Effects of Aging on Older Drivers' Travel Characteristics

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This study focuses on the changes in driving characteristics of older drivers. A statewide survey of older drivers combined with focus group meetings was conducted. A total of 664 older drivers responded to a mail survey. Data were analyzed at three levels. First, the responses of all drivers to a certain question were investigated. Next, the data were divided into four age groups: 66 to 68, 69 to 72, 73 to 76, and 77 and more years of age. Finally, the differences in gender were examined. The survey results indicated that 70 percent of older drivers used their cars at least 5 days a week, and a higher proportion of male drivers than female drivers drove 7 days a week. The majority of older drivers did most of their driving in a town or a city, and as age increased, urban road use increased and highway use decreased. Nearly half of older drivers drove less than they did 10 years ago, and they drove fewer miles as their age increased. The majority drove frequently in off-peak hours, and age is a factor in deciding when to drive during a day. The older drivers recognized significant changes in their driving capabilities.

The American population is aging rapidly, and an increase in the percentage of older drivers using the highways and streets is expected. In 1990, 12.6 percent (31 million) of the population in the United States was 65 years old and over (*1*). This percentage is projected to increase to 21.1 (64 million) in 2030 (*2*). A growing proportion of the elderly live in the suburbs. For example, in Illinois, census data from 1970 and 1990 show that the number of persons over 65 in the central areas and the fringes inside the urbanized areas increased by 13 and 88 percent, respectively (*1,3*). Another trend is the increasing proportion of the elderly who drive automobiles. For those who live in the low-density suburbs, the automobile is the dominant mode of mobility (*2*). The number of licensed drivers 65 years and over in the United States has increased more than 50 percent since 1969 (*4*).

These trends indicate that the travel characteristics of older drivers should be understood and that their driving needs should be considered in the design and operation of highways and streets. It has been found that, in general, visual and cognitive performance on driving-related tasks diminishes with age. Many highway design assumptions used today, however, are based on the performance characteristics of a younger population (*2*) and provide less margin of safety in driving to the elderly.

It is known that travel characteristics of older people are different from those of younger people. For example, the elderly drive fewer miles than do others, and, on average, men drive more annual miles than women (*2,5*). The elderly tend to drive when conditions are the safest. For example, they drive less frequently at night than do those under 65. Research has found that the most difficult driving conditions are headlight glare, followed by night driving, driving when tired or upset or in rain and fog, peak-hour driving, long-distance driving, and driving in snow, sleet, and slush (*6*).

Little research, however, has been directed at a detailed analysis of travel characteristics of older drivers. Understanding travel characteristics of the elderly is essential for responding to their mobility and traffic safety needs. A study was conducted for the Illinois Department of Transportation (IDOT) to analyze the travel characteristics of older drivers in Illinois and to determine their needs and concerns in driving. A statewide survey of older drivers accompanied by focus group meetings was conducted in order to gain more insight on their travel characteristics and to better comprehend travel behavior and needs of the elderly. The travel characteristics of older drivers (those over 65) in Illinois are discussed in this paper.

STUDY APPROACH

A statewide survey of older drivers was conducted in Illinois to determine travel characteristics and driving changes occurring with aging. A total of 664 senior drivers responded to a mail survey. The survey also sought the older drivers' comments and suggestions concerning improvements that they would like implemented in Illinois highways and streets.

In addition, focus group meetings were conducted to examine their needs and concerns in a more detailed approach than the one provided by the survey. Older drivers from rural and urban areas participated in these meetings. The findings about older driver travel characteristics from the survey and the focus group meetings are presented. Statistical analyses were performed to study the survey results.

Data Collection

A mail survey was conducted of a statistically random sample of Illinois residents over 65 years old who had valid Illinois driver's licenses. Older drivers who renewed their driver's licenses in 1990 (the year before the survey) were identified with the help of the Illinois Secretary of State's Office. Renewal criteria for a driver's license in Illinois (effective in 1989) are as follows: vision test only for ages 69 to 74 every 4 years, written or road test or both for ages 75 to 80 every 4 years, written or road test or both for ages 81 to 86 every 2 years, and written or road test or both for age 87 and older annually. Also, vision tests are required for all

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in the 75+ group. Since this stepped-expiration scheduling was not in effect long enough to cover all older drivers at the time of the survey, it is not known what the driver's license renewal rate is for older drivers over 65 years. From this population of older drivers, 850 were randomly selected as the sample control group. The questionnaire was mailed to them and they were asked to fill out the survey form and return it in the prepaid envelope enclosed. For those who did not respond to the first mailing, follow-up letters and questionnaires were sent.

Nearly 78 percent of the recipients (664 drivers) returned the completely filled-in questionnaires. The age distributions of male and female participants were very similar, indicating that similar proportions were selected from both sexes in a given age category. A very large number of respondents (about 85 percent) were 75 years old or younger. Only a few drivers were 90 years or older.

