Transport-related social exclusion in East Baton Rouge Parish

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TRANSPORT-RELATED SOCIAL EXCLUSION IN EAST BATON ROUGE PARISH

A Thesis

Submitted to the Graduate Faculty of the Louisiana State University and Agricultural Mechanical College in partial fulfillment of the requirements for the degree of Master of Social Work

in

The School of Social Work

By
Andrew Jonathon Dietz
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ABSTRACT

Transportation systems are powerful tools, capable of entrenching existing inequalities or facilitating the pursuit of a more equitable society (Wellman, 2015). This is particularly true for urban areas that are plagued by sprawl, congestion, and racialized poverty like East Baton Rouge Parish. Transport-related social exclusion (TRSE) provides a framework for understanding the relationship between access to transportation (or lack thereof, known as transport disadvantage) and individuals’ ability to participate in the economic, social, cultural, and political aspects of life (Kamruzzaman, Yigitcanlar, Yang, & Mohamed, 2016). Transport-related social exclusion is associated with numerous negative outcomes including poor mental and physical health, unemployment, and poverty (Levitas et al., 2007). While TRSE has long been applied to analyses of transportation access in large cities around the globe, it has not been applied to midsized urban areas. This study attempts to better understand the relationship between characteristics associated with transport disadvantage, transport-related social exclusion, and race in the context of a midsized urban area.

To accomplish this, I constructed indices that measure transport disadvantage and TRSE at the census tract level in East Baton Rouge Parish, tested for a correlation between the two, as well as with the indices and race, and I used ArcGIS to examine their spatial distribution in East Baton Rouge. I found a significant relationship between TRSE and transport disadvantage ($r(90)=-0.222$, $p<.05$), TRSE and race ($r(90)=-0.371$, $p<0.01$), and transport disadvantage and race ($r(90)=0.619$, $p<0.01$). Additionally, transport deprivation, transport-related social exclusion, and race were clustered in the mid- to northwest part of the parish, areas that have experienced significant disinvestment in recent years.

These findings suggest that policy solutions that target TRSE should address areas of concentrated transport disadvantage by improving the supply of non-car transportation in those areas. It also suggests that transit-oriented development could ameliorate some of the negative impacts of TRSE. Future research on this topic could work on disentangling the complex relationship between TRSE, transport disadvantage, and race.
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CHAPTER 1. INTRODUCTION, TRANSPORTATION AND INJUSTICE

Transportation systems are powerful tools, capable of entrenching existing inequalities or facilitating the pursuit of a more equitable society (Wellman, 2015). Segregation, income inequality, unemployment, disability rights, social exclusion and many other matters of social justice are inextricably tied to transportation. However, public perception of transportation planning is often that it is a technical problem that primarily deals with congestion (Wellman, 2015).

Scholarship on transportation has long explored the relationship between transportation deprivation and negative outcomes like unemployment. In recent years, there has been growing interest in how transport fits into the broader framework of social exclusion. This has been referred to as transport-related social exclusion (TRSE). How TRSE functions depends on the context, and there is a paucity of research in smaller urban areas. Further research in a more diverse range of contexts will help better address the unmet transportation needs of individuals that experience TRSE.

Transportation in the United States

The passage of the 1956 Federal-Aid Highway Act (FAHA) expanded access to US cities from the primarily white suburbs while strengthening de facto racial segregation by building interstates through African American neighborhoods, displacing the residents. Coming just two years after Brown vs. Board, the FAHA was often used by southern cities as a way to block efforts at integration (Avila & Rose, 2009). Interstates often served as lines that demarcated white from African American neighborhoods in cities as wide ranging as Atlanta, San Francisco, New York, and Detroit (Retzlaff, 2020). Simultaneously, many cities were engaged in urban renewal programs that sought to attract investment to a city, often at the cost of displacing low-income and minority residents (Avila & Rose, 2009).

The tandem attacks of urban interstates and “urban renewal” on marginalized groups has been well documented in large cities, but it also occurred in midsized urban areas. East Baton Rouge Parish (EBRP) is a paradigmatic example of a midsized urban area where these policies have fueled suburbanization, disinvestment in some neighborhoods, and racialized poverty. More than 400 houses in EBRP’s historically black Old South Baton Rouge were demolished to allow for the building of I-10. City streets in northern parts Baton Rouge were disrupted by the building of I-110, making those neighborhoods more difficult to navigate for residents (Build Baton Rouge, 2019; Mungin, 2015). The interstate encouraged the development of suburbs in the southern parts of EBRP, fueling white flight from many of its northern neighborhoods. In the decades following desegregation and FAHA, economic development became centered in EBRP’s south, while the northern neighborhoods—now predominantly African American—experienced disinvestment and urban decay (Build Baton Rouge, 2019). As a result, there is a great deal of racial and economic segregation in EBRP similar to other midsized urban areas throughout the US (Estis & Gilleylen, 2007; Avila & Rose, 2009).

Urban interstates have contributed to sprawl, improving accessibility for car owners in the suburbs but rendering urban areas difficult to navigate for the carless. Interstates have also changed societal norms of mobility. The expectation of high personal mobility in urban areas has created hardships for individuals that do not meet that norm. Carless individuals, people with disabilities, seniors, single parent households, and many other marginalized groups can struggle
to perform daily activities due to transportation limitations (Kamruzzaman, Yigitcanlar, Yang, & Mohamed, 2016). In EBRP—a place consistently found to be one of the most sprawling and congested urban areas of its size in the United States—these struggles are compounded by an unforgiving urban form (FutureBR, 2018b). This makes EBRP an excellent test case because of its generalizability to other segregated, midsized urban areas.

**Transportation and social work**

Transportation touches the practice of both direct practice and policy oriented social workers. Someone cannot receive effective services if those services are difficult to reach. Transportation has been found to have significant impacts on client outcomes in areas of direct service practice including gerontology, substance use disorder treatment, people experiencing homelessness, and people receiving anti-retroviral therapies (Cornelius et al., 2017; Marsh, D’Aunno, & Smith, 2000; Meyer, 2019; Orellana, Goldbach, Rountree, & Bagwell, 2015; Shier, Ginsburg, Howell, Volland, & Golden, 2013; Sowell, Bairan, Akers, & Holtz, 2004). Although hardly a comprehensive list, it helps illustrate the relevance of transportation to many aspects of social work.

The National Association of Social Workers (NASW) has identified dignity and worth of the person and social justice as key professional values (2017). Transportation is instrumental in pursuing both of these. Access to transportation is essential for self-determination—a component of the worth and dignity of individuals (NASW, 2017; Wellman, 2015). Without proper transportation, it is difficult to pursue employment, socialize, reach places of worship, or many other destinations that are essential to people living the life they want to live (E. Blumenberg & Manville, 2004). An awareness of the transportation barriers that constrain self-determination will help social workers to better serve their clients. Regarding transportation and social justice, researchers have applied Amartya Sen’s capabilities approach by examining the relationship between individual transportation needs and the transportation options made available to them (Bantis & Haworth, 2020). Other researchers have looked at transportation as a matter of unfair distributions of transportation resources (Farrington & Farrington, 2005). Some activists have pushed to have accessibility and mobility viewed as individual rights (Cass, Shove, & Urry, 2005; Farrington & Farrington, 2005).

