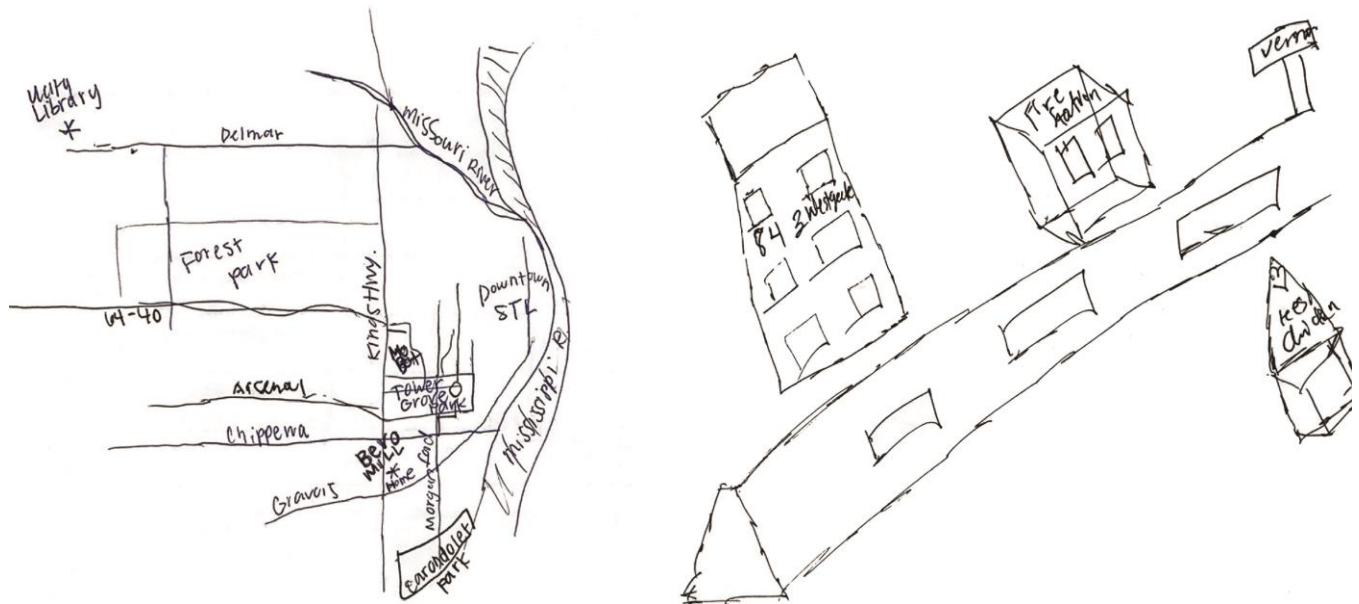


Figure 15: Southern Respondent's Map with a Large Activity Range and a Northern Respondent's Map with a Small Activity Range

Chapter 5 - Conclusion and Discussion

Conclusion

This study posed two research questions: **First, do St. Louis citizens on different sides of the Delmar Divide have equitable opportunities for public parks? And why?**

This study examined St. Louis residents' park knowledge and physical and park access. Delmar Boulevard was shown to affect the perceptual access variables substantially when the northern African-American and southern White populations were compared. Comparisons of people of color and White participants showcased instances of significant differences for both physical and perceptual park access. People of color participants were also less likely to be aware of where parks are located in their neighborhood, which contributes to physical and perceptual park access differences. These manifested in enhanced transportation barriers, making it physically more difficult to access parks, and higher rates of perceived issues in parks, forming a perceptual barrier to park access for people of color in St. Louis. Perceptual park access showed more significant differences, indicating that perceptual park access may be the primary indicator for park access. Cognitive maps revealed a stark divide in the parks noted by members of the differing sides of Delmar Boulevard. However, they did not showcase significant differences between richness of detail, visual diversity, map activity, or range of activity.

Second, do St. Louis citizens on different sides of the Delmar Divide perceive the neighborhood environments and barriers that affect their park access differently?

Delmar Boulevard also dictated differences in how residents perceived their neighborhoods and neighbors. General respondents who lived north of Delmar perceived their neighborhood as a good place to grow old at a considerably lower rate than their southern counterparts.

