Characteristics of ride share services for older adults in the United States⋆

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Abstract

Introduction: Safe and accessible transportation options are important for older adults' health, safety, mobility, and independence. Ride share services may promote older adult health and well-being. This is the first study that describes ride share services available to older adults (65+ years) in the United States, including factors that may affect use of services.

Methods: We analyzed secondary data from two research and administrative databases provided by ITNAmerica, a national non-profit transportation service for older adults: ITNRides, which tracks information on older adults who used ITN in 29 locations across the United States from 1996 to 2019, and Rides in Sight, the largest national data source on ride share services for older adults. We conducted a literature review, and telephone interviews with nine key informants representing ride share services, referral services, and other organizations. We offer a conceptual framework describing factors that may affect older adults' use of ride share services.

Results: This study identified 917 non-profit ride share services and eleven for-profit ride share services available for older adults in the United States as of August 2018. Services varied by corporate structure, location, use of technology, and business model. The majority of non-profit services served primarily older adults, while the for-profit services served primarily younger adults. Riders from one multi-site non-profit service had a median age of 82. Use of ride share services is affected by individual needs and preferences; social conditions; and business and policy factors.

Conclusion: Ride share services may offer a promising alternative to driving for older adults and may help to address negative health consequences associated with driving cessation.

Practical applications: These findings may help policy makers, practitioners, and other stakeholders understand older adults' needs related to use of ride share services in order to offer solutions that prioritize public health and safety.

1. Introduction

Older adults (65 + years of age) in the United States travel primarily in privately owned vehicles and most often as the drivers of those vehicles (Shen, Koech, Feng, Rice, & Zhu, 2017). Driving accounted for approximately 70% of daily trips taken by older adults in 2015, and another 20% of daily trips were taken as passengers in privately owned vehicles (Shen et al., 2017). This dependence on driving may pose both safety and mobility concerns for older adults. Older drivers, particularly those aged 75 + years, have higher crash fatality rates than middle-aged drivers (aged 35–54 years) (Cicchino, 2015). These higher crash fatality rates are attributed to increased frailty and injury susceptibility, as well as higher risk of crash involvement, with the former contributing the most to these elevated rates (Cicchino, 2015). In addition, physical and cognitive changes associated with aging may make driving more difficult as people grow older (Dawson, Uc, Anderson, Johnson, & Rizzo, 2010).

Optimal mobility has been defined as "being able to safely and reliably go where you want to go, when you want to go, and how you want to get there" (Satariano et al., 2012). Older adults can expect to live 7 to 10 years past the time that they stop driving (Foley, Heimovitz, Guralnik, & Brock, 2002), and reduced mobility often accompanies driving cessation (Marottoli et al., 2000). Reduced mobility may affect access to health care, medications, groceries, and other goods and services necessary for everyday well-being. In addition, driving cessation is associated with negative health outcomes, including depression (Fonda, Wallace, & Herzog, 2001), an increased risk of mortality (Chihuri et al., 2016), and declines in social health and engagement (Curl, Stowe, Cooney, & Proulx, 2013). Some populations, especially older adults in rural areas where transportation options are scarce, are disproportionately affected by driving cessation (Rosenbloom, 2003; Strogatz et al., 2019).

Identifying alternative transportation options may improve mobility for older adults. Given the aging of the population - it is estimated that more than 20% of Americans will be aged 65 + years by 2030, compared with 13% in 2010 (Ortman, Velkoff, & Hogan, 2014) - alternative transportation options may become more important.

While ride sharing has been defined in different ways, for the purposes of this paper, ride sharing refers to transportation that is arranged through a third party, where a person is a passenger in a private automobile. This excludes public transportation or a ride provided by a van, bus, or taxi. Ride share services in the United States date back to 1964, with the founding of a chapter of the Friends In Service Helping (FISH) program in West Springfield, Massachusetts (Fisher, 2016). Other early ride share services include Faith in Action, funded by Robert Wood Johnson Foundation from 1983 to 2008 and now operating under the umbrella of the National Volunteer Caregiver Network with about 700 local programs (Parker & Pomphrey, 2009); and the Independent Transportation Network (ITN), founded in Maine in 1995 as a not-for-profit effort to provide transportation services for older adults regardless of income (ITNAmerica, 2019). In recent years, modern for-profit ride share services, known as transportation network companies (TNCs), have emerged. The Shared-Use Mobility Center (2015) defines TNCs as "ride-sourcing providers…that use online platforms to connect passengers with drivers who use personal, non-commercial, vehicles." The most well-known TNCs include Uber and Lyft, founded in 2009 and 2012, respectively (Hartmans & Leskin, 2019).

The use of ride share services has grown rapidly in recent years. In 2018, thirty-six percent of all U.S. adults had used a service to share rides in private automobiles, more than double since 2015. In addition, a total of 24% of U.S. adults age 50 and older reported having ever used a ride share service (Jiang, 2019). Research has shown that older adults reduce their driving frequency and/or avoid certain driving situations in recognizable stages, and that they are willing to use a ride share service to address mobility needs (Bergen et al., 2017). These findings suggest that ride share services may promote older adult health and well-being by improving mobility for those who have stopped or reduced their driving.

The Centers for Disease Control and Prevention (CDC) promotes safe transportation for older adults with the goal of keeping older adults safe and independent as they age. To support this aim, CDC funded a qualitative research study to assess barriers and facilitators to older adults' use of ride share services. The purposes of the study were to: (1) conduct an environmental scan describing the characteristics of ride share services in the United States, including services designed specifically for older adults; and (2) understand older adults' attitudes and beliefs toward using these services and compare older adults' attitudes and beliefs to those of younger adults. The current report focuses on key findings from the environmental scan (Freund, Bayne, Siegfried, Warren, Nadel, Natarajan, & Beck, 2019). Results from the second phase of the study will be made available when analyses are completed.

2. Methods

This paper was developed using data gathered for an environmental scan based on four activities: an analysis of ITNAmerica's ITNRides database, an analysis of ITNAmerica's Rides in Sight database, a targeted review of the literature, and key informant interviews. This study was reviewed by NORC's Institutional Review Board and was approved as exempt.

2.1. Definition of ride share services

A ride share service is an organization (for profit or non-profit) where the majority of the services provided use a private automobile. Excluded from this definition are individuals who provide transportation but are not affiliated with an organization. For example, older adult living facilities might have freelance drivers where a private citizen, not commercially licensed, will give rides to other residents for a fee. Rides regularly provided by a family member, neighbor, friend, or co-worker, but not arranged by a third party, are also excluded from the definition.