Social exclusion is a framework that allows for the examination of structural challenges to participation that people may face (Kamruzzaman et al., 2016; Levitas et al., 2007). Transport-related social exclusion (TRSE) applies this framework to transportation specifically. It helps us to understand how transportation deprivation—also called transport disadvantage—can constrains individuals’ ability to participate in activities. But how does this function in EBRP? What characteristics are associated with TRSE? In this paper, I will explore how TRSE functions in this unique context.
CHAPTER 2. REVIEW OF THE LITERATURE

Social exclusion is a construct that facilitates the exploration between deprivations of resources, services, and rights and participation in economic, social, cultural, and political aspects of life (Levitas et al., 2007; Pantazi, Gordon, & Levitas, 2006). Negative outcomes such as physical and mental health problems, poverty, and political disempowerment have been found to be caused by—and contribute to—social exclusion (Currie et al., 2009; Levitas et al., 2007; Schwanen et al., 2015). One type of deprivation that has drawn special attention from social exclusion researchers is deprivation of transportation—also called transport disadvantage (Currie & Delbosc, 2010; Ma, Kent Jennifer, & Mulley, 2018; Pyrialakou, Gkritza, & Fricker, 2016; Yigitcanlar, Mohamed, Kamruzzaman, & Piracha, 2019). In the following section, I will give an overview of social exclusion and transport disadvantage. I will conclude with a discussion of transport-related social exclusion—a concept that examines transport disadvantage through the framework of social exclusion—in order to illuminate how individuals’ experience transportation in EBRP.

Social Exclusion

In the social exclusion framework, researchers explore the interaction between deprivation and participation. Social exclusion is a relative phenomenon that is generally determined by making comparisons between places within a geographic area. Because of the extensive array of variables that make up deprivation and participation, social exclusion is a complicated process. Table 1 provides an overview of the domains of deprivation and participation identified in the literature (Levitas et al., 2007).

Table 1. Domains of deprivation and participation

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One way of understanding social exclusion is as a feedback loop where low-participation can lead to deprivation, which exacerbates the lack of participation, and vice versa (Schwanen et al., 2015). The relationship is not simply between deprivation and participation, but also between the separate domains within participation and deprivation (Burchardt, Le Grand, & Piachaud, 1999; Pantazi et al., 2006). Resource deprivation can lead to low economic participation, which can lead to reduced political participation, resulting in a deprivation of rights and services. Social exclusion is a dynamic, ongoing process rather than a cause or outcome. Figure 1 shows an example of how participation, deprivation, and the separate domains contained in each can feed into the process of social exclusion.
The breadth of the social exclusion construct allows researchers to explore the complex interactions between the various aspects of deprivation and participation within a single framework (Levitas et al., 2007). However, this also can result in vagueness when using the term (Kamruzzaman et al., 2016). Many areas of study explore aspects of participation and deprivation, which has led to confusion about how to distinguish social exclusion from related concepts like poverty, racial segregation, social capital and civic engagement (Schwanen et al., 2015; Shortall, 2008). In general, these concepts can be thought of as aspects of social exclusion, but I will briefly go over some additional distinctions.

Several researchers have noted that there is a tendency to use social exclusion as synonymous with poverty (Kamruzzaman et al., 2016; Pantazi et al., 2006; Parent & Bonnie, 2002). Poverty is generally defined by deprivation while social exclusion looks at a relationship between deprivation and participation. Deprivation makes participation in economic, social, and political life more difficult, but not necessarily impossible. Likewise, people with abundant resources can still be socially excluded if another factor prevents them from participating in society (Burchardt et al., 1999).

Research about the impact of segregation on economic outcomes also shares a great deal with social exclusion. For example, spatial mismatch hypothesizes that African Americans have experienced relatively high rates of unemployment and low earnings because discriminatory practices have constrained their housing options to places where there is relatively low job growth (Kain, 1968; Laurent, Harris, & Yves, 2007). This is even closer to social exclusion than a concept like poverty because it is interested not only in outcomes, but in how outcomes reinforce one another (Laurent et al., 2007). What distinguishes spatial mismatch from social exclusion is that the former is testing a very narrow hypothesis about economic exclusion, while the latter is a framework in which economic exclusion is only one aspect.

The distinctions between social exclusion, poverty, and spatial mismatch show the diversity of study questions to which the framework has been applied. Social exclusion has also been used to examine the impacts digital technology on social participation among older and low-income people (Kenyon, Lyons, & Rafferty, 2002; Seifert, Cotten, & Xie, 2020). Other researchers have looked at how health outcomes are impacted by low-participation and resource deprivation amongst individuals without homes (Watson, Crawley, & Kane, 2016). A variety of studies have looked at the impact of social exclusion on mental health and subjective wellbeing across different groups (Currie et al., 2009; Ma et al., 2018; Nordbakke & Schwanen, 2014). Social exclusion has also been used by transportation scholars to examine participation rates for various groups that often experience transport disadvantage (Bantis & Haworth, 2020; Casas,
Transport Disadvantage

Transport disadvantage occurs when a lack of accessibility and/or mobility prohibits an individual from reaching a destination – any place that someone would want to go outside their home, ranging from a friend’s home to a job to a healthcare provider (Denmark, 1998). Broadly speaking, mobility is “ease-of-moving” and accessibility is “ease-of-reaching” (Kamruzzaman et al., 2016; Levine, Grengs, Shen, & Shen, 2012). Transport disadvantage results from an interaction of transportation system characteristics and individual characteristics (Hurni, 2007; Kamruzzaman et al., 2016). In the following section, I will give an overview of mobility, accessibility, and how they are influenced by the urban form. I will then discuss characteristics of transport systems and individuals that are associated with deprivations of accessibility/mobility.

Mobility, accessibility, and the urban form

Mobility is defined by how far someone can travel in a set time, or how long it takes someone to travel a set distance (Preston & Rajé, 2007). Mobility is determined in part by the spatial arrangement of destinations—also called the urban form (Darren & Mark, 2008). Generally, someone driving a car has greater mobility than someone riding a bike, but this may not be the case when there is a dense urban form. Transportation and urban planners make trade-offs in mobility for different modes of transportation (Litman, 2020). To increase public transit mobility, a city might convert a private vehicle lane to a bus-only lane. This would reduce mobility for cars because the increased congestion would reduce the distance they could go in a period of time. However, bus riders would have greater mobility because buses would be able to go further in the same amount of time. Similar trade-offs are made for bike lanes, pedestrian traffic, e-scooters, etc.

How the urban form influences mobility for individuals varies across modes of transportation which can be grouped into 5 categories: private vehicles (including both traditional cars and motor operated scooters and bikes), self-powered vehicles (bikes, scooters, skateboards, etc.), public transit (buses, trains, trolleys, etc.), rideshares/taxi services, and pedestrian. The distinction between types is important because someone who chooses not to own a car, but can easily afford taxi/rideshare services, may have similar mobility to someone who owns a private vehicle. However, someone that owns a private vehicle, but struggles to afford the cost of gas, maintenance, insurance, etc., may be less mobile than a high-income person that can afford taxis/ride shares (Lima & Portugal, 2020). Knowledge about transit services can also constrain mobility. If an individual lives in a place with great bus service, but is unable to understand and/or use the timetables effectively, they will have lower public transit mobility than someone living further from a bus stop who can use the timetables (Schwanen et al., 2015).

Accessibility, as used in the context of transport disadvantage, is concerned with the ability to reach destinations. A variety of methods have been used to evaluate accessibility which fall into two categories: infrastructure-based studies and behavior-based studies (Kamruzzaman et al., 2016). Infrastructure-based research attempts to determine a place’s accessibility through analysis of the urban form and/or transportation systems. An example of this type of a
methodology is the cumulative opportunity method, which counts the number of destinations within a geographic area (Geurs & van Wee, 2004). Measures of cumulative opportunities are often enhanced by including measures of density, walkability, public transit supply, availability of parking, etc. (Carleton & Porter, 2018; Casas et al., 2009; Estupiñán & Rodríguez, 2008).