Data Analysis

For a given question, data were analyzed at three levels. First, the responses of all drivers to the questions were examined. Second, the data were categorized by the age of the respondents. Given the sample size, four age categories were used: 66 to 68, 69 to 72, 73 to 76, and 77 and older. Third, the differences among responses from male and female drivers were examined. If statistically significant differences existed between male and female drivers, these two gender categories were investigated by dividing them into the four age groups.

Different statistical tests were used, based on the distribution characteristics of the responses for each question as well as on the number of groups to be compared. For instance, if a question displayed continuous features, a general linear model (GLM) for the analysis of variance (ANOVA) was applied (7). Duncan's multiple range tests were used if the ANOVA showed significant differences. Similarly, *t*-tests were performed when two groups were compared for continuous features. The remaining statistical analyses, where the responses were discrete and comparisons were made, were conducted on the basis of χ^2 test results. Table 1 is a summary of χ^2 goodness-of-fit tests of gender and age groups. All statistical tests were performed with a 95 percent level of confidence.

Focus Group Studies

In addition to the statewide survey, focus group studies were carried out. One focus group meeting was conducted in the Chicago metropolitan area and three others in the Champaign-Urbana area. The purpose of these focus groups was to probe in depth senior drivers' feelings about driving and highway design. In essence, this part of the study was designed to supplement the survey data and provide further insights into the driving behavior of the older population.

The number of participants varied from 5 to 12 a meeting. All of the participants were senior drivers. The discussions were taped, reviewed, and analyzed after the meetings. A content analysis was performed on the recordings for the urban and rural groups. A total of 18 participants were interviewed in three different meetings in the Champaign-Urbana area. There were 6 male and 12 female participants from different income levels, who were still driving.

SURVEY FINDINGS

Travel Frequency

The survey results indicated that older drivers used their cars on a regular basis. Seventy percent drove at least 5 days a week and

TABLE 1 Summary of χ^2 Goodness-of-Fit Tests

Items		Degree of Freedom	χ^2-value	Probability for $\geq\chi^2$ Value	Interpretation (With 95% Confidence Level)
Trip frequency	Gender	7	31.657	0.000	Significant
	Age	21	40.868	0.006	Significant
Road type	Gender	3	3.073	0.381	Not Significant
	Age	9	15.626	0.075	Not Significant
Trip recency for most recent trip	Gender	3	18.370	0.000	Significant
	Age	9	6.531	0.686	Not Significant
Trip purpose for most recent trip	Gender	6	19.905	0.003	Significant
	Age	18	37.297	0.005	Significant
Conditions avoided	Gender	2	1.836	0.399	Not Significant
	Age	6	22.450	0.001	Significant
Driving difficulty	Gender	2	3.211	0.201	Not Significant
	Age	6	5.326	0.503	Not Significant

42 percent used their cars daily. As the age of older drivers increased, the frequency of daily driving decreased and the frequency of 2 or 3 days of driving a week increased. Figure 1 shows the distribution of travel frequency for different age groups. The ANOVA showed that a statistically significant difference existed among the four age groups. Duncan's multiple range test with a 95 percent confidence level showed that driving frequency for the oldest group (77+) was significantly different from those of the other three age groups (66 to 76). Driving frequency for the oldest group was 4.4 days a week, but for the other three age groups it was 5.7 days a week.

A higher proportion of male drivers than female drivers, 50 percent compared with 32 percent, drove 7 days a week. Conversely, more female drivers used cars fewer days a week as compared with male drivers. The distribution was significantly different using a χ^2 test with a 95 percent confidence level. Furthermore, a *t*-test showed that the average travel frequency of men (5.8 days a week) was significantly higher than that of women (5.0 days a week).

For each age group the average number of days driven was computed. For all drivers combined, the average frequency for the 77+ group (4.4 days a week) was significantly lower than those of the other three groups (5.4 to 5.7 days a week), using Duncan's multiple range test with a 95 percent confidence level. The other three groups did not have significantly different frequencies. The data were divided into male and female categories, and similar tests were run. A significant difference in average travel frequency was found for male, but not for female, drivers. The 66- to 76-year-old male drivers drove more frequently (5.7 to 6.3 days a week) than the 77+ male group (4.7 days a week).

Detailed analyses were performed separately for male, female, and total drivers because the gender difference was significant. For these analyses trip frequencies of 3 days or less were combined in one group. Thus a total of five trip frequency groups was obtained. For each gender category and each trip frequency group, a one-way χ^2 test was performed to determine if the observed frequencies were significantly different from the expected frequencies for that age group. A total of 15 (5 trip frequency groups and 3 gender categories) χ^2 tests were run, and the results are summarized in Figure 2. The results show that only for frequencies of 3 days or less and 7 days, the distributions of drivers in the four age groups were significantly different for male and total drivers. It should be noted that male drivers were the main reason for total drivers to have significantly different distributions among the four age groups.