2.2. Analysis of ITNRides database

We conducted an analysis of the database for ITNRides, ITNAmerica's enterprise software which provides routing and rides coordination, volunteer management, finance, and reporting for ITN rides in 29 locations across the United States. In ITNRides, location is defined as a service area with a population of 200,000 or more within a 15-mile radius, primarily mid-sized urban areas. ITN is a membership organization. People who wish to use the service become dues-paying members and open a Personal Transportation Account, which is managed through the ITNRides software and tracks both cash payments and transportation credits from volunteer driving (Freund, 2008), automobiles traded to pay for rides and co-payments from merchants and healthcare providers (Freund, 2002).

ITNRides is both an operational and a research database that connects member characteristics to longitudinal rides data on transportation. The research database contains 178 fields describing characteristics and behaviors of older adults and visually impaired ITN members who use ITN's ride share service, the volunteers who drive them, and the rides taken. Informed consent is obtained at the time of application for membership. The database tracks each rider's trip origin, destination, and ride frequency, as well as rider needs, driving status, and participation in other ITN programs. ITNRides has tracked every ride and older adult who has ever used the ITN service in any of the 29 ITN locations since 1996.

We analyzed secondary data from ITNRides (June 1996 to October 2019) to create a demographic profile of older adult riders based on characteristics that were self-reported on ITN membership applications. This study examined whether they had a current driver's license (yes or no), currently owned a vehicle (yes or no), or were current drivers (yes or no). We also analyzed riders' living arrangements (live alone or live with others) and whether they had any special needs that might affect mobility, such as use of a cane, walker, or wheelchair; visual impairment, or required driver assistance. Demographic variables examined were race/ethnicity (Caucasian, African-American, Hispanic/Latino, or other),

gender (male or female), and age at the time of application recoded into age group (65–74 years (youngest-old); 75–84 years (middle-old), or 85 + years (oldest-old)). We also analyzed data on self-reported physical health and annual household income, which were collected from ITN annual customer satisfaction surveys administered from 2008 to 2018 for health and 2010 to 2018 for income. Members reported their physical health as excellent, very good, good, fair, or poor in response to the question, "How would you describe your current physical health?" Annual household income was categorized as less than $25,000, $25,000-$49,999, $50,000-$74,999, $75,000-$99,999, or $100,000 or more.

Finally, we analyzed ride purpose by ride segment. There are fewer rides than ride segments because a ride may include stops at separate destinations, each with a different purpose. For example, a rider may stop at the post office to mail letters on the way to the hairdresser. The ITN database records this as one ride with two segments. The return ride home, after the hair appointment, is recorded as another separate ride. Ride purposes were initially identified by ITN, based on several years of experience delivering rides to older adults before the ITNRides software was built. Over time, ITN added ride purposes based on feedback from riders. In the software, specific geographic locations may be associated with a default ride purpose. As necessary, the rides coordinator can override the default. For reporting and analysis, similar ride purposes were grouped together. For example, there are almost two dozen medical specialties in ITNRides, such as cardiologist, dentist, and rheumatologist, and these are grouped as medical rides. An intermodal trip indicates that the rider used ITN to connect to another mode of transportation (for example, a ride from an ITN driver to or from a bus stop, airport, train station or ferry terminal). Ride segment data are based on every ride taken by ITN members age 65 and older.

For this study, we used data from 27 of 29 ITN locations. Data from two locations whose operations were slightly different from the standard ITN operations were excluded from the analysis. The analysis was conducted in October 2019. ITNRides data are not publicly available.

2.3. Analysis of ITNAmerica's rides in Sight database

To identify and describe the ride share services available to older adults throughout the United States, we conducted an analysis using the Rides in Sight (RIS) database. The RIS database is the largest national data source on transportation services available for older or visually impaired people (ITNAmerica, n.d.). ITNAmerica created RIS by researching communities nationwide and aggregating the information into a free online searchable database, with a free RIS hotline and trained operators to assist those who request information by telephone about transportation services available in their communities. ITNAmerica continuously updates RIS by reviewing publicly available information and verifying information about the transportation services through telephone interviews with administrators of the services. RIS includes transportation options for nearly all of the 3,114 U.S. counties/county equivalents and lists approximately 15,000 individual transportation options. These 15,000 options include ride share services as well as numerous other types of transportation, such as public transportation, non-emergency medical services, taxi cabs, and others, that do not meet the definition of ride share services used for this study. From the

15,000 transportation options in the RIS database, we identified 920 ride share services (that operated in 1,805 service areas) and calculated descriptive statistics to summarize the characteristics of these services.

Ride share service characteristics analyzed for this study included the type of transportation provided, such as curb-to-curb (i.e., the driver picks up the passenger at the curb of the road and delivers them to the curb of the road at their destination), door-to-door (i.e., the driver assists the rider from the door of the pick-up location to the vehicle, and from the vehicle to the door of the destination), or shared rides (i.e., any service in which passengers may share a ride or in which there may be more than one passenger in a trip). Eligibility requirements included factors such as age, medical conditions (such as illness or disabilities), veteran status, or income. Eligible trip purposes were categorized as any (i.e., no restrictions on the trip purpose), medical or health care, grocery shopping, necessary errands (such as trips to the pharmacy or bank), recreation, social, or work/volunteer. The types of assistance available included help with mobility devices, getting in and out of the vehicle, or using seat belts; drivers who provide a steadying arm to escort a passenger to and from the vehicle; drivers who will wait with a passenger during the errand/appointment; and other factors. Pricing structure was defined as paid or free rides. For those ride share services that required payment, types of payment accepted included cash, check, credit cards, exact change, insurance, Medicaid, pre-payment, or taxi voucher. Ride share services were also analyzed by whether they allowed advance scheduling (yes or no), types of vehicles used (cars or cars/vans), corporate structure (non-profit or for-profit), and state in which they operated.

The RIS analysis was conducted in August 2018. All of the RIS information analyzed was either present on the ride share services' website or confirmed by ITNAmerica through personal communication with the ride share services.