Behavior-based research often uses data from transportation surveys to analyze accessibility based on actual individual movement (Casas et al., 2009; Currie, 2010; Darren & Mark, 2008; Geurs & van Wee, 2004; Kamruzzaman et al., 2016). While infrastructure-based methods attempt to predict whether individuals will reach destinations, behavior-based analyses simply look at whether individuals actually reach those destinations. This allows behavior-based research to make insights that infrastructure-based research might miss. For example, take a place that has an ideal infrastructure to facilitate all modes of mobility but also a high crime rate. Crime rate is not an aspect of urban form or transportation systems, so infrastructure-based studies would simply conclude that the place is very accessible. It would not notice that the high crime rate might discourage travel, so people do not actually access their desired destinations. Studies that look at travel behavior would be aware that an additional variable was reducing the place’s accessibility. Behavior-based measures have the benefit of scooping up a wide range of individual-specific information. The flipside is that it also scoops up information that is associated with individual preference. Extroverts make more trips to a more diverse range of activities than introverts do, but it would be wrong to say this puts introverts at a transport disadvantage (Wyllie & Smith, 1996). While studies often emphasize either behavior or infrastructure, assessments of accessibility usually include both strategies.

Transportation systems and transport disadvantage

While characteristics of transportation systems are not a focus of this study, they provide important context for a comprehensive understanding of transport disadvantage. Research that focuses on transportation systems primarily uses mobility- and infrastructure-based evaluations. Mobility-based evaluations look at modes of transportation—such as the supply of public transit and congestion for car drivers. Infrastructure-based evaluations look at characteristics of the built environment that facilitate various modes of transportation—such as bike lanes, sidewalks, and density (Geurs & van Wee, 2004; Kamruzzaman et al., 2016; Preston & Rajé, 2007).

From a mobility perspective, greater congestion results in reduced mobility. Therefore, places that experience greater congestion could be seen as transport disadvantaged (Litman, 2020). Most mobility-based research about transportation systems and transportation disadvantage looks at public transit rather than private vehicles. Because mobility is interested in how far someone can go in a period of time, the aspects of public transit related to mobility are frequency of service and speed of travel. In general, using public transit reduces travel speed because public transit makes frequent stops, disadvantaging transit users relative to car users (Levine et al., 2012; Litman, 2020). Frequency of service impacts mobility because part of the duration of a transit trip is determined by how long an individual must wait at a stop. In urban settings, researchers generally find greater frequency of transit service in dense areas around city centers (Cass et al., 2005; Currie, 2010; Delbosc & Currie, 2011; Pyrialakou et al., 2016; Scott & Horner, 2008).

Analysis of the transportation infrastructure is another way to identify transport disadvantaged places. More transit stops facilitate transit use and reduce transport disadvantage. The density of transit stops is measured by setting a buffer zone around transit stops and then
determining the total area in a place that falls outside the buffer zones (Currie, 2010). A lack of sidewalks has been identified as contributing to transport disadvantage because it reduces mobility/accessibility for transit users, pedestrians, and bicyclists (Estupiñán & Rodríguez, 2008; Jiao, 2017; Lutz, 2014; Ma et al., 2018). People that use bicycles as a mode of transportation enjoy increased mobility and accessibility in places with more bike lanes (Hasnine & Habib, 2020; Zaman & Habib, 2011). Road quality is another aspect of the transportation infrastructure that can contribute to transport disadvantage. In one study, researchers used the International Roughness Index as a way of comparing road quality between residential and business districts in Kenya, finding that business districts enjoy better roads. (Gabriel, Aggrey, & Jay, 2019). Lastly, denser urban areas are more accessible for the carless, so density has also been used to identify transport disadvantaged places (Estupiñán & Rodríguez, 2008; Griffin & Sener, 2016; Jiao, 2017)

It is notable that many of the characteristics of the transportation infrastructure discussed above are disproportionately located in neighborhoods near the city center, making peripheral and rural areas appear to be more transport disadvantaged (Carleton & Porter, 2018; Currie, 2010; Scott & Horner, 2008). However, when accessibility is given greater consideration, transport disadvantaged places are identified closer to city centers. Studies that examined how well transportation infrastructure connected people with destinations in Chicago and Detroit found that neighborhoods nearer the city center had a greater provision of public transit, but that it was ineffective at connecting riders with their desired destinations (Grengs, 2010; Karner & Golub, 2019; Laurent et al., 2007; Stoll, 2006) A study done in Jackson, Mississippi also found that, despite the greater provision of transit in the city center, residents still struggled to reach their destinations (Estis & Gilleylen, 2007).

Characteristics associated with transport disadvantage

Many characteristics have been associated with transport disadvantage by disaggregating transport survey data on low trip making behavior (Currie, 2010; Delbosc & Currie, 2011; Denmark, 1998; John et al., 2011; Kamruzzaman et al., 2016; Currie & Stanley, 2008; Kamruzzaman & Hine, 2011). Instead of making guesses about whether the transportation system and urban form will facilitate access to destinations, research into characteristics associated with transport disadvantage simply assesses who actually reaches destinations based on geographic and socioeconomic factors (Kamruzzaman et al., 2016; Yigitcanlar et al., 2019). Though mobility and accessibility interact, behavior-based research focuses on accessibility. Characteristics associated with transport disadvantage may be related to resource deprivation—such as being unable to afford a private vehicle—or physical/logistical reasons—such as wheelchair users in a place with few sidewalks (Carleton & Porter, 2018).

Carlessness is consistently associated with transport disadvantage (Currie, 2010; Delbosc & Currie, 2011; Lutz, 2014). The overwhelming majority of households in the US own cars, and households without cars tend to be low-income. Low-income households that do own cars often find them disproportionately costly, spending an average of 34% of their yearly income on their vehicle (Lutz, 2014). Disproportionate spending on cars due to a lack of viable transportation alternatives is referred to as “forced car ownership,” another risk factor for transport disadvantage (Currie et al., 2009; Yigitcanlar et al., 2019).

Racial and ethnic minorities have been found to experience greater rates of transport disadvantage. African Americans and Hispanic peoples have been shown to be
disproportionately carless and reliant on busses (Evelyn Blumenberg, Brown, & Schouten, 2020). Despite this, a study of public transit planning found that many city transit systems catered primarily to white residents (Griffin & Sener, 2016). Resource deprivation that prevents car ownership, and public transportation systems that fail to meet the needs of those most reliant on them, both have the potential to result in transport disadvantage.

Single parents disproportionately live below the poverty line, as well as having transportation needs that extant transportation systems often fail to provide for (Rogalsky, 2010; (Kamruzzaman et al., 2016; Casas et al., 2009). First, they are less likely to own a car due to resource deprivation. Second, they are more likely to engage in “trip-chaining”—or making multiple stops on a single trip, which is very difficult using public transit (Rogalsky, 2010). Parents in general show constrained mobility (Casas et al., 2009).

Both ends of the age spectrum have also been found to be associated with transport disadvantage. Children are primarily reliant on their caregivers for transportation. Retirement age adults, who may experience a decline in mobility, are also at risk of transport disadvantage (Nordbakke & Schwanen, 2014). Health concerns can result in people becoming unable to drive, choosing not to drive, or limiting their driving to specific circumstances. This can also make alternatives like walking or bicycling more difficult, while long waits outdoors and uncomfortable seating can discourage the use of public transit (Litman, 2020). Aging may also be accompanied by a reduced social circle, making it more difficult for retirement age adults to get help with transportation (Nordbakke & Schwanen, 2014). Finally, retirement age adults may be reluctant to ask for help—or use transportation options specifically for seniors—because doing so can feel like a loss of self-reliance (Schwanen et al., 2015).

