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Barriers and facilitators of older adults' use of ride share services

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Abstract

Introduction: Safe, affordable, and convenient transportation may help older adults (age 65 and older) stay independent, access healthcare services, and maintain their quality of life. While older adults in the United States primarily rely on private automobiles, those who reduce or cease driving may require alternative forms of transportation. Ride share services show promise as an alternative mode of transportation for older adults, particularly for those who no longer drive.

Methods: We employed a qualitative research design to explore barriers and facilitators of older adults' use of ride share services and compare findings to younger adults (age 18 to 64). We conducted 96 telephone interviews (68 older adults and 28 younger adults), and 10 in-person focus groups (56 older adults and 17 younger adults), including individuals who used a ride share service and those who never used a ride share service. We conducted qualitative data analysis to identify key themes and developed a conceptual framework to organize and describe findings.

Results: The qualitative analysis revealed the most important facilitator of older adults' use of ride share services was the desire to remain independent, particularly among those with health conditions and special needs that prevented them from using other transportation. Other

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CRediT authorship contribution statement

Alycia Bayne: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Visualization, Writing – review & editing, Supervision, Project administration, Funding acquisition. **Alexa Siegfried:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Visualization, Writing – review & editing, Project administration. **Laurie F. Beck:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration. **Katherine Freund:** Conceptualization, Methodology, Software, Data curation, Writing – review & editing, Funding acquisition.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jth.2021.101055.

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The findings and conclusions in this paper are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Data statement

The research data used in this study are confidential and not publicly available.

Declarations of interest

Bayne, Siegfried, and Beck declare no conflicts of interest. Freund has received financial support from Regeneron Pharmaceuticals and from ITN Affiliates.

facilitators included driver assistance (door-to-door service), a polite and courteous driver, a clean vehicle, and prompt and dependable service. Barriers among older adults included safety concerns, affordability, technology, and a lack of ride share services in the community. Among younger adults, technology was a facilitator of use.

Conclusion: Ride share services are a promising transportation option. Findings highlight a need to tailor these services to older adults' needs. Ride share services that are safe, reliable, and offer driver assistance and telephone scheduling have the potential to support older adults' health, mobility, and independence.

Keywords

Alternative transportation; Driving; Safety; Mobility; Health; Aging

1. Introduction

In the United States, the primary mode of transportation used by older adults (age 65+) is a privately owned vehicle, with older adults most often as the drivers of those vehicles (Shen et al., 2017). With life expectancy in the United States increasing (Xu et al., 2020), the percentage of drivers age 65+ has also increased from 14.1% in 1998 to 19.9% in 2018 (Federal Highway Administration, 1998; 2018). Over time, age-related changes in vision, cognitive, and physical function may diminish older adults' driving ability, requiring them to reduce or cease driving (Dawson et al., 2010; Anstey et al., 2005). In 2017, the average number of daily person trips was lower for older adults over age 65 (3.2 trips) than for younger adults age 36 to 65 (3.7 trips) (National Household Travel Survey, 2017).

Driving cessation and changes in driving habits can affect "optimal mobility – 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 who reduce or stop driving are at greater risk for social isolation and loneliness (Qin et al., 2019) and worsening symptoms of depression (Fonda et al., 2001) and other health consequences (Dickerson et al., 2019). Further, transportation impacts access to healthcare services, with an estimated 5.8 million people in the United States delaying healthcare in 2017 because of a lack of transportation (Wolfe et al., 2020); such delays are associated with negative health outcomes (Syed et al., 2014).

Adults age 70 to 74 who stop driving will rely on alternative transportation for approximately seven years for men, or ten years for women (Foley et al., 2002). Alternative transportation is defined as a "mode of transportation other than driving one's self in a private vehicle" ("Taxonomy and Terms for Stakeholders in Senior Mobility," 2016). The most common alternative to driving among older adults in the United States is riding with family and friends (Jones et al., 2018). However, some older adults may be reluctant or unable to rely on family and friends. Other transportation options include public transportation, such as buses, and paratransit, in which public or private agencies provide individualized door-to-door or curb-to-curb transportation (National Association of Area Agencies on Aging, n.d.). Public transportation use is low among older adults (Yang et al., 2018), not available in every community, follows set schedules along fixed routes, and lacks

personal assistance. Paratransit requires advance scheduling and may have long wait times (Feeley et al., 2016). Non-emergency medical transportation is also available to people with Medicaid who need transportation to and from medical appointments, though eligibility and criteria vary by state (Centers for Medicare and Medicaid Services, 2020).

Given older adults' high reliance on private automobiles, the need to stop or reduce driving for health and safety reasons, and the importance of maintaining independence, healthcare access, and social participation, there is a profound need to identify safe, affordable, convenient, and accessible transportation options for older adults. Ride share services show promise as an alternative mode of transportation because they offer characteristics similar to private automobiles (Bird et al., 2017). Ride sharing is transportation arranged through a third party where a person is a passenger in a private automobile and excludes public transportation or a ride provided by a van, bus, or taxi (Freund et al., 2019). There are nearly 1000 ride share services available in the United States. These include volunteer and non-profit services serving older adults and for-profit services, called Transportation Network Companies (TNCs), serving the general public, including older adults. TNCs connect riders to drivers using private vehicles and online or smartphone-based applications (California Public Utilities Commission, n.d.).

