Changes Over Time in Community Mobility of Elders with Disabilities

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SUMMARY. Many elders have difficulty getting to places outside the home and face reduced community mobility. Using a retrospective self-report of places visited by 40 elders with disabilities, this study explored two questions: (1) Does community mobility change over time (6 and 15 years prior to interview)? (2) What factors predict changes in community mobility over time? Decline in community mobility appeared to be related to driving cessation. Occupational therapists can provide information on vehicle modifications and adaptations to assist elders in driving longer and safer. They can also provide information on alternate forms of transportation within the community.

KEYWORDS. Community mobility, aging, disability

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INTRODUCTION

Elders are living longer and healthier lives sustained by modern medicine, technology, and more supportive environments. As we age, however, we are more likely to experience an increase in the number of chronic conditions that impact functional performance. Almost 6.1 million older Americans have difficulty traveling outside the home (Russell, 2001). Traveling outside the home is closely related to driving, an important but complex activity. The focus of research in this area has been primarily on older drivers, rather than the larger concept of community mobility, which considers getting to places outside the home by any means of transportation. The present study explored differences in community mobility of elders, comparing distances traveled at the time of the interview, 6, and 15 years prior.

REVIEW OF THE LITERATURE

This literature review addresses: (1) the relationship of functional status and health changes to elders' community mobility; (2) research on drivers, non-drivers, and characteristics associated with taking a "trip"; (3) the implications of driving cessation on community mobility, available transportation, access to services, and depression; and (4) research on public transportation use.

Changes in Functional Status and Community Mobility. Many people who reach older adulthood experience decline in functional abilities (Wallace & Hirst, 1996). Specifically, instrumental activities of daily living (IADLs), which include use of a variety of transportation modes, may become more difficult as a result of age-related changes in their health or functional ability (Whittle & Goldberg, 1996). The amount of travel, social, and recreational activities tends to decrease as one ages due to declines in health. This trend often becomes accelerated for older adults as they reach their late 70s (Lefrancois, Leclerc, & Poulin, 1998).

Age-related cognitive changes can affect participation of elders in independent transportation, both driving and use of public transportation. A Canadian study of 5,874 community-dwelling persons over age 65 found that loss of functional abilities occurred in a hierarchical fashion, where IADLs were affected at higher scores than ADLs on the Modified Mini Mental State Examination (Njegovan, Man-Son-Hing, Mitchell, & Molnar, 2001). The first IADL task typically lost was homemaking, followed by shopping, and then the ability to use transportation.

Two other research studies suggest that while elders are continuing to drive, health changes, to some extent, affect their independence in driving. The American Association of Retired Persons conducted the Community Transportation Survey of 710 Americans age 75 and older. Sixty-one percent of the respondents ceased driving due to declines in health status, 63 percent reported they avoided night driving, and 51 percent reported avoiding rush hour traffic (Straight, 1997). The New Haven Established Populations for Epidemiologic Studies of the Elderly (EPESE) studied 1,331 elders and found a decrease in mileage driven over the six years of the study as age and disability increased (Marottoli, Ostfeld, Merrill, Perlman, Foley, & Cooney, 1993). These results suggest that with changes in functional and health status elders either discontinue driving or reduce the distance they drive.

Relationship of Driving to Community Mobility. Elders who report independence in driving appear to have greater community mobility. The Community Transportation Survey found that 73 percent of elders reported that they still drove: 89 percent of males and 64 percent of females. Those who drove reported taking three times as many trips as non-drivers (Straight, 1997). The 1995 National Personal Travel Survey found that 84 percent of those age 65 to 74 years who drove left their home for a trip (defined as going from one place to another in a vehicle, walking, or biking) on a typical day, while only 55 percent of non-drivers left their home (Evans, 1999). For the 75 and older group, 75 percent of drivers versus 44 percent of non-drivers left their home on a typical day (Evans, 1999).

Impact of Driving Cessation on Community Mobility. The risk of fatal motor vehicle crashes increases for older adults (*Fatality Facts*, 2001). Many cease driving to avoid possible vehicular accidents. The EPESE found that driving cessation is associated with increased age, lower income levels, neurological disease, cataracts, decreased physical activity and functional disability (Marottoli et al., 1993). Women are two times as likely as men to stop driving (Campbell, Bush, & Hale, 1993).

