



Safe Routes to Age in Place



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STUDY PARTICIPANT

“ In the course of doing the study, it made me realize, think about mobility and think about right now. I can do whatever I wanna do; I can go wherever I wanna go whenever I feel like it, but at some point in time, that might not be the case and then what’s my life gonna be like? ”

Executive Summary

Older adult fatalities and serious injuries continue to rise year after year. It is imperative that as the population ages, older adults and other transportation disadvantaged communities are included in transportation planning and funding considerations so that as individuals are no longer able to drive, or no longer interested in driving, they have accessible, affordable and acceptable transportation options in their community.

In order to provide options that meet these requirements outside of driving themselves, communities must build knowledge through infusing the expertise of older residents into the ideas and insights of public and private partners.

Historically, older adults, individuals with disabilities, individuals with limited English proficiency and those with low incomes have been hard-to-reach populations. However, they are the same groups that experience transportation and mobility challenges at higher rates. Safe Routes to Age in Place is a systematic way to collect information from hard-to-reach populations that can lead to data-driven interventions including: knowledge of transportation challenges and options in your community, knowledge of targeted infrastructure improvements needed in your community and pilot programs that provide new transportation solutions.

Completing a Safe Routes to Age in Place program in your community ties your work to an emerging network of interdisciplinary professionals working to increase participation of hard-to-reach populations in transportation planning, programming and other advocacy efforts. It increases connection to community members and builds the rapport needed to mobilize around short- and longer-term challenges. In particular, listening to resident voices can help your community inform the prioritization of infrastructure improvements that support motivation to consider transportation outside of the car. For example, crosswalks, curb cuts and leading pedestrian intervals have all been shown to increase feelings of safety, a commonly stated barrier to walking, biking or taking the bus.

Safe Routes To Age in Place Concept

The chart below displays the Safe Routes to Age in Place concept, displaying various modes of transportation - alternative transportation, neighborhood circulators, public transit and paratransit, vehicles for hire (such as taxis), e-hail (such as Lyft and Uber) and driving a privately-owned car.



Benefits of Safe Routes to Age in Place

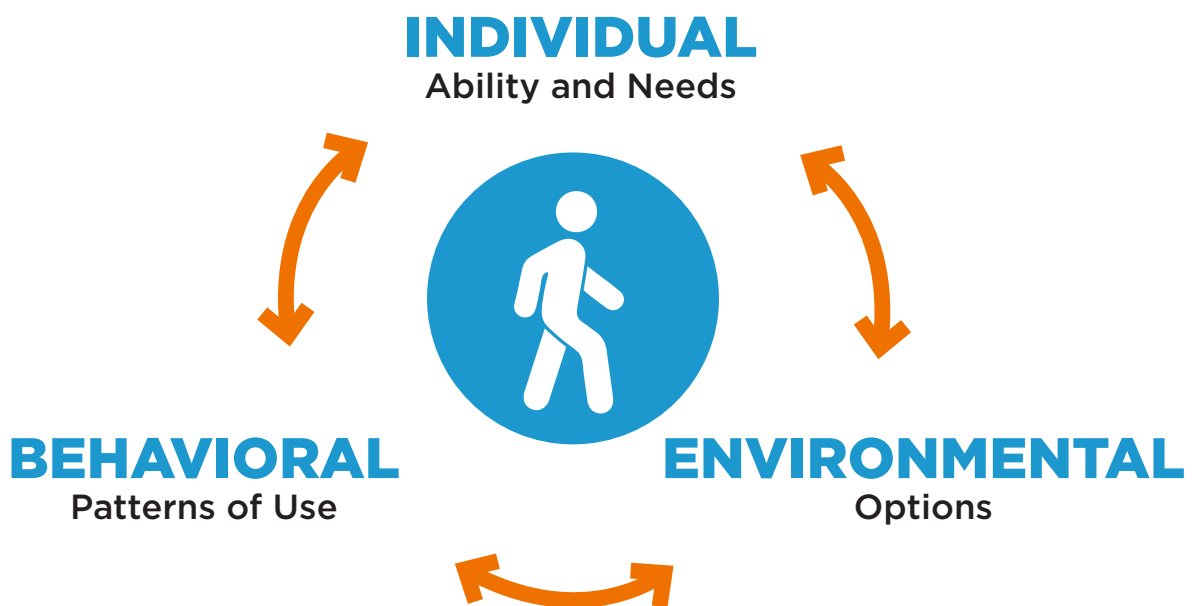
- ✓ Builds community relationships with hard-to-reach populations that can be engaged for recruitment for surveys, focus groups, walk audits and other opportunities to inform transportation planning and equitable funding investments
- ✓ Provides a baseline understanding of transportation barriers and facilitators in your community, important destinations for older adults in your community and uncovers potential/new scalable programs that are occurring through nonprofits and other small organizations
- ✓ Blends the expertise of older residents with public and private sector knowledge
- ✓ Identifies specific areas to invest infrastructure improvements that support alternative transportation
- ✓ Gauges community readiness for pilot projects

Project Overview

From 2019-2020, Age-Friendly Columbus and Franklin County, a program of The Ohio State University, created and piloted “Safe Routes to Age in Place.” The purpose of this study was to identify older adults’ transportation challenges in their communities and collaboratively identify solutions. Older adult residents were recruited from three pilot communities in Franklin County, Ohio and used an app, *MyAmble*, developed by The University of Texas at Arlington School of Social Work, to track details of their trips using tablets. For 14 days, participants answered a variety of questions related to their daily transportation experiences, travel memories and how transportation affects

their social participation, access to resources and quality of life. Following this two-week period, participants engaged in one of three focus groups held in each community to elaborate on their experiences during the study. The overarching findings from all data sources are organized according to the Social Cognitive Theory of Environmental, Individual and Behavioral barriers and facilitators to transportation. Though presented independently, it should be noted that environmental, individual and behavioral factors interact and influence one another when considering issues of transportation and mobility among older persons. Found on pages 44-45, recommendations propose solutions to transportation barriers by connecting identified challenges to evidence-informed interventions.

SOCIAL COGNITIVE THEORY APPLIED TO MOBILITY/TRANSPORTATION OF OLDER ADULTS



1,190 trips

recorded by older adults



Summary of Key Findings

Environmental Barriers

- Poor lighting, inadequate sidewalks and areas in need of construction contributed to safety concerns related to walking and biking.
- Significant traffic, dangerous drivers, busy intersections, parked cars and a lack of law enforcement impacted use of alternative transportation.
- Areas under construction created significant barriers to alternative transportation use as well as driving challenges.
- The location of existing bus stops or a lack of bus services limited alternative transportation use among those interested in utilizing alternative transportation options.
- The logistics of riding a bus including schedule, lack of reliability and getting on and off the bus created challenges to utilization.
- Bad weather such as rain, snow and extreme heat limits the utilization of alternative transportation methods.
- Existing alternative transportation options such as a senior bus or agency-provided transportation had limited hours and destinations and only ran within city limits.
- Certain aspects of community infrastructure, such as narrow roads or roadside ditches, can make driving be perceived as less convenient and more dangerous.

Environmental Facilitators

- Areas with sidewalks and close daily points of interest such as the grocery stores, pharmacy, restaurants and doctors' offices contributed to more walking.
- When the weather is nice, alternative transportation was more frequently utilized for exercise and to get to daily points of interest.
- Bus logistics such as nearby stops and convenient schedule contribute to increased utilization of public transportation.

Individual Barriers

- Physical and cognitive limitations create challenges in terms of accessing and utilizing alternative transportation. For instance, participants noted the inability to walk long distances to the bus stop and carry groceries on the bus.
- The cost of alternative transportation including the bus and e-hail is a barrier for some potential customers.
- The time it takes to get to and from destinations of interest on the bus or walking limits individual participation.
- Car problems were the most common reason for incomplete trips.

Individual Facilitators

- Regardless of transportation mode used, trips taken were very important to participants (84%) and improved participants' mood (72%).
- Walking was viewed as an important way to exercise and as good for health.
- An identified benefit of alternative transportation was not having to worry about parking.

Behavioral Barriers

- Driving oneself was the preferred method of transportation.
- There was little expressed motivation to shift away from driving with self/others to alternative modes of transportation unless required.
- Did not have a history of riding the bus.

Behavioral Facilitators

- Daily tracking of travel patterns led to planning current and future transportation use and needs including thinking about where to live, identifying what transportation supports exist in their communities and how friends get around. Participants did anticipate needing to walk, ride the bus and use Uber/Lyft as well as rely on others in the future as their physical and cognitive needs change.
- There was significant interest in peer-to-peer training and information sharing about alternative transportation options. There was an interest by some in using a tricycle, scooter or other wheeled mobility device on designated pathways.

- Although no participants biked daily, nearly 50% of individuals walked daily. Identifying what alternative transportation mode is the best fit for different individuals while considering their environmental, community and personal contexts appears critical.

The information collected through *MyAmble*, focus groups and interview-style data have provided a deep, foundational knowledge of transportation patterns, barriers and facilitators experienced by Central Ohio older adults. Of particular note, the powerful quotes in appendices 5-8 showcase the importance of prioritizing the participation of older adults in transportation planning processes. The community-based participatory approach used by the research team increased participation of underserved populations and this type of specialized outreach for underserved communities should continue to be a priority in the approach toward planning more equitable transportation and mobility options.

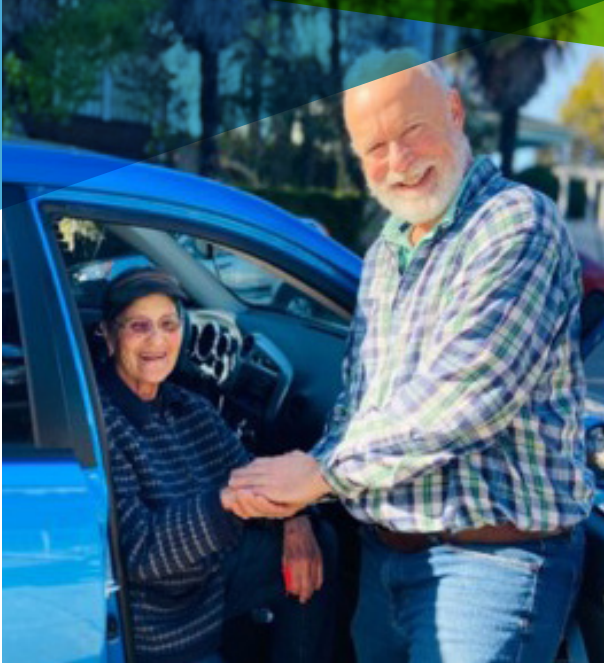
As adults age, they may no longer be interested in driving or able to drive; however, connection to needed resources, one another and daily activities requires access to a variety of transportation options. Many alternative forms of transportation could fill the gap between need and access with reasonable attention to age-friendly details. There is a growing awareness in communities across the U.S. of the importance of creating safe transportation and mobility options to age in place. Similar to the national Safe Routes to School program, Safe Routes to Age in Place focuses on active modes of transportation such as walking and biking, but also identifies the importance of unique issues faced by older adults such as accessibility, safety and comfort (Age Friendly Miami Dade County, 2016).

