



## Transportation alternative preferences of the aging population



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### ABSTRACT

The population of older adults in the US is growing extremely rapidly, and is expected to grow at an even faster rate in the near future. Consequently, there is an increasing need to provide transportation services for non-driving older adults. As older adults' transportation needs are different from the needs of other age groups, the scholarly evaluation of viable transportation options is crucial. A nationwide survey was conducted to examine older adults' perceptions and preferences for five transportation alternatives, including: *volunteer drivers*, *shuttle buses*, *senior-center-based shuttle buses*, *prepaid taxi services*, and *specialty coordinated bus/rail service to distant medical centers*. Results found that the *volunteer drivers* alternative was the most preferred by both driving and non-driving older adults. This study also investigated the effects of *location* (rural, micropolitan, or metropolitan), *driving status* (driving and non-driving), *nearness to the most frequently visited place* (grocery stores), and *familiarity with elderly transportation options* on transportation alternative selection. This study provides vital information to transportation policy makers who design transportation systems for older adults in their communities.

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### 1. Introduction

The population of the United States is aging. The number of US citizens aged 65 years or older was 41.51 million in 2012 (13.4% of the total population) (U.S. Census Bureau, 2013a) compared to 34.99 million (12.4% of the total population) in 2000 (U.S. Census Bureau, 2001). The increase in population in this age group has also been expanding at an increasing rate since 1990 (U.S. Census Bureau, 2011) and it is expected to reach its highest point between 2010 and 2030, when the baby boomers will have all passed age 65 (U.S. Census Bureau, 2010). According to the 2011 National Household Travel Survey, adults in the United States aged 66–70 make an average of 3.8 trips per day, whereas adults aged 71 and older make an average of 3.1 trips per day (Sivak and Schoettle, 2011), demonstrating a high level of activity among the elderly population.

The majority of older adults in the United States are active drivers with their own vehicles. There has been a marked increase in the number of elderly licensed drivers in the United States. According to data collected by Sivak and Schoettle (2011), 78.4% of adults aged 70 and older are licensed drivers, compared to only 55.0% in 1983. In the 65–69 age group, the percentage of licensed drivers is 94.0%, compared to 79.2% in 1983 (Sivak and Schoettle, 2011).

Older Americans use personal vehicles for 89% of their travel (Collia et al., 2003). Compared to Americans under the age of 65, older adults take fewer trips, travel shorter distances, and have shorter travel times (Collia et al., 2003).

Elderly drivers are also more likely to self-restrict their own driving by limiting their driving under perceived hazardous conditions (e.g. poor weather, dark) (Naumann et al., 2011), and tend to travel shorter distances compared to younger adults (Morency et al., 2011). They are also least likely to use public transit (e.g. bus, rail), walking, and bicycling modes to travel (Commins and Nolan, 2011; van den Berg et al., 2011).

Among older adults who do not drive, the most frequently used mode of transportation is obtaining rides from others (Kostyniuk and Shope, 2003). Older adults who are dependent on rides from others tend to be much less mobile than those who are not dependent on others (Metz, 2000). As a result, quality of life (Banister and Bowling, 2004) and social interactions (Church et al., 2000) tend to be lower among non-driving older adults. With the growing number of older adults who will need to stop driving in the near future, there is an increased need to provide alternative transportation options for the aging population.

The objective of this current study is to evaluate the perceptions and preferences of various transportation alternatives by the elderly population. The results are important as municipalities continue to develop transportation options for all of their residents.

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## 2. Literature review

A variety of trip, personal, and location factors influence a person's selection of alternative transportation to driving. Characteristics of a person's neighborhood, trip, household, and the person themselves all influence transportation alternative selection (Kim and Ulfarsson, 2007; Scheiner and Holz-Rau, 2007). For the aging population, significant factors include household (e.g. number of family members), age (e.g. choices of young elderly vs old elderly), and ethnicity (Alsnih and Hensher, 2003; Rosenbloom and Waldorf, 2001). With regards to health, medical conditions often limit the travel of older adults, thus changing their choice (Collia et al., 2003). Older adults with higher incomes are more likely to drive or carpool than those with lower incomes (Kim and Ulfarsson, 2007). With regards to gender, women are exposed to fewer benefits (psychological, exercise, and community-helping benefits) of transport mobility compared to men (Spinney et al., 2009). Women tend to use public transportation more than men (Siren and Haustein, 2013), with older women showing a preference for bus travel (Collia et al., 2003).

