

STRIDE

Southeastern Transportation Research,
Innovation, Development and Education Center

Technology Transfer Final Report

STRIDE Project C3

Emerging Mobility Services for the Transportation Disadvantaged

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THE STRIDE CENTER

The STRIDE Center is the 2016 USDOT Region 4 (Southeast) University Transportation Center (UTC) housed at the University of Florida Transportation Institute (UFTI). Our mission is to develop novel strategies for Reducing Congestion. The Center has nine partners, representing seven states in the Southeastern U.S. The UFTI and its partners in the STRIDE Center are recognized leaders at state, regional, national, and international levels. The STRIDE Center is focused on assembling and integrating research projects throughout the region in a way that maximizes contributions to solving current and future transportation problems as well as strengthening expertise and developing new technologies. For more information see <https://stride.ce.ufl.edu/>.

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1. Project Overview

This STRIDE project studied the travel characteristics and use of emerging mobility systems by transportation disadvantaged populations. This project had a special focus on different transportation disadvantaged groups, which currently constitute a large proportion of the US population. The project involved a collaboration between five universities within the STRIDE consortium, the University of North Carolina Chapel-Hill, North Carolina State University, the University of Florida, Auburn University, and Florida International University. The research conducted as part of this project was organized in five research thrusts. In thrust 1, the research team investigated how vehicle ownership and income interact with geographical location to affect trip characteristics, in addition to how travel behavior varied over time. Moreover, this thrust also explored the perception and use of active travel among households of different economic status in various spatial environments. In thrust 2, travel behavior and mobility preferences of older adults (age 65 and older) were examined. To evaluate the potential of using shared mobility services to meet mobility needs of older adults, the research team further investigated the magnitude of cost-saving per month that would encourage travelers to switch from their current mode to ridesourcing services. In thrust 3, we used mobile device data to explore temporal patterns in visits to health care points of interest during 2020 and examined how these patterns were associated with block group-level sociodemographic and spatial characteristics in North Carolina. We revealed distinct inequities in visit patterns, which show block groups with higher population density and those with higher percentages of older adults, low-income individuals, racial and ethnic minorities, and people without household vehicles had lower rates of medical visits during the pandemic and experienced a slower recovery in visits after the state's most restrictive lockdown period. In thrust 4, we developed and applied a tool to the Gainesville Regional Transit System (RTS) to understand the changes in transit accessibility for neighborhoods with concentrations of vulnerable populations (older adults, individuals with disabilities, and low-income households) throughout the COVID-19 pandemic (during, recovery and projected in five years) for five types of trips (work, medical, education, grocery and social). The analysis identified areas with little transit service that could be served with microtransit and showed uneven changes during COVID-19 and a recovery for most types of trips. In thrust 5, the research team examined how MaaS is currently being utilized in rural communities as well as opportunities for MaaS to support existing travel patterns through comparisons to urban MaaS use. This work estimated logistic regression models to understand the regional, trip, and sociodemographic factors influencing current and future MaaS activity (i.e. mode choices and trip distances) in rural areas.

2. Research Goals

In thrust 1, the research goal was to comprehend how income and vehicle ownership status of different households jointly interact with the spatial environment to affect trip characteristics and the use of active travel. In thrust 2, the research goal was to better understand the travel behavior and mobility preferences of the aging population (age 65 and older) in the U.S. In thrust 3, the research goal was to improve the understanding of the temporal patterns in visits to health care points of interest during 2020 and examine how these patterns were associated with block group-level sociodemographic and spatial characteristics in North Carolina. In thrust 4, the research goal was to identify concentrations of vulnerable populations (older adults, individuals with disabilities, and low-income households) and neighborhoods with large populations. In thrust 5, the research goal was to better understand how MaaS is currently being utilized in rural communities as well as opportunities for MaaS to support additional existing travel patterns through comparisons to urban MaaS use.