While we know ride share services are available as a transportation option in the United States, little is known about the factors influencing older adults' use of these services. This paper describes the barriers and facilitators of older adults' use of ride share, and compares older adults' attitudes and beliefs to those of younger adults.

1.1. Conceptual framework

We present a conceptual framework (Fig. 1) describing the factors affecting older adults' use of ride share services across five levels. The framework is based on the socio-ecological model (SEM) and describes the multiple levels of influence on behaviors (Kilanowski, 2017). The authors developed the framework in a prior paper, based on a literature review and key informant interviews (Freund et al., 2019).

At the individual level, ride share use is shaped by personal characteristics, attitudes, beliefs, and knowledge. The interpersonal level emphasizes the influence of relationships on ride share use. Organizational-level factors describe the structures, policies, and business models used by ride share services. Community-level factors include the availability of services in the community. The public policy and marketplace level addresses the influence of policy, regulation, and economics on ride share use. Information technology affects all levels of the framework. The overlapping rings depict how these factors relate to and influence one another. We use this conceptual framework to structure the presentation of findings.

2. Methods

We employed a qualitative research design to collect primary data through interviews and focus groups with adults age 65 and older ("older adults") and age 18 to 64 ("younger adults"). Between April and October 2019, we conducted 96 interviews with 68 older adults and 28 younger adults across the United States. During July and August 2019, we conducted

10 focus groups, with a total of 73 participants—56 older adults and 17 younger adults—within two U.S. communities. The reporting of the qualitative research findings in this paper is consistent with the Consolidated Criteria for Reporting Qualitative Research (COREQ). The study was reviewed by the NORC Institutional Review Board (IRB00000967, Federal Wide Assurance #FWA00000142) and approved by the Office of Management and Budget (OMB No. 0920–1154).

2.1. Participant recruitment

2.1.1. Interviews—For the interviews with ride share users and non-users, we used a convenience sample (Patton, 2002) of adults age 18 and older. Eligibility criteria included age, ride share use ("users" were defined as people who had ever used a ride share service; "non-users" were defined as people who had never used a ride share service), and employment by a ride share service (those ever employed were not eligible).

Ride Share Users.: We aimed to recruit 50 older adults (age 65+) and 25 younger adults (age 18 to 64) who were users of ride share services. We partnered with two for-profit services, and six non-profit ride share services to recruit users for interviews. One for-profit service provides rides across the United States, and the second is a concierge service that schedules rides with for-profit TNCs on behalf of older adults. Non-profits included a national ride share service with affiliates and transportation partners in 47 states, and ride share services that operate in Austin, Texas; Door County, Wisconsin; Blount County, Tennessee; select counties in New Hampshire; and Hood River, Oregon. Partners shared a study flyer and information with their members via newsletters, telephone, and email. Individuals interested in participating called the toll-free number from the flyer and were screened by the research team and scheduled for an interview. The researchers did not have a prior relationship with participants.

Ride Share Non-Users.: We aimed to recruit 10 older adults (age 65+) and 10 younger adults (age 18 to 64) who were non-users of ride share services. We contracted with a third-party recruitment firm. The firm used a telephone screener for eligibility and scheduled participants for an interview.

2.1.2. Focus groups—For the focus groups with ride share users and non-users, we used a convenience sample of older adults (age 65+) and younger adults (age 25 to 39). Our target was to conduct eight focus groups with 72 older adults and two focus groups with 18 younger adults (nine participants per group). We sought to conduct focus groups with younger adults age 25 to 39 because data available at the time of the study suggested that this age group used ride share services more frequently than other cohorts of younger adults. In one study of Uber and Lyft users in San Francisco, 57% of 25–34 year olds used these services, compared to 19% of 35–44 year olds, and 6% of 45–55 year olds (Rayle et al., 2014). Eligibility criteria included age, ride share use, and employment by a ride share service (those ever employed were not eligible).

Ride Share Users.: We aimed to recruit 54 older adult ride share users (age 65+) for six focus groups. To recruit older adult users, we partnered with a national non-profit ride

share service's local affiliates in two counties (one metropolitan and one micropolitan). The affiliates shared the study description and flyer via newsletter, email, and telephone with local members, and provided rides to members to the focus groups. We also partnered with community organizations (five community centers, five public library branches, one senior center, and one restaurant) which shared the study flyer at their locations. We used the same screening questions that were used for the interview recruitment, with the addition of county of residence (those residing within the county were eligible for the focus groups).

We also aimed to recruit 18 younger adult users (age 25 to 39) for two focus groups. To recruit younger adult users, we contracted with a third-party recruitment firm. The firm used a telephone screener for eligibility and scheduled participants for the focus groups.

Ride Share Non-Users.: Finally, we aimed to recruit 18 older adult non-users for two focus groups. To recruit non-users, we contracted with a third-party recruitment firm, following the same protocol as described above.

All focus group participants received a reminder letter with the focus group date, time, and location via U.S. mail or email.

2.2. Data collection

Data were collected using semi-structured protocols. AB, AS, LB, and KF developed the protocols based on a literature review on transportation for older adults and ride share services. The data collection topics are listed in Table 1, and the interview and focus group protocols for users and non-users are included in appendices.