COMMUNITY-BASED PARTICIPATORY RESEARCH PROCESS FOR SAFE ROUTES TO AGE IN PLACE



STUDY PARTICIPANT

“ There’s physical reasons why you might not be able to drive, but then there might be financial reasons why. If driving’s your primary mode, your car breaks down, you can’t fix it, then what would you do? It’s not a physical change, but some other change that means you can’t drive. What are the options? ”



Background

In 2016, Age-Friendly Columbus and Franklin County (AFCFC) completed an assessment of the livability of the City of Columbus with residents 50 years and older. Data were collected through community-wide surveys, focus groups and walk audits.

AFCFC is working with older residents and community partners in suburban, urban and rural communities throughout Franklin County to implement the strategic plan developed from the assessment. Transportation and mobility challenges were consistently identified as priorities in the assessment, focus groups and other local reports on aging in Central Ohio. Because of this, a significant number of strategies and action steps to improve current and to pilot new transportation options were included in the AFCFC strategic plans.

The transportation and mobility initiatives of AFCFC closely align with the Alternative Transportation Focus Area of the Older Road Users Action Plan from Ohio Department of Transportation (ODOT) Strategic Highway Safety Plan (SHSP). According to the 2012-2016 SHSP, Franklin County was one of six Ohio counties that had over 5,000 crashes involving drivers 65 and older. Furthermore, older Columbus adults accounted for the highest percentage of serious injuries and fatalities when involved in crashes. The 2016 ODOT SHSP outlined multiple strategies to decrease older adult serious injuries and fatalities on Ohio's roadways. One such strategy was to create and pilot a "Safe Routes to Age in Place (SRTAIP)" program for older adults in Central Ohio.

Project Overview

There is a growing awareness in communities across the U.S. of the importance of creating safe transportation and mobility options to age in place. Similar to the national Safe Routes to School program, Safe Routes to Age in Place focuses on active modes of transportation such as walking and biking, but also identifies the importance of unique issues faced by older adults such as accessibility, safety and comfort (Age Friendly Miami Dade County, 2016). In Ohio, older adults come from a wide range of backgrounds. A variety of mobility and transportation options are needed to provide SRTAIP in our communities. The 2019 ODOT older driver crash analysis recognized that the risk of serious injuries from driving increases as individuals age; however, all individuals aged 65 and older do not face the same risks. There are environmental, individual and behavioral differences that influence facilitators and barriers to have SRTAIP.

As adults age, they may no longer be interested in driving or able to drive; however, connection to needed resources, one another and daily activities requires access to a variety of transportation options. From 2019-2020, AFCFC was able to pilot Phase I of Safe Routes to Age in Place, which focused on the evaluation of various alternative transportation options and built environment considerations. Though this study report emphasizes alternative transportation including walking, biking and riding the bus, the umbrella concept of SRTAIP encompasses an integrated and dynamic connection between alternative transportation, neighborhood circulators, volunteer drivers, public transit and para transit, vehicles for hire, E-hail and driving oneself or catching a ride with a family member or friend in a private vehicle. The menu of options requires not only availability, but also acceptability, accessibility, adaptability and affordability (Kerschner & Silverstein, 2018) to support people of all ages and abilities to safely age in place.

STUDY PARTICIPANT

“ I am capable of driving most places. As long as I am capable of driving, I don't think I would ride the bus. I just don't think I would feel comfortable riding the bus. for some reason it just does not feel safe or warm. Using uber or lyft would be a plausible solution to that problem, however I honestly would be wary of getting into a vehicle with an unknown person. I live in a building where it's—it's subsidized housing. There's a lot of people who don't have money, so that's [Uber or Lyft] not an option for them. ”

Figure 1 to the right displays the Safe Routes to Age in Place concept, displaying various modes of transportation – alternative transportation, neighborhood circulators, public transit and paratransit, vehicles for hire (such as taxis), e-hail (such as Lyft and Uber) and driving a privately-owned car.



The purpose of this project was to:

- Increase active or alternative transportation options for older adults living in selected urban, rural and suburban communities within Franklin County
- Increase use of alternative transportation options by older adults living in these targeted areas
- Create a replicable and evidence-based model to be used in other cities across Franklin County and Ohio

This was achieved by collaborating with older adults and municipal leaders in Franklin County to identify the transportation-related challenges faced by older people while navigating their communities and those challenges.

Specifically, this study was informed by the Social Cognitive Theory (Bandura, 1986), recognizing the importance of the environmental, individual and behavioral factors influencing mobility. It used the principles of community-based participatory research (CBPR). CBPR combines research

and action and incorporates community residents as equals with researchers through co-learning and reciprocal transfer of expertise to discover and solve immediate challenges (Dabelko-Schoeny et al, 2020).

The purpose of this study was to:

- Understand how older residents use transportation in pilot communities
- Identify facilitators and barriers related to transportation use by older residents in the pilot communities
- Provide evidence-informed recommendations to increase access and use of alternative transportation

In consultation with municipal leaders, three geographic areas or “hot spots” in the pilot communities of Westerville, Prairie Township and the Near East Side of Columbus were identified through existing publicly available data. The data used to identify these hot spots included areas of high older adult density; the locations of Central Ohio Transit Authority (COTA) bus stops; COTA Mainstream routes; sidewalks; and bike, car, pedestrian and intersection crash data. The data was used to create a heat map in each community to pinpoint areas of high older adult density and high incidence of traffic collisions.

Older adult residents were recruited from the three communities (32 total participants). Participants used an app (*MyAmble*) to track details of their planned and actual trips on a tablet. *MyAmble* includes several innovative features including a daily digital trip planner that is able to capture unserved travel demand, a text messaging-based qualitative interview tool, travel history and a challenge logger enabling users to document videos and/or photos of transportation barriers in the environment in real time.

For 14 days, participants were asked to use *MyAmble* to answer a variety of open- and closed-ended questions related to their daily transportation experiences, travel memories and how transportation affects their social participation, access to resources and quality of life. Following this two-week period, participants engaged in one of three focus groups held in each community to elaborate on their experiences during the study.

To supplement this study and in recognition of the importance of over-sampling diverse older adults, the study team also held eight, 90-minute focus groups with older adult immigrants and refugees in six different languages (English, Nepali, Khmer, Somali, Russian and Mandarin) to identify any unique barriers and facilitators to transportation use. (See https://csw.osu.edu/wp-content/uploads/2020/09/2020-8-Aug_We-want-to-go_v6.pdf for more details). The focus group’s overarching findings and themes also informed the study.



Figure 2 Pathway for biking and motorized scooter.

Literature Review

Previous efforts across the nation to increase active transportation by older adults have been described as “top-down” (lacking meaningful input by older adult consumers) and non- theoretical with inconclusive results (Arnett et. al, 2014).

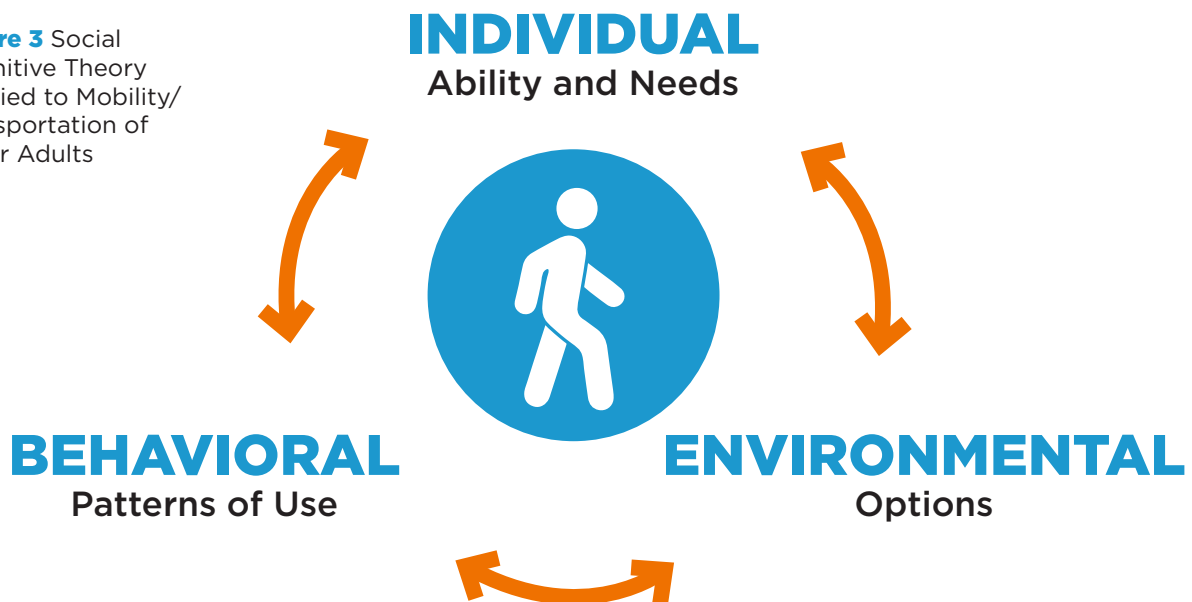
Our project was driven by the experiences of older adults, theory, existing literature and current best practices in data collection for transportation of disadvantaged populations. We recognize that successful community-based interventions focused on changing the behavior of individuals must consider the physical and the social environments. The following brief literature review supporting the theoretical perspective used and the key factors influencing the ability for older persons and people with disabilities to have Safe Routes to Age in Place.

Social Cognitive Theory

Social Cognitive Theory (SCT) has been widely influential in understanding why individuals and groups behave the way they do. Bandura (1986) posits that the way humans function is a reciprocal interaction between environmental, individual and behavioral processes.

If one is interested in increasing the options and utilization of alternative transportation, one must take into consideration these three forces. Because in the United States (U.S.) there is a dependence on personal vehicles to meet transportation needs, recognizing the role of self-efficacy to build knowledge, skills and ultimately change behavior is critical to behavior change in response to individual mobility needs and environmental options. Behavior change occurs through observational learning, reinforcement and feelings of self-control and self-efficacy.

Figure 3 Social Cognitive Theory Applied to Mobility/ Transportation of Older Adults



Aging and Transportation

Consistent with the trend of global aging, the number of older adults (65 years and older) in the U.S. is projected to exceed 71 million by 2030 (Centers for Disease Control and Prevention [CDC], 2015). As the older adult population continues to grow, it is imperative to create safe, affordable and accessible mobility options to meet their daily needs.

