Research & Theory

Users' Willingness to Ride an Intercity Passenger Rail: A Case Study From Louisiana

Public Works Management & Policy
2023, Vol. 0(0) 1–28

DOI: 10.1177/1087724X231185493
journals.sagepub.com/home/pwm
Sage

Guang Tian[1] and Tara Tolford[2]

Abstract

Intercity passenger rail services must be designed in a way that users will be willing and able to ride. This study examines potential users' current travel behaviors and willingness to ride a proposed passenger rail between New Orleans and Baton Rouge in Louisiana, US. By analyzing a user preference survey with discrete choice experiment (DCE), the results show a strong support of the proposed rail service, but distinct deficiencies in the current multimodal transportation environment connecting to and from proposed stations. In addition, previous analyses include potentially faulty assumptions about trip purposes, which have critical implications for service design. The findings of this study reflect the priorities of likely rail passengers and advance efforts to plan for successful passenger rail service operation in Southeast Louisiana. The potential user-based and data-driven approach of this case study can also be used for planning other passenger rail services in the US.

Keywords

passenger rail, intercity, transit, land use, multimodal transportation

[1]Department of Planning and Urban Studies, UNO Transportation Institute, University of New Orleans, New Orleans, LA, USA
[2]UNO Transportation Institute, University of New Orleans, New Orleans, LA, USA

Corresponding Author:
Guang Tian, Department of Planning and Urban Studies, University of New Orleans, 378 Milneburg Hall, 2000 Lakeshore Drive, New Orleans, LA 70148, USA.
Email: gtian@uno.edu

Introduction

Intercity passenger rail has many social, economic, and environmental benefits over other modes of transportation. However, it faces many implementation obstacles and challenges in the US. For example, the prospect of resuming a passenger rail connection between New Orleans and Baton Rouge in Louisiana, discontinued in 1969, has periodically surfaced as a transport priority and subject of study at intervals over the last 30 years, from an early feasibility study completed in advance of the 1984 World's Fair (HNTB, 2014) to a rail station master plan for a proposed interim stop location in Gonzales, Louisiana, completed in 2018 (City of Gonzales, 2018).

Broad support from economic development organizations and local and regional governments has been garnered for the project, in order to better connect the "Southeast Louisiana Super Region," home to over 2 million people and almost 1 million jobs (Southern Rail, 2022). Advocates along the corridor have formed the Louisiana Super Region Rail Authority (LSRRA), a collaborative entity authorized by the state legislature. LSRRA allowed municipal and parish governments to form a compact focused on reinvigorating the feasibility of passenger rail between Baton Rouge and New Orleans. However, the project has faced significant challenges in advancing toward implementation (Amdal, 2011) most notably over concerns about ongoing operating costs not covered by projected fare revenue. A recent opportunity to seek federal funding to implement the project has been passed over due to a lack of interest (and matching funds) from neighboring states in advancing a broader proposal to return passenger rail to the Gulf Coast, including the New Orleans-Baton Rouge connection (Landry, 2018).

A broad coalition of stakeholders, including local and regional governmental entities, economic development organizations, and advocates support the development of this connection. Several feasibility studies and station area plans have been developed in anticipation of possible future funding for implementation. However, the effectiveness of the proposed expand employment opportunity, promote economic growth, mitigate traffic congestion and provide efficient access to goods, services, and destinations depends on easy access to transportation connecting the rail service to nearby communities.

Both the intercity link itself, as well as the first- and last-mile connections associated with the trip must be considered. Not only must the train be competitive with driving from station to station, but the time and cost of connecting to and from the station, whether by walking, bicycling, automobile, or transit, must be considered. To ensure that the proposed service, if developed, can successfully serve its potential users, stakeholders need to understand which factors (in terms of access, potential rider characteristics, and connecting service scenarios) are most likely to result in achievement of projected ridership targets. Additional research is needed to identify state and local actions that will maximize station connectivity and best support the development of a successful service that realizes purported economic benefits in the region.

This study aims to address the gap in our understanding of how the proposed rail terminals relate to their immediate and regional context by evaluating potential riders' current travel behaviors, preferences of proposed rail service, and perceptions of local multimodal connectivity. The study conducted a user preference survey, structured around a discrete choice experiment (DCE) component, to illuminate key considerations for service design and station area planning. The results of this study illuminate how service design, station placement, and planning can be expected to impact users' willingness to ride an intercity passenger rail and maximize the overall utility, feasibility, and economic potential of intercity passenger rail, particularly in areas where regional commuting by transit is not currently feasible and new services may principally be expected to serve other types of trips.

Literature Review

While passenger rail services have been growing and successful in many countries around the world, very few intercity passenger rail services survive or are profitable in the United States. One exception is Amtrak's Northeast Corridor and Acela Express Lines, which operate along the high-density Northeast Corridor between Washington, DC and Boston, MA. Many lines in other regions in the US have discontinued their services or are in danger of discontinuance in the Midwest and South. For example, the 145-mile Gulf Coast Limited train used to run from New Orleans, LA to Mobile, AL and was suspended in 1997. There are many reasons involved, such as low ridership, a car-centered built environment, public interest, and state and local funding, etc. (Goldman, 2022; Kamga & Yazici, 2014).

Proponents of the new intercity rail service in the US typically plan for high-speed rail intended to serve business-related travel, competing with air transport. Studies found that a higher business and professional employment contributed to higher usage of the Acela Express (Chen, 2010). While that may be the case for Amtrak's flagship passenger train service along the Northeast Corridor in the Northeast region, there may be different stories in other parts of the US. Two on-board surveys of the Hoosier State Train (HST) line, connecting five stations between Indiana and Illinois, found that the most dominant trip purpose (approximately 83%) was social–recreational according to the riders' responses. Around 8% of riders stated that they took the train on a school trip and around 6% riders stated that they were commuting to/from their work (Losada-Rojas et al., 2017; Pyrialakou & Gkritza, 2016). By analyzing more than 10,000 surveys from passengers of five state-supported intercity passenger rail routes (Hiawatha Service, Wolverine, Blue Water, Pere Marquette, and Heartland Flyer) in the Midwest and South Central US, Sperry and Collins (2018) found that the most common purposes of travel among rail passengers were "visiting family or friends" and "leisure/entertainment/vacation" and commuting and business related trips were low. Specifically, "visiting family or friends" and "leisure/entertainment/vacation" accounted for 50%–89% of the total trips and "work commute" and "business trip" accounted for 3% to 42% of the total trips among these five rail lines.

Sperry and Collins' study (2018) also conducted an alternative mobility analysis for five rail lines. Passengers were asked to choose an alternative mode of travel if there was no rail service in the region. The automobile was chosen as an alternative to rail service by the majority of respondents on all five lines. This finding indicated that passengers traveling for business purposes were more likely to use automobile or airplane as an alternative to rail services. This reiterates the challenge of competing for new business-related travel with automobile and air transportation that rail services face.

Intercity passenger rail faces the same first-mile-last-mile issue as other forms of public transportation. It does not offer a complete journey from origin to destination. Additional modes of transportation, such as walking, bicycling, buses, etc., are required to connect to the rail service from the origin and to the destination. These local connections affect the overall travel time and are important to the success of the rail system. In two on-board surveys of HST riders conducted in 2015 and 2016 before and after a public-private partnership was formed to keep the service continuing, studies found that more than half of the respondents were dropped off or drove to access the train station, followed by driving or renting a car, and using a taxi or ridesharing service (Losada-Rojas et al., 2017; Pyrialakou & Gkritza, 2016). They also found that although intercity trains were the most favorable mode for riders who traveled less than two miles to access a station, a significant number of riders came from counties without a station. By using a node-place model and studying intercity rail station of Amtrak network in the US, Cummings and Mahmassani (2022) found that the stations with bus service available had higher ridership than those without bus services, which suggested that intercity rail and local bus service may complement each other. Walking and bicycling are also promoted as favorable modes to solve the first-mile-last-mile issue (Mueller & Hunter-Zaworski, 2014; Park, Farb, & Chen, First-/last-mile experience matters: The influence of the built environment on satisfaction and loyalty among public transit riders, 2021). Compared with transit services, walking and bicycling do not have transfer penalties, require a lower investment cost, and generate less environmental harm. Bicycling can also attract travelers from larger areas by allowing people to reach longer distances in the same period of time compared with walking. In addition, intercity passenger rail can be part of and support intermodal travel. A case study in Milwaukee, MI found that passengers choose intercity passenger rail to access the airport because of its convenience and reliability (Sperry et al., 2012).