Last, disability has been found to be associated with transport disadvantage. People receiving a disability benefit have been found to be less likely to drive and may experience resource deprivation which prevents them from owning a private vehicle (Palmer, 2011). These two factors result in people with disabilities being more reliant on alternative modes of transportation. The Americans with Disabilities Act requires public transit to be accessible to people with disabilities but, depending on the specific disability, utilizing services can still be a challenge. Transport timetables are usually available online, but rarely in a format that someone who is blind could use (Markus, 2011). For wheelchair users, accessible public transit is useless if it connects them with inaccessible destinations. In places with scarce sidewalks, sidewalk ramps, or other features that facilitate mobility for people in wheelchairs, accessible public transit can be a mirage (Bantis & Haworth, 2020).

**Transport-related social exclusion (TRSE)**

TRSE is transport disadvantage as understood in the framework of social exclusion (Kamruzzaman et al., 2016; Lima & Portugal, 2020; Lucas, 2012; Preston & Rajé, 2007; Yigitcanlar et al., 2019). In TRSE, a deprivation of accessibility/mobility inhibits various types of participation (Kamruzzaman et al., 2016; Lima & Portugal, 2020). While all TRSE literature investigates accessibility/mobility, the definition of participation varies.

One subset of TRSE literature defines participation in terms of economic outcomes. In social exclusion literature, economic participation has been defined by consumption activity, savings activity, and employment (Burchardt et al., 1999). Economic participation within TRSE tends to use employment as the measure of economic participation (Andersson, Haltiwanger, Kutzbach, Pollakowski, & Weinberg, 2018; E. Blumenberg & Manville, 2004; Brandtner, Lunn,
This research usually occurs in large American cities where racial/ethnic minority populations primarily reside toward the city center, while economic development occurs largely at the cities’ periphery (Andersson et al., 2018; Estis & Gilleylen, 2007; Stoll, 2006; Stoll Michael & Covington, 2012). In this context mobility has been found to play an important role. Studies conducted in numerous major US cities found that jobs were actually more accessible for individuals in the city center, but that accessibility was contingent on car ownership (Grengs, 2010; Stoll, 2006). Increasing mobility through better provision of public transit has been found to ameliorate some of the impacts of reduced accessibility (Brandtner et al., 2019; Estis & Gilleylen, 2007).

Much research on TRSE does not investigate specific domains of participation, but rather focuses on participation in general. This is done by examining travel behavior to all types of destinations (Kamruzzaman et al., 2016; Kenyon et al., 2002; Schönfelder & Axhausen, 2003). Four distinct measures that have proved useful for examining participation are activity spaces, measures of subjective experience, activity duration, and counts of travel behavior.

The concept of activity spaces—the entire geographic area that an individual travels through in order to reach destinations—has been used to measure participation (Schönfelder & Axhausen, 2003). Activity spaces are created by having individuals complete travel surveys and then mapping their travel habits. Transportation is relevant to activity spaces because activity space size is correlated with mobility (Kamruzzaman et al., 2016). Schönfelder and Axhausen tested three methods for determining an activity space to see if there was a relationship between activity space size and demographic characteristics associated with social exclusion (2003). Their findings showed that activity space size was predicted by the number of unique destinations visited and trips made by individuals, but not by specific demographic characteristics (Schönfelder & Axhausen, 2003). Other research has found relationships between specific demographic characteristics and activity space size. A study that looked at parents found they had relatively small activity spaces and a study that focused on low-income women found that low mobility was correlated with low activity space size (Casas et al., 2009; Rogalsky, 2010).

A second measure of TRSE is subjective experience—or the emotional and cognitive impact of TRSE. In one such study, researchers used a questionnaire and semi-structured interviews to determine participant satisfaction with involvement in their communities, the role of transportation in their lives, and how difficult they found it to access necessities. Respondents were then organized by levels of mobility and neighborhood accessibility. Lower accessibility was found to be associated with subjective feelings of exclusion, while mobility did not have a significant affect (Shergold & Parkhurst, 2012).

Third, participation has been measured by activity duration as measured by how many total minutes someone is engaged in an activity outside of the home over a sustained period of time. This is then compared to the average activity duration for the area in which they reside. A study done in Northern Ireland found an expected difference between people who work outside of the home and people who do not, but also that people who lived in low-accessibility places spent less time engaging in activities outside of the home (Kamruzzaman & Hine, 2011). Research in Knoxville found that lower trip frequency was associated with lower activity duration (Rogalsky, 2010). Activity duration is a useful measure because it indicates how fully someone can participate in an activity, not just if they were able to briefly attend it.
Finally, counts of travel behavior are another way of determining participation. This is perhaps the most practical way of conducting TRSE research because secondary data on travel behavior is often available from travel surveys conducted by government agencies (Currie, 2010; Pyrialakou et al., 2016). In one notable example of this method, Currie and colleagues analyzed the Adelaide Travel Survey to determine trip frequency by demographic characteristics, and from this information developed a transportation needs index. The index was then used to determine places at risk for social exclusion. In these studies, participation was defined as the number of trips made during the course of the survey. Characteristics associated with TRSE included carlessness, unemployment, disability pensions receipt, enrollment as students, age (both children and retirement age individuals), and poverty (Currie, 2010; Currie & Wallis, 1992). A modified version of the transportation needs index was used in a statewide analysis of travel behavior in Indiana. As opposed to looking at trip frequency, however, this study compared trip lengths. Though the study found that the places the index identified as at risk for TRSE had shorter trips, this was likely because they were disproportionately located in urban areas (Pyrialakou et al., 2016).

Trip counts can be combined with other counts of travel behavior to create a multifaceted picture of participation (Bantis & Haworth, 2020; Kamruzzaman & Hine, 2011; Rogalsky, 2010; Schönfelder & Axhausen, 2003; Scott & Horner, 2008). One such method includes a count of unique destinations visited. Someone who stops at the grocery store, their friends house, and the library has made one trip to three unique destinations (Casas et al., 2009; Kamruzzaman & Hine, 2011; Schönfelder & Axhausen, 2003; Scott & Horner, 2008).

Counts of trip purposes have been used to examine the range of domains in which someone participates (Kamruzzaman et al., 2016; Preston & Rajé, 2007). Participation in more domains has been associated with better mental health and wellbeing (John et al., 2011; Ma et al., 2018; Nordbakke & Schwanen, 2014) Scott and Horner classified trip purpose into the categories of work, school, retail, service, leisure, or religious (2008). Kamruzzaman and Hine (2011) excluded religious and included health and food in their categorization of trip purposes. In addition to a trip purpose count, they also used counts of unique destinations and trip frequency to construct a participation index. They then compared the results of the index with the results of its constituent components. Demographic and socioeconomic characteristics associated with experiencing TRSE by the individual components were consistent—though not identical—with characteristics identified by the index. The characteristics identified as at risk for TRSE were carlessness, unemployment, retirement age, low-income, and female sex.

TRSE has been useful for understanding the role of transportation in a broader framework of disadvantage by focusing on individual behavior and outcomes. Research that emphasizes aspects of urban form and transportation systems alone is less able to determine the impact of transport disadvantage on day-to-day life. However, it still has some notable gaps. First, TRSE research has been primarily interested in large urban and rural areas (Kamruzzaman et al., 2016; Lima & Portugal, 2020; Shergold & Parkhurst, 2012; Yigitcanlar et al., 2019). Midsized urban areas—like EBRP—have unique transportation systems and urban forms. How that changes the spatial characteristics of TRSE is poorly understood. Second, characteristics associated with TRSE in one context are rarely tested in another. More research is needed to better understand the relationship between socioeconomic characteristics and TRSE across contexts. For example, ising activity spaces, trip counts, and trip purpose counts to measure participation in Louisville, Kentucky, researchers found little evidence of a relationship between TRSE and older-age and low income, two characteristics found to be associated with TRSE in
previous studies (Scott & Horner, 2008). This is important because researchers that look at other outcomes of TRSE—such as mental health and subjective well-being—often uses demographic characteristics previously identified in the literature as at risk for TRSE to guide their own research (John et al., 2011; Ma et al., 2018). Indices—such as the transportation needs index—have proved a practical way of comparing between place’s potential transportation needs. However, not all studies that use indices composed of demographic characteristics associated with transport disadvantage test whether those characteristics experience lower rates of participation in their specific study context (Delbosc & Currie, 2011; Martens & Bastiaanssen, 2019; Pyrialakou et al., 2016).