Transportation is a critical component of life quality among older adults. Reliable transportation increases access to food and medical care while decreasing potential for social isolation. However, many older adults find transportation increasingly difficult to navigate as they experience the natural physical and cognitive changes associated with aging. Therefore, alternative transportation strategies are necessary to maintain quality of life as we age. Older adults in rural areas face unique barriers, as fewer alternatives extend beyond metropolitan areas.

The lack of utilization of active and alternative non-auto options are associated with increased rates of social isolation and depression among older adults, particularly those experiencing driving cessations (Cheng et al., 2019; Ragland et al., 2005). Impaired mobility is also associated with negative health outcomes and poorer quality of life for older adults (Alsnih & Hensher, 2003; Kerr et al., 2012). In contrast, active transportation such as walking and biking has a positive relationship with the health of older adults (Cheng et al., 2019).

Around 73% of daily trips by U.S. adults between 65 and 74 years old and 69% for individuals 75 years and older, are completed by driving a privately-owned vehicle (Shen et al., 2017).

Aging-related functional, sensory and cognitive changes increases older adults' risk of car crashes and related injuries (Braver & Trempel,

2004). Additionally, older adults reduce their driving and some stop driving altogether as they age (Adorno et al., 2018; Dumbaugh, 2008). In fact, on average, older adults outlive their ability to drive by seven years (AAA Foundation for Traffic Safety, 2020).

Consistent with national trends, over 82% of Columbus older adults report driving themselves as their usual way of getting around (Age-Friendly, 2016). However, the car-dependent lifestyle is not without consequences. According to ODOT's SHSP, between 2012 and 2016, more than 5,000 crashes in Franklin County involved older adults. The rates of injury and fatality from car crashes for older adults in Ohio were high compared with other states in the U.S. (Federal Transit Administration, 2010).

STUDY PARTICIPANT

“ There are not many places that I can walk to for chores or tasks. I do walk a lot. I exercise about 1.5 to 2 hours daily. If places were closer, it would help. Better public transportation, sidewalks, etc. would help. The nearest bus line that I am aware of is practically three and a half miles away. So if you do not have access to a car you really can't get much done. Even the nearest stores are two miles away. ”

Need for increased Provision and Utilization of Alternative Transportation Options

Many of the alternative transportation modes (e.g., buses, walking and bicycling) are less expensive and can have a positive effect on the health and well-being of individuals (Smart Cities, 2015), particularly marginalized populations (e.g., older adults, low-income populations) (Cheng et al., 2019; Behbahani et al., 2019). However, the limitations in the quantity and quality of alternative transportation options for older adults hinder their utilization (Turner et al., 2017).

In addition to the lack of high-quality alternative transportation options, the use of alternative transportation options is also low (Collia et al. 2003). Barriers in the built environment (e.g., unsafe neighborhoods, lack of walkability) significantly limit the use of alternative transportation (Loukaitou-Sideris et al., 2019; Shrestha et al., 2017). Furthermore, individual behavioral factors including beliefs, social support and culture also influence the adoption of alternative transportation options among different groups of older adults (Turner et al., 2017; Klicnik & Dogra, 2019).

Crashes

Higher physical functioning is associated with fewer automobile crashes (Ng, et al., 2020). Older adults who are at risk for crashes tend to self-limit their driving, but self-regulation may not be sufficient to eliminate increased crash risk (Ross et al., 2009). Despite self-limiting behaviors, at-risk older adults in one large sample were twice as likely to incur at-fault crashes (Ross et al., 2009). Some risk factors for older drivers include attention difficulties (Choi et al., 2019), hearing deficit (Edwards, et al., 2017) and physical changes (Somes & Donatelli, 2017).

Additionally, older adults are more likely to be involved in at-fault, fatal crashes when intoxicated than are younger adults with the same blood alcohol content (Scheetz, 2015). Crash-risk increases in adults over 50 during the 30-day period after they receive a traffic-related charge, particularly in adverse weather conditions or when it's dark (Davis, 2019).

Driving Cessation

Driving cessation has a negative association with older adults' physical, social and cognitive well-being (Chihuri et al., 2016). A meta-analysis indicated that driving cessation doubled the risk of depressive symptoms among older adults (Chihuri et al., 2016). Not driving in the previous year was associated with an increase in the odds of experiencing social isolation among older adults in the United States (Qin et al., 2020). The text below explains how older adults' experiences with transitioning from drivers to non-drivers are shaped by individual, behavioral and environmental factors according to the social cognitive theory (Bandura, 1986).

Individual Factors - Self-Assessment

Older adults assess their driving years left based on their functional and health status (Anstey et al., 2017). Reduced processing speed, difficulty reading a map, older age and poorer self-rated health was associated with a shorter expectancy of driving years left among older adults (Anstey et al., 2017). Shorter driving expectancy rated by oneself also predicted future driving cessation at the four-year follow up together with cognitive, health and financial problems (Anstey et al., 2017). Additionally, older adults' evaluation of one's driving skills can be influenced by

major incidents, such as being in an accident or narrowly missing an accident; minor challenges with driving, including difficulty with parking; and caregivers' assessment of older adults' driving skills (Barco et al., 2021; Ang et al., 2019). Age-based stereotypes and driving anxiety can also negatively influence older adults' driving confidence and decisions for driving cessation (Chapman et al., 2016; Taylor et al., 2018).

Expectations for years left to drive vary greatly among older adults (Babulal et al., 2019). In a study on a sample consisting mainly of older African Americans, researchers asked participants "how long do you expect to continue driving?" Older drivers who had higher income, were younger, expected to live longer, were not self-regulating one's driving (e.g. not limiting driving destinations to nearby) and have higher levels of difficulty imagining themselves as non-drivers had higher expectations for years left to drive (Babulal et al., 2019). Although over 76% of the sample expected to outlive their driving lives, a small proportion of older adults held unrealistic expectations regarding years left to drive (Babulal et al., 2019).

Behavioral Patterns – Planning and Social Support

Studies found that more driving retirement planning was associated with greater driving stress, less driving confidence and a more positive view of driving alternatives (Vivoda et al., 2021). Older adults who were at increased

risk for driving cessation (e.g. those with lower income, female, racial and ethnic minority older adults) planned more than their counterparts (Vivoda et al., 2021).

Older adults' social network plays an important role in the driving reduction and cessation. When perceiving a need to regulate their driving, older adults often share driving responsibilities with a spouse (Ang et al., 2020). Informal transportation support from one's social network plays a big role in mobility after driving cessation (Murray et al., 2019). However, informal social support may not always be available and some older adults report feeling like a burden when not being able to reciprocate (Murray et al., 2019). Therefore, community-wide transportation interventions are also needed (Murray et al., 2019).

Environment Factors

Most older adults consider driving important, with rural seniors being twice as likely to indicate that driving cessation would have a high impact on their daily lives (Strogatz et al., 2019; Hansen, 2020). Rural adults are particularly at risk for social isolation upon driving cessation (Hansen et al., 2020). For those who decide to stop driving, three facilitators are necessary to successfully transition to driving cessation: social support, legal support and infrastructure (Ang et al., 2019). Specifically, seniors benefit from public transportation and mobility advisory

STUDY PARTICIPANT

“ I would like to say that in the course of doing the study, it made me realize, think about mobility and think about right now. I can do whatever I wanna do; I can go wherever I wanna go whenever I feel like it, but at some point in time, that might not be the case and then what's my life gonna be like? That really made me think about it. ”

services (Ang et al., 2019). Those in rural areas are vulnerable to negative health and social outcomes after they stop driving because neither public transportation nor active transportation tools are readily available (Hansen, 2020).

Furthermore, older adults depending on public transportation, which is more prevalent in urban areas, are more likely to resume driving after driving cessation than their peers who utilize taxis and rideshare services (Ratnapradipa et al., 2018). This might be explained by older adults' perceived inconvenience (e.g. challenges carrying groceries) when relying on public transportation (Ratnapradipa et al., 2018). Moreover, the local community environment such as safety, walkability, human services and engagement opportunities becomes increasingly vital for older adults' well-being after driving cessation (Rapoport et al., 2017; Dickerson et al., 2019).

A systematic review of interventions for facilitating driving cessation among older adults suggested that psychosocial education, support groups and local community engagement opportunities (Rapoport et al., 2017) hold promise in managing depressive symptoms associated with driving cessation. Educating older adults and caregivers on aging and driving, losses and changes, alternative transportation, lifestyle planning and advocacy support (Scott et al., 2020) may also facilitate driving cessation among older adults, including among older adults with dementia (Scott et al., 2020).

Walking

When driving becomes dangerous or inadvisable, some older adults turn to walking as an alternative mode of transportation. Participants in one study walked more often for utilitarian purposes than for recreational ones (Cerin et al., 2020). The primary features of the

built environment that impacted walking for transportation among seniors included food/retail densities and street intersection densities. Such density reduces the need for cars to accomplish basic errands. Other factors that influenced within-community walking included residential density and the availability of public transportation (Cerin et al., 2020). Another study demonstrated that non-modifiable constraints to walking (e.g., weather and personal health) could in fact be mitigated by the built environment (Klicnik & Dogra, 2019). Specifically, installing heated sidewalks, increasing times of lights at crosswalks and adding benches may increase the walkability of the built environment for older adults.



About 50%

of participants walked outside of their home to get to places they needed to go.

Biking

Many older adults cannot replace driving with biking as a means of transportation because the two require similar physical and cognitive functioning (Leger et al., 2019). Additional barriers to biking as alternative transportation for seniors included stigmatization, regulation, road safety and cycling infrastructure (Leger et al., 2019; Van Cauwenberg et al., 2019). However, among those who continue to bike during their later years, maintaining or creating social connections is an important part of the experience (Leger et al., 2019). Older adults who cycle on a regular basis showed preferences for designated cycle paths with even surfaces, fewer environmental barriers (e.g., dangerous intersections, dead-end streets, freeways) and reduced traffic density (van Cauwenberg et al., 2019, Mertens et al., 2019).



Transportation Network Services (TNS) Usage

In general, Transportation Network Services (TNS) are increasingly utilized as alternative transportation, but are not widely known or used by older adults (Vivoda et al., 2018). Technology is a functional barrier for many older adults. One study reported that up to 42% of older adults do not possess smart phones, which are necessary to hail TNS rides (Vivoda et al., 2018). Older adults also reported safety concerns as a limiting factor, since TNS have fewer regulations than traditional taxis and drivers are strangers, unlike rideshares brokered through senior communities (Vivoda et al., 2018). Participation in rideshare programs is contingent upon individual needs, individual preferences, social conditions, as well as local business and policy conditions (Freund et al., 2020).