2.4. Targeted review of literature

We conducted a targeted review of peer-reviewed literature in August 2018, as well as grey literature available from organizations such as the Transportation Research Board; websites of ride share organizations such as Uber and Lyft, and transportation referral services, such as GoGoGrandparent; websites of federal agencies such as the Administration on Aging and the Centers for Medicare & Medicaid Services; and websites of other relevant organizations, such as the National Organization of Mobility Managers, National Rural Transit Assistance Program, and American Planning Association. The literature review focused on identifying information related to the barriers and facilitators of older adults' use of ride share services and the characteristics of ride share services available for older adults or services that connect older adults to ride share services. This report contains a summary of the extensive review presented in the environmental scan (Freund et al., 2019).

2.5. Key informant interviews

We conducted one-hour semi-structured telephone interviews with nine key informants, including representatives from organizations that provide ride share services and referral services, as well as other stakeholders who work on issues related to older adult transportation. The purpose of the interviews was to learn about the types of ride share

services available to older adults and the barriers to and facilitators of older adults' use of these services. We used a semi-structured interview protocol to conduct the discussions. Topics included an overview of the ride share service or organization, services available for older adults, and barriers and facilitators that older adults face in using ride share services. The interviews were led by a senior member of the study team; a second team member took detailed notes. We conducted interviews by telephone in June and July 2018 and utilized NVivo qualitative analysis software (QSR International Ptd., Version 12) to conduct a thematic analysis of the interviews. Using a combined inductive and deductive approach, we created a list of codes based on a review of the interview transcripts to identify themes of interest related to this study.

3.   Results

3.1.   Characteristics of adults age 65 and older who used ITN's ride share services

Four out of 10 ITN riders were between 75 and 84 years of age (41.1%; Table 1), and more than one third (36.8%) were age 85 and older at the time they joined ITN. Taken together, more than 3 out of 4 riders (77.9%) were 75 years of age and older, while those between 65 and 74 years of age accounted for only 22.1% of the riders. Overall, the mean age of ITN riders 65 years and older was 81, while the median was 82, and the most common age (the mode), was 85. The majority of riders in our sample were female (73.6%), compared with male (26.4%), and predominantly Caucasian (92.9%). Riders in our sample reported modest annual household income (41.2% had an income less than $25,000 and 72.7% had an income less than $50,000). The majority lived alone in the community (62.4%).

When they became ITN members, almost three-quarters of older adults had a current driver's license (71.7%) and more than half owned a vehicle (60.2%), but only one third still drove (34.3%). Despite their special mobility needs (28.7% of riders used a cane, 26.5% used a walker, and 5.2% used a wheelchair), 7 out of 10 riders (69.8%) reported their physical health status as excellent, very good, or good. Driver assistance-which represents a range of services from door-to-door or door-through-door service to lending an arm for balance, pushing a wheel chair, or buckling a seat belt-was required by 17.8% of riders. Medical needs accounted for approximately 4 out of 10 rides (42.7%) and consumer needs, such as trips to the grocery store or hairdresser, accounted for 25.3% of trips. Other trip purposes included work, volunteer activities, religious activities, social and recreational activities and intermodal connections, such as a ride from an ITN driver to a bus stop. All 27 ITN affiliates included in this study scheduled rides by telephone, email, and standing request, and accepted checks and credit cards as a payment method.

3.2.   Characteristics of ride share services available for older adults

From the RIS analysis, we identified 917 individual non-profit ride share services (in 917 locations) and three for-profit ride share services (with 888 locations) available for older adults in the United States (Table 2). It is important to note that the number and characteristics of these services is dynamic, and the findings presented here reflect services that were available in the RIS database as of August 2018. We also identified an additional

eight for-profit ride share services from the literature review that were subsequently added to the RIS database.

3.2.1. Characteristics of Non-Profit ride share services available for older adults—As shown in Table 2, almost 80% (79.0%) of the 917 non-profit ride share services identified from the analysis of the Rides in Sight database offered door-to-door service (assistance from the door to the vehicle). In addition, almost all of the services had a minimum age requirement: about 4 in 10 (42.3%) specified a minimum age that ranged from 50 years to 65 years (depending on the organization), and another 52.2% served "seniors" without specifying a specific age range. One third (33.3%) had a residency requirement, meaning people seeking rides must live within a well-defined service area. The most common eligible trip purposes were medical or health care (67.9%), necessary errands, (37.3%), and grocery shopping (37.2%). More than one quarter of the services (27.0%) offered rides for any purpose.

Almost all of the non-profit services offered at least one type of assistance to riders, although the specific types of assistance varied. One third of services reported that their drivers offered a steadying arm (33.7%) (sometimes referred to as arm-through-arm service). About one quarter of services reported their drivers offered help in and out of the vehicle (27.3%) and 17.3% assisted with mobility devices, such as walkers. One in 10 (9.1%) services reported their drivers would wait with the older adult during their appointment or errand. Two thirds (65.9%) offered their services for free, though most also accepted contributions. Those that did charge primarily calculated rides by the mile or the zone. One non-profit ride share service that charged by the mile reported an average fare of $11.24, while the most common fare was $6.00. Of those that accepted payment, roughly 3 in 4 reported taking cash (73.8%), and 24.0% took checks or credit cards. One hundred percent of the ride share services scheduled rides in advance, though some did accept rides on demand. Key informant interviews with two non-profit ride share service providers who served the older adult population exclusively offered some insight into their motivation for this work. One described their organization's mission as empowering older adults to remain in their homes and to be independent and engaged in the community. Another said their mission was to enhance health and quality of life by providing affordable, volunteer-based transportation. Both ride share providers described the importance their organizations place on providing a rewarding personal experience for the drivers and the riders. Key informants characterized their ride share services as "neighborly" and "trustworthy" and emphasized that volunteer drivers also benefited from "building relationships with the people transported." Both services arranged rides by telephone.

As shown in Fig. 1, non-profit ride share service tended to be fewer in lower density areas, with populous states such as New York, California, Pennsylvania and Wisconsin having 40 or more non-profit services and states with lower population density, such as Nebraska, with as few as three services. There was at least one ride share service identified in every state.

3.2.2. Characteristics of For-Profit ride share services available for older adults—Analysis of RIS data identified three for-profit ride share services (with 888 locations) available in August 2018 to older adults (Table 2). Two offered ride share services

to the general population, including older adults; one exclusively served older adults. All of the for-profit ride share services offered rides for any trip purpose.