Additionally, African-American/Black respondents who lived north of Delmar Boulevard had a

lower satisfaction with their quality of life and felt like they had fewer interesting things to look at in their neighborhood. People of color participants also noted considerably lower satisfaction with the quality of their lives than their white counterparts. The general southern population and white southern respondents noted a significantly higher number of whom they feel they could call on for help during a time of need. White participants south of Delmar Boulevard and general white respondents also had more neighbors they see or hear from once a month. These findings indicate lower social cohesion, trust, and long-term satisfaction with their neighbors and neighborhoods among St. Louis citizens living north of Delmar and people of color across St. Louis. This further fortifies trends of people of color citizens and citizens who live north of Delmar Boulevard having less social cohesion, trust, and perceived quality of life in St. Louis. However, despite the perceptual effects Delmar Boulevard has on neighborhoods, only 54.1% of residents believe Delmar divides the city, indicating the potential successful effects of the St. Louis Economic Justice Development Plan and the emergence of potential new dividing lines such as Olive Boulevard.

The hypothesis testing results of this study are summarized as below:

Table 6: Hypotheses Results

	Hypothesis	Testing Results	Methods
H1	The difference in perceived neighborhood environments and barriers is associated with the difference in public park access and usage between neighborhoods divided by the Delmar Divide.	Significant difference at the 0.05 level.	T-Test and cognitive mapping analysis
H1-1	Perception of lower public park quality inhibits park usage for residents north of the Divide.	No significant difference.	T-Test and cognitive mapping analysis
H1-2	Residents on different sides of the Delmar Divide pursue different alternative recreational and social opportunities when not going to public parks.	Distinctive difference (cognitive mapping)	T-Test and cognitive mapping analysis

H1-3	Perceptions of northern St. Louis public parks as poorly programmed and unsafe restrict park usage and frequency.	Significant difference at the 0.05 level.	T-Test
H1-4	Residents living south of the Delmar Divide visit public parks more often than residents living north.	No significant difference.	T-Test
H1-5	Superior sidewalk quality and higher car ownership rates allow for increased public park usage south of the Delmar Divide.	No significant difference.	T-Test
H2	Racial divisions affect perceptual neighborhood environments and barriers of either side of residents differently.	Significant difference at the 0.05 level.	T-Test and cognitive mapping analysis
H2-1	Northern St. Louis residents have smaller perceived neighborhoods than southern St. Louisans.	No significant difference at the 0.05 level.	T-Test and cognitive mapping analysis
H2-2	Citizens' north of the Delmar Divide perceive lower quality levels of their essential community facilities	No significant difference at the 0.05 level.	T-Test
H2-3	Differences exist between what St. Louisans on differing sides of the Delmar Divide perceive as landmark features that they associate with civic pride.	No significant difference at the 0.05 level.	T-Test and cognitive mapping analysis
H2-4	Racial division inhibits cohesion in neighborhoods north of the Delmar Divide.	Significant difference at the 0.05 level.	T-Test
H2-5	Residents on both sides of the Delmar Divide perceive it as a legitimate barrier that restricts their mobility through the city.	No significant agreement at the 0.05 level.	T-Test and cognitive mapping analysis

Discussion

The historical understanding is that Delmar Boulevard divides two wholly different sides of St. Louis. However, in this study, Delmar Boulevard (for both the general population of the two sides of Delmar and northern African Americans and southern White participants) did not play a prominent role in participants' park knowledge or how likely they were to draw parks in their cognitive maps. However, comparisons of people of color and White respondents from both

sides of the Delmar Boulevard noted a significant difference in park knowledge. Results indicate that White respondents have a significantly higher knowledge of park locations in their neighborhood and how to get there. This informational barrier inhibits park access for minorities regardless of which side of Delmar one lives on and is one of the initial barriers that target minority citizens (Wang et al. 2015).

Contradicting studies have debated whether minorities have lower geographic access to parks (Byrne et al. 2009; Estabrooks et al. 2003; Wang et al. 2015a) or higher geographic access to parks but lower perceived access to them (Jones et al. 2009; Wang et al. 2015a). In this study, both physical and perceptual access had significant differences, but perceptual access showcased more. For physical accessibility to parks, results indicate that people of color are more likely to use transit to access public parks than White residents. Additionally, all instances of transit stops noted in cognitive maps were in responses from north of Delmar Boulevard, mostly from people of color participants. This aligns with broader trends in St. Louis, with minorities being more likely to use public transit to get to work (United States Census Bureau 2023). Despite walking and driving to parks being the most popular choices for all racial demographics, the heightened reliance of people of color participants on public transportation, as well as higher car ownership rates for White residents, indicates enhanced physical barriers and accessibility issues posed for minorities compared to their White peers and reinforces race as a key component to understanding park access (Aday & Anderson 1974; Bisht et al. 2012; Ferreira & Batey 2007; Pirie 1981; Wang et al. 2015b).