The influencing factors which were emphasized in the literature include location, availability and accessibility of transportation, and distinct options for the elderly. Location factors have a significant influence on travel behavior and transportation mode selection. Some researchers have claimed that housing location can affect travel behavior (Alsnih and Hensher, 2003; Scheiner and Holz-Rau, 2007). Pucher and Renne (2005) found that rural elderly residents are more mobile than their urban counterparts, whereas, Kim (2011) reported that older adults living in suburban communities have greater transportation deficiency. Rosenbloom and Waldorf (2001) found that residential location (urban, suburban, second city, and town) is the most important variable in explaining differences in mode choice. Vehicle ownership is also impacted by location, with 97% of rural and 92% of urban households owning a car, and rural residents making 91% of trips by car compared to 86% of urban residents (Pucher and Renne, 2005).

The availability and accessibility of transportation options also impacts transportation alternative selection for older adults. When considering the use of various alternatives in the United States, driving a personal vehicle and walking are the two most common modes of transportation. All other alternatives make up only 2% of daily travel (Collia et al., 2003). For the elderly, mobility difficulties often limit the number of transportation modes that are feasible for use. Elderly drivers in Scotland were surveyed regarding their transportation use. Of adults aged 70 and above, 38% of male drivers and 50% of female drivers reported mobility difficulties (Li et al., 2012). A study conducted in Canada showed that, for public transit, reliability, convenience, and ride comfort are the most important factors for passengers aged 65 and older (Habib et al., 2011).

Research shows that many older adults are not aware of the options available (Kostyniuk and Shope, 2003). If public transit options are accessible, older adults are more likely to utilize them (Schmöcker et al., 2008). Transit use increases in the more elderly group (75 years and older) compared to the less elderly group (65–75 years), possibly due to the loss of ability to drive (Alsnih and Hensher, 2003). Healthy older adults are more likely to use transit compared to those with health limitations (Schmöcker et al., 2008). Older adults are more likely to use transit that is close to their residence (Kim and Ulfarsson, 2007).

Additional transit options exist for the elderly and disabled. These options are distinct from general public transit, and are offered only to a subset of the population. It is estimated that nearly 200,000 para-transit trips are made annually (United States Government Accountability Office, 2012). With regards to

para-transit options, age and distance have a significant effect on their use (Franklin and Niemeier, 2007). Among older adults with medical conditions that limit travel, only 12% use special transportation services, while the others rely on more traditional transportation options (Collia et al., 2003).

Based on the review of literature, it is apparent that the design of elderly transport systems has not yet been fully explored. While the influencing factors of older adults' travel behavior and transportation mode choice have been studied by several researchers, there is not enough work on the appropriate transportation options based on varying location types and demographics. This study intended to identify feasible elderly transportation alternatives and provide design suggestions for such systems. Additionally, this study investigated the effect of *location, driving status, nearness to frequently visited places* and *familiarity of elderly transportation options* on older adults' preference of transportation alternatives. The selection of these factors was not entirely based on a review of the literature, rather these factors were selected to provide specific design insights of elderly transportation systems.

## 3. Materials and methods

### 3.1. Survey

A telephone survey was designed to collect data on senior citizens' transportation needs: their activity participation away from home, timing of those activities and how they would meet those needs if they needed to restrict their driving. Phone numbers were purchased from a specialized vendor. The study sample was based on the number of older adults living in each state as well as the concentration of older adults nation-wide. Therefore, states like Florida had the most phone numbers. The research team also over-sampled non-metropolitan numbers as the team was more interested in responses from rural populations.

The survey consisted of 77 questions from five different categories: demographics, driving and riding behavior, trip planning, independence, and transportation alternatives. Table 1 presents a summary of the survey contents. Except for a few demographic questions, the survey collected participant responses on Likert

**Table 1**  
Summary of the survey questions.

Question category	Content	Number of questions
Demographics	Gender, age, marital status, race, employment status, education, income, offspring, physical health, difficulty doing heavy work, nearness to frequently visited places (grocery store, hospital, church, doctor's office)	22
Driving and riding behavior	Possession of driver's license and/or automobile, driving frequency, driving confidence, driving need, walking behavior	13
Trip planning	Errand planning, use of public transportation, familiarity with transportation options	6
Independence	Comfort with asking friends and family for transportation, importance of being independent, giving up driving, paying for transportation rather than asking friends and family	11
Transportation alternatives	Five questions for each of the five alternatives: use of transportation alternatives if the participant currently drives; and if not currently driving, practicality of the alternative, sense of independence, acceptability of service cost	25

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