This study contributes to the understanding of TRSE in midsized urban areas and its relationship to race by examining three questions: How does transport disadvantage correlate with rates of activity participation—i.e. TRSE—in the context of EBPR? How does race correlate to TRSE? Lastly, how are transport disadvantage, TRSE, and race spatially distributed across EBPR census tracts.
CHAPTER 3. METHODOLOGY

I examined these questions by exploring the relationship between demographic characteristics associated with transport disadvantage, TRSE, and race in the context of the midsized urban area of EBRP. I developed a spatial profile of EBRP by identifying census tracts with high concentrations of potentially transport disadvantaged households, census tracts that experience greater rates of TRSE, and the racial composition of census tracts. To accomplish this, I used an index that aggregates characteristics associated with transport disadvantage—the transport disadvantage index (TDI)—an index that aggregates two counts of activity participation—the participation index (PI)—as well as demographic information about race in EBRP.

Data

Data from three sources was used in this study. The American Community Survey (ACS) was used to create the TDI and determine the racial composition of census tracts. The Capital Area Transit (CAT) survey was used to create the PI. Shapefiles created by the US Census Bureau were used to create the maps. The ACS 5-year estimate is based on data collected by the US Census Bureau from 3.5 million households nationwide between 2014 and 2018. The benefit of the 5-year estimate is that it provides the most accurate estimate available between comprehensive census years and provides data at the census tract level (US Census Bureau, 2018).

The Capital Area Transit Survey was conducted by the Resource Systems Group on behalf of the Capital Area Planning Commission. Resource Systems Group is a data consultancy service that specializes in data related to transportation and transit. They have worked with municipal, state, and federal transportation agencies through the United States. Survey participants were recruited using two methods. One was a convenience sample taken by advertising the survey to parish residents. The other was a random sample of addresses stratified by geographic area. In both cases, a $20 gift card was used to incentivize participation (Resource Systems Group, 2020b). Of the total 2,747 households that participated, 2,417 were selected using the address-based sampling. Participants answered travel related survey questions over a 7-day period via a smartphone app or over the phone. Respondents logged trips, mode of travel, destination purpose, and other information specific to the trip (e.g. did they perform a transfer if using public transit).

Weighting was used to address survey nonresponse, survey participation mode, and geographic bias due to oversampling and other factors. In the first step of weighting, the address-based sample was weighted more heavily than the convenience sample and households in areas with low-response rates were weighted more heavily than oversampled areas. In the second step, households were weighted based on household income, number of vehicles, gender, age, employment status, student status, race, and typical commute mode (Resource Systems Group, 2020b). Shapefiles of parish and census tract boundaries—based on the 2010 US Census—were used to create maps of EBRP. These shapefiles were created by the US Census Bureau and made available through ArcGIS Online.
Measures

Transport disadvantage and TRSE were measured using the transport disadvantage index (TDI) and the participation index (PI) respectively. The TDI was constructed based on the transportation needs index created by Currie and Wallis (1992) with slight modifications to make it more appropriate to the studies regional context (Currie, 2010; Currie & Wallis, 1992; Delbosc & Currie, 2011; Pyrialakou et al., 2016; Scott & Horner, 2008). The PI was constructed based on studies that used counts of activity participation as an indicator of TRSE (Bantis & Haworth, 2020; Kamruzzaman & Hine, 2011; Rogalsky, 2010). Census tracts were chosen as the unit of analysis in accordance with previous research on urban TRSE (Currie, 2010; Delbosc & Currie, 2011; Pyrialakou et al., 2016; Rogalsky, 2010).

Transport disadvantage—Transport disadvantage index (TDI)

The TDI measures the percentage of transport disadvantaged households living in a census tract relative to other census tracts in EBRP. Scholars have taken similar, but slightly varying approaches to constructing indices to measure transport disadvantage. Casas et al. uses measures based on the Index of Multiple Deprivation that looks at household characteristics related to income, employment, health, housing, education, and cumulative opportunities in the area (2009). Pyrialakou et al. and Currie used demographic characteristics that have been found to be correlated with low trip frequency (2016; 2010).

The TDI is a modified version of the transportation needs index developed by Currie et al. (1992; 2010). I chose to use a version of this index because it uses data readily available from transportation surveys, it provides a useful overview of the spatial distribution of transport disadvantage, and it has been used in a number of other studies on the topic (Currie, 2010; Currie & Delbosc, 2011; Pyrialakou et al., 2016). Table 2 provides a comparison of indicators and weights used by Currie’s transportation needs index and the TDI. In contrast to Currie (2010) I omitted distance from the central business district, students, and children 5-9 while including single-parent households. Distance from the central business district was not used because the sprawling urban form of EBRP makes accessibility less dependent on proximity to this area. Students were omitted because of potential complications to analysis created by the major university’s private transit system. I chose to include single-parent households rather than children 5-9 as Casas and colleagues have found that a child experiencing TRSE is really their guardian experiencing TRSE (Casas et al., 2009).

To construct the TDI, measures were first standardized so that they fell between 0 and 1. This was done by determining the census tract with the highest value for a measure—e.g. 32.4 for carless households—then dividing each census tract’s value for that measure by the highest value. The resulting number is the standardized indicator. Individual indicators were weighted to best estimate their contribution to transportation disadvantage. For example, the characteristic most consistently associated with transport disadvantage is carlessness, so it was weighted most

\footnote{Louisiana State University provides private transit for students. This transit system covers a relatively small area and provides excellent service, so students’ transportation needs are better met than the general public’s. Southern University and Baton Rouge Community College do not have private transit systems, so to avoid the need to distinguish between students at different institutions, students were not specifically included.}
Table 2. Indicators/weights used in Transportation needs index and TDI

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Transportation needs index</th>
<th>TDI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carless Households</td>
<td>X</td>
<td>.19</td>
</tr>
<tr>
<td>Distance from CBD</td>
<td>X</td>
<td>.15</td>
</tr>
<tr>
<td>Seniors</td>
<td>X</td>
<td>.14</td>
</tr>
<tr>
<td>Persons with a disability</td>
<td>X</td>
<td>.12</td>
</tr>
<tr>
<td>Households in poverty</td>
<td>X</td>
<td>.10</td>
</tr>
<tr>
<td>Unemployment</td>
<td>X</td>
<td>.09</td>
</tr>
<tr>
<td>Students</td>
<td>X</td>
<td>.09</td>
</tr>
<tr>
<td>Children 5-9</td>
<td>X</td>
<td>.12</td>
</tr>
<tr>
<td>Single-parent households</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

I relied on weights Currie et al. (2010) derived from characteristics associated with low trip frequency. Because the composition of indicators included in the TDI is different, weights were modified to keep them proportional to the weight assigned by Currie. I did this by subtracting the weights of the excluded indicators: 1-(.9+.15) = .76. Each of the original weights was then divided by .76 to create a new proportional weight. The formula for the TDI is shown below:

\[
\text{TDI}_{CT} = \sum (\text{SI1}_{CT} \times W1) + (\text{SI2}_{CT} \times W2) + \ldots + (\text{SI6}_{CT} \times W6)
\]

CT = Census tract
SI = Standardized indicator
W = Weight

TDI scores represent the percentage of residents in a census tract that have a characteristic associated with transport disadvantage. Higher scores indicate more transport disadvantage and lower scores indicate less.