3. Findings

In thrust 1, results suggest low-income, carless households living in suburban environments travel more frequently by walk and bike compared to low-income households with personal vehicles and higher-income households, potentially due to lack of other transportation options, such as public transportation. In thrust 2, findings from analyses with a stated preference survey suggest that ridesourcing services for older adults may have to focus on service quality, especially privacy, reliability, convenience, and flexibility to appeal to the market of older adults. In thrust 3, results showed that block groups with higher population density and those with higher percentages of older adults, low-income individuals, racial and ethnic minorities, and people without household vehicles had lower rates of medical visits during the pandemic and experienced a slower recovery in visits after the state’s most restrictive lockdown period. In thrust 4, three scenarios (impact of COVID-19 pandemic, recovery from COVID-19 pandemic and development in the next five years) were developed to map changes in transit accessibility for five types of trips (work, medical, education, grocery and social) for four neighborhoods with concentrations of transportation disadvantaged populations in Gainesville, Florida. In thrust 5, results highlight the importance of trip distances on MaaS adoption in rural areas, and opportunities for partnerships with transit systems to further develop MaaS modes.

4. Performance Metrics

Metric	# Completed
OUTPUTS	
Product(s): Number of new or improved tools, technologies, products, methods, practices, and processes created or improved	4
Technical Report: Number of client-based technical reports published	STRIDE Final Report
OUTCOMES	
Body of Knowledge: Number of trainings for transportation professionals	1
Professionals Trained: Number of professionals participating in trainings	TBD
IMPACTS	
Stakeholders: Number of stakeholders you met with to encourage adoption or implementation of product(s)	15
Adoption/Implementation: Number of incidences outputs of research have been implemented or adopted	1

5. Products

1) Spatiotemporal Methodology to Compare Travel Characteristics for Low-Income and High-Income Populations

Thrust 1 The research team developed a methodology and wrote two manuscripts on the spatial and temporal variation in travel characteristics for low-income and carless populations in comparison to higher-income populations. Data from 2001, 2009, and 2017 were compiled to develop models on the weekly number of trips completed by personal vehicle or by active travel (walking, biking) that enable us to identify differences in travel by geography (urban, suburban, rural areas) and household type (low-income carless, low-income with vehicles, higher income). The results are general for the US, but the methodology can be used by regional/local agencies interested in understanding spatiotemporal variations in travel for their region/area.

2) Methodology to Examine Influencing Factors for Older Adults to Adopt Shared Mobility Services

Thrust 2 The research team developed a methodology to examine the influencing factors for older adults to adopt shared mobility services and identify how their reasoning and motivations might differ from younger adults using stated preference survey data. The manuscript describing this methodology and study results is accepted for publication in the ASCE Journal of Transportation Engineering, Part A: Systems.

3) Manuscript: Perspectives of Care Coordinators on Transportation Barriers to Health Care

Thrust 3 The research team wrote a manuscript describing our research investigating the perspectives of care coordinators working in North Carolina on transportation barriers to health care. We conducted 16 interviews for this research. This manuscript was submitted for peer-review to a special issue of Transportation Research Part A (Policy and Practice): Characterizing Health Pandemic Impacts on Transportation Systems and the Demand for Mobility.

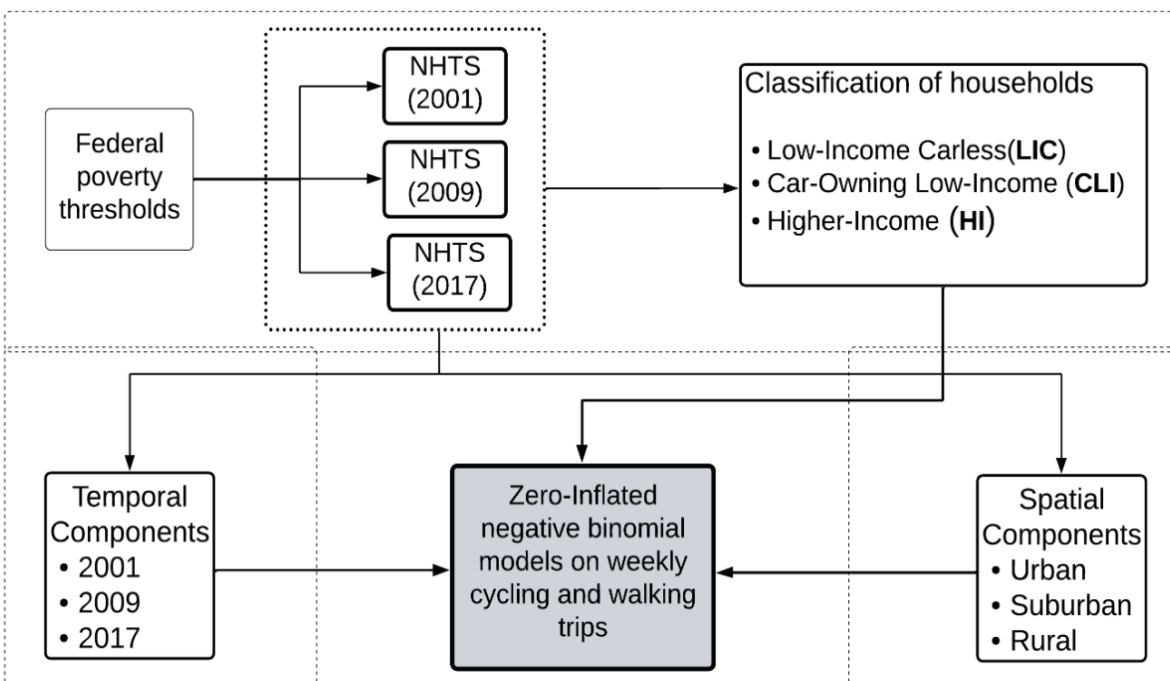
4) Set of Python Script Editors to Modify GTFS Data