During key informant interviews, representatives from two for-profit ride share services (with 887 combined locations) described their organizations as technology companies, and their organizations' missions as providing reliable, affordable transportation for all and improving people's lives with the best transportation. Key informants from for-profit ride share services emphasized their relationships with organizations that serve older adults, such as older adult living communities, but did not emphasize relationships with the older adult riders themselves.

Based on our literature review, the two largest for-profit ride share companies in the United States offer rides on demand, in private automobiles, requested through a smartphone application. Both conduct the largest part of their business in the most densely populated cities in the country. In one study, nine metropolitan areas (Boston, Chicago, Los Angeles, Miami, New York, Philadelphia, San Francisco, Seattle, and Washington, DC) accounted for 70% of their trips (Schaller, 2018). In these metropolitan areas, people age 25 to 34 with an income of more than $50,000 used their services 2 to 3 times as often as less affluent or older persons (Schaller, 2018). One study found that 4% of those who have used a ride share service are 65 and older, compared with 36% who are between 18 and 29 (Clewlow & Mishra, 2017). The same study found that only 7% of people living in suburban neighborhoods of major cities use ride share services compared with 29% of people living in urban neighborhoods of major cities.

For-profit ride share organizations that served the general population reported they were working to create systems to address some of the barriers that prevented older adults from using their services. Through our literature review, we learned that for-profit ride share organizations had created programs that allowed adults and service providers to schedule rides for older adults, and they had formed partnerships with health care providers, assisted living facilities, and professional care-giving franchises to schedule and/or pay for rides on behalf of older adults (Blog, 2018; Uber Technologies, Inc., n.d.).

Older adults could also schedule their rides in advance, a preference for those who wanted the security of knowing in advance that they would be guaranteed a ride. Through our interviews, we learned that the for-profit ride share services were aware that many older adults needed more than curb-to-curb service and were seeking ways to address this need. Interview respondents noted that a challenge may be their labor model, since their drivers were independent contractors who cannot be required (Internal Revenue Service, 2019) to offer the kind of assistance necessary for older adults who needed a steadying arm or help with a walker, packages or seat belt. Interview data also showed that the for-profit ride share services interviewed were particularly interested in rides for health care, where a third party, such as a health care provider, assisted living facility, or professional caregiving franchise could schedule and pay for trips.

The for-profit ride share landscape in the United States is changing rapidly. Our review of the literature and websites identified 8 other for-profit ride share services that provided local

and regional services in addition to the 3 for-profit ride share services included in the RIS database. One organization, for example, provided on-demand transportation services to the general population, but offered discounted fares for older adults and individuals with mobility limitations. In 2015, this organization reported that a total of 27% of their riders were over 55 years of age, and 10% of riders were 65 years and older (Schwartzburg, 2015). Some for-profit ride share services specifically designed for older adults charged $20 to $40 each way, and for an additional charge, driver companions would stay with the customer, a service that consumed 70% of drivers' time, at a cost to the customer of $45 to $85 per hour (Read, 2017). One organization's services varied based on the plan a client chose, with prices ranging from $35 to $39 per hour and all driver companions offered door-to-door service and additional assistance throughout the trip (Envoy America, n.d.).

3.3. The marketplace

Through the literature review and key informant interviews, we learned that, in the non-profit sector, where rides were scheduled by telephone and services were often provided by volunteers, non-profit ride share services had difficulty meeting the demand for ride share services because they did not have a sufficient number of volunteer drivers or did not have sufficient funding.

In the for-profit sector, the largest ride share organizations in the United States have not yet achieved profitability (Lyft, 2019; Technologies, 2019). The literature review identified numerous challenges that may limit the for-profit sector's organizational growth, including labor issues and traffic congestion (Schaller, 2018). For example, New York City passed an ordinance requiring the TNCs to pay drivers $17.22 per hour after expenses, in line with the $15 per hour minimum wage (Hawkins, 2019). Sherman (2017) compared for-profit ride share difficulties in achieving profitability to those of the pre-regulated taxi industry, including "bounded demand, abundant supply, relatively undifferentiated service quality, extremely low barriers to entry, low customer switching costs, high variable costs and virtually no economies of scale."

3.4. Barriers and facilitators of older Adults' use of ride share services

Based on our literature review and key informant interviews, we identified the following factors that may affect older adults' use of ride share services: individual needs and preferences; social conditions, environments, and settings; and business and policy factors that affect availability of services. The factors identified may act as facilitators by contributing to or enabling older adults' use of ride share services or may act as barriers by preventing or deterring older adults' use of ride share services. We developed a conceptual framework to organize these factors (see Fig. 2), informed by the socio-ecological model (Centers for Disease Control and Prevention, 2018). The socio-ecological model describes how personal and environmental factors influence one another and may be a useful framework for identifying barriers and facilitators to older adult ride share use.

At the center of the framework are *individual factors* that may affect older adults' use of ride share services. These factors include biological and social traits, such as age and gender; physical traits such as physical and mental health, mobility, and special needs; and personal

behaviors and preferences such as knowledge, attitudes, and beliefs. *Interpersonal factors* are defined as the older adult's social network, including family members and friends who are available to provide transportation. *Organizational factors* include the characteristics of the ride share service that may include capital, labor model, services, scheduling procedures, and cost of services. *Community-level factors* may include geography, the availability of ride share services and other transportation alternatives, and community support for ride sharing. The outer-most ring is *public policy and the marketplace*, which includes regulations, funding, and incentives that may influence the extent to which ride share services may be available for older adults and others. *Information technology*, and specifically, technological advances including the smartphone, affects all levels of the framework. Assessing barriers and facilitators is complex because factors that may affect use of ride share services may be both barriers and facilitators depending upon the circumstances.

4. Discussion

This study sought to describe characteristics of ride share services in the United States, including services designed specifically for older adults. Based on Rides in Sight data, there were 917 individual non-profit transportation ride share services in 917 locations and 3 for-profit services in 888 locations that provided rides for older adults as of August 2018. The subsequent literature review identified an additional 8 for-profit services (then added to RIS). There were marked differences between the non-profit and for-profit services; they varied by corporate structure (non-profit and for profit), location (urban, suburban, and rural), use of technology (high tech and low tech), and business model (local and national). This study also described the characteristics of older adults using a ride share service based on an analysis of more than 20 years of data in 27 U.S. locations from the ITNRides database. Within this cohort, most ride share users age 65 and older were women, lived alone in the community, and had a median age of 82.