Public Transportation

Public transportation is an important alternative means of transportation for older adults. Using public transportation is associated with increased daily physical activity (Voss, et al., 2016), decreased social isolation (Lamanna et al, 2020) and decreased depression (Yang et al., 2019). One study demonstrated that a decrease in bus fare and bus waiting times, along with an increase in the number of buses and routes, is a promising strategy to decrease depression among older adults by increasing their access to daily transport (Yang et al., 2019). One way to reduce barriers to public transportation use among older adults is through travel training. Peer-based travel training educates seniors about how to purchase a ticket, board the bus and read a map (Dabelko-Schoeny et al., 2020).

Need for Safe Routes to Age in Place

As populations age, transportation systems must evolve to meet the needs of older adults. Many alternative forms of transportation could fill the gap between need and access with reasonable attention to age-friendly details. Common facilitators of alternative transportation across a variety of platforms include smooth riding/walking surfaces, traffic calming measures, initiatives to improve safety of public transportation, increasing the number of bus routes, adding benches or similar rest stations and lowering costs for older adults.

In order to improve the provision and use of alternative transportation options for older adults in Franklin County and increase older adults' participation in transportation planning, Safe Routes to Age in Place aims to identify older adults' challenges to transportation in their communities and identify solutions with them in a collaborative manner.

Methods

Community-Based Participatory Research

This study used principles of Community-Based Participatory Research (CBPR) for outreach to specialized populations. The CBPR approach involves forming partnerships with community members and engaging participants as experts of their community

rather than merely a source of data. Older adult participants were engaged throughout the project in order to identify how best to conduct various aspects of the study procedures. Applying CBPR allowed researchers to be informed by participants' lived experiences. Additionally, it led to stronger relationships between the research team and community stakeholders.

Figure 4 CBPR Process for Safe Routes to Age in Place



Identification and Mapping of Target Areas or “Hot Spots” in the Community

The first step of community engagement in the SRTAIP pilot study was the identification of “hot spots,” which are areas in each of the pilot communities where a high density of vulnerable older adults reside. Vulnerability was determined using the vulnerability index created by The Kirwan Institute and The Ohio State College of Social Work.

Twelve indicators of vulnerability such as being non-white, living in poverty, living alone, having 2 or more disabilities, being 85 years and older, having no vehicle and limited English proficiency were taken into consideration. (For a more comprehensive discussion of this index, please see <http://kirwaninstitute.osu.edu/wp-content/uploads/2015/03/ki-tcf-senior-study.pdf>).

The study team reviewed maps of each community reflecting areas of high density (i.e., large number of older adults) as well as vulnerability. On each map, areas with high density and high vulnerability were highlighted in red and areas with low density and low vulnerability were highlighted in blue. The red areas (high density/high vulnerability) were identified as the preliminary areas of focus for the study. These maps also included various points of interest (community centers, recreation facilities, grocery stores, medical offices, etc.) and key infrastructure (bus lines, bike lanes, sidewalks).

For the Central Ohio region, data from several sources were used: U.S. Census, American Community Survey, the Mid-Ohio Regional Planning Commission (MORPC), the Central Ohio Transit Agency (COTA) and local planning and public service departments.



Figure 5 Community “Tabling” Session at Westerville Senior Center

Equipped with these maps, the team set out to engage stakeholders in the urban, rural and suburban communities in the study. Municipal leaders were contacted in each of the communities to discuss the study and to begin a conversation to identify common goals.

These conversations were beneficial in that they provided insight into the communities that the study team lacked as non-residents. The municipal leaders shared knowledge about what challenges their communities face, what they perceived as being transportation-related assets, what had been done in the past in their communities and what plans they had for future changes. In addition, the municipal leaders assisted in identifying older adult community champions to assist in the next step of the study.



Figure 6 SRTAIP Presentation at Blackburn Community Center

These conversations also added important context to the team’s understanding of the hot spot maps. For example, since the leaders have a deep knowledge of the areas in question, they were able to help explain why certain areas have high incidences of car crashes. They also discussed what areas they felt were most important to target based on feedback they had received from community members.

In addition to stakeholders and municipal leaders, older adults were engaged early in the process of identifying hot spots to build relationships and learn more about the study areas. Older adult voices are valuable in determining barriers and facilitators to transportation, as they are able to directly share their own lived experiences.

For this pilot study, older adults were identified through municipal leader partners, contact lists compiled through previous Age-Friendly work and through the identification of community points of interest. During these initial meetings, older adults received an overview of the study, that described the study’s goals and were asked for feedback on the community hot spot maps.

Site Review

Next, site reviews were conducted in each pilot community. A “site review” is an on-foot exploration of a particular area within a community. It is similar to a walk audit, but differs in that it is less structured than a formal walk audit. For the purposes of the SRTAIP pilot study, the site reviews were intended to coincide with the high density/high vulnerability areas on the hot spot maps for each community. Older adult and municipal stakeholders selected site review locations and the locations, They were not finalized until the research team had solicited feedback for each geographic area.

Site reviews were planned in advance and community members (both municipal leaders and older adults) were invited to participate. Site reviews were also used as a recruitment opportunity for the two-week travel documentation study. In addition, they allowed the research team to build rapport with community members and to become familiar with the study locations.



Figure 7 Prairie Township Site Review

The AARP Walk Audit Tool was used to guide the site reviews. In addition, notes and pictures were collected. Site reviews provide valuable information about a specific area and are recommended prior to a formal walk audit to ensure safe participation by older adults and community members. In addition, having the opportunity to hear older adults' and community members' stories, challenges and thoughts about transportation in their own communities provided critical contextual information for the mapped information. The Walk Audit Tool acted as a strong framework, but team members encouraged additional conversation beyond the items on the tool including community history, recent and planned infrastructure changes and past transportation and mobility experiences of the participants.

Formal walk audits were planned for spring of 2020. In preparation for this, two team members attended an ODOT walk audit certification course. This certification course included information on walkability, infrastructure, pedestrian and bike crash data, purposes of a walk audit, typical features of a walk audit and best practices for conducting walk audits.

Following this certification training, the team was prepared to conduct a walk audit for the SRTAIP participants. However, these walk audits were not conducted during the study period due to safety concerns with the COVID-19 outbreak.



Figure 8 Team members attend ODOT walk audit training

Three site reviews were conducted - one in each study community:

Prairie Township Site Review: This site review took place at the Lincoln Village Plaza on West Broad St. in Columbus, Ohio. Older adult residents and municipal leaders attended the site review, which involved traversing the plaza and discussing the strengths and weaknesses of the infrastructure there.

Westerville Site Review: The Westerville site review took place near the intersection of Schrock Road and South State Street, Westerville, OH. Similar to the Prairie Township site review location, this is an area near major roads and with a high density of points of interest. Westerville city officials participated in this site review. They spoke to the history of the development in that area as well as plans moving forward.

Near East Side Site Review: The Near East Side site review took place at the Kroger grocery store located at 2000 E Main St, Columbus, OH. Municipal leaders from the City of Columbus participated in the site review, which involved walking the streets surrounding the grocery store.

Recruitment

Next, 32 participants were recruited across the three communities to document their travel patterns for a two-week period using the application *MyAmble*. Specific inclusion criteria for sample selection included adults ages 50 and older who live, work or travel in the target communities; and had the cognitive ability to provide informed voluntary consent. Because the current version of *MyAmble* is only available in English, an additional criterion was that participants needed to be able to speak, read and write in English. Future versions of *MyAmble* will be designed for non-English speaking participants.

As a result of the Site Reviews and previous community engagement work, a number of potential participants were previously identified. However, the majority of the participants were recruited through community engagement efforts related to this project.

The study team visited popular community “hubs” such as senior centers, community centers and housing developments, in order to engage directly with older adults, inform them of the study and solicit their feedback. Participants were asked to share their contact information (name, email address, phone number) in order to be invited to additional recruitment events.

The research team returned to these community hubs multiple times in order to recruit additional participants as well as to build trust and community understanding.

Eventually, these locations served as the centralized locations where recruitment and training events took place. Our final sample included 12 older adults from Prairie Township, 11 from the Near East Side of Columbus and nine from Westerville.

 **32** Participants were Recruited

Across **3** Communities 

 **2** Weeks

Sample

A total of 32 participants provided demographic information. The age of participants ranged from 56 to 88 years old, with an average age of 69.65. The majority of the participants were Non-Hispanic White women. All participants identified English as their primary language.

About 53.1% of the sample earned a Bachelor's degree or higher. Over half the participants were currently married. Seventy-five percent of participants lived in their own homes and half of the participants lived with their spouse or partner. Around 43.8% of the participants lived alone. Approximately 68.7% of the participants had been living in their current residence for over five years and their average number of years of residence in their community was 39.03 (SD=23.832) years. **Table 1** summarizes the demographic characteristics of SRTAIP participants.

Table 1 Demographic Characteristics of SRTAIP Participants

		n	%
Gender	Male	11	34.4%
	Female	21	65.6%
Age	Mean: 69.65		
	Standard deviation: 6.575		
Race	White	19	59.4%
	Black/African American	10	31.3%
	Asian	2	6.3%
	Two or more races	1	3.1%
Hispanic origin	No	30	93.8%
	Yes	1	3.1%
Primary Language	English	32	100%
Highest Education Level	Grammar School	1	3.1%
	High School or equivalent	3	9.4%
	Vocational/Technical School	1	3.1%
	Some college	9	28.1%
	Bachelor's degree	7	21.9%
	Master's degree	8	25.0%
	Doctoral degree	1	3.1%
	Professional degree	1	3.1%
Marital status	Married	17	53.1%
	Single	7	21.9%
	Divorced	5	15.6%
	Widowed	2	6.3%
Housing type	Own home	24	75.0%
	Senior Housing Complex	5	15.6%
	Complex/apartment Non-relative's	1	3.1%
	Home/apartment Other; Rent single family home	1	3.1%
Living arrangement	Live alone	14	43.8%
	Only with spouse or partner	16	50.0%
	With Children and spouse	1	3.1%
	With others	1	3.1%
Length of residency	Less than 1 year	2	6.3%
	2 years	6	18.8%
	3 years	1	3.1%
	5+ years	21	65.6%
	All my life	1	3.1%

Training

Once potential participants were identified, individuals were invited to consent to participate in the study and receive an initial training on how to use *MyAmble*. Meetings were held in each of the pilot communities at either a community recreation center (Prairie Township and Near East Side) or senior center (Westerville). Due to scheduling constraints, it was necessary to hold additional consent meetings in each community – there were a total of two consent meetings in Near East Side, two in Westerville and three in Prairie Township.

Participants received details on the study period, expectations and how to use *MyAmble* (tablets were available and a brief *MyAmble* tutorial was conducted). Consent forms were provided and the study team member read an overview of the consent form and answered any questions.

Next, a “group training event” was held in each community with all participants who consented at the previous event. The purpose of the group training event was to provide participants with all the information needed to launch the two-week data collection period. At this event, participants received a tablet, as well as some paper materials such as an in-depth *MyAmble* user guide and a one-page *MyAmble* “quick guide.” The two-week study period began the day following the group training event.