2.2.1. Interviews—AS and two other researchers on the team, whose occupations are social science research and who have training and experience conducting qualitative research, conducted the interviews. Interviews were approximately 30 min and audio recorded with permission. A researcher took notes during the interviews and prepared non-verbatim transcripts, which were used for data analysis. All participants provided verbal consent to participate. Participants received a $10 incentive via U.S. mail after completing the interview.

2.2.2. Focus groups—A lead facilitator and co-facilitator conducted the focus groups. Five focus groups were held in July 2019 at a senior center in Bergen County, New Jersey — three with older adult users, one with older adult non-users, and one with younger adult users. Five focus groups were held in August 2019 at a public library in Fayette County, Kentucky— three with older adult users and two with younger adult users. The average size of each focus group was seven people (range: 4 to 11). Focus groups were 90 min in length and audio recorded with permission. A researcher took notes during the focus groups and prepared non-verbatim transcripts, which were used for data analysis. All participants provided written consent to participate. Participants received a $50 incentive at the conclusion of the focus group.

Prior to beginning each focus group, we asked participants to complete a short focus group questionnaire containing the following topics: driver's license (yes/no), sex (male or

female), race (American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, White, Other), and ethnicity (Hispanic or Latino, or not Hispanic or Latino). The questionnaire also included an item to indicate the frequency of ride share use (never, once per day or nearly daily, once per week, once per month, once every few months, once in the last year, once or twice ever, other). When analyzing the results, we recoded six responses from the "other" category to the "once per week" category and renamed this category "at least once per week." For example, a respondent who wrote in a response for "other" indicating that they used ride share services 2 to 3 times per week was recoded as "at least once per week" (but less than daily use). We also recoded three "other" category responses to "once per month" and renamed this category "at least once per month" (but less than weekly use).

2.3. Data analysis

De-identified data were analyzed and tabulated using MS Word, MS Excel, and NVivo (QSR International Pty Ltd., Melbourne, Australia). We aggregated and coded data on participant demographics (sex, age, race, and ethnicity) from the focus group questionnaires and interview transcripts in MS Excel. We calculated percentages for these participant demographics. Participants' geographic location was coded using the 2013 Urban Influence Codes (Economic Research Service, 2019). We developed a codebook to analyze the qualitative data in NVivo using code query, key word searches, or a combination. Initial codes were deductively developed by AB, AS, and LB, and inductively refined during coder training. The codes mapped to the levels of the socio-ecological model in Fig. 1. The final codebook contained 22 codes. AB and AS conducted the coder training across the five-member coding team. Interrater reliability (IRR) was measured using Cohen's Kappa coefficient, and the team achieved almost perfect agreement, with an IRR of 0.82 (McHugh, 2012). All findings were derived from the data and agreed upon by all authors.

3. Results

3.1. Sample characteristics

Table 2 presents the characteristics of study participants. Among older adults (N = 124), ages ranged from 65 to 99 years; approximately half were age 65 to 74, one quarter were age 75 to 84, and one quarter were age 85 and older (not shown). Among younger adults (N = 45), about half were less than age 50 and half were age 50 to 64 (48.9% and 51.1%, respectively). The majority of older adults and younger adults were female (70.2% and 64.4%, respectively). Nearly two-thirds (63.9%) of older adults and more than half (55.6%) of younger adults resided in a large metropolitan area. The remainder of older and younger adults resided in a small metropolitan area (36.1% and 44.4%, respectively). The majority of older adults were White (97.5%). Among younger adults, 80.0% were White, 13.3% were Black, 2.2% were Asian, and 4.4% were another race. More than nine-tenths of older and younger adults were not Hispanic or Latino (98.4% and 93.3%, respectively). The proportion of older and younger adults with a driver's license was similar (72.1% and 71.1%, respectively).

More than three-quarters of older and younger adults were ride share users (76.6% and 77.8%, respectively), and nearly one-quarter had never used a ride share (23.4% and 22.2%, respectively). Among older adult users, 43.6% had used for-profit service (s), 40.4% had used non-profit service(s), and fewer had used both (16%). Among younger adult users, the majority had used for-profits (91.4%), and few had used non-profits or both types (2.9% and 5.7%, respectively).

Older and younger adult focus group participants reported how frequently they used ride share services (Table 3). Less than half of older adult participants (41.2%) used ride share at least one time per month or more often, in contrast to more than two thirds of younger adults (70.6%) who used ride share services at least one time per month or more often. During interviews, all but one older adult non-user said they were familiar with ride share services prior to the study, and the majority of those familiar named a for-profit ride share as an example (not shown). Other transportation used by older adults included driving a personal vehicle, rides from friends or family, public transportation, paratransit, taxi cab, personal paid driver, residential shuttle services, and walking or biking (not shown).

3.2. Barriers and facilitators to older adults' use of ride share services

This section presents findings from the qualitative analysis, organized by the levels in the conceptual framework – individual, interpersonal, organizational, community, and public policy/marketplace – and the cross-cutting information technology factor.