To estimate future travel demand and impacts of investment in alternative transportation modes, different models have been developed in the past, such as the traditional four-step model, more advanced activity-based models, etc. (National Research Council (US), 2007; Sabouri et al., 2021). These models usually use highway and transit network data but fall short in factoring in non-motorized travel options and local built environmental contexts (Park et al., 2020). Lack of comprehensive data that can be adequately compared state to state, or region to region, and a resulting lack of systematic statistical analysis have made it difficult to make reliable projections (Flyvbjerg, 2007). Another method of measuring the potential of a rail

project is to formulate a cost–benefit analysis (CBA), or a financial risk assessment. To perform a simple assessment, Flyvbjerg (2007) suggests a method that plots projected and actual costs against projected and actual traffic. Holistic assessment of the costs and benefits of a proposed transit investment may also incorporate metrics across several different mobility, economic, and land use dimensions that are not always captured by traditional forecasting or CBA, which tends to focus primarily on vehicle speeds and operating costs (Litman, 2020).

To move from general travel forecasting to specific ridership predictions, different approaches and statistical methods must be employed. Discrete choice experiment (DCE) can solicit preferences of potential riders across a range of alternative scenarios and is a technique frequently used in the social sciences when collection of revealed (observed) preference data is not feasible (Weber, 2021). Using statistical software to display different choice sets in a user-friendly way, DCE facilitates experimental design that allows users to review a reasonable number of meaningful choice sets that highlight key trade-offs and subsets/levels to reliably estimate parameters of interest (Weber, 2021). Then multinomial logit models can provide a useful analytic framework to analyze the hierarchical and "nested" data involving multiple levels of variables (Greene, 2018; Tian et al., 2015).

In sum, we cannot plan an intercity passenger rail and assume people will ride it without the consideration of local context, such as the current travel behaviors of potential users, the land use patterns in the area, the existing infrastructure, the multimodal connections between the planned rail service and the current transportation network, etc.

Methodology

A Case Study from Louisiana

This study focuses on the New Orleans-Baton Rouge corridor. It is located in the southeast of Louisiana along the Mississippi River and consists of seven parishes (equivalent to counties in other US states): Orleans, Jefferson, St. Charles, St. John the Baptist, St. James, Ascension, and East Baton Rouge (EBR) parishes. The seven parishes have a population of 1.5 million, which account for about one third of the state's total population (4.6 million for 64 parishes) (U.S. Census Bureau, 2020). This corridor connects the two largest metro areas in the state – New Orleans and Baton Rouge. New Orleans is well known for its rich culture and food and attracts tourists nationally and globally. It also is the home of the major airport in the state, two professional sport teams, and several universities and institutions. New Orleans hosts many festivals throughout the year, and has other recreational destinations that attract many visitors within the region. Baton Rouge is the capital of the state and home of the state's flagship university, which also has two popular college sport teams. The parishes between the two major metro areas are called River Parishes – a stretch of land along the Mississippi River between Baton Rouge and New Orleans. It contains over

150 petrochemical plants and refineries and accounts for 25% of the petrochemical production in US (James et al., 2012). There are five water ports located in this corridor, including three (Port of South Louisiana, Port of New Orleans, and Port of Baton Rouge) that made the top 10 on the list of top 50 U.S. water ports by total tons in 2020 (Bureau of Transportation Statistics, 2021).

The major transportation links between New Orleans and Baton Rough within this corridor are Interstate 10 (I-10) and three railroads (Figure 1). Currently, there are a few privately operated intercity bus services running through I-10 within the corridor, such as Greyhound, Megabus, Flixbus, and other carpool and vanpool programs. They provide a few round trips a day between New Orleans and Baton Rouge with some stops in between. There is no rail transit service. The railroads are mainly for freight movement. With the growing travel needs from both passenger and freight sides, the I-10 section in both New Orleans and Baton Rough is getting more and more congested. In fact, it is on the list of top Interstate bottlenecks and congested corridors in US (Federal Highway, 2019). There is a need to provide passenger rail services and build a multimodal transportation network within this corridor. Not only will it provide an alternative travel choice for passengers and relieve the congestion but also it is the way to build more sustainable and resilient transportation infrastructure.

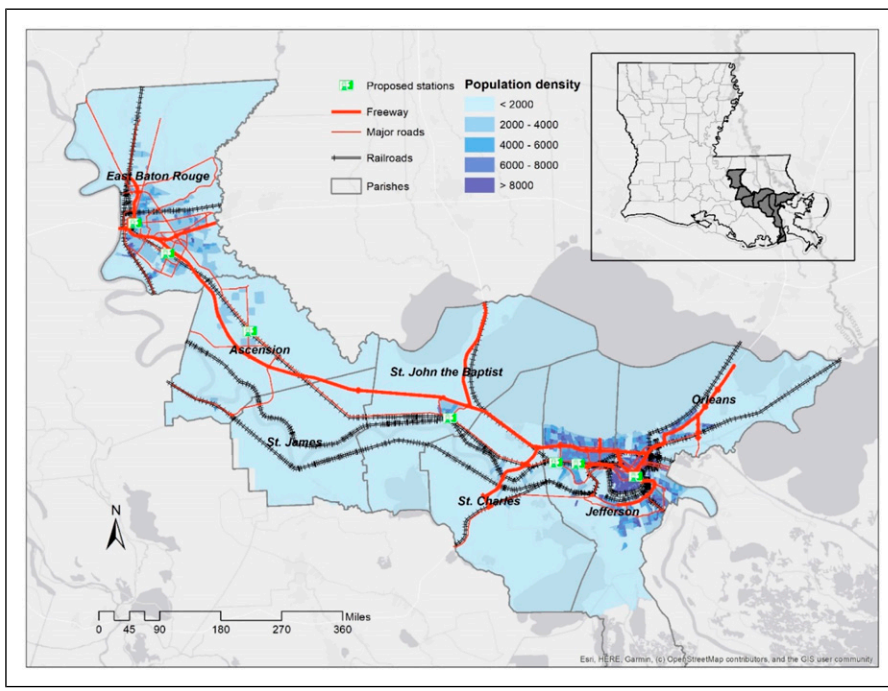

Figure 1. New Orleans-Baton Rouge Corridor.

Survey Design and Distribution

The goal of this survey was to better understand which key variables would make travelers more likely to choose intercity transit over driving in order to make recommendations for planning and implementation. The survey was structured to include the following question types:

- socioeconomic background information and respondent geolocation (voluntary, open-response field with a prompt to identify a specific address, block, or nearest intersection),
- respondents' current travel behavior within the corridor, support of passenger rail, and perception of local multimodal connections,
- discrete choice experiment (DCE) to assess respondent's preference of different service designs.

Data collection was conducted from February through June in 2020. The respondents of the survey included anyone who lives or works in the New Orleans-Baton Rouge corridor and travels between destinations within this corridor. Respondents were recruited primarily through online solicitation through partner organizations, including local government agencies, economic development organizations, transit agencies, advocacy organizations, chambers of commerce, and other non-profits interested in regional connectivity and/or potential rail development. An email invitation/press release was developed and distributed to a compiled list of stakeholder organizations within the study area, with request to distribute to their contact lists (newsletter, email, social media) and/or to publish in news media, resulting in a story by the region's largest online news outlet. As noted, the data collection occurred at the beginning of the COVID-19 pandemic when social distancing restrictions and other public health measures were in place. Respondents were asked to use their best guess to consider how and where they expect to travel after COVID-19 related restrictions were lifted and they began to return to routine travel and activities.

There were 10,208 surveys initiated and 4699 completed. In order to provide spatially disaggregated response data with precise geocodes as well as to remove incomplete, suspected fraudulent, and geographically irrelevant (i.e., out of state) responses, several rounds of data cleaning process were conducted automatically and manually. The final sample includes 4054 survey responses with geocoded addresses throughout the study area. Responses for which sufficiently precise (block group level) geographic data could not be reasonably deduced were excluded from this portion of the analysis.

The descriptive statistics of the responses in the survey sample comparing the population in the study area is shown in Table 1. Geographically, there is an overrepresentation from EBR Parish to the population. The survey sample also skewed slightly female. In addition, younger adults (25 – 44) are overrepresented relative to the population, while older adults (65+) are underrepresented, which is unsurprising given

Table 1. Descriptive Statistics of Respondents in the Sample Versus Census 2020.