Approximately 70% of ITN ride share users reported good, very good, or excellent health, which mirrors a national estimate of 73% of older adults (60 + years) who reported good, very good, or excellent health (White, Philogene, Fine, & Sinha, 2009).

Although the most commonly reported trip purpose among the ITN ride share users was for access to health care, the majority of rides were for other purposes such as shopping, having fun, meeting people, going to religious services, volunteering, and going to work. Some interesting comparisons can be made between these ITNRides findings and a national study of older adults' travel patterns, despite several differences between data sources for the two studies. Collia, Sharp, and Giesbrecht (2003) analyzed 2001 National Household Travel Survey (NHTS) data for all trips (whether as drivers or passengers of private automobiles or by transit, walking, or any other mode of transportation), rather than for ride share trips as represented in the ITNRides database. Additionally, the 2001 NHTS data comprised a nationally representative sample of older adults (age 65 and older). This population of older adults was likely younger, with fewer health conditions or mobility concerns than the ITN ride share users whose median age was 82 years. Finally, we excluded "return home" trips when calculating percentages by ITN trip purpose, whereas Collia et al. (2003) included

those trips in their calculations. With these differences in mind, we observe that, similar to trip purposes of the ITN ride share users, the majority (55%) of older adults' travel as reported on the 2001 NHTS were for shopping, social/recreation, or family/personal business reasons (Collia et al., 2003). On the other hand, 43% of trips taken through this study's ride share service were for access to health care, while Collia et al. (2003) reported that only a small percentage (3% of all trips, including return home trips) taken by older adults were for the same purpose. Future studies might explore the relationship between age (65–74 years, 75–84 years, 85 + years) and use of ride share services, specifically, for health care purposes.

Our study also culminated in the development of a conceptual framework to organize the barriers and facilitators impacting older adults' use of ride share services. This framework warrants further discussion about the different types of factors that may influence older adults' use of ride share services.

4.1. Individual level

Key informant interview respondents described how age, health, and mobility are factors that affect older adults' use of ride share services. One key informant also noted that personal comfort with ride sharing is a potential barrier to use of ride share services. At the same time, another key informant noted that some older adults feel stigmatized or embarrassed when using vans or shuttles; older adults may prefer to use ride share services because they provide transportation in a personal vehicle. Driving status, which is influenced by age, physical health, and special needs (Hajek et al., 2019), may also affect utilization of ride share services. Ride sharing may contribute to independence among older adults who are no longer driving or who have begun the gradual transition from the driver's seat to the passenger seat (Bergen et al., 2017).

4.2. Interpersonal level

Many older adults rely primarily on family members and friends to provide transportation, while others depend on organizations that provide transportation services (Choi, Adams, & Kahana, 2012). Family and friends may provide door-to-door and door-through-door assistance for older adults with mobility limitations. However, research shows that older adults who do not have access to a personal vehicle feel dependent on family members and friends for rides, and report difficulty asking them for rides (Hadley Strout et al., 2016). Older adults who have unmet transportation needs may choose to use ride share services. Key informants also suggested that ride share services offer an opportunity for increased social interaction among both riders and drivers.

4.3. Organizational level

The characteristics of the ride share service-capital, labor model, services, scheduling procedures, and cost of services-may affect older adults' use of ride share services. Interview data suggested that non-profit ride share services tend to rely on social capital, or volunteerism, to provide rides. Through our interviews, we learned that some non-profit ride share organizations offer free or low-cost services to older adults but ration these services by offering limited rides. Such service restrictions are often a result of insufficient volunteer

drivers or insufficient financial capital to support additional rides. Many non-profit ride share services require advance scheduling, which may facilitate use among older adults who maintain set schedules. For-profit ride share services offer transportation on demand, using independent contractors as drivers-meaning individual drivers decide when, where, and who they will serve. Ride share services may offer training for special needs riders, but drivers are not required to participate in trainings or offer special assistance to older adults who need to be escorted into their homes or helped with walkers or packages.

4.4. Community level

Geographic location-and specifically, the community in which an older adult resides-may impact the availability of ride share services. Through the literature review, we found that older adults in rural communities have more limited options for alternative sources of transportation (Payyanadan, Lee, & Grepo, 2018; Strogatz et al., 2019) in comparison to their non-rural counterparts, and ride share services are less prevalent in rural areas (Jiang, 2019). Since nearly four-fifths of older Americans live in rural or suburban communities (Rosenbloom, 2003), this finding suggests that there may be unmet needs for older adult ride share services in rural communities.

The youngest-old (people aged 65 to 74) who reside in urban areas have greater access to ride share services. However, in urban communities with heavy traffic congestion, it may be difficult for drivers to leave their vehicles to help older adults with packages and walkers, or offer a steadying arm, and may be a barrier for older adults who need this assistance.

4.5. Information technology

Technological advances, including the smartphone, may facilitate access to ride share services but may also present barriers to their use. Among non-profit ride share services, the predominant means for older adults to request and schedule rides is the telephone. Smartphones are the primary technology used by for-profit ride share services to schedule and pay for rides. While smartphone technology is a major facilitator to ride share use among certain populations, it may be a barrier for some older adults. Transportation referral services that connect older adults who do not have smartphones to for-profit ride share services may offer opportunities to overcome this technology barrier, leveraging both smartphone technology and web-based dashboards to facilitate scheduling and coordination of rides for older adults.

4.6. Public policy and the marketplace

Policies and legislation at the state, local, and federal levels, and other private-market considerations may continue to influence the extent to which ride share services are available for older adults and others. Ride sharing regulations in some states have, in the short-term, expanded their availability (Borkholder, Montgomery, Chen, & Smith, 2018), but the longer-term effects and unintended consequences, which might take time to emerge, remain unclear. For example, traffic congestion in major American cities has been identified as one outcome of ride share expansion (Schaller, 2018). A 2018 study showed that ride share services increased urban traffic by 160%, adding 2.6 new TNC miles for every mile of personal driving removed (Schaller, 2018). Also, within non-profit ride share organizations,

the loss of personal insurance coverage among volunteers, is another outcome. Personal auto insurance policies may contain exclusions when people use their personal vehicle for business to provide ride share services (Association, 2019). While new insurance products are becoming available for ride share drivers, they might be cost prohibitive for volunteer drivers who use their vehicles to provide ride share services to older adults. These policy restrictions may be additional barriers to volunteer drivers who use their vehicles to provide ride share services to older adults.