3.2.1. Individual level

Health Conditions and Special Needs.: Older adult participants reported they used ride share because they had health conditions and special needs that negatively impacted their ability to drive or use public transportation. Nearly 19% of older adult interview participants (n = 23) reported visual and hearing impairments (e.g. macular degeneration, low vision, low hearing); mobility impairments (e.g. use of a cane, walker, wheelchair); and chronic health conditions (e.g. cancer, arthritis, asthma, anxiety). Many of these participants did not drive, and some stated they had difficulty walking to a bus stop, climbing steps, fastening seat belts, stepping onto a high vehicle, and waiting for long periods of time. Older adult users reported that non-profit ride shares, in particular, met their transportation and mobility needs by providing door-to-door or door-through-door service (personal, hands-on assistance), and, in a few cases, accompanying them to appointments or errands. One person said:

> "[The drivers] make sure you're … secure with your seatbelt before you take off, and they go with me to where I need to go—to the doctor's office—and they always get out and come in and stay with me until my appointment is finished. They wait out in the waiting room until I'm finished and then we go back to the car and they bring me home." (Female, age 75, non-profit ride share user)

More than half of older adult ride share users who reported having a health condition or special need said they were blind or had a visual impairment (n = 13). A barrier to their use of ride share services was their inability to see and confirm whether the correct vehicle had arrived to pick them up. Participants with visual impairments said it helped when the driver got out of the car, confirmed their name and the rider's name verbally upon arrival,

and offered a helping arm. A few older adults with service animals described experiences with “service animal rejection” and “service animal denial,” wherein a for-profit ride share driver canceled the trip upon seeing a service animal.

> “I have a seeing-eye dog … There was one guy, he didn’t want the dog in his Mercedes. He drove off and left. Then he switched to another ride share service, and showed up again. The driver attitude about service animals is the challenge. It bothers me that it’s put on me, that I am the one causing the challenge. I’m not. I’m just doing what I always do.” (Male, age 72, for-profit ride share user).

Independence.: Older adults’ desire to remain independent motivated them to use ride share. Older adults who stopped driving described the negative emotional effects of driving cessation and their loss of independence.

> “I’ve actually been not driving for about a month now, so I feel, I feel I’ve really lost my independence and I am so dependent on being able to get a ride. I don’t get to go anywhere really … I don’t feel like being a prisoner and I do feel that way somewhat, but I don’t want to burden neighbors or friends. Also I’m not from this area and I am here alone now.” (Male, age 79, for-profit ride share user).

Older adults said ride share services increased their independence and ability to be spontaneous, rather than planning a ride in advance. Several participants noted they preferred to use ride share, rather than rely on friends or family, to maintain their independence.

Safety.: Safety concerns were a barrier to older adults’ use of ride share services. Older adult non-users were uncomfortable accepting a ride from a “stranger.” Some non-users pointed to fear of crime as a reason they did not use ride share, and relayed news stories about ride share driver impersonators and passengers who were victimized. Other concerns among non-users were related to the driver’s driving record, substance use, and distracted and drowsy driving.

> “It reminds me of when I was a kid—don’t go with a stranger. So, there’s a stranger pulling up in front of my house, with no identification, I don’t know. It’s a car. It doesn’t even look like anything special. Why should I go in it with that person?” (Female, age 80+, non-user).

Conversely, older adult users of two non-profit ride share services said they felt safe because they “trust” their driver, and that the drivers of these services are “really good people” and they “feel safe with them.” In some cases, users took rides with the same drivers over time and developed relationships with them. Among older adult users who participated in interviews, 91.8% (n = 45) agreed with the statement “ride share services are safe.” Notably, some older adult users of non-profit services said they would not feel comfortable or safe using a different service.

Affordability.: Older adult participants said affordability of ride share services affected use. Participants had differing opinions about ride share affordability compared to other options such as driving, taxis, and public transportation. Among older adult users who

participated in interviews, 77.6% (n = 38) agreed with the statement "ride share services are cost effective." In five of the older adult user focus groups, participants said they felt ride share services were less expensive than car ownership (because of insurance and maintenance costs) or paying for airport parking while traveling. However, others said they used ride share sparingly because of the high cost—for example, only to travel to a medical appointment. Several users of one non-profit service felt the service was costly because of the annual membership fee, but they were willing to "pay more for safety." Finally, several older adult non-users said they did not use ride share because of cost but might consider it if it were "free" or "affordable."

3.2.2. Interpersonal level—Two interpersonal-level factors affecting older adults' use of ride share services were social network and social interaction.

Social network.: Nearly one-third (n = 38) of older adults relied on friends or family to provide rides, yet many were motivated to use ride share because they did not want to "burden," "bother," "depend on," or "inconvenience" friends and family by requesting a ride. One interview participant said they used ride share services because *"I like to relieve the stress of my family members" (Female, age 72, for-profit ride share user).* Older adults noted challenges coordinating rides with friends and family – for example, adult children living nearby were busy with work and young children, traveled frequently, or were not flexible to provide a ride when needed. Older adults living alone or without family and friends nearby said they relied on other sources of transportation, including ride share, because there were no other options.

> "Some of us are on our own. I don't have a partner, a family friend, or someone who is close enough to provide the ride at the time it is needed." (Female, age 65+, non-profit ride share user).

Among older adult non-users, the majority did not use ride share because they preferred to drive. Many said they would call on family or friends if they were unable to drive or arrange other transportation.

Social interaction.: Older adults liked using ride share because it provided an opportunity for social interaction, camaraderie, and conversation with drivers. Users of non-profit services, in particular, had built friendships with their drivers, while others said they would like the opportunity to build friendships with their drivers.

> "All my drivers have become my friends. One even stops and stays at church with me. It's been a wonderful experience and I hope to be able to enjoy it in the days ahead." (Female, age 90, non-profit ride share user).