**Transport-related Social Exclusion - Participation Index (PI)**

Participation in activities is a widely used indicator of TRSE. Counts of various components of participation in activities—such as frequency, unique destinations visited, variety of purpose, etc.—are used to determine exclusion. The PI combines counts of trips and trip purposes following the model of Kamruzzaman and Hine in their 2011 study. Using an index to look at participation allows different aspects of participation to be combined into one score that can be compared across a geographic area. Trip counts use travel survey data to determine how many individual trips are made during a period of time (Bantis & Haworth, 2020; Currie, 2010; John et al., 2011; Kamruzzaman & Hine, 2011; Litman, 2020; Schönfelder & Axhausen, 2003).

Trip purpose counts determine the range of domains in which an individual is participating. A trip purpose is the reason someone travels outside their home—i.e. recreation, shopping, work (Casas et al., 2009; Kamruzzaman & Hine, 2011; Schönfelder & Axhausen, 2003).

Both the trip and trip purpose counts are totaled at the household level, weighted, and then averaged by census tract to generate a census tract-level mean Trip Count \(\overline{T_C}_{CT}\) and Trip Purpose \(\overline{T_P}_{CT}\). To determine the trip count component of the PI, the mean trips for EBRP was
calculated by multiplying each household’s (HH) total trips by its respective weight (W) as provided by the Capital Area Transit Survey. This was then divided by the number of households in EBRP. The process was then repeated for each census tract. Census tract means were then divided by the parish mean, yielding each tract’s average number of trips:

$$\bar{T}_{CT} = \frac{((\text{TotalTrips}_{HH1} \times \text{HHW}_{HH1}) + \ldots + (\text{TotalTrips}_{HH25} \times \text{HHW}_{HH25})) \div HH_{CT}}{((\text{TotalTrips}_{HH1} \times \text{HHW}_{HH1}) + \ldots + (\text{TotalTrips}_{HH1935} \times \text{HHW}_{HH1935})) \div HH_{EBRP}}$$

The trip purpose count determines how many distinct trip purposes were recorded for each household during the survey. Trip purposes (TP) were categorized by the Capital Area Transit Survey as home, work, school, escort, meal, social/recreation, and errand/other. Trip purpose was measured at the trip level of analysis—not the household level—so all individual trips were sorted into households. Trip purposes per household were then counted. Not every household completed the survey for the full 7 days, so the number of trip purposes was divided by the number of survey days (SD) completed, then multiplied by the respective household weight. The average for the parish was determined by adding each weighted household’s average trip purpose score, then dividing by the total number of participating households. The average for each census tract was determined by adding each household’s average trip purpose score and dividing by the number of participating households in that tract. Each census tracts’ trip purpose average was then divided by the parish average:

$$\bar{TP}_{CT} = \frac{\left((\frac{\text{TP}_{HH1}}{\text{SD}} \times \text{HH Weight}_{HH1}) + \ldots + \left(\frac{\text{TP}_{HH..}}{\text{SD}} \times \text{HH Weight}_{HH..}\right)\right) \div HH_{CT}}{\left((\frac{\text{TP}_{HH1}}{\text{SD}} \times \text{HH Weight}_{HH1}) + \ldots + \left(\frac{\text{TP}_{HH1935}}{\text{SD}} \times \text{HH Weight}_{HH1935}\right)\right) \div HH_{EBRP}}$$

Both the trip count and trip purpose count were standardized by dividing each census tracts’ value by the highest value for a census tract. The final PI was derived by adding the standardized trip count and standardized trip purpose counts for each census tract:

$$\text{PI}_{CT} = \text{standardized trip count} + \text{standardized TP count}$$

Percent African American or Black residents

Approximately 93% of EBRP residents identify as either white alone or African or American or Black. Previous research has found that racial/ethnic minorities are at higher risk for transport disadvantage in urban settings, making the percentage of African American or Black residents in a census tract of particular interest in this study (Brandtner et al., 2019; Cass et al., 2005; Delbosc & Currie, 2011; Griffin & Sener, 2016; Stoll, 2006). I used data from the ACS to determine the percentage of African American or Black residents by each census tract in EBRP.

Analysis Plan
Using ArcGIS, I created maps that show the spatial distribution of transport disadvantage, TRSE, and the percentage of African American or Black residents at the census tract level in EBRP. I then calculated global Moran’s I to analyze the extent to which scores were clustered in EBRP broadly and then used a local Moran’s I to create maps of the clusters (Pyrialakou et al., 2016). I hypothesized that census tracts with high percentages of transport disadvantage, high rates of TRSE, and high percentages of African American or Black residents will be clustered in similar geographic areas. Last, I conducted a statistical analysis using Pearson’s correlation coefficient to test the relationship between transport disadvantage and TRSE, as well as between each construct and the percentage of African American or Black residents. (Schönfelder & Axhausen, 2003). Statistical analyses were conducted using SPSS.

I hypothesized that census tracts with high percentages of transport disadvantage, high rates of TRSE, and high rates of African American or Black residents would be clustered in similar geographic areas. I expected a positive correlation between transport disadvantage and the percentage of African American or Black residents. High PI scores indicate low rates of TRSE, so I expected a negative correlation between PI scores and transport disadvantage. Last, I expected a negative correlation between the percentage of African American or Black residents and PI scores.
CHAPTER 4. RESULTS

Demographics and overview

A demographic profile of East Baton Rouge Parish (EBRP) using the 2018 American Community Survey (ACS) 5-year estimates and the CAT survey is presented in Table 3. According to the ACS estimates, EBRP has a roughly equal number of white and Black or African American residents—47.3% and 45.9% respectively. However, CAT survey respondents were 55% white and less than 20% African American or Black. A disproportionate number of CAT survey respondents made over $100,000 annually, while a disproportionately small number of respondents made less than $25,000 a year. The number of household vehicles and age of respondents were roughly equivalent in the ACS estimates and the CAT survey.

Table 3. Demographic overview of EBRP

<table>
<thead>
<tr>
<th></th>
<th>ACS (N=444,094)</th>
<th>CAT survey (n=6,087)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Percent</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black or African American</td>
<td>204036</td>
<td>45.9</td>
</tr>
<tr>
<td>White</td>
<td>210236</td>
<td>47.3</td>
</tr>
<tr>
<td>Other race</td>
<td>29822</td>
<td>6.8</td>
</tr>
<tr>
<td>No answer</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>212778</td>
<td>47.9</td>
</tr>
<tr>
<td>Female</td>
<td>231316</td>
<td>52.1</td>
</tr>
<tr>
<td>Other Gender</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Prefer not to say</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Income (household)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under $25,000</td>
<td>-</td>
<td>24.5</td>
</tr>
<tr>
<td>$25,000-$49,999</td>
<td>-</td>
<td>23.4</td>
</tr>
<tr>
<td>$50,000-$74,999</td>
<td>-</td>
<td>15.9</td>
</tr>
<tr>
<td>$75,000-$99,999</td>
<td>-</td>
<td>10.9</td>
</tr>
<tr>
<td>$100,000 or more</td>
<td>-</td>
<td>25.4</td>
</tr>
</tbody>
</table>

Vehicles (households)

(table cont’d)
Table 5 describes the measures of transport disadvantage, social exclusion, and African American residency in EBRP. For transport disadvantage, higher TDI scores indicate greater presence of characteristics associated with transport disadvantage. The sample had a mean TDI of 26.76591 (SD 11.75601), ranging from 12.7915 to 56.85. Lower PI scores indicate lower rates of participation, and thus greater TRSE. PI scores had a mean of 57.61026 (SD 31.19645), ranging between 3.817082 and 156.941. The percent of African American or Black residents had a mean of 50.73516 (32.21983), with a range between 0.7 and 99.7.