Thrust 4 The research team developed a set of Python script editors to modify the GTFS data based on the scenarios' needs. The four editors can be used for different purposes: 1. suspending specific transit routes; 2. decreasing transit frequency of a route; 3. increasing transit frequency of a route; and 4. changing service span of a route.

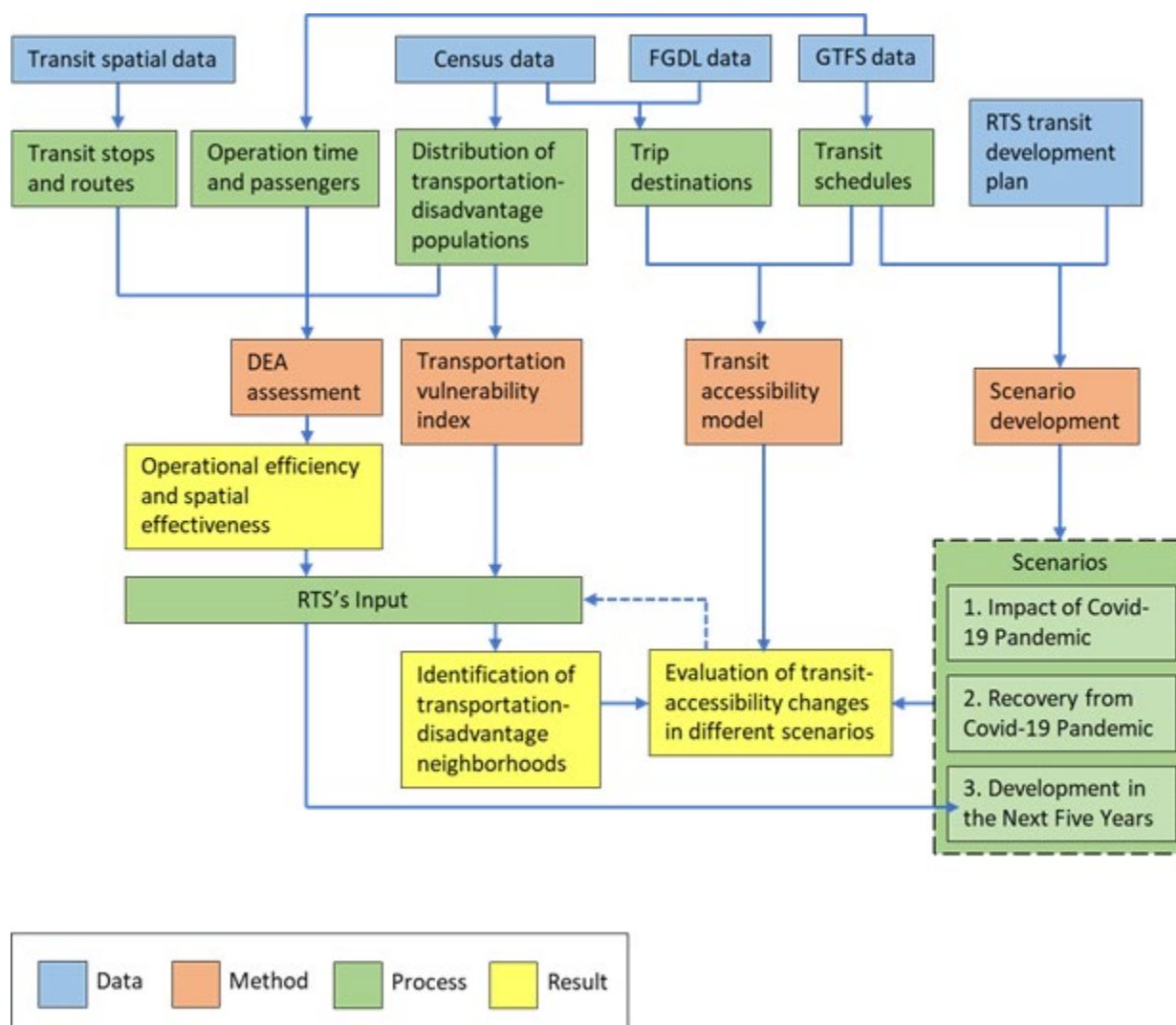
6. Who benefits/will benefit from your products?