The data collection periods for each community were as follows:

Prairie Township: 10/29/19 to 11/10/19

Westerville: 10/31/19 to 11/12/19

Near East Side: 11/5/19 to 11/17/19

Demographic data were collected during this group training event. After completing demographic questionnaires, participants were split up into groups based on the study team member to whom they were assigned as their “Travel Buddy.” (More information on Travel Buddy data collection below.)

In these smaller groups, each member of the research team sat with a group of participants and conducted an in-depth review of the *MyAmble* application. Participants were encouraged to ask questions about the app, the tablet or any other aspects about the study process. The overall goal was to ensure that each participant was comfortable enough with all aspects of the study, which began the day following the training was held in each community.

MyAmble Application

MyAmble is a custom-designed mobile app whose purpose is to collect data relating to an individual's transportation habits and patterns. Traditional data-collection methods often fail to capture the lived experiences and underserved travel demands of older adults at risk for or experiencing transportation disadvantage.

MyAmble was designed to address these gaps in data collection methods and the app consists of five key features: Trip Planner, Trip Review, Travel Buddy, Challenge Logger and Travel Story. The app is designed to collect quantitative and qualitative data. *MyAmble* is currently an Android-based app.



Figure 9 Prairie Township Training Event



Figure 10 Near East Side Training Event

At the time of writing this report, *MyAmble* has been used in two transportation research studies in Ft. Worth and Arlington, Texas. In both projects, study participants used *MyAmble* over a two-week period. In spring of 2021, *MyAmble* will be used for a project in three sites: Tuscon, Arizona; Knoxville, Tennessee; and Dallas, Texas. During the SRTAIP pilot study, the *MyAmble* app was compatible only on Android tablets. A total of 45 tablets were purchased for the study, with the intention of providing the tablets as study incentives and to provide tablets for each of the study team members.

Team members (N = 5) were each assigned a small group of participants to support throughout the data collection period. This support included answering any questions participants might have through the Travel Buddy feature in *MyAmble* or over the phone.

Figure 11 displays the *MyAmble* home screen.

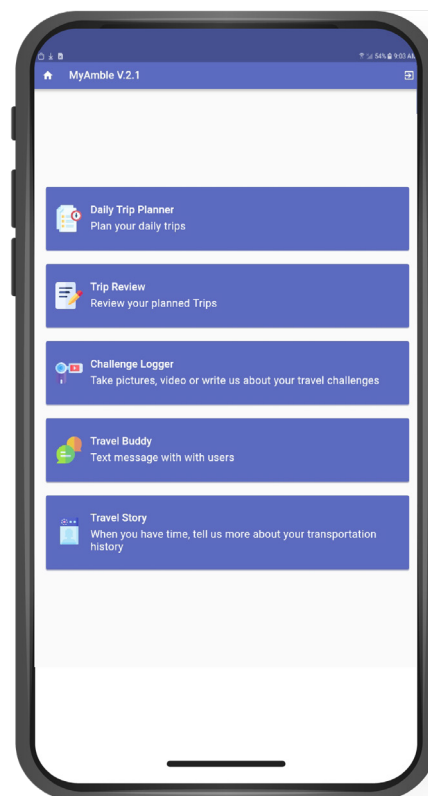


Figure 11
MyAmble
Home Page
(Version 2.1)

Trip Planner

The Trip Planner captures participants' plans for the day. Participants chose from icons that depicted daily maintenance activities (e.g., grocery store, health care provider, social services) as well as discretionary activities (e.g., entertainment, restaurant) and mandatory activities (e.g., school, employment). The Trip Planner is typically completed at the beginning of the day (ideally first thing in the morning), but participants can also choose to plan their trips in the evening for the following day. They describe where they plan to go, how they plan to get there, whether they will utilize any assistance and how important they perceive their trips to be. **Figure 12** displays a page within the Trip Planner feature.

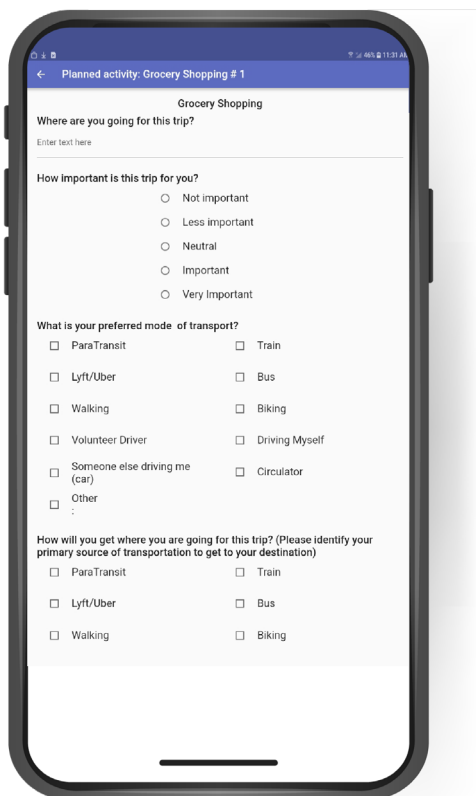


Figure 12 MyAmble Trip Planner (Version 2.1)

Trip Review

The Trip Review allows participants to review to what extent they were able to carry out their trips as described in the Trip Planner. The Trip Planner reflects how one intends to get where one would like to go, the Trip Review reflects what actually happened (see **Figure 13**). In addition to reviewing the trips participants took, the Trip Review offers an opportunity to describe trips taken by participants that were not planned in advance, as well as to discuss the effect of missed trips – trips that participants planned to take but did not. Participants were asked details about each missed trip including the importance of the trip (Likert scale), why the trip was important, why they were unable to complete the trip, the consequences of not completing the trip and to what extent missing the trip resulted in the participant feeling frustrated, disappointed, stressed, sad and/or that they missed an opportunity (Likert-scale check boxes). Together, the Trip Planner and the Trip Review offer a detailed picture of not only where participants go and how they get there, but the effect that completing trips (or not) has on their lives.

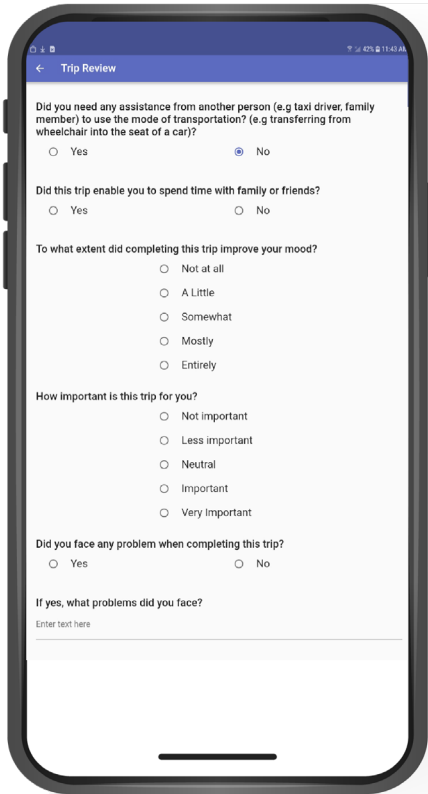


Figure 13 MyAmble Trip Review (Version 2.1)

Travel Buddy

Travel Buddy is the primary qualitative component of *MyAmble*. It operates similarly to text messaging and is a place for participants to have a structured, yet open-ended, conversation with study team members. The study team compiled a list of questions to send out to participants based on Bandura’s Social Cognitive Theory. Participants were free to respond to these questions however they chose, which then provided opportunities for the study team to reply with additional probes. **Figure 14** displays an example of one thread between a participant and a study team member during the SRTAIP pilot study (using app version 1.4.03.06)

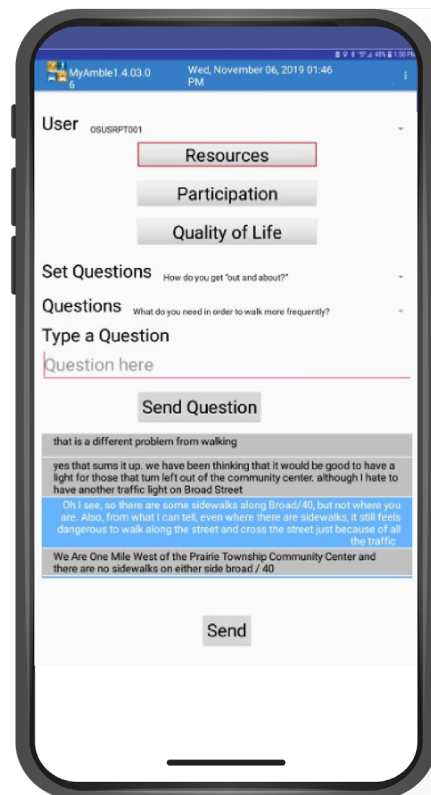


Figure 14 Screenshot of MyAmble Travel Buddy (version 1.4.03.06)

Challenge Logger

Challenge Logger is a place for participants to take photos or videos of barriers to transportation, upload them using the app and write a description of the barrier (see [Figure 15](#)).

For example, if there is an uneven sidewalk making it difficult to walk or use a wheelchair, a participant could take a photo of the place where the sidewalk is uneven, upload it through the Challenge Logger and write that this particular sidewalk is a block from their home. *MyAmble* is able to capture the GPS coordinates of the where the photo or video was taken.

The photos and accompanying descriptions are sent directly to the study team. During the SRTAIP pilot study, the Challenge Logger was the least-used feature in *MyAmble*. The study team is uncertain as to why, but suspects that it is because many of the participants did not carry their tablets with them on a daily basis. This feature of *MyAmble* was to be used during Walk Audits to supplement the written information and to systematically collect images and coordinates.