4.7. Limitations

There are several limitations to consider for the present study. First, data for older adult ride share users spanning 24 years were available from one database used by 27 similar non-profits in different locations. We are unable to generalize these findings to all older adults who use the full range of ride share services available across the United States. Second, ITNRides data were self-reported by ITN members in their applications (for example, their living arrangements and whether they currently drive) or completed by caregivers, social workers or family members. Third, personal data in ITNRides reflected member characteristics at the time they completed their applications for enrollment in ITN services. While personal data may have been updated as new information became available (e.g., if a member reported their living arrangement had changed), it is possible that data were not updated by the member or member's caregivers, social workers, or family. Fourth, the identification of ride share services in this report was limited to those included in the Rides in Sight database and to services identified through the literature review (including peer-reviewed literature, grey literature, and websites). To the extent that information was missing from either of these sources, the number of ride share services reported in this study may be underestimated.

5. Conclusions

Our analysis identified nearly 1,000 ride share services available for older adults in the United States. We divided ride share services for older adults into two categories for this analysis-for-profit and non-profit. The for-profit transportation network companies that serve the general population were more available in urban areas, used smart phone technology, and may be an option for older adults who need transportation to and from health care providers and senior living facilities in urbanized areas. However, for profit services' drivers are often independent contractors who may not provide the kind of human assistance many older people require, such as offering a steadying arm, folding a walker or carrying packages. Also, some for-profit services do employ trained drivers and offer assistance for which they charge an hourly fee of $35 to $85. Non-profit services, of which there are more than 900, serve the older population (65 +), schedule rides in advance by telephone, and rely heavily on volunteer drivers. The majority of non-profit ride share services (604 of 917 services) do not charge for rides, though some accept contributions. The average fare per ride for one non-profit ride share service was $11.24 and the most common fare for the same service was $6.00. Non-profit ride share services may face more demand for their services than they can supply. Additional research might improve understanding of how cost for services can serve as a barrier or facilitator to older adult utilization of ride share services.

Incentives for private solutions, such as programs where older adults trade the cars they no longer drive to pay for their own transportation, or where volunteers earn "service credits" for driving older adults and bank their social capital for their own future needs (D'Ambrosio, Coughlin, & Council, 2012), may help to prepare for the mobility needs of the next generation. Addressing barriers to the use of private resources, such as insurance impediments for volunteer drivers and resources to facilitate technology for solutions in rural and suburban communities, especially for those who are 75 and older, may help to scale ride sharing solutions that meet the needs of the aging population.

A majority of the ride share services identified in our study are located in higher population density areas. Much of rural America may be under-served, as there are fewer transportation options of any kind, including volunteer driver programs (Center, 2010) and ride share services (Jiang, 2019). Longer travel distances and fewer resources make both public transit and ride share services critically scarce in rural areas.

6. Practical applications

More than 20% of Americans will be aged 65 + years by 2030 (Ortman, Velkoff, & Hogan, 2014), and the need for alternative transportation options to improve older adult mobility may continue to increase with this aging of the population. This study expands our understanding of how organizational, community, and other factors affect older adults' use of ride share services and may be of particular relevance to policy makers, practitioners, and other stakeholders with an interest in older adult mobility. The landscape of ride share services in the United States continues to evolve. In the future, there may be a mix of new service types available to help fulfill a range of mobility needs for older adults to travel safely, remain in their homes, and actively engage in their communities.

Acknowledgements

Biography

Freund is the founder and President of ITNAmerica where she serves as Executive Director and oversees policy studies, social research, technology, communications and all aspects of national development. She has a Master of Arts degree in Public Policy from the Edmund S. Muskie School of Public Service and a Bachelor of Arts in English Literature from SUNY Buffalo.

Bayne is a Principal Research Scientist with NORC at the University of Chicago where she conducts public health research and evaluation studies. Her areas of interest include public

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Beck is an epidemiologist with the Centers for Disease Control & Prevention (CDC), National Center for Injury Prevention & Control (NCIPC), where her work has focused on transportation safety for the past 15 years. Her areas of interest include safe transportation for older adults and seat belt use. She received her Master of Public Health degree in behavioral sciences from the Emory University Rollins School of Public Health.

Siegfried is a researcher at NORC at the University of Chicago where she designs and implements quantitative and qualitative research studies and program evaluations related to transportation, rural health, and public health systems and services, among other topics. Her Master of Public Health degree in health promotion is from the George Washington University.

Warren is the Rides in Sight Project Manager at ITNAmerica where his responsibilities include managing the national information hotline, the transportation provider database, and the Trusted Transportation Partners programs. He has been with ITNAmerica for 6 years. Joe has a Bachelor of Arts degree in History from Northeastern University.

Nadel is a Research Analyst in the Public Health Department at NORC at the University of Chicago. She conducts research on a variety of program evaluation projects, including public health, health behavior, and transportation. She holds a Bachelor of Arts in Public Policy from the University of Delaware.

Natarajan is a Senior Programmer and Database Manager at ITNAmerica. She works on enhancements and maintenance to the ITNRides software, manages the backend affiliate databases and develops reports. She has been with ITNAmerica for 13 years. She has a Master of Science degree in Biochemistry from University of Madras in India and a Master of Science degree in Computer Science from University of New Haven, Connecticut.