![Table 5. Variation of transport disadvantage, TRSE, and African American or Black residents for EBRP (n=90)](image)

Figures 2 through 5 show census tracts’ distribution of the TDI, PI, and African American or Black residents respectively. The TDI scores were skewed right with the majority
of the sample falling into the lowest two quintiles, meaning that most census tracts had similar, small percentages of residents with characteristics associated with transport disadvantage. A small number of census tracts had a large percentage transport disadvantaged residents relative to the rest of the parish.

Figure 2. Quantile distribution of census tracts by level of transport disadvantage (TDI scores)

Figure 3 shows a more normal distribution, meaning that PI scores were more evenly distributed throughout the parish. Lower scores indicate higher TRSE and higher scores indicate lower TRSE. While the lower scores all fell within two standard deviations of the mean of 57.61, the highest score was more than three standard deviations above the mean, showing some outliers at the high end of the PI.

The distribution of African American or Black residents by census tract is seen in Figure 4. African American or Black residents constituted either more than three-quarters or less than one-quarter of residents in 55 of the 91 census tracts, speaking to the high rate of residential segregation in EBRP.

Figure 3. Quantile distribution of census tracts by level of TRSE (PI scores)
Spatial analysis of TDI, PI, and African American or Black residents

Table 5 shows the results of the global Moran’s I conducted for all three units of analysis. There was statistically significant spatial autocorrelation, or clustering of transport disadvantage, meaning that census tracts with similar TDI scores tended to be near each other (Moran’s I: 0.4, \( p < .001 \)). Percent of African American or Black residents was also highly clustered (Moran’s I: 0.42, \( p < .001 \)). TRSE, however, did not indicate significant spatial clustering (Moran’s I: 0.03, \( p = .07 \)).

<table>
<thead>
<tr>
<th></th>
<th>Moran’s Index</th>
<th>( p )-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport disadvantage</td>
<td>0.4</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>TRSE</td>
<td>0.03</td>
<td>0.07</td>
</tr>
<tr>
<td>African American or Black residents</td>
<td>0.42</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

The spatial distribution of transport disadvantage at the census tract level is shown in Figures 5 and 6. Census tracts with higher rates of transport disadvantage are shaded darker. Census tracts with the greatest transport disadvantage were clustered primarily in the mid- to northwest parts of the parish. Figure 6 is a map of the Anselin Local Moran's I result for transport disadvantage. Clusters of greater transport disadvantage are shaded darker while clusters of less transport disadvantage are lighter.
There was a notable overlap between tracts with high percentages of African American or Black residents and transport disadvantaged tracts. In Figure 7, census tracts with a higher percentage of African American or Black residents are shaded darker and, like transport disadvantage, are found in the mid- to northwest parts of the parish. Results of the Anselin Local Moran's I analysis is shown in Figure 8, with the darker shaded areas indicating a cluster of tracts with high African American residency and lighter shading indicating a cluster of tracts with low African American residency. Tracts with high rates of African American residency are clustered in the mid- to northwest parts of the parish again, while tracts with low rates of African American residency are clustered in the southern part of the parish.

TRSE was not as concentrated in one area as the previous two components of analysis were. As can be seen in Figure 9, the darker shaded tracts that indicate greater TRSE are distributed more equally throughout the parish. While TRSE still appears somewhat concentrated toward the center of the parish, the outlying tracts in the north- and southeast also experience greater TRSE. Figure 10 shows the results of the Anselin Local Moran's I. There were no clusters of tracts with low rates of TRSE, though there was a cluster of tracts with high rates of TRSE in the central part of the parish.
Figure 7. Map of percentage of African American or Black residents

Figure 8. Map of African American or Black local Moran’s I results

Figure 9. Map of PI scores

Figure 10. Map of PI local Moran’s I results
Correlation between TRSE (PI), transport disadvantage (TDI), and African American or Black residents

There was a significant negative correlation between TDI and PI scores, meaning that TRSE and transport disadvantage were positively correlated ($r(90)=-0.222, p<.05$). This conforms with my hypothesis that census tracts with greater transport disadvantage would experience greater TRSE. The strongest correlation was between transport disadvantage and African American or Black residents ($r(90)=0.619, p<0.01$). Census tracts that experienced TRSE were also highly correlated with African American residency ($r(90)=-0.371, p<0.01$). The correlation between TRSE and percentage of African American residents was notably stronger than the correlation between TRSE and transport disadvantage.

Table 6. Correlations of transport disadvantage, TRSE, and % African American

<table>
<thead>
<tr>
<th>Variables</th>
<th>TDI Score</th>
<th>PI score</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDI Score</td>
<td>-</td>
<td>-.222*</td>
</tr>
<tr>
<td>PI Score</td>
<td>-.222*</td>
<td>-</td>
</tr>
<tr>
<td>African American/Black residents</td>
<td>.619**</td>
<td>-.317**</td>
</tr>
</tbody>
</table>

***$p<0.001$  
**$p<0.01$  
*p<.05

Summary

I found a significant correlation between transport disadvantage and TRSE and between TRSE and percentage of African American residents. Additionally, I found a significant, strong correlation between transport disadvantage and percentage of African American residents. The spatial distribution indicated that census tracts with both higher rates of transport disadvantage and a greater percentage of African American residents were tightly clustered in similar parts of the parish. Though there was some clustering of TRSE, it was not seen to the same degree as it was with the other two components of analysis.
CHAPTER 5. DISCUSSION

This study found that transport disadvantage was significantly related to TRSE in the context of a midsized urban area. I found that census tracts with high levels of transport disadvantage experienced greater TRSE ($r(90)=-0.222$, $p<.05$). This is consistent with previous findings that have tested for transport disadvantage using versions of the transportation needs index (Currie, 2010; Pyrialakou et al., 2016). It is also consistent with research that used characteristics associated with transport disadvantage to predict areas that would have lower rates of participation (Kamruzzaman & Hine, 2011). TRSE was less clustered than in the Kamruzzaman & Hine study though.

Many of the census tracts identified as transport disadvantaged are relatively dense and have frequent bus service compared to the rest of the parish ("CATS Fares and Schedules," 2020). Both of these characteristics can reduce TRSE (Levine et al., 2012; Ma et al., 2018; Schönfelder & Axhausen, 2003). While not a focus of this study, these attributes do influence the interpretation of the correlation between transport disadvantage and TRSE. One possible explanation for the lack of spatial overlap between TRSE and transport disadvantage is that the relative density and bus service provided to these areas helps to alleviate social exclusion for transport disadvantaged individuals. Alternatively, the results of the PI could be misleading due to the possibility of sampling/weighting errors. The correlation between transport disadvantage and TRSE still does suggest that resident’s needs are not being met.

Both spatial and statistical analyses show that the census tracts with high levels of transport disadvantage tend to be disproportionately African American ($r(90)=.619$, $p<.01$). Part of this correlation may be attributed to an overrepresentation of African Americans among characteristics that were used to construct the TDI. For example, African Americans experience higher rates of carlessness, poverty, and unemployment (Evelyn Blumenberg et al., 2020; Karner & Golub, 2019). It is in line with previous research on the social impacts of transportation which has consistently found a relationship between race and disadvantage (Brandtner et al., 2019; Cass et al., 2005; Delbosc & Currie, 2011; Griffin & Sener, 2016; Stoll, 2006). While most of the cited studies relate to larger urban areas, it is also congruent with the findings of a study of race and transportation conducted in the midsized southern city of Jackson, Mississippi (Estis & Gilleylen, 2007).