Variables	Value	Survey sample (%)	Census 2020 (%)	Census 2020 Source
Home place (parish)	Orleans	21.4	25.2	DEC Redistricting Data (PL 94-171)
	Jefferson	7.4	28.9	
	St. Charles	0.6	3.4	
	St. John the Baptist	2.5	2.8	
	St. James	0.1	1.3	
	Ascension	6.6	8.3	
	East Baton Rouge	52.6	30	
Female	Yes	53.8	51.9	ACS 5-Year Estimates
Age	18–24	7.5	12.6	ACS 5-Year Estimates
	25–34	32	19.5	
	35–44	25.4	16.5	
	45–54	14.5	15.4	
	55–64	12	16.7	
	65+	8.5	19.3	
Race*	African American	9.6	39.7	DEC Redistricting Data (PL 94-171)
	White	85.7	43.1	
	Other**	7.7	17.2	
Household income	< $35,000	12.6	34.4	ACS 5-Year Estimates
	$35,000 – $75,000	29.1	28.2	
	$75,000 – $150,000	36.9	25	
	> $150,000	21.4	12.4	

Note: *multiple choice, select all that apply was allowed in the survey sample.
**Including Hispanic or Latino (of any race) in the survey sample.

the online distribution format. The impact of the sample distribution on overall findings has not been specifically assessed. However previous research (Delbosc & Ralph, 2017) suggests that younger demographic groups tend to be more open to alternative modes of transportation including bicycling, walking, and transit.

Respondents identifying as white are overrepresented in the survey sample, and respondents identifying as African American or Black are significantly underrepresented, making up less than 10% of the overall sample, but close to 40% in the study area. This data gap exists in each parish but is particularly problematic for Orleans and East Baton Rouge Parishes, in which more than half of the population is African American or Black. It suggests a limitation of the findings from this sample to evaluate the opinions, travel behaviors, and preferences of the populations of these urban areas.

The incomes of survey respondents distinctly reflect a more affluent group than the study area as a whole, with relatively fewer responses at the lower end of the income spectrum, and an overrepresentation of high-income households. This, along with racial composition of the sample pool, suggests an important caveat to findings, indicating, among other things, that those most likely to use local and regional transit services currently are underrepresented.

Discrete Choice Experiment

A DCE was included in the survey, where respondents were asked to choose pairs of travel choice sets between New Orleans and Baton Rouge. Each respondent was presented with 10 choice sets and asked to choose the alternative they most preferred. Alternatives were defined by various levels of attributes. It is assumed that the respondents assessed the trade-off between different travel attributes. The choice sets differed in terms of travel mode, cost, and time to the station at both origins and destinations and cost of the trip between New Orleans and Baton Rouge. These attributes and the related levels were chosen based on past and current services, local context, literature, and easily understood increments and are shown in Table 2. The survey layout is shown in Figure 2.

Analysis

Descriptive statistics were used to summarize the respondents' stated travel behaviors and opinions about existing and proposed transportation options in their community. DCE results, geocoded and joined to spatial datasets in ArcGIS (i.e., TIGER shapefiles to append census block group data), form the foundation of modeling analysis to understand respondents' preferences. Other factors that were also tested in the analysis include sociodemographic variables from the survey and built environment variables from the Environmental Protection Agency's (EPA) Smart Location Database (SLD). The details about these variables are shown in Table 3.

The data in the DCE contains, for each of the 4054 individuals, 10 repetitions of the choice between alternative 1 and alternative 2. Alternatives are represented by the bundle of attributes contained in a set of independent variables denoted $x_{ij,t}$. The subscripts represent i for individual i, $j = 1$ or 2 for the two choices in the choice set, and $t = 1, 2, 10$ for the 10 repetitions of the choice task. There is also a dependent variable, $y_{ij,t}$, which equals 1 if individual i chooses alternative j in repetition t, and 0 if not. Note that for each pair of choices $x_{i1,t}$ and $x_{i2,t}$, exactly one of the $y_{ij,t}$ values will equal 1, and the other will equal 0. What is an appropriate model to analyze this data? It is not appropriate to use a familiar binary choice model to model each of the 20 choices made as if each were a separate choice. In so doing, one would be assuming that each of the 20 choice outcomes represents a discrete choice between that specific outcome and not. But, in fact, there are only 10 choice situations for each person: each choice is made between the two offered alternatives, not

Table 2. Definition of Trip Attributes and Levels in the Discrete Choice Experiment.

Attribute	Description	Level
How you get to the station	mode used to get to the station and associated cost	1 = drive and pay to park 2 = take local transit and pay transit fare 3 = walk or bike (free) 4 = pay for a taxi/uber/lyft
Travel time	travel time to get to the station	1 = 15 minutes or less 2 = 15–30 minutes 3 = 30+ minutes
Vehicle/mode	mode for the trip between New Orleans and Baton Rouge	1 = coach bus 2 = passenger train
How you get from station to final destination	mode used to get to the final destination from the station and associated cost	1 = drive and pay to park 2 = take local transit and pay transit fare 3 = walk or bike (free) 4 = pay for a taxi/uber/lyft
Travel time	travel time to get to the station	1 = 15 minutes or less 2 = 15–30 minutes 3 = 30+ minutes
Total one-way trip cost	total cost from the origin to the destination	1 = $10 2 = $15 3 = $20 4 = $30

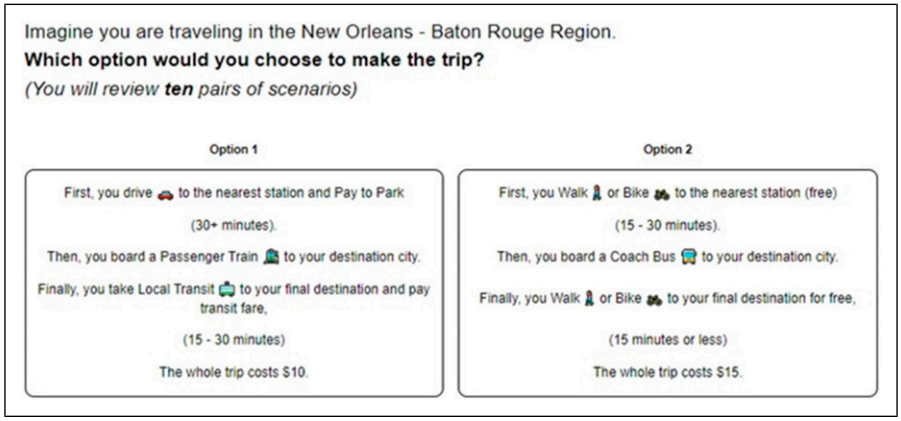

Figure 2. Example Format of the Discrete Choice Survey as Viewed by End User.

Table 3. Socio-Demographic and Built Environment Variables.

Variables	Description	Source
Sociodemographic variables at Individual level		
Employment	employment status of the respondent in three groups: employed (both full time and part time); students; not employed (such as retired, unemployed, homemaker, etc.)	Survey
Commuting mode	typically commuting mode to work in five groups: drive; public transit; walk or bike; Uber/Lyft/taxi; other	Survey
Vehicle access	own or have regular access to a vehicle. Dummy variable: 1 = yes; 0 = no.	Survey
Age	age in six groups: Age_18_24; Age_25_34; Age_35_44; Age_45_54; Age_55_64; Age_65+	Survey
Female	dummy variable: 1 = female; 0 = male	Survey
Race	race in three groups: black, white, other	Survey
Income	household annual income in four groups: income_low (less than $35,000); income_medium ($35,000-$75,000); income_medium-high ($75,000-$150,000); income_high (more than $150,000)	Survey
Built environment variables at census block group level		
Population density	gross population density (people/acre) on unprotected land	SLD
Employment density	gross employment density (jobs/acre) on unprotected land	SLD
Activity density	gross activity density (employment + HUs) on unprotected land	SLD
Job-population balance	standard calculation based on population and total employment: deviation of CBG ratio of jobs/pop from regional average ratio of jobs/pop	SLD
Land use mix	employment and Household entropy (based on vehicle trip production and trip attractions including all 5 employment categories)	SLD
Road density	total road network density	SLD
Intersection density	street intersection density	SLD
Distance to transit	distance from population weighted centroid to nearest transit stop (meters)	SLD
Transit accessibility quarter mile	proportion of CBG employment within ¼ mile of fixed-guideway transit stop	SLD
Transit accessibility half mile	proportion of CBG employment within ½ mile of fixed-guideway transit stop	SLD
Auto accessibility	proportional Accessibility to Regional Destinations - Auto: Employment accessibility expressed as a ratio of total MSA accessibility	SLD

between each offered alternative and the rest of the universe. An appropriate model for data such as these is a multinomial logit model (Greene, 2018; Tian et al., 2015).

The data in this analysis is also hierarchical, with choices "nested" within individuals and individuals "nested" within census block groups. The choices that were made by the same individual share the same sociodemographic characteristics of the individual. The individuals that live in the same census block group share the built environment of the census block group. The best statistical approach for nested data is hierarchical modeling (HLM), also called multilevel modeling (MLM). The essence of HLM/MLM is to isolate the variance associated with each data level. HLM partitions variance between the choice level (Level 1, variables shown in Table 2), individual level (Level 2, sociodemographic variables shown in Table 3), and the census block group level (Level 3, built environment variables shown in Table 3), and then seeks to explain the variance at each level. Individual and census block group variances are captured in the random effects term from the Level 2 and Level 3 equation. In the model estimation, only the intercept is allowed to vary across Level 2 and Level 3units. All the regression coefficients at Level 1 are treated as fixed. This is referred to as a random intercept model (Raudenbush & Bryk, 2002).