Elders may experience a decrease in the transportation available to them depending on their age and their locale. In an examination of the Public Use Microdata sample of the 1980 census of Population and Housing, Cutler and Coward (1992) found a decrease in available transportation at home as the age of the household members increased. This study, however, provided information on the availability of an automobile for members of the home, and did not distinguish if the elderly member was able to use the vehicle.

If alternatives to personal transportation are not available where they are living, elders may be forced to move to a location where alternative transportation is available. In a survey of 56 elders age 66 to 96, many of those subjects, confronted with the decision to stop driving, had moved to retirement communities to take advantage of more readily available transportation. Thirty percent depended on their friends, 26 percent depended on their relatives, and 22 percent of participants reported they used the retirement community's van (Persson, 1993).

Many elders rely on family or friends for transportation. Eighty-six percent of non-drivers in the Community Transportation Survey reported they did not use public transportation, while 33 percent preferred to be transported by family or friends. Two-thirds of non-drivers reported being transported by family or friends (Straight, 1997).

Without transportation, the older adult's access to services becomes limited. A qualitative study on the attitudes of eighty-three rural and urban elders towards community-based services documented elders' difficulty with transportation as a barrier to accessing community-based services, such as senior centers (Krout, 1986; Schoenberg & Coward, 1998). For those with limited transportation, specifically elders who are no longer able to drive, the distance to health care providers presents a problem in accessing necessary medical care (Nemet & Bailey, 2000; Roberto, Richter, Bottenberg, & MacCormack, 1992).

Driving cessation was found to be associated with increases in depressive symptoms in a longitudinal study of 1,316 elders living in urban communities (Marottoli, Mendes de Leon, Glass, Williams, Cooney, Berkman, & Tinetti, 1997). Badger (1998) conducted a study with 80 white English-speaking elders on service use and depression. The group with the most severe depression (as rated by the Center for Epidemiological Studies-Depression Scale, CES-D) had fewer round trips per week than groups with mild or no depression. Although eighty-three percent provided their own transportation, there were more participants in the groups with mild or severe depression who relied on family, friends, or public transportation (Badger, 1998). Badger (1998) concluded that available transportation may preclude the development of depression and is important in allowing the older adult to live independently in the community.

Public Transportation. Johnson (1999) in her study of urban-dwelling older adults found they regretted forfeiting their driver's license because of the lack of acceptable public transportation. Subjects described public transportation as unreliable. Additionally, they expressed concerns over the cost of, and their safety in using, taxi services.

From NPTS data, 39 percent of non-driving elders age 75 years and older went out on a typical day when public transportation was unavailable. Forty-seven percent went out when public transportation was available, whether they used the service or not (Evans, 1999). When public transportation was available, the elders were more likely to use it if they lived in dense, urban, white populations. Additionally, higher income and higher educational level were associated with more frequent transit use (Evans, 1999).

Patterson (1985) revealed four areas of concern among 225 elderly transit users in Philadelphia: problems with schedules, with the bus, with crime, and with bus stops. The lack of frequency of service and dependability of the bus schedule were described as concerns by three-quarters of the respondents. Crowding on the bus and dirty windows caused 68 percent of the elders to feel helpless when using the bus system. Fear of crime while waiting at the bus stop was voiced by 77 percent of the participants. Two-thirds of the respondents were afraid while walking to and from the bus stop and while riding the bus. Problems with the bus stop (no shelter, nor benches) created problems for over 70 percent of respondents (Patterson, 1985).

Summary. Generally with advancing age, elders go through changes in functional and cognitive status that can impact independence in driving, which can negatively impact community mobility. The present study sought to quantify the differences in community mobility for elders over time, differences in the number of places visited over time, and the reasons for differences in community mobility.

METHODS

This study examined two major research questions: (1) Does the community mobility of elders change over fifteen years? Community mobility is defined as the number of miles traveled from home in a typical week; (2) Do functional status, health status, and independence in driving relate to changes in community mobility?