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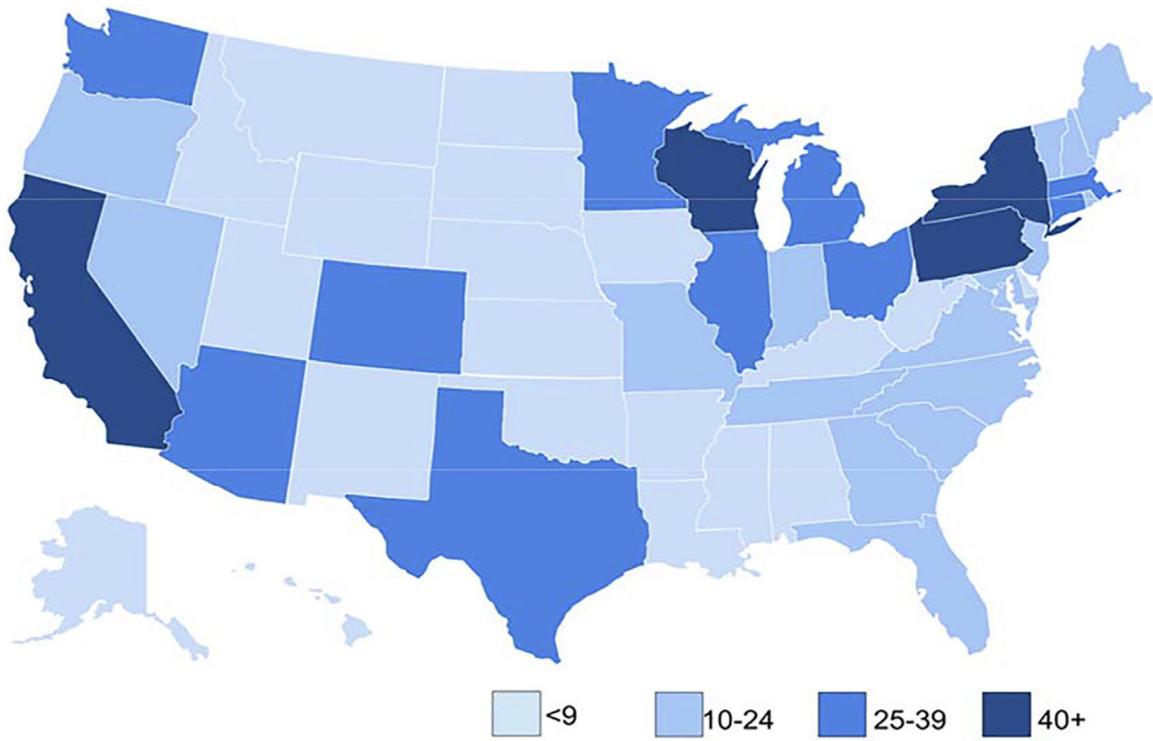
Fig. 1.

Distribution of Non-Profit Ride Share Services, by State (N = 917), ITN Rides in Sight, August 2018. This map shows the distribution of non-profit ride share services by state. It does not display the ride share organization's service area within the state.
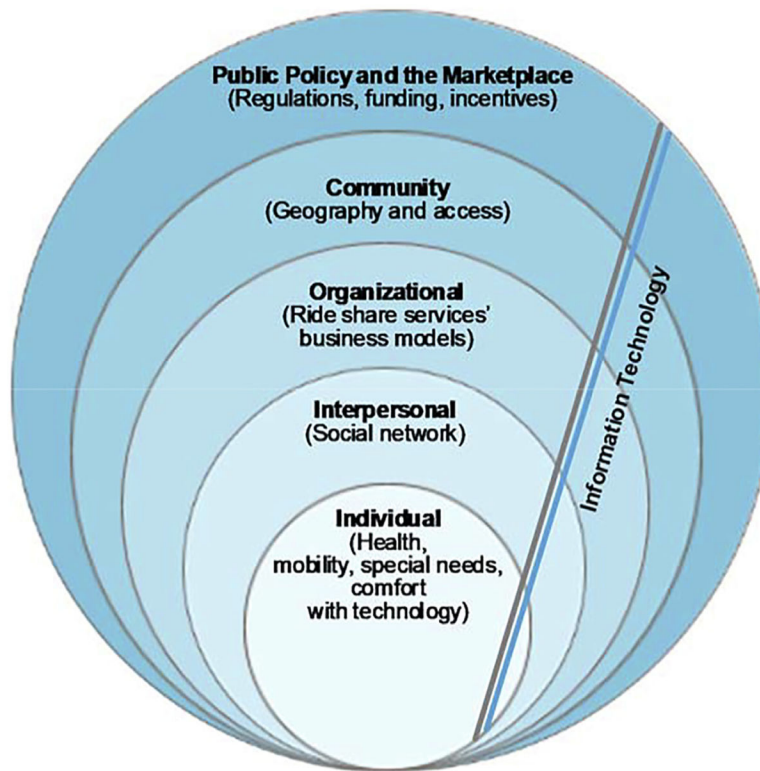
Fig. 2.
Barriers and Facilitators of Older Adults' Use of Ride Share Services: A Socio-Ecological Model. The conceptual framework describes the barriers to and facilitators of older adults' use of ride share services as overlapping rings that influence one another.

Table 1

Characteristics of Adults Age 65 and Older Who Used ITN's Ride Share Services, ITNRides Data, June 1996 - October 2019.

Characteristics	N (%)
Age Group (N = 10,010)	
65–74 years	2,212 (22.1)
75–84 years	4,116 (41.1)
85 + years	3,682 (36.8)
Mean	81
Median	82
Mode	85
Gender (N = 9,881)	
Male	2,612 (26.4)
Female	7,269 (73.6)
Health Status (N = 7,284)	
Excellent	551 (7.6)
Very good	1,727 (23.7)
Good	2,806 (38.5)
Fair	1,826 (25.1)
Poor	374 (5.1)
Living Arrangements (N = 9,124)	
Live alone	5,695 (62.4)
Live with others (family or friends)	3,429 (37.6)
Race/Ethnicity (N = 8,333)	
Caucasian	7,737 (92.9)
African American	255 (3.1)
Hispanic/Latino	104 (1.3)
Other	237 (2.8)
Household Income (N = 4,796)	
Less than $25,000	1,975 (41.2)
$25,000-$49,999	1,510 (31.5)
$50,000-$74,999	660 (13.8)
$75,000-$99,999	349 (7.3)
$100,000 or more	302 (6.3)
Current Driver's License (N = 6,664)	
No	1,887 (28.3)
Yes	4,777 (71.7)
Currently Own a Vehicle (N = 6,454)	
No	2,568 (39.8)
Yes	3,886 (60.2)
Currently Drive (N = 6,400)	
No	4,202 (65.7)

Characteristics	N (%)
Yes	2,198 (34.3)
Special Needs (N = 10,010) [1]	
Cane	2,872 (28.7)
Walker	2,651 (26.5)
Driver assistance required	1,784 (17.8)
Visual impairment	1,485 (14.8)
No high vehicle	1,422 (14.2)
Alzheimer's/dementia	635 (6.3)
Trunk required	590 (5.9)
Wheelchair	521 (5.2)
Deaf	366 (3.7)
Full size vehicle required	346 (3.5)
Bladder control problem	319 (3.2)
Personal assistant	290 (2.9)
Anxiety disorder	279 (2.8)
Blind	107 (1.1)
Service animal	7 (0.1)
Ride Purpose by Segment (N = 830,046 total ride segments; ride purpose calculation excludes 388,327 return home ride segments)	
Medical	188,792 (42.7)
Consumer	111,627 (25.3)
Recreation	44,598 (10.1)
Religious	34,294 (7.8)
Social	29,227 (6.6)
Employment/volunteer	11,735 (2.7)
General	11,002 (2.5)
Education	5,891 (1.3)
Intermodal	3,021 (0.7)
Professional services	1,532 (0.3)

[1] The categories are not mutually exclusive; categories may not add to 100%.