Multilevel multinomial logit models were estimated by using HLM 7 software by Scientific Software International, Inc. Survey findings and supplementary data sources facilitate identification of factors that determine whether a person would take rail or not, in order to identify optimal service design to capture as many potential riders as possible and identify the threshold of travel time by transit within the city to get to the rail terminal that people are willing to accept to make trips by rail.

Results

Current Travel behavior within the corridor

Travel Frequency. Respondents were asked to identify how frequently they travel within the study corridor (Figure 3). Overall, over half of respondents indicated that they travel outside of their home parish to another destination within the study area at least a few times per month, with nearly ¼ making trips weekly or more frequently. At the parish level, many residents of New Orleans and Baton Rouge tend to stay close to home, with only about 20% of respondents traveling within the proposed service corridor once a week or more. However, residents of intermediate locations tend to travel outside their home parish frequently, led by St. John parish with over 60% of respondents indicating travel once a week or more.

Most respondents indicated that they regularly visit multiple parishes within the corridor, with the greatest share indicating travel to the urban centers of New Orleans and Baton Rouge, plus adjacent Jefferson and Ascension parishes. Fewer indicated frequent travel to intermediary stops. Unsurprisingly, respondents tend to travel most frequently to adjacent parishes. However, as Table 4 indicates, the region's residents travel widely within the corridor, with residents of all parishes traveling to both New

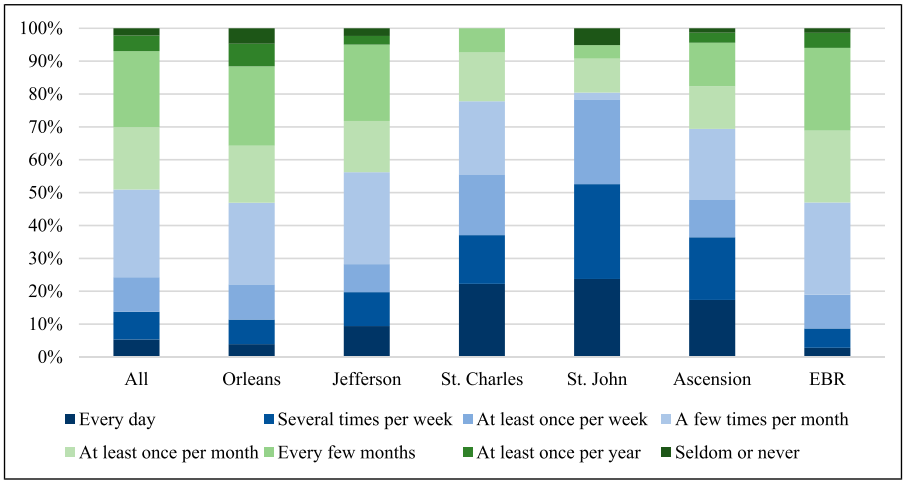

Figure 3. Survey Respondent Travel Frequency Within New Orleans – Baton Rouge Corridor.

Table 4. Survey Respondent Intraregional Travel Behaviors by Parish.

Parishes visited regularly within NO-BR Corridor (excluding respondent's own):						
	Survey respondent home Parish					
Parishes visited regularly	Orleans	Jefferson	St. Charles	St. John	Ascension	EBR
Orleans	—	95.9%	88.9%	89.1%	92.9%	96.5%
Jefferson	92.4%	—	92.6%	92.4%	77.2%	73.3%
St. Charles	32.0%	48.2%	—	77.3%	24.5%	13.8%
St. John	26.9%	45.0%	88.9%	—	32.0%	16.6%
St. James	18.8%	20.0%	44.4%	70.6%	—	13.8%
Ascension	37.9%	53.5%	74.1%	75.6%	62.9%	68.7%
East Baton Rouge (EBR)	87.4%	87.1%	81.5%	73.9%	93.2%	—

Orleans and Baton Rouge regularly, regardless of their residence location. For example, 92.4% of St John Parish residents regularly visit nearby Jefferson Parish, and 93.2% of Ascension Parish respondents travel frequently to East Baton Rouge. The overwhelming majority (88.9% or more) of residents of all parishes indicate regular trips to New Orleans (Orleans Parish), in particular. This suggests that, if logistically practical, there could be considerable demand for intermediate stop locations, as well as some degree of unmet demand for transit access to St. Charles and St. James Parishes.

Travel Purpose. Critically, only about half of respondents indicated that they travel within the corridor for work trips (Figure 4). A clear majority, on the other hand,

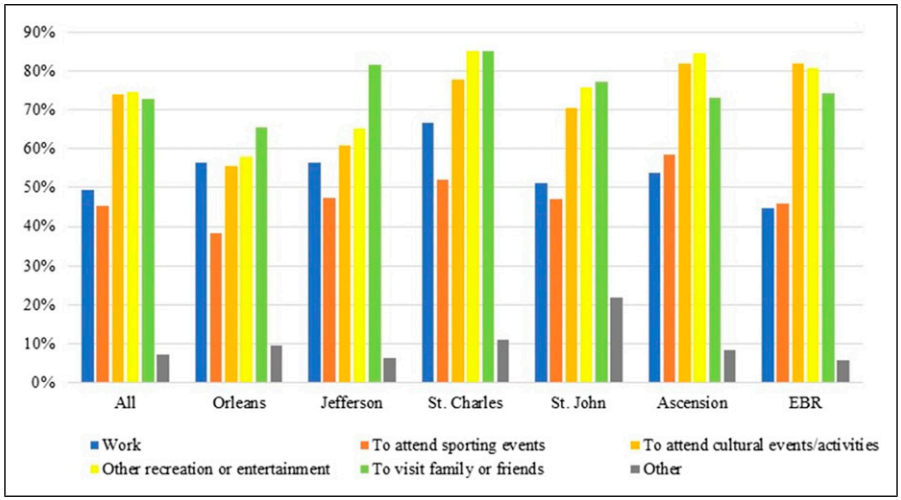

Figure 4. Survey Respondent Purpose of Travel Within Corridor.

indicate that they travel to see family or friends, to attend cultural events or activities, or for other recreation or entertainment purposes. This highlights the need and potential of any future intercity transit services to meet the needs of non-commute travelers, who are likely to represent a larger share of potential riders than is typically assumed for regional intercity rail travel. These findings differ somewhat among parishes (work-related vs. non-work-related, chi-square test = 53.978, $p < 0.001$), with a greater share of St. Charles Parish residents indicating work-related travel, and a smaller share of New Orleanians traveling to sporting events or cultural activities than the rest of the region. For all parishes, recreation, entertainment, and/or family and friends make up the dominant drivers of intra-regional travel. Among alternative reasons for travel listed as "other," respondents indicated that education, medical appointments, airport travel, and shopping were the primary additional reasons respondents cross parish lines.

Travel Mode. When traveling within the region, most respondents currently drive alone, although a notable majority (57%) also carpool at least some of the time. Only a small share of respondents currently uses alternative modes of travel either to or within destinations in the region. This varies only slightly among parishes, with nearly all trips made by private automobile, either solo or shared. However, in Orleans Parish, a notable minority (7.5%) take transit either to other destinations within the corridor or upon arrival. Respondents from Jefferson and Ascension parishes, meanwhile, were most likely to indicate the use of taxis or rideshare services to get around when traveling regionally.

Travel Days and Times. Most respondents indicate that they tend to travel within the region on weekends, with over half indicating that they typically travel exclusively on weekend days (Figure 5). Again, this has important implications for the potential use and service design of proposed rail service and reinforces the likelihood that riders would primarily be traveling for non-work trips. This varies slightly by parish, with residents of St. Charles and St. John Parishes less likely to reserve regional travel for the weekend, likely indicating a greater need to access employment, services, or other daily needs outside of their home parish.

Reported typical travel times align with expectations, with a majority of trips beginning in the morning, and return trips taking place in the evening (Figure 6). Depending on anticipated inflows and outflows from each terminus of the proposed route, this may have implications for the timing and spread of service, as demand fluctuates throughout the day. Regional variation is minimal; respondents are most likely to begin travel in the morning, and end travel in the evening, regardless of starting destination. Notably, return travel patterns demonstrate a more pronounced PM "peak," whereas regional trips are more likely to originate throughout the day.