Perceptual park access differences existed between African-American/Black northern and White southern participants. African-American/Black respondents who live north of Delmar Boulevard expressed higher rates of avoiding parks due to the presence of issues in them (e.g.,

crime safety or antisocial behavior). This trend was also present when comparing people of color and white participants. This aligns with past studies which have shown that minorities are more likely to avoid parks due to fear of safety, crime, and interracial conflict (Bryne & Wolch 2009; Garcia et al. 2016; Gobster 2002; Harris et al. 2020; Keith et al. 2018; Payne et al. 2002; Powers et al. 2020; Scott & Lee 2018; Washburne 1978; Wesley & Gaarder 2004). This perceptual barrier layers onto physical barriers, making accessing parks more difficult for people of color and African-American/Black participants. The presence of more perceptual park access inhibitors across multiple groups indicates its primary status as an indicator of park access in St. Louis.

Layering onto the perceptual park access disparities that Delmar delineated, parks were territorialized. Outside of Forest Park, parks noted in cognitive maps were often dominated by respondents from one side of Delmar (see Figure 10). The territoriality of parks indicates low permeability and comfort when crossing Delmar and visiting parks on the other side. Additionally, Abdelmonem and McWhinney (2015) argue that cities with a divided social landscape see group territorialization of their parks, which could be seen in the exclusivity of the parks accessed by residents living along Delmar Boulevard.

Analysis of cognitive maps showed no significant difference between the two sides of Delmar Boulevard when comparing the richness of details, visual diversity, or map accuracy within their maps. These factors combine with park knowledge to give a holistic view of participants' spatial knowledge of their city. Map richness levels were low across both sides of Delmar Boulevard, indicating lower levels of spatial understanding and familiarity for both groups. Despite being two different groups in socio-economic makeup, consistencies in map visual diversity or design strategies are common (Madalemo 2010). The map accuracy was low

across both groups, but accuracy was not a significant criterion, focusing on spatial representations of the city and neighborhoods (Madalemo 2010).

While there were no differences in broad map analysis, a more focused examination showed Delmar Boulevard did dictate the alternate recreation and social opportunities St. Louis residents undertake in their cognitive maps (see Figure 9). In their cognitive maps, respondents living south of Delmar noted social outlets such as restaurants and leisure shopping more often than their northern counterparts. In contrast, respondents north of Delmar noted more essential and immediate needs, such as their workplace and transit centers. Despite having similar ranges of activity space in their cognitive maps, southern participants were also more likely to highlight some of St. Louis' most "iconic" and potentially more exclusive areas spread throughout the city, such as Washington University in St. Louis and the Gateway Arch. This contrast highlights the material and economic divide that exists along Delmar Boulevard today as well as the differing comfort level members of socio-economic classes have in public spaces (Crawford et al. 1991; Hillier et al. 2016; Kaźmierczak, 2013; Keith et al. 2018; Mullenbach et al. 2022; Plumer & Popovich 2020; Powers et al. 2022; Rigolon 2016; Schell et al. 2020)

Despite physical and perceptual park access and knowledge significantly influencing respondents' park access, there was disagreement on whether Delmar Boulevard impacted this. There has been a long-established understanding of Delmar Boulevard as a dividing force separating races and economic classes in St. Louis (Trivers & Rosenthal 2015). However, only 54.1% of respondents stated that Delmar Boulevard divides the city, indicating some differing perspectives on the role of Delmar Boulevard in contemporary St. Louis.

While only 54.1% of respondents believe Delmar Boulevard divides the city, it was frequently used as a boundary in city and neighborhood cognitive maps. This trend was seen in

responses from both sides of Delmar Boulevard. A typical physical boundary common throughout the cognitive maps is seen in many past studies (Catney et al. 2019). However, the frequency of Delmar Boulevard's role as a boundary that defines the edges in maps indicates that it still consciously or subconsciously dictates movement and activity among many St. Louis citizens.