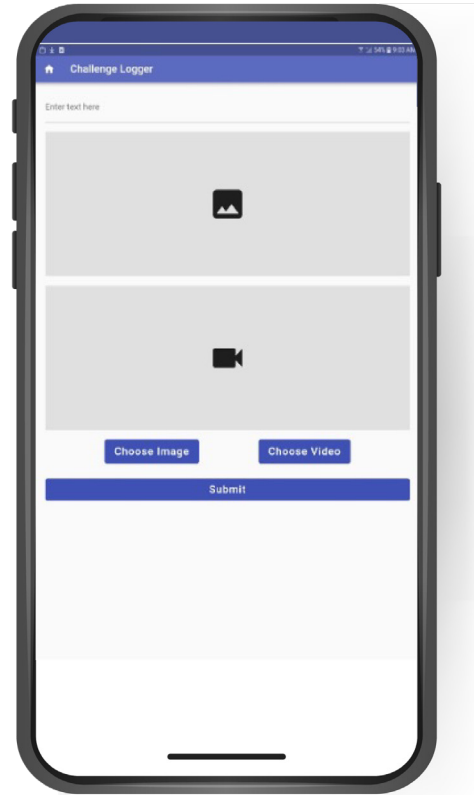
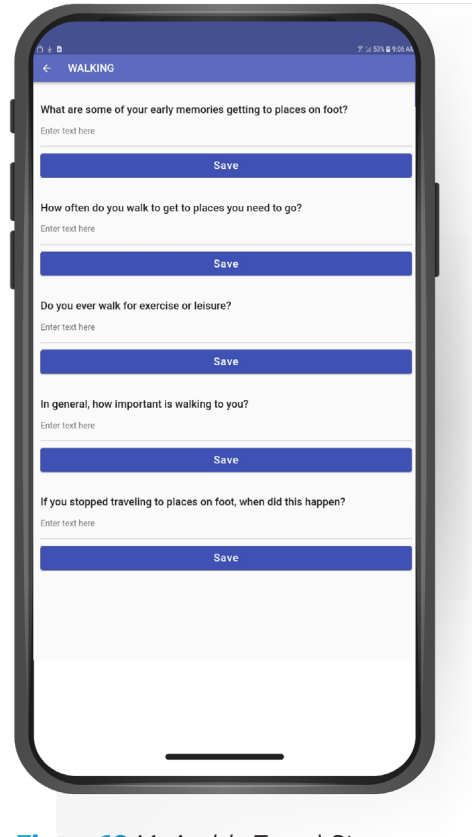


Figure 15 *MyAmble* Challenge Logger (Version 2.1)

Travel Story

Travel Story is another component of *MyAmble* that allows for the collection of qualitative data. Travel Story includes questions programmed into the app. Participants can respond to any number of these questions at any time throughout the study period. They can only respond once to each question. Although it was preferred for participants to respond to all of the Travel Story questions, it was not required. The benefit of having Travel Story responses is to have a more in-depth understanding of the participants' travel histories and their current and past experiences with transportation. Figure 16 displays Travel Story questions about walking.



The image shows a smartphone screen with the following content:

- Header: WALKING
- Question 1: What are some of your early memories getting to places on foot?
Input field: Enter text here
Button: Save
- Question 2: How often do you walk to get to places you need to go?
Input field: Enter text here
Button: Save
- Question 3: Do you ever walk for exercise or leisure?
Input field: Enter text here
Button: Save
- Question 4: In general, how important is walking to you?
Input field: Enter text here
Button: Save
- Question 5: If you stopped traveling to places on foot, when did this happen?
Input field: Enter text here
Button: Save

Figure 16 *MyAmble* Travel Story (Version 2.1)

Technology Considerations

Comfort and proficiency with technology across participants varied greatly. Due to this, it was important to acknowledge which portions of *MyAmble* were required. Those with a lower level of comfort were asked to focus on the Trip Planner and Trip Review. Those with a high level of comfort were encouraged to complete these as well as the Travel Buddy questions and participate in the Travel Story.

It was necessary to maintain differing expectations for different participants. Some participants who were proficient in technology needed little help. Other participants needed a great deal of guidance in navigating the app and the tablet in general. For these participants, the goal was to encourage them to complete the Trip Planner and Trip Review each day at a minimum.

The researchers at UT Arlington monitored the *MyAmble* database each day to take into account any participants who were not logging in and completing the daily trip planner as well as participants who were not responding to the Travel Buddy and/or Travel Story. The information was relayed to the OSU research team, who then followed up with individual participants to remind them to complete these items. This sort of follow-up was most frequently conducted with those participants with a higher level of technological competency. However, 31 of the 32 participants responded to at least one Travel Buddy question; and 28 of the 32 participants responded to at least one Travel Story question.

Despite the various technology challenges, some participants reported making lasting changes to their behavior around technology following the study. For example, one participant wrote in an email,

“ Our son set up a Gmail account for me so will use it to contact you. First time to use it [...] I wanted to tell u that I have enjoyed doing the survey. Hope the info I have provided will be helpful. [...] Thank u for the tablet. Been having fun learning how to use it.” In a second email, this participant wrote, “I have a new phone and still learning how to use it. ”

Data Collection

Demographic questionnaires were administered to all participants. These surveys included standard questions about age, gender, race, language, education and living arrangements. There were also questions related to their health, mobility, transportation habits and experience with different forms of technology.

The principal means of data collection in the SRTAIP pilot study was through *MyAmble*. Within the app, participants were responsible for the Trip Planner/Review, the Challenge Logger and Travel Story. The members of the research team were responsible for regularly sending qualitative questions through the Travel Buddy feature of the app.

As described, each team member had multiple participants to whom they were assigned. Every team member was holding conversations (similar to a text message conversation) with multiple participants, but each participant only had one person with whom they communicated throughout the two-week period. In addition, the research team reminded participants to complete the Trip Planner if they were going multiple days without making entries.

Upon completion of the two-week data collection period through *MyAmble*, three focus groups were held – one in each community. Focus groups were an opportunity for participants to provide feedback of any kind regarding the app or the study process itself. Participants were also encouraged to elaborate on many of the transportation-related concepts woven throughout the study.

Data Analysis

For the qualitative data components from focus groups, Travel Buddy and Travel Story, key themes were identified using software designed for qualitative analysis (focus groups were analyzed using Atlas.ti; Travel Buddy was analyzed using NVivo; Travel Story was coded in Microsoft Word).

Words and phrases were first formulated into codes independently by two members of the research team. These codes were then compared to confirm a sufficiently high level of coding agreement between individuals. Next, codes were grouped into code categories (i.e., groups of codes addressing a similar topic). Finally, these code categories were synthesized into broader, overarching themes.

The quantitative information collected from the demographic questionnaire, *MyAmble* Trip Planner and *MyAmble* Trip Review were entered and stored in Excel. Two research team members checked the accuracy of the data entry. One research team member then entered the data into the Statistical Package for Social Sciences (SPSS) for analysis. The research team analyzed the demographic characteristics of participants (e.g., age, gender, education) and the descriptive pattern (e.g., frequency, mean, standard deviation) of participants' planned/reviewed trips.

STUDY PARTICIPANT

“ Not sure I'd ride the bus as long as I can still drive myself. Standing out in the weather and walking to and from bus stops is not appealing. Would it (bus shelters) influence my decision? It might if it was snowing or raining. I'm not gonna stand out in the middle of a rainstorm waiting on a bus. They do have them. You see them all over the place, but they're not everywhere. Even if there was an available public transportation option, it may not even—because of groceries, how are you gonna carry? How are you gonna get it? The timing. I could take the bus more places rather than driving myself, I do lack confidence in terms of finding my way. ”

Findings

Tables 2-13 display and describe participant demographic information, travel behaviors, travel activities and other important findings.

Health and Functional Status

Over 84% of participants rated their general health to be “good” or better than “good.” Similarly, about 71.9% of participants were satisfied with their health condition. Although the reported difficulty varied depending on the types of activities of daily living (e.g., eating, bathing, using the toilet), approximately 80% of older adults reported no difficulty at all performing each daily living activity.



Good or Better than Good Health



Satisfied with Health Condition



No Difficulty Performing Each Daily Living Activity

Table 2 Health and Functional Status

		n	%
Self-rated Health	Poor	1	3.1%
	Fair	4	12.5%
	Good	10	31.3%
	Very Good	16	50%
	Excellent	1	3.1%
Satisfaction with One’s General Health	Very unsatisfied	1	3.1%
	Unsatisfied	4	12.5%
	Fair	4	12.5%
	Satisfied	17	53.1%
	Very satisfied	6	18.8%
Difficulty with Bathing	A little bit	5	15.6%
	No difficulty at all	26	81.3%
Difficulty with Dressing	A little bit	4	12.5%
	No difficulty at all	26	81.3%
Difficulty with Getting out of Bed or Chair	A little bit	6	18.8%
	No difficulty at all	25	78.1%
Difficulty with Walking Around the Room	A little bit	6	18.8%
	No difficulty at all	25	78.1%
Difficulty with Using the Toilet	A little bit	3	9.4%
	No difficulty at all	26	81.3%
Difficulty with Eating	A little bit	2	6.3%
	No difficulty at all	27	84.4%

Note. For self-rated health, one participant selected both very good and excellent and was coded as very good.



Providing and Receiving Care

Among the 32 participants, 94% of them did not have a family caregiver and 85% of them were not a family caregiver.



Did Not Have a Family Caregiver



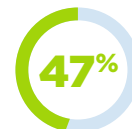
Were Not a Family Caregiver

Travel Behaviors

Around 87.5% of the sample owned a car and drive. About 93.8% of had a valid driver's license. Among study participants, 46.9% walked outside of their home to get to places they needed to go and 50% walked outside of home daily. The rate of bike ownership was lower than car ownership and no participants reported biking daily.



Had a Valid Driver's License



Walked to Get to Places



Owned a Car and Drive



Walked Outside of the Home Daily

Table 3 Travel Behaviors

		n	%
Own a Car	No	4	12.5%
	Yes	28	87.5%
Drive	No	4	12.5%
	Yes	28	87.5%
Have a Valid Driver's License	No	2	6.3%
	Yes	30	93.8%
Own a Bike	No	18	56.3%
	Yes	14	43.8%
Frequency of Biking	1-2 times a year	9	28.1%
	Never	20	62.5%
	Weekly	2	6.3%
Walk Outside of Home	No	16	50.0%
	Yes	15	46.9%
Frequency of Walking Outside of Home	Daily	16	50.0%
	Monthly	2	6.3%
	Weekly	6	18.8%
	1-2 times a year	2	6.3%
	Never	6	18.8%

Technology Use

About 84.4% of participants did not use assistive equipment to get around. About 48.3% of participants reported using a combination of computer/laptop, tablet and phone. Over 81% of participants accessed internet from home on a daily basis.



Did Not Use Assistive Equipment



Accessed Internet from Home Daily



Used a Combination of Computer, Tablet and Phone

Table 4 Technology Use

		n	%
Use Assistive Equipment to Get Around	No	27	84.4%
	Yes	5	15.6%
Type of Assistive Equipment	Cane	5	15.6%
Use of Electronic Devices	Computer/Laptop	1	3.1%
	Computer/Laptop; Phone	13	40.6%
	Computer/Laptop; Tablet	1	3.1%
	Computer/Laptop; Tablet; Phone	14	43.8%
	Phone	2	6.3%
	Tablet; Phone	1	3.1%
Length of Using Electronic Device	1 to 3 years	2	6.3%
	4 to 6 years	2	6.3%
	6 to 12 months	1	3.1%
	7 years or more	26	81.3%
Length of Using the Internet	Never used it	1	3.1%
	Less than 6 months	1	3.1%
	1 to 3 years	2	6.3%
	4 to 6 years	1	3.1%
	7 years or more	27	84.4%
Frequently of Accessing the Web from Home	Daily	26	81.3%
	Monthly	2	6.3%
	Never	3	9.4%
Frequency of Accessing the Web from Work	Daily	1	3.1%
	Never	9	28.1%
Frequency of Accessing the Web from School	Never	9	28.1%
Frequency of Accessing Web from the Public Terminal (e.g., library, cybercafé, etc.)	Daily	4	12.5%
	Monthly	1	3.1%
	Never	5	15.6%
	Weekly	1	3.1%
Frequency of Accessing the wWeb from the other Places	Daily	5	15.6%
	Daily; Cell phone	2	6.3%
	Less than once a month	1	3.1%
	Never	4	12.5%
	Weekly	1	3.1%
Never Accessing the Internet	I do not access the web	2	6.3%

Trips Planned

Among the 1,190 trips reported through the *MyAmble* Trip Planner, 894 (75.1%) of the trips were planned.