Sample. Study participants were selected from the Rehabilitation Engineering Research Center on Aging Consumer Assessments Study (CAS) sample pool. The CAS was a longitudinal study of 1,103 community-dwelling frail elders in Western New York and Northern Florida, supported by a grant from the National Institute on Disability Rehabilitation and Research (Mann, Hurren, Tomita, & Charvat, 1997). The investigator screened CAS participants from Northern Florida ac-

cording to the inclusion criteria for this study: (1) age 60 years and older; (2) Mini Mental State Exam score of twenty-four or higher. The Mini Mental State Exam score was obtained from the CAS interview conducted within one year of the present study. Braekus, Laake, and Engedal (1992) suggested that a score of 24 is the appropriate cut-off point for identifying persons as cognitively impaired or not cognitively impaired. The first five subjects were enrolled as a pilot study, to test the interview questions and the format. Following the pilot study, the interview questions were modified slightly. Data from the pilot subjects were included in the analysis with the other thirty-five subjects. Forty subjects met the inclusion criteria and were willing to participate in the study.

The participants were primarily women (82.5%), Caucasian (92.5%), and lived alone (62.5%). If the person was not living alone, the majority lived with their spouse. Table 1 summarizes demographic and driving-related characteristics of study participants.

Instrument. The interview questions were adapted from the 1995 National Personal Travel Survey (NPTS), an initiative of the National Highway Transportation and Safety Association (NHTSA) (*National Household Travel Survey Household Interview*, 2001). Additional questions were developed based on the literature and the research questions for this study. The areas covered by the additional questions included places traveled in a typical week, distance to the places traveled, and frequency of visits; mode of transportation to destination; public transportation use.

Procedure. Study participants were initially contacted by telephone to schedule an interview. The investigator, an occupational therapist, went to the person's home and conducted the interview, which lasted about one hour. The interview was conducted in a semi-structured format with closed and open-ended questions. The questions addressed the elders' community mobility patterns, specifically the places they visited in a typical week fifteen years ago, six years ago, and "now" (the day of the interview), and the distance to each of the places visited. The distances to each place visited were recorded in average miles per week, and frequency of visits. The total number of miles and total number of places visited was calculated for each person's travel in a one-week period at the time of the interview, six years ago, and fifteen years ago. Other areas considered during the interview were factors that might contribute to their ability to leave home and move about the community, and the use of personal and/or public transportation. Personal transportation included driving one's own vehicle, being transported by family

TABLE 1. Demographic Variables for Study Participants (N = 40)

	Mean	SD
Age, years	78.25	7.00
	N (%)	
Gender		
Male	7 (17.5%)	
Female	33 (82.5%)	
Race		
Black	2 (5.0%)	
White	37 (92.5%)	
Education		
Less than high school	7 (17.5%)	
High school	4 (10.0%)	
Some college	13 (32.5%)	
Bachelor's degree	4 (10%)	
Some professional school or degree	10 (25%)	
Living Status		
Live alone	25 (62.5%)	
Live with someone	15 (37.5%)	
Health Status (self-reported)		
Impairment limiting mobility	27 (67.5%)	
No impairment	13 (32.5%)	
Driving Status		
Currently driving	20 (50%)	
Not currently driving	20 (50%)	
Public Transportation Use		
Current use	13 (32.5%)	
Not currently using	26 (65%)	

SD = standard deviation

or friends in a private vehicle, or use of a personal motorized device, such as a power wheelchair or a scooter. Public transportation included fixed-route service bus, paratransit vehicle (car, van, or wheelchair van), resident community transportation services, taxi, train, or airplane. The modes of transportation that each participant used to travel to his or her destination were also recorded, and grouped: personal vehicle (participant driving), personal vehicle (other driving), large public bus,

paratransit vehicle, wheelchair van, taxi, train, airplane, walking, organized community transportation, and personal motorized devices.