- Researchers in transportation engineering, urban planning, and other related fields
- Transit agencies (GoTriangle, Orange County Public Transit, Chapel Hill Transit, Gainesville Regional Transit, and others)
- Departments of transportation (NCDOT, FDOT, and others)
- Cities and metropolitan planning organizations (City of Gainesville, FL, City of Wilson, NC, Miami-Dade TPO, and others)
- Community-based organizations and NGOs (UNC Health Alliance, and others)
- Social service agencies and health institutions (UNC Health Care, NC Department of Health and Human Services, Orange County Health Department, and others)

7. Images of Products



Product 1: Methodological framework for exploring variation in active travel by household type, geography, and time



Product 4: Technical details of research method: Data and methods used, analysis process, and outcomes.

8. Body of Knowledge & Professionals Trained

- 1) STRIDE Webinar: Scheduled November 16, 2022

9. Stakeholder Engagement

MEETING DETAILS		NARRATIVE DESCRIPTION
STRIDE rep.	Mary Wolfe	Mary Wolfe presented our STRIDE research results to a virtual summit of local transit and social service agencies engaged with access to health care. Meeting involved UNC Health care, Orange County Public Transit, Chapel Hill Transit.
Date of Activity	June 2020	
Type of Activity	Choose an item.	
Location	Virtual	
Stakeholder	Orange County Dept for Aging (Alison Smith)	

STRIDE rep.	Noreen McDonald, Abigail Cochran	We met with representatives from the UNC Health Alliance to share our research and identify the issues they face in their work as medical providers around transport barriers to care.
Date of Activity	9/25/20	
Type of Activity	Choose an item.	
Location	Zoom	
Stakeholder	Mark Gwynne, President UNC Health Alliance and UNC Senior Health Alliance	
STRIDE rep.	Xiang Yan, Xueyin Bai, Liang Zhai, Andre Soucy, Larissa Krinos	We presented preliminary analysis of demographic data and transit route analysis to Gainesville Regional Transit (RTS) and City of Gainesville Department of Mobility. Our research team obtained data and opinions on proposed scenarios.
Date of Activity	7/17/2020	
Type of Activity	Meeting.	
Location	Zoom	
Stakeholder	City of Gainesville Department of Mobility (Malisa McCreedy) and RTS (Jesus Gomes (Director), Krys Ochia (Planning Mgr.), Julian Lauzan, Ricky Walker	
STRIDE rep.	Xueyin Bai, Liang Zhai	Our research team met with RTS to learn more about the general transit feed specification (GFTS) and transit operations. We used that information to adjust our scenarios.
Date of Activity	9/15/2020	
Type of Activity	Meeting	
Location	Zoom	
Stakeholder	RTS (Krys Ochia)	
STRIDE rep.	Abigail Cochran	Abigail Cochran presented our STRIDE research results to a virtual working group meeting of local transit and social service agencies engaged with access to health care as well as community members. Meeting involved representatives from UNC Health, Orange County Public Transit, Chapel Hill Transit, Go Triangle, NC Department of Health and Human Services, the Orange County Health Department, and the Orange County Department for Aging.
Date of Activity	December 2020	
Type of Activity	Meeting	
Location	Virtual	
Stakeholder	Orange County Dept for Aging (Alison Smith)	
STRIDE rep.	Xueyin Bai, Liang Zhai, Juan Suarez, Andre Soucy, Xiang Yan, Ruth Steiner	Xueyin Bai presented the results of our analysis of the accessibility of the transit network for the following types of trips: work, medical, grocery shopping, education, and social under the three scenarios - the impact of COVID-19, Recovery from COVID-19, and the transit development plan for the next five years.
Date of Activity	January 20, 2021	
Type of Activity	Meeting	
Location	Virtual	
Stakeholder	Malisa McCreedy (Director of Transportation and Mobility, City	