When asked about their "ideal driver," older adults commonly wanted a driver who was friendly, polite and courteous, helpful, and able to communicate clearly. Among older adult users who participated in interviews, 95.8% (n = 46) agreed with the statement "ride share services drivers are friendly."

3.2.3. Organizational level—Organizational-level factors affecting older adults' use included driver assistance, vehicle condition, service reliability, and operational capacity.

Driver assistance.: Older adults voiced a strong preference for driver assistance, which facilitated their use of ride share. Most older adult users who participated in interviews (89.8%, n = 44) agreed with the statement “ride share drivers are helpful,” and among users of non-profit services, 100% (n = 20) agreed. Older adult users of non-profit services said drivers provided door-through-door assistance (help exiting and entering the home and car); lifted luggage, groceries, and packages; opened car doors; secured seat belts; folded mobility aids, such as walkers; and helped at their destinations.

For many older adults, driver assistance was necessary due to health issues or special needs. For example, those with a visual impairment, heart condition, osteoarthritis, or use of a walker or wheelchair said they needed extra assistance. Participants discussed the need for “specialized transportation” for older adults with mobility challenges, including physical and visual impairments. Driver assistance also extended to providing transportation to and from healthcare appointments, including waiting during an appointment or surgery. Older adults noted that some drivers provide this level of assistance, particularly drivers of non-profit services, while others do not, although some will take special instructions if requested.

> “And there is some personalization with them [ride share] because they will write instructions for your drivers such as please look for me, I won’t be able to see your car, and possibly come inside if it’s raining.” (Female, age 76, for-profit ride share user).

Vehicle condition.: Older adult users and non-users discussed the importance of traveling in a vehicle in “good condition”—clean, comfortable, smoke-free, and well-maintained. Many older adult users said ride share service vehicles are exceptionally clean, which was a facilitator, and compared cleanliness to other transportation such as taxi cabs. It was also important for older adult users to know vehicles were well-maintained and had safety checks and inspections. Among non-users, uncertainty about vehicle safety was a barrier to use, and in one non-user focus group, this was discussed as a primary reason for not using ride share.

> “We’re very vulnerable. We’re sitting in a car with a stranger, we don’t know how good the car is. It could be a piece of junk. We’re on the highway and the car breaks down – now what?” (Female, age 93, non-user).

Reliability.: Service reliability was a key facilitator of older adults’ use of ride share services. Most participants discussed the importance of reliability—being prompt and dependable—and chose to use ride share because they were reliable. Reliability was particularly important for traveling to and from medical appointments. Nearly all older adult ride share users who participated in interviews agreed with the statement “ride share services are reliable” (87.8%, n = 43). During interviews, users discussed that non-profit services were more reliable than public transit, taxis, and paratransit. About one-third of older adult non-user interview participants were unsure about reliability, saying they “don’t know” if ride share services are reliable (33.3%, n = 6 of 18). One non-user did not use ride share because of uncertainty about reliability: “*[I have] not had any experience with them and I’m afraid they might flake out” (Female, age 68, non-user).*

Operational capacity.: Older adults, particularly for-profit users, liked that ride share services provided rides on-demand, often 24/7. Multiple participants noted barriers with paratransit and public transit systems, which required advanced scheduling, had limited days and times of service, and used fixed routes. However, some older adults noted these same barriers with ride share services. Some participants said non-profits, in particular, had limited volunteers to provide rides and therefore required advanced scheduling. Wish lists included transportation service in the evenings and on weekends.

3.2.4. Community level—At the community level, availability was the key factor affecting older adults' use of ride share services. Some older adults said non-profit ride share services provided transportation only within specific geographic areas – for example, within a county – which was a barrier to use. Some participants said some non-profits provided transportation to medical appointments, but not to stores, airports, or social events. Some participants were not aware of the ride share services available within their community and said it was difficult to learn about these services. Users of for-profit services noted that availability was a challenge in rural communities.

3.2.5. Information technology—Older adult users preferred scheduling ride share services using a telephone. They wanted to speak with someone to provide instructions, ask questions, or report issues. Older adult users liked non-profits because they can speak with a person to schedule a ride and ask questions. With for-profits, many noted technology barriers, indicating they did not own or were not comfortable using a smartphone or device to schedule a ride. One participant said ride share apps need to be more accessible for people with visual impairments.

> "There's no telephone number to speak directly to [the service]. Everything is online or on the computer, and if you aren't savvy with a computer or iPhone, you are out of luck." (Female, age 72, for-profit ride share user).

To address technology barriers, some older adult users of for-profit services relied on another person, such as a partner, child, or grandchild, to schedule their rides using a smartphone. Older adults also used a concierge service that schedules rides with for-profit ride share services for an additional fee. Among older adult non-users, technology was not a key barrier; many participants noted they would use a smartphone to schedule a ride if they were to use a ride share service.

3.2.6. Public policy/marketplace level—A few older adult users and non-users noted factors related to public policy and the marketplace that impacted ride share use. First, participants discussed the importance of for-profit drivers being "fairly" and "properly" compensated. For some, concerns about driver compensation was a barrier to use of for-profit services. Second, older adults said a lack of regulation of ride share services was a barrier to use, raising concerns about screening and monitoring drivers and their vehicles. Older adults also compared ride share services to traditional taxi companies, noting they disliked that the former were not as well-regulated as the latter. Finally, several said they liked that taxi drivers were "governed by" or "beholden to" a company, compared to ride share drivers who are independent contractors.