The open-ended responses of participants were coded into groups according to common responses. The types of places that individuals attended were grouped by IADLs (shopping, banking, hair appointments, errands), senior supports and programs, medical and health services (doctor, dentist, and therapy appointments, hospital stays), visiting (friends, relatives, clubs, meetings, going to restaurants, and transporting family members), trips (local and far), religious ceremony/services, leisure and exercise (concerts, plays, movies, library, art galleries, sports, spectator activities, volunteering, educational activities), and work.

RESULTS

Distance Traveled. Comparing the present with 6 years and 15 years prior, the mean total miles traveled in a typical week was compared using paired t-tests at alpha level .05. The mean distance traveled now was 50.14 (SD = 61.39) miles compared to 87.04 (SD = 98.89) miles six years ago ($t = -3.56$, $p \leq .001$). Fifteen years ago, the mean number of miles traveled in a typical week was 155.50 (SD = 211.75) compared with current miles traveled ($t = -3.60$, $p \leq .001$). The mean number of miles fifteen years ago versus six years ago was also significantly higher ($t = -2.43$, $p \leq .020$). Results for distance traveled are summarized in Table 2.

Number of Places Visited. The change in mean number of places visited in a typical week was analyzed using paired t-tests with the following pairs: present and six years ago ($t = .36$, $p \leq .72$), present and fifteen years ago ($t = .68$, $p \leq .50$), and six and fifteen years ago ($t = .48$, $p \leq .63$). The results showed no significant differences at the alpha level .05 in the number of places each person visited over time. The mean number of

TABLE 2. Mean Miles Traveled, Mean Places Visited Over Time

	At Interview	6 years prior	15 years prior
Miles Traveled (all)	50.14 (61.39)	87.04 (98.99)	155.50 (211.75)
Still driving	78.30 (75.10)	122.74 (118.78)	197.01 (237.10)
No longer driving	21.98 (20.62)		
Number of Places Visited	5.83 (2.51)	5.70 (2.21)	5.60 (2.19)

places was 5.83 (SD = 2.51) now, 5.70 (SD = 2.21) six years ago, and 5.60 (SD = 2.19) fifteen years ago. Results are summarized in Table 2.

Health. About 68 percent of participants reported that they had a "health problem that makes it difficult to travel outside of the home." As a result of this, 45 percent reduced their day-to-day travel.

The mean number of miles traveled "now" for those reporting health problems was 46.65 (SD = 56.54), while those reporting no impairment in their ability to leave their home, traveled 57.40 (SD = 72.35). Using an independent sample t-test, the difference was not significant ($t = -.54$, $p \leq .61$). Five subjects had over 100 weekly average miles, which created a skewed distribution. When the five outlying values were excluded from the analysis (n = 35), however, there was still no significant difference between the numbers of miles traveled now among the people with reported health impairments versus those without reported health impairments ($t = -.05$, $p \leq .96$).

Driving. Half of the subjects reported they currently drive and two never drove. If the person had a vehicle, but was not driving, a family member was most likely to drive.

The mean total number of miles traveled by those participants still driving was 78.30 (SD = 75.10), compared to 21.98 (SD = 20.62) miles for those not driving. This difference was significant ($t = 3.23$, $p \leq .003$). The mean total miles of those currently driving was compared with those driving six years ago (122.74, SD = 118.78) ($t = 2.42$, $p \leq .020$) and those driving fifteen years ago (197.01, SD = 237.10) ($t = 1.25$, $p \leq .219$). Those subjects still driving had reduced the number of miles they were driving now in comparison with six years ago. Figure 1 illustrates the changes in numbers of frail elders driving at the time of the interview, 6 and 15 years ago. Results are summarized in Table 2.

Subject Report of Leaving Home. When asked if they were leaving their home now less than six years ago, 60 percent reported in the affirmative. The most common reason cited for reduced community mobility was "I don't feel like going anywhere; I am content."

Mode of Transportation. The mode of transportation was predominately personal vehicle (either driving or being driven by someone else). For "now," 97.5 percent reported that they traveled by personal vehicle to the places they visit in a typical week, while 30 percent reported using some kind of public transportation. Six years ago, even fewer participants used public transportation (10%). Fifteen years ago, 95 percent traveled by personal vehicle, and the number using public transportation was 10 percent. Figure 2 illustrates the use of personal vehicles and public transportation at each of the 3 times considered.