Perspectives About the Proposed Passenger Rail

Support. The intent of this study was not to rigorously assess overall public support for the proposed rail service, as a randomized representative sample is outside of the feasible scope of this research. In order to frame and contextualize the responses to this study's survey, the level of interest in the proposed rail service was assessed. Overall, this survey should be understood to primarily capture the attitudes and preferences of those who are already in support of the proposed rail service, with 95% either strongly

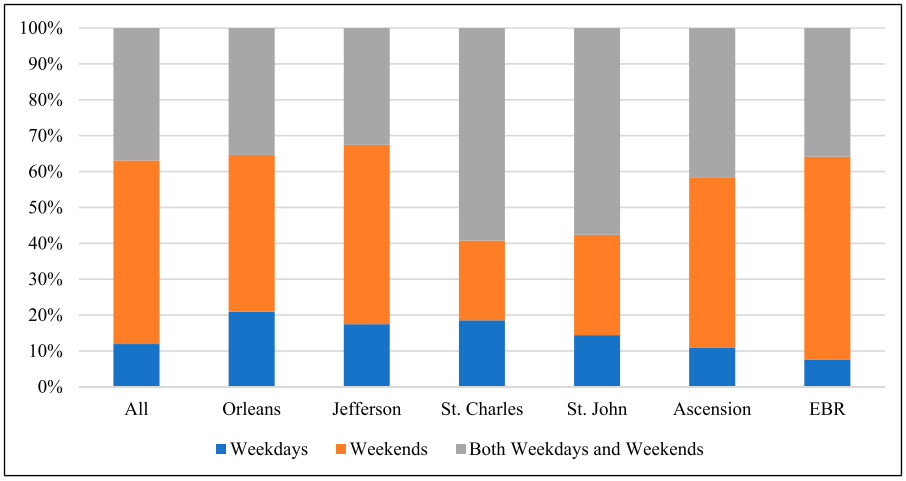

Figure 5. Survey Respondent Typical Travel Days Within Corridor by Parish.

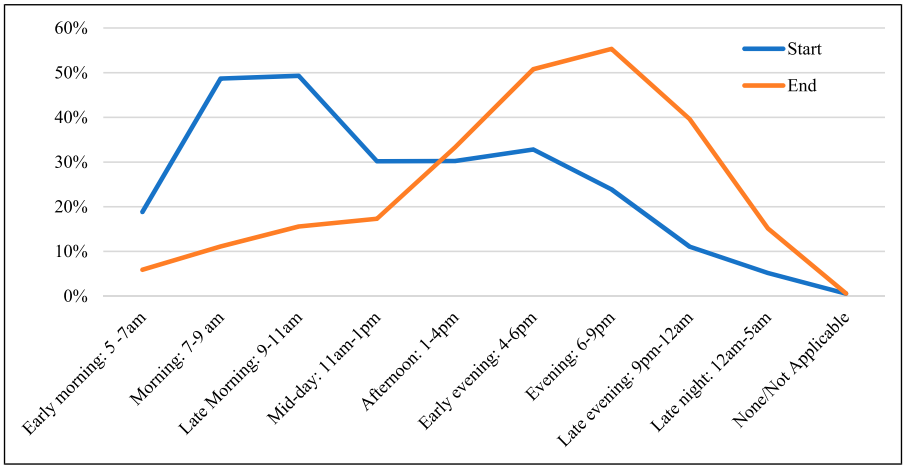

Figure 6. Survey Respondent Typical Travel Times Within Corridor.

or moderately in favor of its development (Figure 7A). This is unsurprising given that in an online, opt-in survey, those most likely to respond are those with an existing interest in the subject matter. However, this is generally consistent with previous polls (Center for Planning Excellence, 2011; Southern Rail, 2019). In addition, the results do indicate geographically broad support, reinforcing previous assessments highlighting strong overall interest in and support for regional intercity rail within this corridor. The most robust support for the proposed rail service is in Orleans and East Baton Rouge Parishes. Support in St. Charles Parish, which is within the study corridor but would not directly benefit from a station within its own borders, is the lowest, but still approaches 90% of responses.

Respondents were also asked to identify which of four strategies they preferred to address congestion within the I-10 corridor long-term (Figure 7B). Overwhelmingly, respondents indicated that their preferred strategy is indeed development of passenger rail, although it should be noted that this result is reflective primarily of the opt-in nature of the survey instrument, in which enthusiastic rail advocates may be assumed to be overrepresented. These findings are relatively consistent across parishes, with residents of suburban parishes (defined here as all within the corridor other than Orleans and East Baton Rouge parish) slightly more likely to advocate for highway expansion.

Quality of Local Connections. Respondents were asked to rate the quality of local transportation options within their community. Overall, respondents expressed dissatisfaction with existing public transit options, with approximately half indicating that transit is either "poor" or "terrible" at present (Figure 8). Broken down to parish level, residents of Orleans and Jefferson Parish were substantially more likely to indicate at least modest satisfaction with transit provision, whereas fewer than 10% of Baton

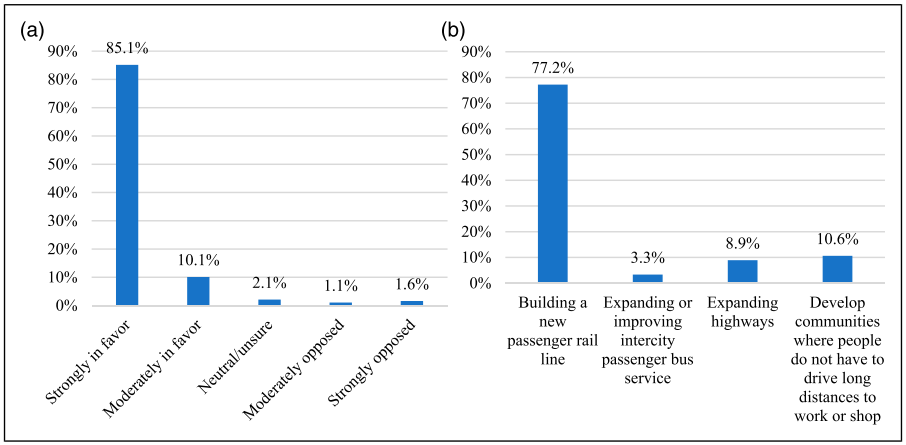

Figure 7. Survey Respondent Support for Proposed Rail Service. (A) Support for Proposed rail Service (B) Preferred Long-Term Solution for i-10 Congestion.

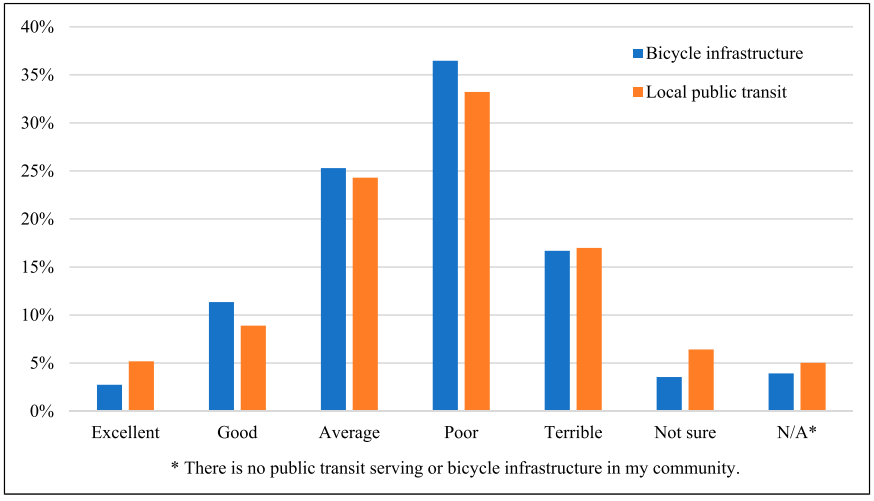

Figure 8. Survey Respondent Assessment of Local Bicycle Infrastructure and Public Transit Quality.

Rouge residents affirm that transit services available are "excellent" or "good." Notably, a portion of respondents from intermediate parishes where transit is generally limited to demand-response options for mobility impaired persons, nonetheless ranked their local public transit services as excellent or good. This incongruity may reflect a

regional perspective, a lack of familiarity, or a relativistic view of what constitutes adequate transit service for smaller towns and rural areas.

Similarly, the majority of respondents indicated that existing infrastructure for bicycling is sub-par (Figure 8), with significant differences by parish. Nearly one third of Orleans Parish residents indicated that bicycle infrastructure is excellent or good, reflecting New Orleans' progress toward implementing a Complete Streets approach to infrastructure. By contrast, less than 8% of Baton Rouge residents felt that the built environment for bicycling is excellent or good, while 32% opined that it is "poor" or "terrible." Overall, respondents in Ascension Parish assessed their bike infrastructure most poorly, however, with 19% indicating that there is no bicycle infrastructure at all and an additional 63% declaring that what does exist is inadequate.