Many participants were unsure whether it divides the city, indicating it does not play an active role in the psyche of many respondents. Some free-answer responses brought up Olive Boulevard as the predominant divider in their life rather than Delmar Boulevard (see Figure 3). This was only found in responses of those who lived in University City as Olive Boulevard terminates at the St. Louis proper boundary but implies a divide shift northward once you enter University City. Additionally, St. Louis is making deliberate efforts to eradicate the historical perception of Delmar as a dividing force through its "St. Louis Economic Justice Action Plan" (St. Louis Development Corporation 2022). The number of respondents who do not view Delmar Boulevard as dividing the city suggests the plan's initiatives on perception have potentially had some initial success.

While the perception of Delmar Boulevard may be changing, differences in perceived neighborhood qualities and neighbors continue to exist. The general populations south of Delmar Boulevard noted a significantly higher perception of their neighborhood as a good place to grow old. With higher crime levels, poverty, and decrepit infrastructure, many northern residents do not view it as a long-term living option (United States Census Bureau 2023). African-American/Black respondents living north of Delmar Boulevard also showed lower satisfaction with the quality of their lives and the perception of their neighborhood as having less interesting things to see. People of color also had a lower level of satisfaction with the quality of their lives.

The systematic racism that has persisted in America for generations continues to inhibit minority quality of life through unique health challenges, lower park access and economic levels, and the disproportionate effect COVID-19 has had on the minority community (Carney et al. 2022; Francis et al. 2016; Mullenbach et al. 2022; Purnell et al. 2015; United States Census Bureau 2015).

Analysis of general populations from north and south of Delmar Boulevard and northern African-American/Black and southern White participants revealed that residents living north of Delmar felt that they had fewer neighbors they could go to to call on for help. Additionally, northern African-Americans and general people of color participants felt that they had fewer neighbors who they see or hear from once a month. These findings reveal that minorities and residents who live north of Delmar Boulevard have less social cohesion and neighbor trust. The lack of social cohesion and neighborly trust is a factor that contributes to the lower satisfaction levels of quality of life for these groups.

The differences in cognitive mapping styles also reveal the differences in perceived neighborhoods. Southern maps from the general southern population were more spatial, revealing that they focused more on the landmarks, buildings, rivers, etc. than spatial accuracy. In contrast, northern responses were more sequential, meaning they focused more on road networks and the spatial connectivity of items. This juxtaposition of styles reveals each group's different priorities within their neighborhoods, with southern respondents prioritizing the amenities and assets their neighborhoods contain. In contrast, northern respondents prioritize the transportation and movement networks their neighborhoods enable.

Limitations

Several limitations to this research must be considered: First, the sample size is too small to represent the population, thus limiting the generalizability of the results. Subject recruitment was originally to be achieved through collaborations with organizations around Delmar Boulevard. The engagement level for the initial subject recruitment technique was lower than anticipated. This led to an unrepresentative population, especially north of Delmar Boulevard, where there is not a representative amount of African-American participants.

This study recruited the subjects using convenience sampling through solicitation at Delmar Loop amenities. Convenience sampling limits the study's external validity since the findings cannot be easily applied to those with differing characteristics not sampled (Andrade 2020). Convenience sampling did not achieve a desired sample size of one hundred despite in-person surveys typically receiving higher response rates (Nulty 2008).

Due to financial constraints limiting site visits and the intensive nature of cognitive map drawing, seventy-six samples were collected. Cognitive mapping is a time-intensive study method for both the researcher and the participant (Smith & Aranha 2022). Past research has shown that a practical map takes a minimum of 30-40 minutes to complete, which is incompatible with the amount of time many participants are willing to contribute to the creation (Smith & Aranha 2022). Despite this, Hikmet and Chen (2003) argue that small sample sizes still create valuable data, validating the significant differences found in this study.

The preferred data collection method for cognitive mapping is in small groups to increase comfort levels and have the researcher readily available to answer questions (Smith and Aranha 2022). This focus group collection style was incompatible with the convenience data collection through solicitation, limiting the effectiveness of the map generation process.

This led to communication fallacies throughout the map-making process. The most common miscommunication was with participants drawing their city map in the neighborhood space and their neighborhood map in the city space. This caused the researcher to reorganize and adjust maps that were drawn in the wrong order.

A final major limitation is the researcher's status as a White individual and the complications of minority mistrust of researchers and research projects (Schraff et al. 2010). African American citizens frequently fear that their involvement in a study could produce data that reinforces dangerous stereotypes (Schraff et al. 2010). This was especially present in the subject recruitment process of this study, with many potential subjects declining participation due to a mistrust of research and once they heard the study was on Delmar Boulevard's legacy and impact.