	of Gainesville), Jesus Gomez (Director, Gainesville Regional Transit)	
STRIDE rep.	Eleni Bardaka, Kai Monast	<p>We discussed with Rodger Lentz about the new microtransit pilot in the City of Wilson (operated by Via) and the possibility of them sharing data with our research team in order to conduct a preliminary evaluation of their system from an equity lens. This fits into one of our research objectives: assessing smart mobility solutions for rural and suburban areas.</p> <p>In a follow-up meeting on March 22, 2021, we met with Via staff and discussed a potential data-sharing agreement.</p>
Date of Activity	February 4, 2021	
Type of Activity	Meeting	
Location	Virtual	
Stakeholder	Rodger Lentz, Chief Planning and Development Officer, City of Wilson, NC	

9. Adoption/Implementation

Thrust 1: Our study provides insights to the planning agencies that in addition to health and environmental benefits, promoting active travel could also provide equitable mobility options for low-income and carless individuals in a primarily car-dependent society. Our study can also serve as useful reference material for tracking further changes in travel overall and the prevalence of active travel in the U.S. in the future. This research adds to the limited number of existing studies that investigate the spatiotemporal changes in car and active travel in the U.S. The research team plans to submit two papers for publication in academic journals based on this work. Two papers were also presented at the 2022 TRB annual meeting.

Thrust 2: Our study provides insights for planners, policymakers, and service providers on the factors affecting older adults' decisions toward ride-sourcing services and highlights the unique attitudes that influence their decisions. This study advances our understanding of the propensity toward ride-sourcing among older adults in terms of their preferences and motivations. This knowledge would lead to better estimation of their mobility choices and better design of policies and services that meet the mobility needs of older adults. The results of this study is being published in the ASCE journal, the research team will also seek webinar opportunities to present to a wide audience.

Thrust 4: Our study provides a methodology for public transit agencies that matches populations with the highest needs with accessibility to various destinations - work, groceries, education, social activities - and allows the development of scenarios based upon changes in routes (dropping routes, reducing/increasing frequency) and other related activities. This research adds to the literature on transit accessibility for vulnerable populations. The results of the research have been shared with the Gainesville Regional Transit system and incorporated into a research report on a microtransit pilot project in Gainesville.

10. Broader Impacts

In Thrust 1, by demonstrating disparities in the amount of travel for different types of households in urban, suburban, and rural areas, we raise awareness on the financial distress experienced by low-

income households whose limited transportation options force them to own personal vehicles as well as the challenges faced by carless households. We expect that the results of our research will contribute to the emergence of public transit systems that can better support suburban and rural areas, such as public microtransit systems.

In Thrust 2, by examining the mobility patterns and needs of older adults and highlighting the unique attitudes that influence their mobility decisions, we point out the need to address the mobility needs and challenges of the aging population. The results could help the design and planning for more equitable transportation systems.

In Thrust 4, by demonstrating the possibility of conducting accessibility-based planning, we are offering an opportunity for transit agencies to understand the differences in access to various destinations to provide transit solutions - Uber, Lyft, fixed-route transit - that can more clearly match the needs with the characteristics of the service. Ultimately this could improve the efficiency of transit service, reduce congestion, and other transportation-related issues.