Finally, survey respondents resoundingly indicate that walking is a challenge in their community, with over 64% indicating that it is somewhat or very difficult to walk where they live (Figure 9). Intraregional disparities are evident here as well, with New Orleans residents overwhelmingly (70%) affirming that it is very or moderately easy to walk, compared to similar responses from as few as 4% of Ascension Parish residents. While respondents were asked to report generally on the quality of active transportation infrastructure in their community, not on the specific proposed station areas in question, the overall poor perception of facility quality and extent is a regional problem. Lack of a safe and comfortable walking environment can be a major inhibitor of successful transit implementation as well as corresponding efforts to revitalize station areas, thus, this finding is an important consideration for the potential success of the proposed rail link.

Preferred Local Connections. Respondents were asked to identify, given conditions of the built environment at present for all modes of travel, how they would most likely access the train station if the proposed rail link were to be developed (Figure 10). The majority of respondents indicate that they would be most likely to drive, either alone (36%) or with others in a carpool or taxi/rideshare (44%). Approximately 7% indicated they

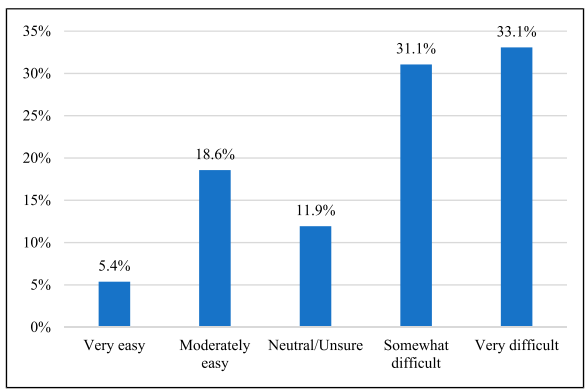

Figure 9. Survey Respondent Assessment of Walking Environment in Community.

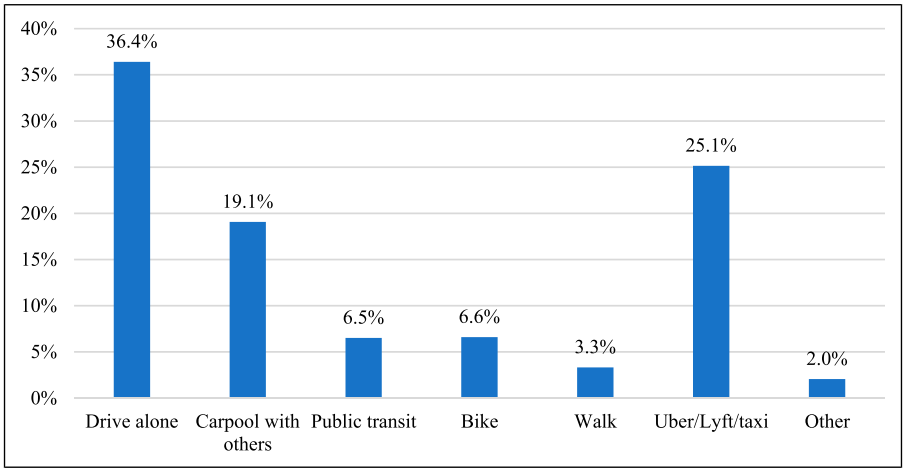

Figure 10. Survey Respondent Likely Mode of Access to Rail Station.

would take transit or bike to the station, respectively, while only 4% indicated they would likely walk. This suggests that the proposed stations, as planned and currently situated, are poorly positioned to attract a large number of riders by alternative modes of transport, indicative of perceived deficiencies in these options. At the parish level, New Orleans residents were more likely (17% of respondents) to indicate openness to taking transit to reach the station, suggesting that the central, transit-integrated location of New Orleans Union Passenger Terminal (NOUPT), paired with the relatively more robust New Orleans Regional Transit Authority (RTA), makes this a viable option for potential train passengers. In addition, Orleans Parish respondents indicated favorability of bicycling to the station (15% of respondents).

Overall, these results of respondent perspectives indicate that, even among a largely enthusiastic sample of potential train passengers, with strong stated preferences for intercity train access and a tendency toward multimodal travel behaviors, most can be expected to access passenger rail by automobile under current infrastructure and policy conditions (which is to say, transit and active transportation are not explicitly prioritized).

Discrete Choice Experiment Results

As described in the methodology section, the DCE component of the survey was utilized to examine factors that may determine whether a person would take rail or not. The goal of this experiment is to identify the features of optimal service design—including multimodal connections on either end of the journey—to capture as many riders as possible and identify the threshold of travel time by various modes within

origin and destination cities that people are willing to accept in order to make trips by rail.

The coefficients of all attributes included in the DCE analysis were found to have the expected signs, and most of them are significant at the .001 level or beyond. Compared with the reference level of each attribute, a negative coefficient means that this level is less preferred by respondents, and a positive coefficient means that this level is more preferred.

Model 1 – Only Including Variables in the Discrete Choice Experiment. The first model was estimated with only the variables in the discrete choice experiment in order to test the respondents' preferences among the levels of the attributes (Table 5). For the mode of transportation to get to the station, the order of preferred mode is 1) driving, 2) taking ride-sharing service, 3) taking public transit, and 4) walking or biking based on the sign and value of the coefficients or odds ratio. The odds of a respondent choosing to walk or bike to the station are 0.67 times the likelihood that they would choose to drive. For the travel time to get to the station, it is not surprising that the most preferred option is 15 minutes or less and then 15–30 minutes. 30 minutes or more is the least preferred. Respondents prefer to spend less time getting to the rail station. For the mode of the link between New Orleans and Baton Rouge, a passenger train is strongly preferred compared with a coach bus. The odds ratio shows that the odds of a train being chosen is 12.95 times that of a bus. For the mode from the station to the final destination, there is no significant difference between taking local transit and taking ride-sharing services, and both of them are more preferred than walking or bicycling. The preference of travel time from the station to the destination is the same as from the origin to the station. Last, for the cost of the whole trip, there is no significant difference between $10 and $15, and both of them are more preferred than $20, then $30. A respondent would be approximately one third times likely to take a rail trip for $30 compared to at a total cost of $10.

Overall, driving to the station and paying to park within 15 minutes or less, boarding a passenger train between New Orleans and Baton Rouge, taking transit or ride-sharing service from the station, and spending less than $15 for the whole (one-way) trip are the preferred configurations.

Model 2 – Adding Sociodemographic and Built Environment Variables. The second model was developed by adding sociodemographic and built environment variables in order to test the different preferences among individuals with different characteristics and neighborhoods with different built environments. All the variables shown previously were tested. There was only one sociodemographic variable and two built environment variables that were found to be statistically significant. All the variables in the discrete choice sets are minimally changed.

The only significant sociodemographic variable is the medium-high income group of households with income between $75,000 and $150,000. Compared with other

Table 5. DCE Model Results.

	Model 1			Model 2		
	Coef.	*p-value*	*Odds ratio*	*Coef.*	*p-value*	*Odds ratio*
Intercept	−0.644			-0.644		
Attributes in discrete choice experiment						
Origin mode: drive*						
Origin mode: transit	−0.257	< 0.001	0.77	−0.257	< 0.001	0.77
Origin mode: walk or bike	−0.405	< 0.001	0.67	−0.405	< 0.001	0.67
Origin mode: sharing	−0.191	< 0.001	0.83	−0.191	< 0.001	0.83
Time (origin): 15 min or less*						
Time (origin): 15–30 min	−0.176	< 0.001	0.84	−0.176	< 0.001	0.84
Time (origin): 30+ min	−0.258	< 0.001	0.77	−0.258	< 0.001	0.77
Mode: coach bus*						
Mode: train	2.561	< 0.001	12.95	2.561	< 0.001	12.95
Destination mode: transit*						
Destination mode: walk or bike	−0.175	< 0.001	0.84	-0.175	< 0.001	0.84
Destination mode: sharing	—	—	—	—	—	—
Time (destination): 15 min or less*						
Time (destination): 15–30 min	−0.076	0.001	0.93	−0.077	0.001	0.93
Time (destination): 30+ min	−0.159	< 0.001	0.85	−0.16	< 0.001	0.85
Cost: $10*						
Cost: $15	—	—	—	—	—	—
Cost: $20	−0.146	< 0.001	0.86	−0.147	< 0.001	0.86
Cost: $30	−0.417	< 0.001	0.66	−0.418	< 0.001	0.66
Sociodemographic variables						
Income: medium (35K–75K)*						
Income: medium-high (75K–150K)				−0.008	0.06	0.99
Built environment variables						
Employment density				0.0003	0.004	1.0003
Transit: Proportion of employment within ½ mile of fixed-guideway transit stop				0.014	0.081	1.01
Pseudo-R^2		0.21			0.23	
N		4054			4054	

Note: *reference level; — not significant.

individuals, this group is less interested in the proposed rail link between New Orleans and Baton Rouge.