Trips Were Planned

Table 5 Trips Planned

	n	%
Planned/Unplanned/Missed		
Missed	85	7.1%
Unplanned	211	17.7%
Planned	894	75.1%

Trip Success

Among the 1,190 trips reported through the *MyAmble* Trip Planner, 91.8% of the trips were successful. In the open-ended question regarding reasons why participants could not complete the trip, their responses can be summarized as “Not feeling well,” “Bad weather,” “No car” and competing priorities.



Trips Were Successful

Table 6 Trips Success

	n	%
Was this trip successful?		
Yes	98	8.2%
No	1092	91.8%

Activities in Trips

Based on data collected from the *MyAmble* Trip Review, some popular purposes of trips included physical activity, other unspecified activities and visiting the grocery store.

Table 7 Activities in Trips

Activity	n	%
Doctor Appointment	31	4.6%
Eat out at restaurant	44	6.5%
Employment	10	1.5%
Entertainment	25	3.7%
Grocery Store	96	14.2%
Hospital	11	1.6%
Library	27	4.0%
Other	110	16.3%
Pharmacy	20	3.0%
Physical activity	123	18.2%
Post office	15	2.2%
Religious Services	52	7.7%
School	21	3.1%
Social services	19	2.8%
Social visit	55	8.2%

Trip Importance

About 84.5% of the trips were important or very important to older adults in the sample.



Trips were Important or Very Important to Them

Table 8 Trips Importance

Importance	n	%
Not important	3	0.4%
Less important	16	2.4%
Neutral	85	12.6%
Important	354	52.5%
Very Important	216	32.0%

Transportation Mode and Access Mode

About 88.9% of trips were completed through driving one’s own vehicle and/or having someone else drive. Over 63.5% of trips required no help accessing their mode of transportation.



Trips Completed through Driving Own Vehicle



Required No Help Accessing their Mode of Transportation

Table 9 Transportation Mode and Access Mode

		n	%
Transportation Mode	Bus	8	1.2%
	Driving Myself and/or Someone Driving Me	599	88.9%
	Bus	2	0.3%
	Lyft/Uber	7	1.0%
	Other	56	8.3%
	Taxi	1	0.1%
Access Mode	No Help	428	63.5%
	Walking Unassisted	233	34.6%
	Walking with an Assistive Device	9	1.3%
	Other	4	0.6%

Trips with Others

About 33.7% of trips were accompanied by other people, such as a family member.



Trips were Accompanied by Other People

Table 10 Trips with Others

		n	%
Took This Trip with Someone Else	No	447	66.3%
	Yes	227	33.7%
Relationship with the Person Who Went with You	Co-Worker, Family Member	1	0.1%
	Family Member	199	29.5%
	Family Member, Other	6	0.9%
	Friend	19	2.8%
	Friend, Family Member	1	0.1%
	Friend, Family Member, Neighbor	1	0.1%
	Friend, Neighbor	3	0.4%
	Friend, Other	1	0.1%
	Neighbor	4	0.6%
	Other	7	1.0%
	Volunteer, Other	1	0.1%

Assistance Required

Over 99.6% of the trips reported did not require assistance from other people.



Trips Did Not Require Assistance from Other People

Table 11 Assistance Required

	n	%
Assistance Required		
No	671	89.6%
Yes	3	0.4%

Activity Mood

Over 72% of the trips reported improved participants' mood mostly or entirely.



Trips Improved Participant's Mood

Table 12 Activity Mood

To What Extent Did This Trip Improve Your Mood	n	%
A Little	44	6.5%
Somewhat	125	18.5%
Mostly	258	38.3%
Entirely	230	34.1%

Activity Problems

Over 96% of trips were completed with no problems.



No Problems

Table 13 Activity Problem

Problems Completing This Trip	n	%
No	649	96.3%
Yes	25	3.7%

Travel Buddy

Travel Buddy conversations were held throughout the two-week study duration in each community. Each of the five OSU team members were paired with between five and eight participants. It was the responsibility of the research team to engage the participants through Travel Buddy at least once on each day of the study period.

Prior to the study launch, a list of questions was compiled. These questions were sent to participants one at a time throughout the study by the research team. For example, on day one of the study, all participants received the question “How do you get ‘out and about?’” Participants responded however they saw fit and the research team responded with probing questions to obtain more detailed information. The research team only sent a new “main question” after determining that the participant had nothing more to say about that particular topic.

The Travel Buddy conversations were sent to the University of Texas Arlington (UTA) database in real time. These transcripts were exported from the database after the study was complete. The type of analysis used with the Travel Buddy data was directed content analysis (Hsieh & Shannon, 2005). This analysis approach was used to begin coding with predetermined codes (e.g., barriers, facilitators), which were derived from the existing research questions of this study.

First, three team members independently coded 25% of the transcripts in Microsoft Word (using track change comments). Next, the team members met to discuss codes and establish consensus based on the 25% coded transcripts. This was done to determine whether the content was being interpreted in a consistent manner between coders. Then the transcripts were imported into NVivo and one team member coded the remaining 75% of the transcripts based on the coding scheme. These codes were then checked and refined in NVivo by the other two team members. The codes were then grouped into categories and finally into themes.

The research found 19 themes that fell into four broad categories:

1. Alternative transportation barriers
2. Alternative transportation facilitators
3. Car barriers
4. Looking ahead/ driving cessation

Challenge Logger

During this pilot study, the Challenge Logger feature was used relatively infrequently compared to the other features of the *MyAmble* app. Participants reported not always having their tablets with them and seeing challenges while driving. This feature of *MyAmble* would have been more widely used as part of the walk audits in this study, had they been able to occur. All photos submitted were of problems relating to sidewalks. Below are two example photos (Figure 18 and Figure 19) and their corresponding descriptions.



Figure 17 Challenge Logger. “problems for strollers & wheelchairs”



Figure 18 Challenge Logger. “poor sidewalk condition”

Travel Story

During the pilot study, Travel Story was used by 28 participants. The Travel Story responses were sent to the UTA database in real time and then exported from the database after the study was complete. The type of analysis used with the Travel Story data was directed content analysis (Hsieh & Shannon, 2005). Two team members independently coded the responses in Microsoft Word using track change comments. Next, the team members met to discuss the codes and to establish consensus. Finally, the team members worked together to group the codes into categories and finally

themes. A total of nine themes were found that include the participants' views on the meaning of transportation, the importance of walking/biking, perceptions of transit and reasons for walking/biking.

Focus Groups

One 90-minute focus group in each of the three pilot communities was held with participants who tracked their transportation and mobility patterns using *MyAmble*. Focus groups took place at a senior center (Westerville) or community recreation center (Prairie Township and Near East Side of Columbus). The purpose of these discussions was to further explore the environmental, individual and behavioral aspects to alternative transportation use as well as learn more about participants' experiences using the *MyAmble* application and overall experiences with the study.

Focus group sessions were recorded and then transcribed. Transcriptions were uploaded to Atlas.ti for coding and analysis. Data from transcriptions were analyzed using line by line direct content analysis. One of the principal investigators and a co-investigator independently coded one focus group transcript to create a preliminary coding scheme. Words and phrases were formulated into codes for discussion, validation and/or refinement. Investigators used constant comparison and analysis of transcripts to formulate codes into themes (Creswell & Poth, 2017). Investigators met twice to reach agreement and finalize the coding scheme. After finalization of the coding scheme and themes, the final coding of the three transcripts was completed by the principal investigator.

Themes pulled from focus group data were divided by relativity to alternative transportation, experiences using *MyAmble* and study processes.

Five overarching themes related to alternative transportation were identified including:

- Thoughts on mobility (now, future, friends and family)
- Driving (parking, what to do when no longer driver)
- Alternative transportation (facilitators and barriers)
- Individual characteristics (physical limitations, isolation, living arrangement)
- Peer-to-peer information sharing. Both positive and negative comments associated with the *MyAmble* application, technology in general and the study process were identified as well as overall positive experiences with the project.

Tables with themes, descriptions and sample quotes can be found in Appendices 7 and 8.

Summary of Key Findings

The research team considered all of the data from the community “hot spots,” site reviews, the *MyAmble* application and focus groups to identify overarching findings related to older adult patterns, barriers and facilitators related to alternative transportation use.

These findings also led to evidence-informed recommendations to increase access and use of alternative transportation. The findings from the focus groups with older adult immigrants and refugees (outlined in the Project Overview section) were consistent with the three pilot communities.

However, three additional themes of note were identified including:

- Helpfulness of neighbors
- Language barriers
- Lack of information about alternative transportation options due to differences in language and culture.

The overarching findings from all data sources are organized below according to the Social Cognitive Theory of Environmental, Individual and Behavioral barriers and facilitators. Though presented independently, it should be noted that environmental, individual and behavioral factors interact and influence one another when considering issues of transportation and mobility among older persons.

Environmental Barriers

- Poor lighting, inadequate sidewalks and areas in need of construction contributed to safety concerns related to walking and biking.
- Significant traffic, dangerous drivers, busy intersections, parked cars and a lack of law enforcement impacted alternative transportation utilization.

- Areas under construction created significant barriers to alternative transportation use as well as driving challenges.
- The location of existing bus stops or a lack of bus services limited alternative transportation use among those interested in utilizing alternative transportation options.
- The logistics of riding a bus including schedule, lack of reliability and getting on and off the bus created challenges to utilization.
- Bad weather such as rain, snow and extreme heat limits the utilization of alternative transportation methods.
- Existing alternative transportation options such as a senior bus or agency provided transportation had limited hours and destinations and only ran within city limits.
- Certain aspects of community infrastructure, such as narrow roads or roadside ditches, can make driving be perceived as less convenient and more dangerous.

Environmental Facilitators

- Areas with sidewalks and nearby daily points of interest such as grocery stores, pharmacies, restaurants and doctors' offices contributed to more walking.
- When the weather is nice, alternative transportation was more frequently utilized for exercise and to get to daily points of interest.
- Bus logistics such as nearby stops and convenient schedule contribute to increased utilization of public transportation.