3.3. Comparison of barriers and facilitators between older and younger adults

Findings among younger adults (aged 18 to 64, n = 45) were consistent with older adults across most levels in the conceptual framework – individual, interpersonal, organizational, community, and public policy and the marketplace. Notably, younger adults under the age of 65 who did not drive, or who reported health issues or special needs, described similar experiences to older adults and the desire for independence. They also described ride share services as filling a transportation gap in their community. In some areas, for example, public transit follows fixed routes and may not service certain geographic areas or destinations. In these instances, younger adults said they used ride share because other services were not available.

The key difference was that the youngest adults (age <40, n = 21), described information technology as a facilitator to use, instead of a barrier. Younger adults almost exclusively used for-profit ride share services and were comfortable using the smartphone app to schedule rides. They liked and used the in-app features, including the driver's picture, license plate, vehicle make and model, and rating, and having the option to choose a large vehicle when traveling with friends or when carrying packages. They also used the in-app safety features, such as sharing the trip status with a friend during a ride.

> "Your friend can see exactly where you are. Click the link and you're brought to a GPS feature, just like the one you're looking at en route in the back of the [vehicle], so [the friend] knows exactly where you are so … you know, so if you go missing, they know where you went missing. I use that every single time." (Male, age 33, for-profit ride share user).

Affordability and convenience were also facilitators among younger adults. This was similar to older adults, but younger adults used the app to calculate costs in advance, which helped them budget and avoid surge pricing (dynamic pricing that increases based on demand). Surge pricing was a barrier among younger adults, while the app cost estimator was a facilitator. Younger adults would also use other transportation options, or take multi-modal trips, based on cost and convenience, which was not mentioned by older adults: *"Usually after work I walk a few blocks down just so my Uber or Lyft rides are cheaper." (Male, age 37, for-profit ride share user*).

Another difference was the youngest adults (age 25 to 39) did not discuss social interaction as a facilitator of their use of ride share services, which was a theme among older adult users. In one focus group with adults age 25 to 39, five of six respondents shared that they would like to indicate their desired level of conversation with the driver either through the smartphone app or a partition between the rider and the driver.

4. Discussion

This study sought to understand older adults' attitudes and beliefs toward using ride share services and describes factors affecting use at the individual, interpersonal, organizational, community, and public policy/marketplace levels as well as factors affecting use related to technology (see Fig. 1). The most important facilitator of older adults' use of ride share was the desire to stay independent. Driving cessation is a life transition associated with a

loss of independence and control (Sanford et al., 2019). The desire for autonomy—"being able to manage on your own, retaining dignity and not feeling like a burden"—is a core tenant of quality of life among older adults (van Leeuwen et al., 2019). Non-profit ride share services, in particular, supported older adults' mobility and independence. Cost was an important consideration, consistent with research from Wolfe et al. (2020) that income is a transportation barrier, particularly among people living below the poverty threshold. Yet, some older adults were willing to pay more to preserve mobility—using a concierge service for scheduling or non-profit services for driver assistance, for example. Further, some older adults—and younger adults who did not drive or had health conditions or special needs—reported that their desire to maintain independence and mobility outweighed other perceived barriers, even safety concerns such as "riding with a stranger."

During the focus groups and interviews, many older adults described experiences with public transportation, paratransit, taxis, and rides from family and friends. Many older adults were unable to use public transportation for health and mobility reasons, consistent with research that transportation barriers negatively impact chronic disease self-management and "transportation management is in and of itself a health self-management component" (Ruggiano et al., 2017). Further, findings that family and friends could not meet all the transportation needs of older adults is consistent with prior research (Dickerson et al., 2019).

This study revealed different barriers and facilitators between for-profit and non-profit ride share services. Older adults who used for-profits liked to schedule on-demand; however, those with health needs described a lack of driver assistance (door-to-door or door-through-door service, waiting during an appointment) as a barrier to use. Barriers to using non-profits included availability, such as advance scheduling requirements, limited hours of operation, service restrictions, and restrictions by ride type, i.e., rides to healthcare appointments only. These limitations are a function of some non-profit service business models that rely on volunteers (Ainsworth, 2020). Among non-profits, human assistance is as much a part of the service as the ride itself, and offering human contact when scheduling and driver assistance were both facilitators of use among older adults.

While older adults preferred scheduling using the telephone, younger adults said smartphones and information technology facilitated their ride share use. Many older adults did not have smartphones, which was a barrier to ride share use (Vivoda et al., 2018). Another key difference was related to social interaction. Younger adults would like to use the smartphone app to customize their experience, such as level of conversation with the driver, whereas older adults liked the opportunity for social interaction. While technology supports on-demand scheduling with for-profit services—which older adults liked—this did not supersede the technology barriers most reported. For-profits are working to address technology barriers by offering options for a person to schedule a ride on behalf of an older adult, and also by partnering with healthcare providers, healthcare insurers, and senior centers to provide transportation to healthcare appointments (Uber, 2020; Wolfe and McDonald, 2020). Technology barriers, driver assistance, and desire for social interaction are three important considerations as transportation planners take into account older adults' needs and preferences related to expanded use of fully automated (self-driving) vehicles, which do not require human input to perform driving functions (NHTSA, 2020).