Further Research and Implications for Practice

Further research is needed to better understand the validity of perception as the primary influence on park access and what factors influence the mixed opinions on Delmar Boulevard. Studies need a more comprehensive sample size that is strategic with its subject recruitment, ensuring population diversity and validity. In St. Louis, targeting adjacent neighborhoods rather than a general area, such as the Delmar Loop, could provide more representative demographics and translatable findings. Replicating this study in other divided American cities, such as Kansas City and Detroit, would showcase significant trends connecting divided cities while highlighting the unique nature of each city's division.

Supplemental interviews would strengthen the survey and cognitive maps' themes, narratives, and revelations. Some short answer and cognitive mapping results revealed themes

that were hard to comprehend and understand without direct dialogue with the participant. Having supplementary interviews after the survey and mapping exercises would assist in researcher comprehension and understanding, allowing for richer explanation and examination of themes and narratives.

Cognitive mapping technological developments could enhance the maps' validity and richness of detail. Combining cognitive mapping with new georeferencing technologies could compare the perceptual and physical activity spaces of participants, illuminating differences in the places people visit in their daily life and the places they perceive as important in their life (Jang & Kim 2019; Raanan Greenberg & Shoval 2014). Virtual reality offers new cognitive mapping frontiers and can enhance the participant's ability to increase the richness of their spatial understanding and detail in their responses (Cimadevilla et al. 2023).

This study will help St. Louis further policies meant to dismantle Delmar's division in St. Louis, whether perceptual or physical. Specifically, with the St. Louis Economic Justice Action Plan, this study can highlight the effectiveness of the initiatives in action. Of the five primary goals outlined in the plan, the goals focused on strengthening neighborhoods, closing the wealth gap, and improving health and education outcomes are directly related to outcomes found in this study (St. Louis Development Corporation 2022). The lower-than-anticipated perception of Delmar Boulevard as a division indicates the potential effectiveness of initiatives attempting to change the perception behind the boulevard. However, the lower neighborhood social cohesion levels, poor neighborhood perceptions, and presence of Delmar acting as a boundary in many maps indicate the need for further policy refinement and enforcement to develop neighborhoods.

The disparities in park knowledge and physical and perceptual park access illustrate the need for revised policy and design techniques. Within the Economic Justice Action Plan, one of

the subgoals is to increase the land used for greenways, community gardens, and other green uses (St. Louis Development Corporation 2022). While this initiative highlights the importance of green spaces, it does not account for the barriers that perceptual access poses, as found in this study. Additionally, this study's findings highlight the need for St. Louis and University City's Parks, Recreation, and Forestry departments to revise their design techniques for new parks and renovate their current parks to enhance park access. To enhance park access for people of color St. Louis residents, the cities of St. Louis and University City need to strategically design parks to promote ease of public transit usage, increase safety measures by collaborating with citizens to understand what would make them feel safe in parks (i.e., may not be police), and better promote their parks to all members of the community, not just White citizens.

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Figure Citations

Figure 1. *University City's Loop Area*. Photograph. Flickr, July 5, 2017. Accessed April 9, 2025. <https://www.flickr.com/photos/tedengler/35698720306/in/photolist-WozgPG-2p4wm5d-2qBuqtf-2qNa6mW-T9L39h-2p4tM5q-2p9FAdz-2iKpr4S-SV4FKC-2p4vkTX-ToyNtH-2qLMw8T-7SeMqu-24CuMpt-2p4wmuX-3Lrxr-2h8rL2K-qD98d-2p4wmmf-Tszjan-8fhFtP-8fhFFx-8fhEVn-NZMPVp-8fkWML-8fkWoJ-2qQEKfQ-avCobh-8fkWWj-2qS7ot7-cWXe1G-6JSxMM-2qVZrxy-2p9FxFUw-9CHnKx-7121MD-7161J5-Ye9BP9-711YWz-3bjMAr-715Xrb-2p9FgQ1-2p4wm2H-711ZCg-2p4wmhH-avzJjg-2iKPsZ-2p4vHZM-avCo5y-ne6RL3>.