Individual Barriers

- Physical and cognitive limitations create challenges in terms of accessing and using alternative transportation. For instance, participants noted the inability to walk long distances to the bus stop and carry groceries on the bus.
- The cost of alternative transportation including the bus and e-hail is a barrier for some potential customers.
- The time it takes to get to and from destinations of interest on the bus or walking limits individual participation.
- Car problems were the most common reason for incomplete trips.

Individual Facilitators

- Regardless of transportation mode used, trips taken were very important to participants (84%) and improved participants' mood (72%).
- Walking was viewed as an important way to exercise and as good for health.
- One benefit of using alternative transportation identified was not having to worry about parking.

Behavioral Barriers

- Driving oneself was the preferred method of transportation.

- There was little expressed motivation to shift away from driving with oneself/others to alternative modes of transportation unless required.
- Did not have a history of riding the bus.

Behavioral Facilitators

- Daily tracking of travel patterns led to planning current and future transportation use and needs, including thinking about where to live, identifying what transportation supports exist in their communities and how friends get around. Participants did anticipate needing to walk, ride the bus, use Uber/Lyft, as well as rely on others in the future as their physical and cognitive needs change.
- There was significant interest in peer-to-peer training and information sharing about alternative transportation options. There was an interest by some in using a tricycle, scooter or other wheeled mobility device on designated pathways.
- Although no participants biked daily, nearly 50% of individuals walked daily. Identifying what alternative transportation is the best fit for different individuals while considering their environmental, community and personal contexts appears critical.

Recommendations

Mapping ODOT Countermeasures to Environmental Findings

Recognizing the substantial ODOT investment in infrastructure as well as the deliverables of SRTAIP, the following table maps the ODOT identified and proven safety countermeasures with the environmental findings of our research. Every countermeasure was supported by various points of data.

Table 14 Environmental Recommendations

ODOT Identified & Proven Safety Countermeasures	Environmental Findings
Rectangular rapid-flashing beacons (RRFB)	Crosswalk safety, crosswalk signals, adequate timing for crosswalks, visibility to drivers as a pedestrian, intersection safety
Leading pedestrian intervals (LPI)	Crosswalk timers, crosswalk safety, adequate timing for crosswalks, intersection safety, intersection visibility, crosswalk signals, visibility to drivers as a pedestrian, speeding vehicles
Crosswalk visibility enhancements	Crosswalk visibility, crosswalk safety, intersection visibility, signage, lighting, parking restrictions
Raised crosswalks	Crosswalk safety, speeding vehicles, visibility to drivers as a pedestrian
Pedestrian crossing/refuge islands	Adequate timing for crosswalks, crosswalk safety, need/place to rest, walking distance
Pedestrian hybrid beacons (PHB)	Adequate timing for crosswalks, crosswalk safety, speeding vehicles
Sidewalks, shared-used paths and road diets	Protected lanes, speeding vehicles, safety, sidewalk condition or gaps, limited options, need/place to rest

In recognition that implementing environmental changes does not take into account the diversity of Ohio’s older adults and lead to behavioral change, the next two tables present evidence-informed interventions that map to individual- and behavioral-level findings from this study.

Table 15 Individual Recommendations

Evidence-informed Interventions	Individual Findings
Multi-modal transportation options	Heterogeneity of population, multi-modal use, importance of trips and impact of trips on mood
Replicate <i>MyAmble</i> examination in additional communities across ohio	Use of <i>MyAmble</i> initiated proactive thoughts and planning about driving cessation
Replicate <i>MyAmble</i> examination with users of other modes of transportation - e-hail, circulator, transit, volunteer drivers, etc.	Use of <i>MyAmble</i> initiated proactive thoughts and planning about driving cessation
Reduced bus fares with easy access points for purchase	Financial constraints
Incentives for walking for health	Recognition of the health benefits of walking

Table 16 Behavioral Recommendations

Evidence-informed Interventions	Individual Findings
Peer-based travel trainings	Don't use alternative transportation because of a lack of knowledge and confidence in how to use
Centralize and distribute information about available alternative transportation options	Don't use alternative transportation because of a lack of knowledge
Peer-based education and self-assessment regarding behavioral modification and driving retirement	More driving accidents at night, left turns and intersections. Sharing driving responsibilities with family and peers.
Campaign to promote options and benefits of alternative modes of transportation	Motivation to reduce or discontinue driving

Conclusion and Next Steps

Safe Routes to Age in Place allowed for significant engagement with older adults and community stakeholders through presentations and focus group meetings (N=165) and with disadvantaged community members through the collection of substantial quantitative and qualitative data.

The information collected through *MyAmble*, focus groups and interview-style data collection have provided a deep, foundational knowledge of transportation patterns, barriers and facilitators experienced by Central Ohio older adults. The community-based participatory approach increased participation of underserved populations in the transportation planning processes. This type of outreach to underserved communities will continue to be a priority as we move toward more equitable transportation and mobility options.

As shown through the findings outlined above, older adults experience many barriers and facilitators to transportation. Infrastructure improvements are one key environmental component to increasing older adult usage of alternative transportation. However, environmental improvements must also be combined with individual- and behavioral-level strategies to support the behavior change necessary for using alternative transportation modes.

Behavioral strategies may include training, education and information on options, whereas individual strategies may include safety, financial and accessibility improvements.

If the goal is to adopt strategies to empower older adults to stay safer on the road, it is necessary to also identify, pilot and analyze the impact of alternative transportation modes.

Using current investment and experience with *MyAmble*, further investigation into older adult experiences with additional alternative transportation modes (Lyft, circulator, transit, volunteer drivers, etc.) should be conducted to understand the effectiveness of these modes on enhancing transportation options and usage to provide safe routes to age in place for older adults.

Next steps should include:

- Building knowledge through the creation of an alternative transportation pilot project inventory
- Replicating pilot projects throughout Ohio with an additional focus on rural communities
- Providing resources and communication toolkits on alternative transportation options across Ohio.
- Increasing equity in engaging and investing in high-demand, disadvantaged communities, a deep analysis of the intersectionality of transportation patterns, barriers and facilitators on age, race, gender, income and English proficiency

These strategies incorporate overlapping goals with multiple ODOT statewide plans, including the SHSP, and will be pivotal for decreasing older adult serious injuries and fatalities.

Presentations and Publications

(Generated from this project)

Community Presentations and Reports

- “Safe Routes for Older Adults,” Safe Routes to Schools National Webinar. November, 2020. Association of Pedestrian and Bicycle Professionals National Webinar. November, 2019.
- Safe Routes to Age in Place: Research Brief. https://csw.osu.edu/wp-content/uploads/2020/05/2020-4-April_Safe-Routes-to-Age-in-Place_v5.pdf
- Transportation Facilitators and Barriers for Diverse Older Adults: Research Brief. https://csw.osu.edu/wp-content/uploads/2020/09/2020-8-Aug_We-want-to-go_v6.pdf

Academic and Peer-Reviewed Presentations

- Dabelko-Schoeny, H. & Fields, N.L. (2020). *Let's Stop Spinning our Wheels: Strengthening the Case for Community Engaged Transportation Solutions*. Symposium with Nina Silverstein, PhD as discussant presented at the Gerontological Society of America's Virtual Annual Scientific Meeting.

- Dabelko-Schoeny, H., Fields, N.L., White, K., Sheldon, M. Ravi, K., Robinson, S., Murphy, I. E. & Jennings, C. (2020). *Using community-based participatory research strategies in age- friendly communities to solve mobility challenges*. Paper presented at the Gerontological Society of America's Virtual Annual Scientific Meeting.
- Dabelko-Schoeny, H., Fields, N.L., White, K., Sheldon, M. Ravi, K., Robinson, S., Murphy, I. & Jennings, C. (2020). *Using Community-based Participatory Research Strategies in Age- Friendly Communities to Solve Mobility Challenges*. Poster presented as part of the National Transportation Research Board Annual Meeting. Washington, DC.
- Dabelko-Schoeny, H., Fields N.L., Murphy, I., White, K., Sheldon, M. & Ravi, K. (2019). *Building Safe Routes to Age in Place Through Partnerships with Age-Friendly Communities*. Poster presented as part of the Gerontological Society of America's Annual Scientific Meeting. Austin, TX.
- Cao, Q., Maleku, A., White, K., Ozblin, B. & Dabelko-Schoeny, H.I. (Nov. 2020). *“We Want to Go, but There are no Options”: Exploring Facilitators and Barriers of Transportation*
- Among Diverse Older Adults in a Midwestern U.S. Metropolitan. *Symposium paper presented at the Gerontological Society of America*. Online.

- Cao, Q., Dabelko-Schoeny, H.I., White, K., Maleku, A., Sheldon, M., (Jan. 2021). *"I Wanna Help, but my Hands can be a Little Tied": The Challenges and Benefits of Volunteering Among Low-Income Diverse Older Adults*. Paper to be presented at Society for Social Work and Research. Online.
- Fields, N.L., Ravi, K., & Dabelko-Schoeny, H. (Nov. 2020). *Outdoor spaces, transportation and environmental justice: A qualitative interpretive meta-synthesis*. Symposium paper presented at the Gerontological Society of America. Online.
- Fields, N.L., Cronley, C., Mattingly, S., Murphy, E., & Miller, V.J. (2019). *You are really at their mercy: Examining the relationship between transportation disadvantage and social exclusion among older adults through the use of innovative technology*. Paper presented at the National Transportation Research Board Annual Meeting. Washington, DC.
- Cronley, C., Fields, N.L., Mattingly, S., Robinson, S., Murphy, E., & Keaton, C. *Investigating divergent transportation inequities between environmental justice populations with varying health risks using data collected via innovative app technologies*. (2019). Paper presented at the National Transportation Research Board Annual Meeting. Washington, DC.

Manuscripts

- Dabelko-Schoeny, H., Maleku, A., Cao, Q., White, K. & Ozbilen, B. (In press). "We want to go, but there are no options": Exploring barriers and facilitators of transportation among diverse older adults. *Journal of Transport and Health*.
- Cao, Q., Dabelko-Schoeny, H., White, K., Maleku, A. & Sheldon, M. (In press). "I wanna help, but my hands can be a little tied": The challenges and benefits of formal volunteering among low-income diverse older adults. *Journal of Gerontological Social Work*.
- Ravi, K., Fields, N.L. & Dabelko-Schoeny, H. (In press). Outdoor Spaces, Transportation and Environmental Justice: A Qualitative Interpretive Meta-Synthesis of Two Age-Friendly Domains. *Journal of Transport and Health*.
- Dabelko-Schoeny, H., Fields, N.L., White, K., Sheldon, M. Ravi, K., Robinson, S.*, Murphy, I. E. & Jennings, C. (In press). Using community-based participatory research strategies in age- friendly communities to solve mobility challenges. *Journal of Gerontological Social Work*.
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