These findings underscore the need to support older adults, including current drivers, in planning for their transportation futures. Vivoda et al. (2018) suggested that providing older adults with more information about different modes of transportation, such as ride sharing, may help them feel more comfortable with their transportation options and potentially increase satisfaction with mobility. Federal efforts to support older adults with transportation information and resources include the Centers for Disease Control and Prevention's MyMobilityPlan, a planning tool with action steps to help maintain mobility and independence as people age. It includes resources such as *Rides in Sight*, a searchable online database of all senior transportation services in the United States (CDC, 2020; Rides in Sight, 2020). The Administration on Aging's Eldercare Locator is another resource that connects older adults to services, including transportation (Eldercare Locator, 2020).

Finally, older adults discussed the fair treatment of drivers and the use of independent contractors for labor (a business model practice with policy and marketplace implications for the availability of for-profit ride share services). The landscape of ride share services is changing rapidly. New York City adopted a minimum wage for ride share service drivers (Matousek, 2018), and California passed a law classifying "app-based workers," including ride share drivers, as employees rather than independent contractors (Conger and Scheiber, 2019; Allyn, 2020). Such changes affect driver compensation and potentially the costs and availability of ride share. Older adults also experienced the market impact of insufficient volunteer drivers, a labor shortage that limits the availability and supply of non-profit ride share services, and which could be addressed by state and federal policymakers.

The following limitations should be considered when interpreting findings. First, study participants were selected through convenience sampling in partnership with ride share organizations and a recruitment firm. We recruited a larger number of older adults than younger adults, since our study aim was to better understand older adults' attitudes and beliefs towards ride share. Future research could use probability sampling and larger sample sizes of older and younger adults, and users and non-users, to test the generalizability of findings. Second, we recruited individuals with any prior use of ride share services, as we were interested in understanding the reasons users had ever used a ride share service. Future research could explore whether older adults' attitudes and beliefs differ based on the frequency of ride share use (i.e., occasional or one-time users compared to regular users). Third, a subset of the 917 non-profit services and 11 for-profit services serving older adults in the United States (Freund et al., 2019) are represented in our sample. Findings may not represent the experiences of users of all ride share services. Fourth, study participants lacked diversity in terms of race and ethnicity, with a majority of participants identifying as White and not Hispanic or Latino. While participants' race and ethnicity is reflective of ridership among our non-profit recruitment partners, future studies should explore barriers and facilitators using a more racially and ethnically diverse sample of older adults. Finally, study samples were drawn from metropolitan areas; further research should explore the experiences of older adults living in rural areas.

5. Conclusion

Ride share services in the United States have the potential to support older adults' transportation, mobility, independence, and social needs. Given that transportation is a social determinant of health, ride share services also have the potential to affect healthcare access among older adults (Social Determinants of Health, 2017). Non-profit ride share services offer personal assistance, preferred by many older adults, and show promise as an alternate form of transportation for older adults who no longer drive. While technology remains a key barrier, there are opportunities to improve ride share accessibility for older adults. These insights into the barriers and facilitators of older adults' use of ride share services have important implications for how these services may be tailored to meet the needs of adults as they age.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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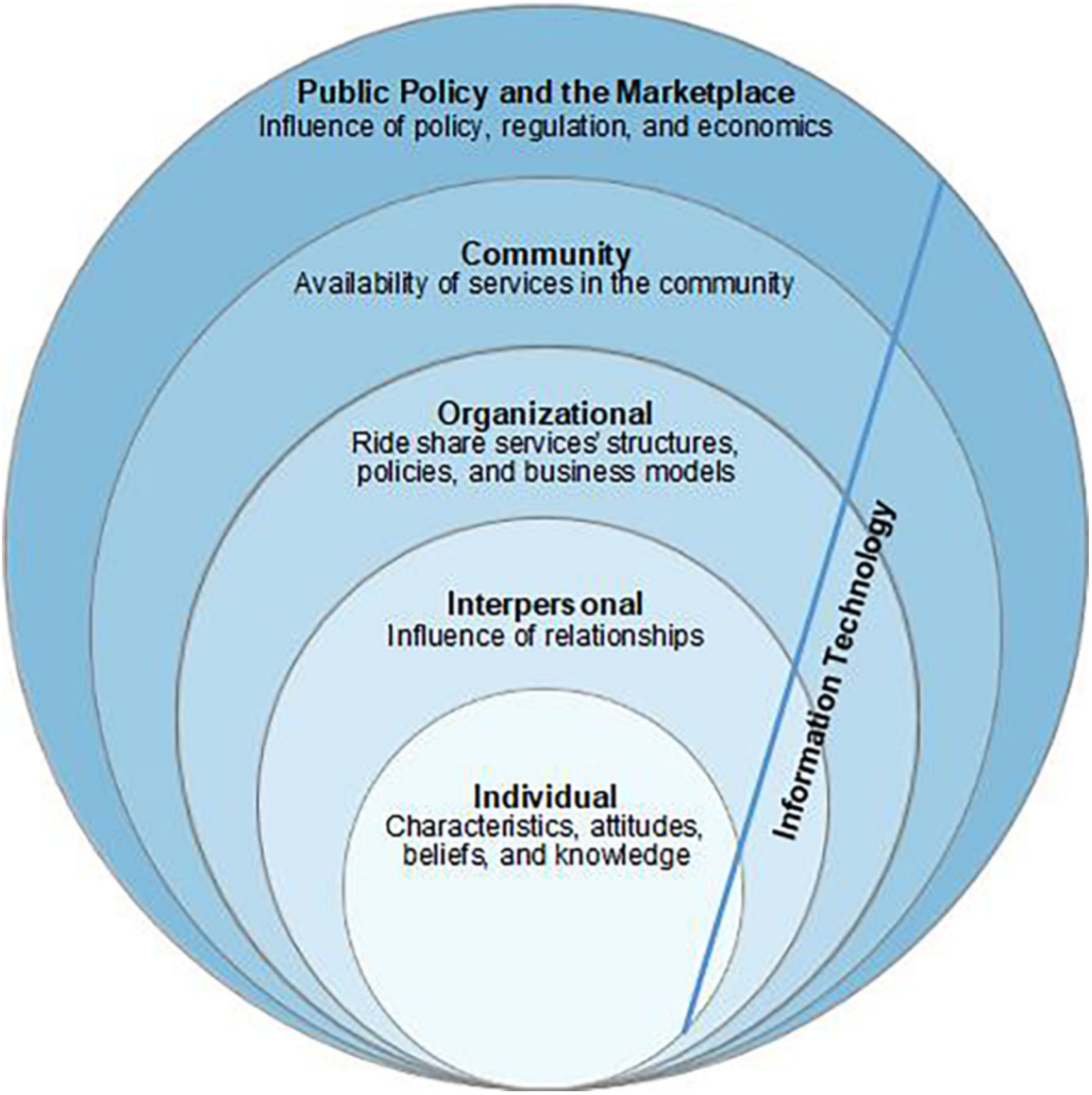