Figure 2. Engler, Ted. *Band Stand*. Photograph. Flickr, July 9, 2022. Accessed April 9, 2025. <https://www.flickr.com/photos/tedengler/52205021716/in/photolist-2nxboaj-2jaz5ej-YueBWS-2oLqCvk-2pYdsUA-2nBZUxx-2oy8Nvk-2kArY7X-STKsEs-2juxD8f-2j7HSJh-2hH9tap-2mq7EYw-2mX5PQi-TLbqYd-2dukboxj-LNdUVj-2pkPc1K-GwM9Mn-UPAcAS-2jr32fF-2953cYf-2o16hPU-2ktkfbL-2iLxKvP-Kobxm-2iNvrgj-26o59jX-2c1QxrV-2oJD8cn-2gQt66w-2365Dyy-2bVMCSs-RJXFqM-S8niCD-2nTPpjL-PUicDy-JFREkt-2jkdb1Y-2kj79Y8-G2mGrU-Lf2rZY-SxA7nw-2n9Dyoq-2o95ibr-2nFehwg-dbtPDc-2muxuK8-dbtR1d-2hvozNc>.

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Figure 4. Appleyard, Donald. 1970. "Styles and methods of structuring a city." *Environment and Behavior* 2, no. 1: 100-17. <https://doi.org/10.1177/001391657000200106>.

Survey Citations

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Appendix A - Survey Questionnaire

Project Approval Date:

Project Expiration Date:

Length of Study:

15 Minutes

Project Title: Do Racial Divisions Affect Inequities In Park Access And Neighborhood Environments? A Comparison Of Neighborhoods On Either Side Of The Delmar Divide In St. Louis, Missouri

Principle Investigator: Kyle Odgers

Co-Investigator: Associate Professor Hyung Jin Kim

Who can I talk to if I have an issue? Please contact Kyle Odgers at (913)-905-9163 and kaodgers@ksu.edu, Associate Professor Hyung Jin Kim at hyungjin@ksu.edu, or Lisa Rubin, Chair, Committee on Research Involving Human Subjects at (785) 532-3224

Why is this research being done? This research project is being conducted to fulfill the requirements for the Master's degree at Kansas State University. With the backdrop of the "Delmar Divide," this study attempts to understand better how perception impacts park access and neighborhood environments.

What should I know about this research? This study uses drawings and surveys to understand better perceptions of spatial environment. Participants will first use drawing materials to create drawings that show their perception of their surroundings. Then, answering survey questions will help understand perceptions and provide demographic data.

Is there anyway this research could harm me? No known risks or discomfort are anticipated from participation in this research. If at anytime you feel uncomfortable, you can skip a question or stop at anytime.

What can I get out of this research? Participation benefits include an enhanced understanding of your access to parks and the city you live in. Additionally, participants have the option to enter into a raffle for an Amazon gift card.

What happens to the information collected in this research? The information collected as part of this research, even if identifiers are removed, will not be used or distributed for future research studies.

Terms of participation: I understand this project is research, and that my participation is voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time, and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

I verify that my signature below indicates that I have read and understand this consent form, and willingly agree to participate in this study under the terms described, and that my signature acknowledges that I have received a signed and dated copy of this consent form.

(Remember that it is a requirement for the P.I. to maintain a signed and dated copy of the same consent form signed and kept by the participant).

PARTICIPANT NAME:

PARTICIPANT SIGNATURE:

DATE:

WITNESS TO SIGNATURE: (PROJECT STAFF)

DATE:

The first task is just... drawing! This is not an art competition and quality of drawing does not matter at all, so don't worry too much about it. Please just let your creativity run free and draw whatever comes to your mind to answer the prompts. Please ensure that you include places important to you and ones you visit a lot.

In the space below, draw a map of your CITY, St. Louis making sure to include your home and Delmar Boulevard.

There is no rule in your drawing but please include places (with names) that are important to you and you have visited frequently, including parks. You can use pencils, colored pencils, crayons, markers, or whatever you want



In the space below, draw a map of your NEIGHBORHOOD.

Like the drawing above, there is no rule in your drawing but please include places (with names) that are important to you and you have visited frequently, including parks. You can use pencils, colored pencils, crayons, markers, or whatever you want.



This survey is your chance to let the researchers know what you think about your neighborhood environments and its parks.

Please tell us how much you agree with each statement on a scale from one (strongly disagree) to five (strongly agree).

1. Your knowledge of public parks.	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	I Don't Know
I am aware of public parks in my neighborhood.						
I know where the parks are located in my neighborhood and how to get there.						
I am aware of the activities and programs held in the public parks near me.						
I think Forest Park belongs to my neighborhood.						