The two significant built environment variables are employment density and proportion of employment within ½ mile of a fixed-guideway transit stop. Both variables have positive signs, which indicate that individuals at higher employment density areas or areas with higher job accessibility by transit have higher interest in taking the link between New Orleans and Baton Rouge. This is consistent with previous literature that high density of local jobs and local connections help increase ridership (Cummings & Mahmassani, 2022).

The models show important information about people's preferences on the different configurations of the link between New Orleans and Baton Rouge. People overwhelmingly prefer train over bus. This was an expected finding. However, the degree to which potential riders would choose to travel by train rather than bus, regardless of cost or travel time variables, is notable. Local stakeholders have recently been discussing the potential to revive a government-supported bus service connecting the two cities in the years following Hurricane Katrina. The service could be seen as either a lower-cost alternative to passenger rail, or as an interim measure intended to help build future rail ridership by fostering a "habit" of transit as a viable alternative to driving in this corridor. The survey finding indicates that it may be difficult to generate bus ridership due to community preconceptions about the quality of bus versus train travel.

There is no significant difference between taking transit or ride-sharing service from the station to the final destination. This suggests that people may not see transit as a viable option in their community, but it doesn't necessarily mean they have an aversion to public transit altogether. If adequate last-mile service connecting riders from the train station to their final destination exists, riders will take advantage of it.

There are two significant built environment variables– employment density and transit accessibility, and these are positive signs. This reiterates the importance of coordination between land use and transportation (Aston et al., 2020; Ewing & Cervero, 2010). If the whole transportation system is improved toward a multimodal transportation network and transit-oriented land use developments are implemented, people's perception of non-auto travel may change. That will further play a role in their travel decisions, leaning to choose non-auto travel, which certainly could lead to increased ridership. Future deployment of this survey instrument can help illuminate the extent to which multimodal transportation system investments impact attitudes and preferences in the region. This may be contrasted with analysis of actual ridership and behaviors, should the service be implemented.

Overall, the results of these models show people's preferences among the difference configurations of the link between New Orleans and Baton Rouge, providing useful data to define the details of the link in order to maximize the ridership if it were built.

Discussions and Conclusions

As was the case in Louisiana, discussions around new passenger rail services often rely on an "if you build it, they will come" philosophy without adequate consideration of the preferences, needs, and current travel patterns of potential users. This study aimed to address this gap and question previously held assumptions about trip types, timing, sensitivity thresholds for travel costs (price as well as time), and first- and last-mile connectivity.

We acknowledge that there are a few limitations of this study. First, the sample is not well distributed within the study area. A large proportion of the respondents were from Baton Rouge. Second, individuals who responded to the survey tend to be homogeneous, especially for an online-only survey. People need access to computers or smart phones and Internet to be able to participate in the survey. Lower-income, older adult, and Black residents in particular were underrepresented in the sample relative to the region's population. It is also common that people who really like or dislike the topic of a survey are more likely to participate in a survey. Last, individuals make their travel choices based on their subjective perceptions on current transportation networks in their neighborhoods, in terms of cost, time, safety, and other factors. In this case, it is generally true across the study area that people's expectations for non-auto travel are not high. For instance, many places in the study area lack facilities for pedestrians and cyclists, have transit routes with few stops or infrequent service, or only have demand-response service. All of these factors together very likely lead to no significant variations across sociodemographic and built environment variables within the sample.

The online, opt-in survey garnered 4054 completed responses in the study area, revealing insights into the current and anticipated travel behaviors, modal preferences, cost and trip duration sensitivities, and origins and destinations of a geographically diverse range of likely passenger rail riders. The survey results indicate that residents of the New Orleans-Baton Rouge corridor travel frequently among parishes and strongly support passenger rail development, though not necessarily primarily as a substitute for driving for commute trips. Rather, the respondents expressed a desire to have transportation options for trips related to sports, entertainment, special events, social activities, family visits, airport trips, and recreation. Accordingly, rail service design would need to accommodate trips at various times of day (including later evenings), perhaps especially on weekends and holidays. This indicates an important opportunity to meet rider needs and optimize revenue: rather than focusing on a commute-oriented service schedule, with one AM and one PM trip per day, it may be more appropriate for initial/pilot service design to focus on weekend/special event travelers and plan schedules accordingly. Furthermore, focusing attention on non-work trips would allow riders to experience the service under lower-stakes conditions, potentially assuaging concerns about travel time, safety, or reliability that were expressed.

Modeling of the survey results revealed a clear, pronounced preference for rail over intercity bus travel (despite the former popularity of the LA Swift bus, limited support for new or enhanced coach bus service was demonstrated), as well as a preference for

faster total travel times and lower fares. Notably, no significant difference was found between $10 and $15 trip costs (although some demographic segments appear to be more price-sensitive than the overall group). Overwhelmingly, respondents also prefer to drive to their origin station, likely reflecting the currently underdeveloped state of bicycling and transit connections throughout much of the corridor, as well as the overall geographically dispersed nature of the region. Respondents who live closer to proposed stations are somewhat more likely to express interest in bicycling or walking (particularly in New Orleans). However, many of even those who live very close to station areas generally prefer to drive. In order to minimize the demand for parking suggested by these findings, significant improvements in multimodal connectivity are needed. As noted above, these improvements are already underway in several corridor communities. Finally, respondents appear to be more open to taking transit as a last-mile solution, and accordingly are less sensitive to travel time for the final leg of their hypothetical trip.

The idea of reconnecting Louisiana's two largest metro areas by rail has been discussed for decades and has garnered broad local and regional support. However, concerns persist about operating costs, potential ridership and revenue, and how the service will integrate into local transportation networks to provide a viable option for residents and visitors alike. This study aimed to assess connections between the proposed rail stations and existing multimodal transportation systems. The goal is to connect the region's 2.2 million people to its 1 million jobs as well as to other economic, tourism, and activity centers within the region.

The success of commuter-oriented or short-distance intercity trains hinges on the presence of high-quality connections to destinations, including airports, campuses, recreation areas, and businesses. Thus, it is imperative to find out where riders are actually trying to go, and when. This study reveals that this does not always (or even most often) mean evaluating where they work. Previous planning efforts have dedicated insufficient attention to the needs of non-commute riders, as well as to vulnerable or special populations including people who lack vehicle access. This study begins to explore the range of these populations and some potential implications for service design.

Ultimately, success means ridership. It may also be defined by mobility and access gains (to employment as well as medical facilities, social infrastructure, and recreation) for local residents (particularly communities of concern). Success can also be measured by the extent to which transportation investments spur local economic development: the less room required to be dedicated for parking (particularly surface parking lots) to meet rider demand, the greater the opportunity for transit-oriented developments (TOD) that mutually boost local tax revenue and rail ridership. Many of the regions currently evaluating opportunities to expand passenger rail (e.g., the southeast, southwest, mountain west) have not had viable services suitable for commuting in decades, if at all. Although in the long term, such services, if implemented, promise to unlock economic opportunity through improved regional job access, in the near-term other trip types are likely to represent the plurality of riders. Data representing their needs, preferences, and

sensitivities is typically lacking. This study provides a template for a data-driven approach to understanding key aspects of service design and local land use and transportation planning which need to be considered in order to support successful service.

Policy Recommendations

Based on the literature review, survey results, and modeling analysis, this study provides the following recommendations for policy consideration regarding to plan intercity passenger rail services:

- This case study of intercity passenger rail from Louisiana shows the importance of data-driven approach for planning rail services in the US. Simply assuming people will ride the train once built may result in the failure of the service. Before implementation, research has to be done to fully understand potential riders' current travel behaviors and preferences, the land use patterns in the area, the existing transportation infrastructure and network, and other local contexts.
- Both studies in the literature and this case study show that in the relatively less dense and auto-oriented built environment (such as Midwest, South, etc.), the demand of rail travel for leisure purposes (such as, visiting family or friends, going to sporting and cultural events, attending recreational activities and entertainment, etc.) is high and for commuting and business-related purposes is low. This should be taken into consideration when designing rail services.
- While respondents show strong support for the passenger rail, they are also highly concerned by current local infrastructures that connect origins and destinations with rail stations. Depending on local conditions, various options should be provided for the first-mile-last-mile, such as walking, riding a bicycle, taking local buses, driving and parking-and-riding, calling ride-sharing services, etc. The passenger rail must be seriously considered and integrated to build a seamless multimodal transportation network.
- The application of new technologies may help increase people's willingness to ride intercity passenger rails. For example, real-time location of trains and on-time performance feedback may help riders to adjust plans accordingly. While on the train, free Wi-Fi may help riders entertain, check availability of local micro and shared mobility options, work remotely, etc.
- In order to advance implementation of the proposed rail service, additional research on potential funding streams and mechanisms to support operational costs is needed. The supportive land use policies (such as TODs, mixed-use developments) and other policies to cross regulatory or legal barriers are also important to achieve the promise of reducing traffic congestion, reducing environmental impacts of vehicles, and promoting connections to economic opportunity across regions.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by Transportation Consortium of South-Central States (19PPLSU11).