Fig. 1. Socio-Ecological Model for Older Adults' Use of Ride Share Services.

The framework describes the factors affecting older adults' use of ride share services across five levels.

Table 1

Data collection topics, Barriers and Facilitators of Older Adults' Use of Ride Share Services Study, 2019

• Reasons for traveling outside the home and types of transportation used
• Factors affecting decision to use different forms of transportation
• Familiarity with ride share services
• Use of ride share services, and among users, types of ride share services used
• Factors affecting decision to use or not use ride share services
• Method for scheduling and paying for rides, among users
• Characteristics of ride share services that users and non-users like and dislike
• Experiences with ride share services
• Special needs affecting use of ride share services
• Suggested improvements to ride share services

Table 2

Characteristics of interview and focus group participants, Barriers and Facilitators of Older Adults' Use of Ride Share Services Study, 2019

	Older Adults (N = 124)		Younger Adults[a] (N = 45)		Total (N = 169)	
Sex	n	%	n	%	n	%
Female	87	70.2%	29	64.4%	116	68.6%
Male	37	29.8%	16	35.6%	53	31.4%
Age group						
Age <50[b]	–	–	22	48.9%	22	13.0%
Age 50–64	–	–	23	51.1%	23	13.6%
Age 65+	124	100.0%	–		124	73.4%
Geographic location						
Large metro area (1+ million residents)[c]	78	63.9%	25	55.6%	103	61.7%
Small metro area (<1 million residents)	44	36.1%	20	44.4%	64	38.3%
Race						
White	116	97.5%	36	80.0%	152	92.7%
Black	2	1.7%	6	13.3%	8	4.9%
Asian	1	0.8%	1	2.2%	2	1.2%
Other	0	0.0%	2	4.4%	2	1.2%
Hispanic or Latino						
No	121	98.4%	42	93.3%	163	97.0%
Yes	2	1.6%	3	6.7%	5	3.0%
Use of ride share services						
Yes (User)	95	76.6%	35	77.8%	130	76.9%
For-profit	*41*	*43.6%*	*32*	*91.4%*	*73*	*56.6%*
Non-profit	*38*	*40.4%*	*1*	*2.9%*	*39*	*30.2%*
Both	*15*	*16.0%*	*2*	*5.7%*	*17*	*13.2%*
No (Non-user)	29	23.4%	10	22.2%	39	23.1%
Driver's license						
Yes	88	72.1%	32	71.1%	120	71.9%
No	34	27.9%	13	28.9%	47	28.1%

[a] Younger adults were included as a comparison group.

[b] Includes one participant less than age 24, 20 participants age 25–39, and one participant age 40–49.

[c] Includes two participants from non-metropolitan communities.

Table 3

Frequency of use of ride share services among focus group participants who had ever used ride share services, Barriers and Facilitators of Older Adults' Use of Ride Share Services Study, 2019

	Older Adults (N = 46)		Younger Adults[a] (N = 17)		Total (N = 63)	
	n	%	n	%	n	%
Once per day or nearly daily	2	4.3%	2	11.8%	4	5.5%
At least once per week	10	21.7%	4	23.5%	14	19.2%
At least once per month	7	15.2%	6	35.3%	13	17.8%
Once every few months	17	37.0%	3	17.6%	20	27.4%
Once in the last year	3	6.5%	1	5.9%	4	5.5%
Once or twice ever	3	6.5%	1	5.9%	4	5.5%
Other[b]	4	8.7%	0	0.0%	4	5.5%

[a] Younger adults were included as a comparison group.

[b] Two older adult participants provided an exact number of times they had ever used ride share services; one older adult participant said "as needed; " and a fourth older adult participant said "never" though they were a ride share user.