Please tell us how you feel or think about each of the following statements on a scale from one (never) to five (very often).

2. Your physical access to parks in your neighborhood.	Never	Rarely	Sometimes (About Monthly)	Often (At Least Weekly)	Very Often (Most Days)	I Don't Know
How often do you visit parks in your neighborhood?						
How often do you walk to parks in your neighborhood?						
How often do you drive to parks in your neighborhood?						
How often do you use public transportation (bus or rail) to go to parks in your neighborhood?						
How often do you visit Forest Park?						

Please tell us how much you agree with each statement on a scale from one (strongly disagree) to five (strongly agree).

3. Your perception about park accessibility in your neighborhood.	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	I Don't Know
It is easy for me to access and get around parks in my neighborhood.						
There are a sufficient number of parks in my neighbourhood.						

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	I Don't Know
There is so much traffic on the streets that it makes it difficult or unpleasant to visit parks						
The walk to public parks is a pleasant experience.						
There are issues (e.g. crime safety or antisocial behaviour, etc.) that make me avoid parks.						

Please tell us how many people in your life align with the statement on a scale from one (none) to five (nine or more)

4. Friendships: Consider all of your friends or those who live in your neighborhood.	None	One	Two	Three or Four	Five Through Eight	Nine or More
How many of your neighbors do you see or hear from at least once a month?						
How many neighbors do you feel at ease with that you can talk about private matters?						
How many neighbors do you feel close to such that you could call on them for help?						

Please tell us how much you agree with each statement on a scale from one (strongly disagree) to five (strongly agree).

4. What is life in your neighborhood like?	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	I Don't Know
I am satisfied with the quality of life in my neighborhood.						
My neighborhood is a good place to raise children.						
My neighborhood is a good place to grow old.						

	Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree	I Don't Know
My neighborhood is a safe place to live.						
Many shops, stores, markets or other places to buy things I need are within easy walking distance of my home.						
It is within a walkable distance to a transit stop (such as bus, train, trolley, or tram) from my home.						
There are many interesting things to look at while walking in my neighborhood.						
There are networks of support for individuals and families during times of stress and need.						
All individuals and groups have the opportunity to contribute to and participate in the neighborhood's quality of life.						
All residents perceive that they — individually and collectively — can make the neighborhood a better place to live.						
There is an active sense of civic responsibility and engagement in my neighborhood.						
There is an active sense of civic pride in my neighborhood.						

How often do you visit the "other side" of Delmar Boulevard?

- Never ☐
 Rarely ☐
 Sometimes ☐
 Often ☐
 Very Often ☐
 I Don't Know ☐

Appendix B - IRB Approval

TO: Hyung Kim
Landscape Archit & Comm Plan
Manhattan, KS 66506

Proposal Number: IRB-12393

FROM: Lisa Rubin, Chair
Committee on Research Involving Human Subjects

DATE: 10/14/2024

RE: Proposal Entitled, "Do Racial Divisions Affect Inequities In Park Access And Neighborhood Environments? A Comparison Of Neighborhoods On Either Side Of The Delmar Divide In St. Louis, Missouri.."

The Committee on Research Involving Human Subjects / Institutional Review Board (IRB) for Kansas State University has reviewed the proposal identified above and has determined that it is EXEMPT from further IRB review. This exemption applies only to the proposal - as written - and currently on file with the IRB. Any change potentially affecting human subjects must be approved by the IRB prior to implementation and may disqualify the proposal from exemption.

Based upon information provided to the IRB, this activity is exempt under the criteria set forth in the Federal Policy for the Protection of Human Subjects, **45 CFR §104(d), category:Exempt Category 2 Subsection ii.**

Certain research is exempt from the requirements of HHS/OHRP regulations. A determination that research is exempt does not imply that investigators have no ethical responsibilities to subjects in such research; it means only that the regulatory requirements related to IRB review, informed consent, and assurance of compliance do not apply to the research.

Any unanticipated problems involving risk to subjects or to others must be reported immediately to the Chair of the Committee on Research Involving Human Subjects, the University Research Compliance Office, and if the subjects are KSU students, to the Director of the Student Health Center.