ORCID iD


Guang Tian https://orcid.org/0000-0002-4023-3912

References

Amdal, J. R. (2011). *Rails to recovery: The role of passenger rail transportation in post-katrina new Orleans and Louisiana*. UNOTI Publications. Retrieved from https://scholarworks.uno.edu/unoti_pubs/6

Aston, L., Currie, G., Delbosc, A., Kamruzzaman, M., & Teller, D. (2020). Exploring built environment impacts on transit use – an updated meta-analysis. *Transport Reviews*, *41*(1), 1–24. https://doi.org/10.1080/01441647.2020.1806941

Bureau of Transportation Statistics. (2021). *Tonnage of top 50 U.S. Water ports, ranked by total tons*. National Transportation Statistics. Retrieved from https://www.bts.gov/content/tonnage-top-50-us-water-ports-ranked-total-tons

Center for Planning Excellence. (2011, February). One great region: Working together to build a sustainable 'super region'. Reconnecting America. Retrieved from http://www.reconnectingamerica.org/assets/Uploads/CPEX-One-Great-Region.pdf.

Chen, Z. (2010). Who rides the high speed rail in the United States: The Acela express case study. *ASME/IEEE joint rail conference*. American Society of Mechanical Engineers. https://doi.org/10.1115/JRC2010-36236

City of Gonzales. (2018, Auguest 1). Gonzales passenger rail station mater plan. Arup USA, Inc. Retrieved from https://gonzalesla.com/wp-content/uploads/2018/09/Final-Gonzales-Master-Plan-1.pdf

Cummings, C., & Mahmassani, H. (2022). Does intercity rail station placement matter? Expansion of the node-place model to identify station location impacts on Amtrak ridership. *Journal of Transport Geography*, *99*(2022), 103278. https://doi.org/10.1016/j.jtrangeo.2022.103278.

Delbosc, A., & Ralph, K. (2017). A tale of two millennials. *Journal of Transport and Land Use*, *10*(1), 903–910. https://doi.org/10.5198/jtlu.2017.1006

Ewing, R., & Cervero, R. (2010). Travel and the built environment: A meta-analysis. *Journal of the American Planning Association*, *76*(3), 265–294. https://doi.org/10.1080/01944361003766766

Federal Highway, Administration. (2019). Freight mobility trends: Truck hours of delay. Federal Highway Administration. Retrieved from https://ops.fhwa.dot.gov/freight/freight_analysis/mobility_trends/national_list_2019.pdf

Flyvbjerg, B. (2007). Cost overruns and demand shortfalls in urban rail and other infrastructure. *Transportation Planning and Technology*, *30*(1), 9–30. https://doi.org/10.1080/03081060701207938

Goldman, B. (2022). *Intercity passenger rail: Federal policy and programs* (p. R47260). Congressional Research Service.

Greene, W. (2018). *Econometric analysis* (8th Ed.). Pearson.

HNTB. (2014). Baton Rouge – new Orleans intercity rail feasibility study: Technical memoranda. In *Regional Planning Commission, Capital Region Planning Commission, and Baton Rouge Area Foundation, Retrieved from*. State and Federal Project Numbers: H.010052, H.010053. https://www.sjbparish.gov/files/sharedassets/public/planning-amp-zoning/br-nola-rail_technical-memoranda_final_february-2014.pdf.

James, W., Jia, C., & Kedia, S. (2012). Uneven magnitude of disparities in cancer risks from air toxics. *International Journal of Environmental Research and Public Health*, *9*(12), 4365–4385. https://doi.org/10.3390/ijerph9124365

Kamga, C., & Yazici, M. A. (2014). Achieving environmental sustainability beyond technological improvements: Potential role of high-speed rail in the United States of America. *Transportation Research Part D: Transport and Environment*, *31*(2014), 148–164. https://doi.org/10.1016/j.trd.2014.06.011.

Landry, A. O. (2018). Lacking matching funds, DOTD not applying for passenger rail grant. Business Report. Retrieved from https://www.businessreport.com/business/lacking-matching-funds-dotd-not-applying-passenger-rail-grant-2

Litman, T. (2020). *Evaluating public transit benefits and costs: Best practices guidebook*. Victoria Transport Policy Institute. Retrieved October 20, 2020, from https://www.vtpi.org/tranben.pdf

Losada-Rojas, L. L., Gkartzonikas, C., Gkritza, K., & Pyrialakou, V. D. (2017). *Evaluating opportunities to enhance Hoosier State Train ridership through a survey of riders' opinions and an assessment of access to the line*. Purdue University. https://doi.org/10.5703/1288284316574

Mueller, J. D., & Hunter-Zaworski, K. (2014). Bicycle network connectivity for passenger rail stations. *Transportation research record*, *2448*(1), 21–27. https://doi.org/10.3141/2448-03

National Research Council (US) (2007). *Metropolitan travel forecasting: Current Practice and future direction–special report 288*. Transportation Research Board. Retrieved October 20, 2020, from http://onlinepubs.trb.org/onlinepubs/sr/sr288.pdf

Park, K., Farb, A., & Chen, S. (2021). First-/last-mile experience matters: The influence of the built environment on satisfaction and loyalty among public transit riders. *Transport policy*, *112*(2021), 32–42. https://doi.org/10.1016/j.tranpol.2021.08.003.

Park, K., Sabouri, S., Lyons, T., Tian, G., & Ewing, R. (2020). Intrazonal or interzonal? Improving intrazonal travel forecast in a four-step travel demand model. *Transportation*, *47*(5), 2087–2108. https://doi.org/10.1007/s11116-019-10002-0

Pyrialakou, V. D., & Gkritza, K. (2016). Exploring the opinions of passenger rail riders: Evidence from the hoosier state train. *ASME/IEEE joint rail conference*. American Society of Mechanical Engineers. https://doi.org/10.1115/JRC2016-5778

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods*. Sage.

Sabouri, S., Tian, G., Ewing, R., Park, K., & Greene, W. (2021). The built environment and vehicle ownership modeling: Evidence from 32 diverse regions in the US. *Journal of transport geography*, *93*(2021), 103073. https://doi.org/10.1016/j.jtrangeo.2021.103073.

Southern Rail, Commission. (2019. April 17). Poll shows wide support of new Orleans to Baton Rouge passenger rail service. Southern Rail Commission. Retrieved from https://www.southernrailcommission.org/press-releases/2020/8/26/poll-shows-wide-support-of-new-orleans-to-baton-rouge-passenger-rail-service

Southern Rail, Commission. (2022). Member states: Louisiana. Southern Rail Commission. Retrieved from https://www.southernrailcommission.org/louisiana/

Sperry, B. R., & Collins, T. (2018). Improving intercity passenger rail planning using evidence from passenger survey data. *Transportation Research Record*, *2672*(10). https://doi.org/10.1177/0361198118793349

Sperry, B. R., Larson, S., Leucinger, D., Janowiak, S., & Morgan, C. A. (2012). Intercity passenger rail access to airports: Case study in milwaukee, Wisconsin. *Transportation Research Record*, *2300*(1), 22–30. https://doi.org/10.3141/2300-03

Tian, G., Ewing, R., & Greene, W. (2015). Desire for smart growth: A survey of residential preferences in the salt lake region of Utah. *Housing Policy Debate*, *25*(3), 446–462. https://doi.org/10.1080/10511482.2014.971333

U.S. Census Bureau. (2020). 2020: Decennial census redistricting data (PL 94-171). U.S. Census Bureau. Retrieved from https://data.census.gov/

Weber, S. (2021). A step-by-step procedure to implement discrete choice experiments in Qualtrics. *Social Science Computer Review*, *39*(5), 903–921. https://doi.org/10.1177/0894439319885317

Author Biographies

Guang Tian is an Assistant Professor of the Transportation Studies Program at the University of New Orleans. He holds a PhD in Metropolitan Planning, Policy and Design from the University of Utah. His interest and research focus on GIS, urban planning and studies, and transportation and its social, environmental, and economic impacts.

Tara Tolford is a Research Associate III of the UNO Transportation Institute at the University of New Orleans. She has been certified by the American Institute of Certified Planners. Her interest and research focus on active transportation, transit, land use, complete streets, green infrastructure, and data.