FIGURE 1. Changes in Numbers of Frail Elders Driving Over 15 Years (N = 40)

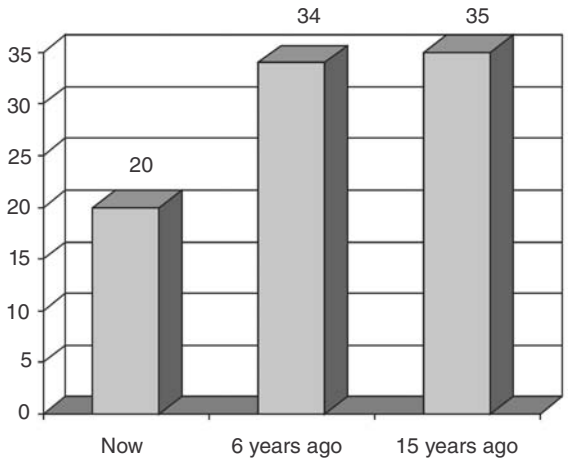
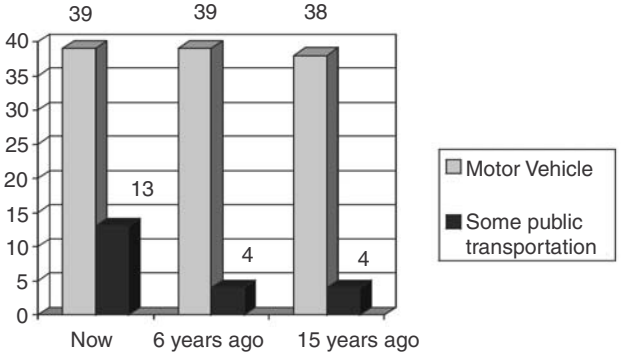


FIGURE 2. Changes Over 15 Years in Modes of Transportation Used (N = 40)



Public Transportation. The number of people who reported they currently use public transportation was 13 of 40 subjects. The most common mode of public transportation was the paratransit vehicle provided by the county. The paratransit service, either a van, car, or wheelchair van, was offered to those who were unable to use the city fixed-route bus service due to their disability. Older adults were eligible for this service if they qualified through a screening process that assessed their

level of disability and need for door-to-door transportation. Of the thirteen subjects who used public transportation, 7 felt the service was "very good." Only one person reported the quality of public transportation as "poor."

Thirty participants were aware of the public transportation services available to them. Seventy-three percent of thirty-five subjects were not worried how they would pay for personal transportation (maintaining their vehicle) or public transportation. Thirty-four participants said they were able to rely on personal transportation to get them to their destination and on time, and only two participants said they were not able to rely on public transportation to get them to their destination on time.

DISCUSSION

In our culture, driving has been associated with independence. For many elders, giving up driving means sacrificing autonomy and freedom to maneuver in their physical and social environment. To maintain their social interactions, to attend to their needs, and to continue their membership in society, they must turn to alternative modes of transportation, or rely on others to get them where they need to go. The alternative is a significant reduction in community mobility. Community mobility, defined in the current study as the number of miles traveled beyond the home in a typical week, declined over fifteen years. Elders also confirmed in a simple, non-quantitative question, that they were leaving their home less frequently than 15 years ago and 6 years ago.

Community mobility was greater for those who were still driving. Independence in driving seems to play a large role getting the older adult to the places they need, or want, to go. This finding is strengthened by the experiences of the two subjects who had never driven. Both had a physical impairment limiting their ability to drive; however, only one reported their physical impairment limited their ability to leave their home. One showed no change in the miles traveled between now and fifteen years ago, suggesting that this person relied on other forms of transportation and community mobility did not decline over time. The other participant showed an increase in community mobility now versus fifteen years ago, but a decline from six years ago. The difference was in the availability of transportation and finances. When there was available transportation, these participants were able to access the community consistently over time. However, for those who had driven in the

past but had stopped driving, their community mobility was significantly compromised.