Electronically signed by Lisa Rubin on 10/14/2024 11:22 AM ET

TO: Hyung Kim
Landscape Archit & Comm Plan
Manhattan, KS 66506

FROM: Lisa Rubin, Chair
Committee on Research Involving Human Subjects

DATE: 10/22/2024

RE: Proposal #IRB-12393, entitled "Do Racial Divisions Affect Inequities In Park Access And Neighborhood Environments? A Comparison Of Neighborhoods On Either Side Of The Delmar Divide In St. Louis, Missouri.."

MODIFICATION OF IRB PROTOCOL #IRB-12393, ENTITLED, "Do Racial Divisions Affect Inequities In Park Access And Neighborhood Environments? A Comparison Of Neighborhoods On Either Side Of The Delmar Divide In St. Louis, Missouri.."

EXPIRATION DATE: Exempt

The Committee on Research Involving Human Subjects (IRB) has reviewed and approved the request identified above as a modification of a previously approved protocol. **Please note that the original expiration remains the same.**

All approved IRB protocols are subject to continuing review at least annually, which may include the examination of records connected with the project. Announced in-progress reviews may also be performed during the course of this approval period by a member of the University Research Compliance Office staff. Unanticipated adverse events involving risk to subjects or to others must be reported immediately to the Chair of the IRB, and / or the URCO

It is important that your human subjects activity is consistent with submissions to funding / contract entities. It is your responsibility to initiate notification procedures to any funding / contract entity of any changes in your activity that affects the use of human subjects.

Electronically signed by Lisa Rubin on 10/22/2024 3:07 PM ET

TO: Hyung Kim
Landscape Archit & Comm Plan
Manhattan, KS 66506

FROM: Lisa Rubin, Chair
Committee on Research Involving Human Subjects

DATE: 11/06/2024

RE: Proposal #IRB-12393, entitled "Do Racial Divisions Affect Inequities In Park Access And Neighborhood Environments? A Comparison Of Neighborhoods On Either Side Of The Delmar Divide In St. Louis, Missouri."

MODIFICATION OF IRB PROTOCOL #IRB-12393, ENTITLED, "Do Racial Divisions Affect Inequities In Park Access And Neighborhood Environments? A Comparison Of Neighborhoods On Either Side Of The Delmar Divide In St. Louis, Missouri."

EXPIRATION DATE: Exempt

The Committee on Research Involving Human Subjects (IRB) has reviewed and approved the request identified above as a modification of a previously approved protocol. **Please note that the original expiration remains the same.**

All approved IRB protocols are subject to continuing review at least annually, which may include the examination of records connected with the project. Announced in-progress reviews may also be performed during the course of this approval period by a member of the University Research Compliance Office staff. Unanticipated adverse events involving risk to subjects or to others must be reported immediately to the Chair of the IRB, and / or the URCO

It is important that your human subjects activity is consistent with submissions to funding / contract entities. It is your responsibility to initiate notification procedures to any funding / contract entity of any changes in your activity that affects the use of human subjects.

Electronically signed by Lisa Rubin on 11/06/2024 2:41 PM ET

TO: Hyung Kim
Landscape Archit & Comm Plan
Manhattan, KS 66506

FROM: Lisa Rubin, Chair
Committee on Research Involving Human Subjects

DATE: 11/12/2024

RE: Proposal #IRB-12393, entitled "Do Racial Divisions Affect Inequities In Park Access And Neighborhood Environments? A Comparison Of Neighborhoods On Either Side Of The Delmar Divide In St. Louis, Missouri.."

MODIFICATION OF IRB PROTOCOL #IRB-12393, ENTITLED, "Do Racial Divisions Affect Inequities In Park Access And Neighborhood Environments? A Comparison Of Neighborhoods On Either Side Of The Delmar Divide In St. Louis, Missouri."

EXPIRATION DATE: Exempt

The Committee on Research Involving Human Subjects (IRB) has reviewed and approved the request identified above as a modification of a previously approved protocol. **Please note that the original expiration remains the same.**

All approved IRB protocols are subject to continuing review at least annually, which may include the examination of records connected with the project. Announced in-progress reviews may also be performed during the course of this approval period by a member of the University Research Compliance Office staff. Unanticipated adverse events involving risk to subjects or to others must be reported immediately to the Chair of the IRB, and / or the URCO

It is important that your human subjects activity is consistent with submissions to funding / contract entities. It is your responsibility to initiate notification procedures to any funding / contract entity of any changes in your activity that affects the use of human subjects.

Electronically signed by Lisa Rubin on 11/12/2024 2:52 PM ET