Table 2

Characteristics of Ride Share Services in the United States, ITN Rides in Sight (RIS), August 2018.

Characteristics of ride share services [1]	Non-profit services (N = 917) and service locations (N = 917) N (%)	For-profit services (N = 3) and service locations (N = 888) N (%)	Total services (N = 920) and service locations (N = 1,805) N (%)
Type of transportation provided			
Curb-to-curb	195 (21.3)	887 (99.9)	1082 (59.9)
Door-to-door	724 (79.0)	1 (0.1)	725 (40.2)
Shared rides	111 (12.1)	0 (0.0)	111 (6.2)
Paratransit	8 (0.9)	0 (0.0)	8 (0.4)
Fixed route	2 (0.1)	0 (0.0)	2 (0.1)
Emergency transportation	0 (0.0)	0 (0.0)	0 (0.0)
Eligibility requirements			
Available to the public	33 (3.6)	887 (99.9)	920 (51.0)
Seniors [2]	479 (52.2)	1 (0.1)	480 (26.6)
Residency requirement	305 (33.3)	0 (0.0)	305 (16.9)
Age 60+	286 (31.2)	0 (0.0)	286 (15.8)
Disabled	234 (25.5)	0 (0.0)	234 (13.0)
Illness	45 (4.9)	0 (0.0)	45 (2.5)
Age 55+	43 (4.7)	0 (0.0)	43 (2.4)
Age 65+	42 (4.6)	0 (0.0)	42 (2.3)
Membership requirement	30 (3.3)	0 (0.0)	30 (1.7)
Income requirement	27 (2.9)	0 (0.0)	27 (1.5)
Age 50+	11 (1.2)	0 (0.0)	11 (0.6)
Home evaluation	10 (1.1)	0 (0.0)	10 (0.6)
Veteran	9 (1.0)	0 (0.0)	9 (0.5)
Age 62+	5 (0.6)	0 (0.0)	5 (0.3)
Eligible trip purpose			
Any	248 (27.0)	888 (100.0)	1136 (62.9)
Medical or health care	623 (67.9)	0 (0.0)	623 (34.5)
Necessary errands	342 (37.3)	0 (0.0)	342 (19.0)
Grocery shopping	341 (37.2)	0 (0.0)	341 (18.9)
Social	58 (6.3)	0 (0.0)	58 (3.2)

Characteristics of ride share services [1]	Non-profit services (N = 917) and service locations (N = 917) N (%)	For-profit services (N = 3) and service locations (N = 888) N (%)	Total services (N = 920) and service locations (N = 1,805) N (%)
Recreation	42 (4.6)	0 (0.0)	42 (2.3)
Work/volunteer	25 (2.7)	0 (0.0)	25 (1.4)
Assistance available			
Steadying arm to escort passenger	309 (33.7)	*	309 (17.1)
Help in and out of vehicle	250 (27.3)	1 (0.1)	251 (13.9)
Help with mobility devices	159 (17.3)	*	159 (8.8)
Help with seat belts	111 (12.1)	*	111 (6.2)
Wheelchair accessible	97 (10.6)	*	97 (5.4)
Driver will wait with passenger during errand/appointment	83 (9.1)	1 (0.1)	84 (4.7)
Driver will come inside	66 (7.2)	1 (0.1)	67 (3.7)
Transport folding wheelchair	51 (5.6)	*	51 (2.8)
Help with packages	49 (5.3)	*	49 (2.7)
Personal assistant/caregiver rides for free	31 (3.4)	*	31 (1.7)
Full service	22 (2.4)	*	22 (1.2)
Help with wheelchair	20 (2.2)	*	20 (1.1)
Wheelchair lift	19 (2.1)	*	19 (1.1)
Service animals allowed	17 (1.9)	*	17 (0.9)
Personal assistant available	15 (1.6)	*	15 (0.8)
Driver will not come inside	6 (0.7)	*	6 (0.3)
Special needs assistance	6 (0.7)	*	6 (0.3)
Pricing structure			
Paid	313 (34.1)	888 (100.0)	1201 (66.5)
Free	604 (65.9)	0 (0.0)	604 (33.5)
Payment methods among services that charge for rides			
Credit cards	30 (9.6)	888 (100.0)	918 (76.4)
Cash	231 (73.8)	0 (0.0)	231 (19.2)
Check	45 (14.4)	0 (0.0)	45 (3.8)
Pre-payment	30 (9.6)	0 (0.0)	30 (2.5)
Exact change	10 (3.2)	0 (0.0)	10 (0.8)
Medicaid	8 (2.6)	0 (0.0)	8 (0.7)
Taxi voucher	3 (1.0)	0 (0.0)	3 (0.3)

Characteristics of ride share services[1]	Non-profit services (N = 917) and service locations (N = 917) N (%)	For-profit services (N = 3) and service locations (N = 888) N (%)	Total services (N = 920) and service locations (N = 1,805) N (%)
Insurance	2 (0.6)	0 (0.0)	2 (0.2)
Advance scheduling[3]			
Yes	917 (100.0)	1 (0.1)	918 (50.9)
No	0 (0.0)	887 (99.9)	887 (49.1)
Vehicles used			
Car	917 (100.0)	805 (100.0)	1805 (100.0)
Car & van	245 (26.7)	0 (0.0)	245 (13.6)
TOTAL	**917 (100.0)**	**805 (100.0)**	**1,805 (100.0)**

*Personal assistance is not guaranteed and is provided at the driver's discretion.

[1] The categories in the table are not mutually exclusive; categories will not always add to 100%.

[2] Some organizations that serve older adults did not specify an age range.

[3] Most, but not all, non-profit ride share services offer advance scheduling exclusively.