Decline in miles traveled in a typical week was evident among persons in the sample still driving. There was a significant difference between current distance traveled and distance traveled six years ago; however, now versus fifteen years ago did not show a significant difference in distance traveled. This can be attributed to the large variation in miles traveled fifteen years ago. Some participants reported traveling out of state on a weekly basis, while others reported travel to the store only a few miles from their home.

Reduction in community mobility may be attributed to functional impairments that limit elders' ability to use their vehicle and access the community. In a study on the use of passenger vehicles by older persons with disabilities, fifty percent of elders reported difficulties in getting in and out of vehicles (Steinfeld, Tomita, Mann, & DeGlopper, 1999). Many participants reported not driving at night or during rush hour because of reduced visual and cognitive abilities.

Loss of self-reliance in driving may result from age-related health changes that in turn limit the person's community mobility. For example, several participants reported limited endurance prevented them from driving and from shopping and attending church services. Health problems may be the inherent cause of declines in community mobility among non-drivers. However, the results of this study did not show health impairment as significantly affecting community mobility. The sample for this study included only elders with disabilities, limiting the amount of variance in health and functional status.

All of the participants were eligible to receive assistance in public transportation. More elders were using public transportation now than reported in the past. It is likely that as a person ages, they begin to rely on public transportation more to assist them in their community mobility. The most prevalent public transportation service used was the paratransit vehicle service provided by the county. One woman reported that, "If it wasn't for the public transportation services and the helpful drivers, I would not be able to go places." Several elders stated that waiting for the vehicle to pick them up was an annoyance and an inconvenience. At times they would have to wait an hour before a vehicle would arrive for the return trip. Other comments about the paratransit service included suggestions to improve the scheduling of vehicles, to provide night service for those adults who would otherwise be unable to take part in night activities, and to decrease the wait time.

Many elders reported they did not use public transportation, but relied on family or friends. Most reported they could rely on their family/friend to transport them to their destination and to get them there on time. With available personal transportation that is reliable, elders are less inclined to access public transportation services. However, one person, who relied on family or neighbors for transportation, became interested in the paratransit service. This participant commented, "I no longer would have to burden my family members by having them take me places."

Implications for Occupational Therapists. Occupational therapists are key professionals in helping older adults maximize their independence in tasks of everyday living. Addressing their basic needs (i.e., shopping, money management, home maintenance, and health-related appointments), participating in social activities, and engaging in leisure activities, typically requires persons to leave their home and enter the community. OT's have a role in assisting older adults in maintaining their independence in caring for their needs and in maintaining their connection to the community. As holistic professionals, we are equipped to address modifications to the travel environment and adaptations to allow the person to engage in the community with more independence. Specifically, modifying the vehicle to make it more accessible for older drivers may assist them in driving. Grab bars, ramp systems, and devices to hold keys and open locks are just a few options (Steinfeld, Tomita, Mann, & DeGlopper, 1999). Driver rehabilitation specialists, typically occupational therapists, have an important role in evaluating and providing remediation or compensatory strategies for impaired drivers to allow them to maintain independence in driving. When an elder stops driving, or restricts driving, we must be prepared to suggest alternative transportation resources and assist our clients in accessing and utilizing those resources for maintaining their community mobility.

Limitations. Self-reporting of past community mobility could be inaccurate especially in reporting of places visited and distances traveled 6 and 15 years ago. The cognitive status of the person, although determined by the CAS and screened for participation in this study, could have interfered with the person's ability to accurately recall and report the places, distances, and frequencies of her/his community mobility. The client's scores on the MMSE may have changed between the original testing during the CAS (up to 2 years prior to current study) and the initiation of this research.

A longitudinal prospective study, measuring community mobility over fifteen years, would provide a more accurate analysis of elders'

community mobility patterns over time. If the subjects recorded distances and frequencies in a diary, then accuracy of reporting might improve. Another interesting perspective would be to look at the types of places visited now versus six years ago and fifteen years ago. Recommendations for future studies include expanding the representation of males so that comparisons can be analyzed across gender. Additionally, replicating the study in urban versus rural environments and in communities with different public transportation systems would permit an analysis of community mobility across different types of communities.

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