The relationship between TRSE and the percent of African American or Black residents was stronger than the relationship between TRSE and transport disadvantage ($r(90)=-0.222$, $p<.05$; $r(90)=0.371$, $p<.01$). Research consistently finds that racial and ethnic minorities experience higher rates of social exclusion, so this is not surprising (Levitas et al., 2007; Yigitcanlar et al., 2019). However, the relative strengths of the correlations between TRSE and the other two components raises the question of whether the PI was actually capturing transport-related social exclusion. The stronger correlation between African American residency and TRSE could suggest that social exclusion is less a function of transport than it is of facets of institutional racism unrelated to mobility. A person may have the necessary mobility to get to a job interview, but it does little good if discriminatory attitudes prevent them from getting hired (Laurent et al., 2007).
That is not necessarily incongruent with the TRSE framework. Even if African Americans had equal access to modes of mobility, discriminatory attitudes could still reduce accessibility by discouraging African Americans from traveling through certain spaces. This has been described as a subtype of TRSE called “social-position based exclusion” where societal attitudes toward people with given characteristics inhibits their ability to move through certain areas, reducing those areas accessibility (Yigitcanlar et al., 2019). The role that the social construction of space plays in determining an areas accessibility for members of various racial and ethnic groups is an important one (Madanipour, 1998). While modes of transportation and infrastructure do impact the mobility component of TRSE in ERBP, attitudes around space and race may play a larger role via their impact on accessibility.

Limitations

While the findings point to significant relationships between transport disadvantage, TRSE, and percentage of African American residents, they should be considered in context of certain limitations. First, the TDI was constructed out of characteristics that are likely intercorrelated. Single-parent households are far more likely to be beneath the poverty line for instance (McQuoid & Dijst, 2012). The correlation between the TDI and the PI could simply be a correlation between the PI and poverty because many of the components of the TDI are associated with poverty (Currie et al., 2009). Components of the TDI—such as carlessness—are associated with race as well (Evelyn Blumenberg et al., 2020). This makes drawing meaningful conclusions from the strength of correlation between TDI scores and PI score and African American or Black residents and PI scores difficult.

Sampling was an issue that potentially impacted the PI results. As discussed earlier, the demographics of the CAT survey sample did not reflect the demographics of the parish at large. This could be the product of the convenience sampling and non-response bias. Household weights were used to improve the studies representativeness of EBRP as whole, not the representativeness of individual census tracts.

Since the study in use was limited to one week, it largely captured data about participant’s normal activities. Important but infrequent activities—like doctors’ appointments—could not be effectively measured in this study due to its short time frame. As other researchers have pointed out, the time frame can have an important impact on results because participation varies by time of day, day of week, and even season (Kamruzzaman & Hine, 2011; Kamruzzaman et al., 2016). Considering how participation rates vary by time would help to give a fuller account of TRSE in EBRP.
CHAPTER 6. CONCLUSIONS AND IMPLICATIONS

This study suggests that individuals with characteristics associated with transport disadvantage and African Americans experience higher rates of TRSE in EBRP. It also finds a correlation between race and transportation disadvantage. These findings have useful implications for policy makers, direct practice social workers, and future research.

Implications for policy

The findings of this study suggest a few ways that policy makers in midsized urban areas with a great degree of structural segregation can address TRSE. To start, improving the provision of various modes of non-car mobility, as well as utilizing land-use policies that encourage more accessible development, could help reduce TRSE. In EBRP, census tracts with high rates of transport disadvantage and high percentages of African American residents also receive relatively frequent bus service ("CATS Fares and Schedules," 2020). Increasing transit certainly helps alleviate some of the difficulties of transport disadvantage, but my findings suggest that relatively frequent transit service by EBRP standards does not meet the needs of people struggling with transportation. Public transit is important to addressing transport disadvantage in EBRP but is not a panacea (Kamruzzaman & Hine, 2011; Williams & Collins, 2001). The parish has partnered with a private bike/scooter-share company as a way to increase the availability of non-car transportation. Importantly, many of the bike/scooter-share docks are located in areas with little transport disadvantage (Bolt Mobility Corporation, 2020). Encouraging the provision of bike/scooter-shares in areas where they are most needed would provide more options for people that struggle with transportation.

Transit-oriented development can help to make transit a more effective mode of transportation in midsized cities. For example, “Imagine Plank Road” in EBRP is a project that seeks to revitalize a major thoroughfare by improving walkability, encouraging development, and having bus rapid transit that connects it to other neighborhoods in the parish (Imagine Plank Road, 2019). Projects that develop hubs of commerce and transit together make transit a more effective option parish wide. EBRP is also implementing a Pedestrian and Bicycle Master Plan (FutureBR, 2018b). The 20-year comprehensive development and land use plan identifies encouraging infill and redevelopment to reduce the effects of sprawl as a priority (FutureBR, 2018a). These types of initiatives have helped reduce transport disadvantage in other locations (Estupiñán & Rodríguez, 2008; Fitch, Mohiuddin, & Handy, 2020; Litman, 2020).

Finally, social exclusion is a phenomenon that is not siloed within specialties. A planning solution is necessary to address it, and social workers can bring unique skills, knowledge, and relationships that make them valuable contributors to this endeavor. With that in mind, planning departments in the parish could benefit from the inclusion of social workers in this effort.

Implications for direct practice

Social exclusion has important impacts on physical and mental health, employment, and other issues that direct practice social workers address (Currie & Delbosc, 2010; Currie et al., 2009; Levitas et al., 2007). In EBRP, where factors like sprawl and segregation obstruct accessibility for vulnerable residents, an awareness of the transportation context is particularly important when providing direct practice services. While many agencies help clients with some
aspects of transportation, they often do not consider the importance of transportation to informal activities—like social events and shopping at the grocery store—that are also vital to wellbeing. Developing comprehensive lists of transportation resources and using an individual transportation assessment could both help direct practice social workers better identify and address client needs.

**Directions for future research**

This paper provides further evidence of the intercorrelation of transportation, social exclusion, and race in midsized urban areas. My findings point toward a number of directions for future research. For one, parsing out the causal relationships between transportation disadvantage, race, and social exclusion would help policy makers better understand how to address social exclusion. Future research in EBRP could include data about non-car modes of transportation to help distinguish social exclusion that results from lack of transportation from other social exclusion variables. Developing a better understanding of the relationship between race and accessibility in EBRP would also help clarify these murky relationships.

Regarding the effectiveness of the construct used to measure transport disadvantage, the TDI was somewhat successful at identifying TRSE. While this study found that aggregated transport disadvantage is associated with social exclusion, how each individual characteristic results in social exclusion was not addressed. Looking at the constituent characteristics used to build the TDI would help provide more insight into the nature of TRSE in EBRP. Also, this study did not consider forced car ownership. As poverty is squeezed toward the urban periphery(where there is little alternative to owning a private vehicle)—understanding forced car ownership will be necessary to understand TRSE.
APPENDIX A. IRB EXEMPT FORM

LSU Office of Research & Economic Development

TO: Scott, Jennifer L  
LSUAM | Col of HSE | Social Work

FROM: Alex Cohen  
Chair, Institutional Review Board

DATE: 17-Nov-2020

RE: IRBAM-20-0511

TITLE: Transport-related Social Exclusion In East Baton Rouge Parish

SUBMISSION TYPE: Initial Application

Review Type: Exempt

Risk Factor: Minimal

Review Date: 17-Nov-2020

Status: Approved

Approval Date: 17-Nov-2020

Approval Expiration Date: 16-Nov-2023

Re-review frequency: Three Years

Number of subjects approved: 0

LSU Proposal Number:

By: Alex Cohen, Chairman

Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU’s Assurance of Compliance with DHHS regulations for the protection of human subjects.

2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.

3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins), notification of project termination.

4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.

5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants, including notification of new information that might affect consent.

6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.

REFERENCES


VITA

Andrew Dietz is completing his Master of Social Work degree and plans to receive his Master’s this May, 2021. He loves bicycles, likes busses, has a grudging acceptance of cars and—despite his frequent claims that he has no spatial adeptness—a developing passion for maps. Upon graduation, he hopes to bring his social work skills to local and state policy.