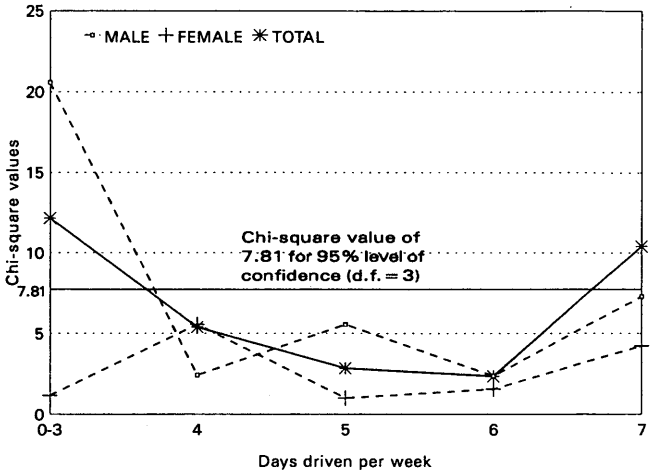

FIGURE 2 Summary of χ^2 goodness-of-fit tests for trip frequency distributions among age groups.

More detailed analyses were performed for the 3-days-or-less and 7-day trip frequency groups. For these two groups the observed number of drivers in each age category was compared with the expected number, and the deviations are shown in Figure 3, which shows that the youngest senior group is overrepresented in the 7-day trip frequency group and the oldest senior group is overrepresented in the 3-day-or-less trip frequency group.

Road Type

The majority of older drivers (75 percent) did most of their driving in a town or a city, but 16 percent use highways. As the age of

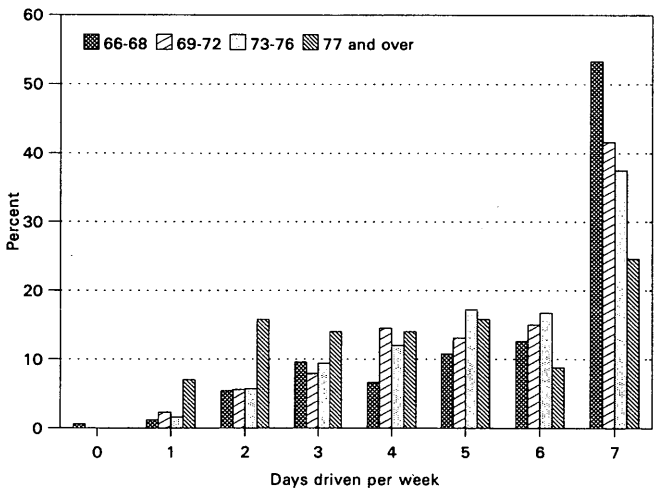

FIGURE 1 Number of days per week that older drivers use cars.

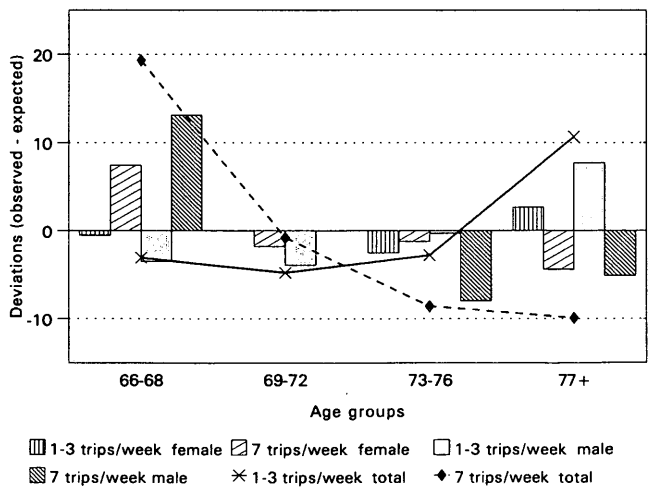

FIGURE 3 Deviations from expected values of average weekly days driven versus age group.

the respondents increased, urban road use increased and highway use decreased. For example, 23 percent of the 66- to 68-year age group use highways compared with 7 percent in the 77+ age group, and 66 percent of the same age group compared with 78 percent of the 77+ age group drive on urban roads. This trend was statistically significant with a 92 percent confidence level.

Trip Recency

Male and female drivers were asked about the two most recent trips they had made. Nearly 69 and 19 percent, respectively, responded that their most recent driving took place that day or the day before, and 12 percent of the respondents said that their last trips occurred two or more days before. This trend was true for all age groups, with a slight (but not significant) decrease for the 77+ age group. More male drivers than female drivers drove that day. This confirms the findings on trip frequency that indicated that men drove more often than women.

About 14 percent of the respondents said that their second most recent trip had been made that day, 49 percent said that it had been the day before, and 20 percent said that it had been two days before. Trip frequency showed a shift from "today or yesterday" to "two or more days ago," as is expected to happen with the age increase. Statistically significant differences were found when comparing all four age groups. Also, a significant difference in gender was found. More men than women drove that day or the day before for the second most recent trip.

The frequency of driving indicates that some of the older drivers drove two or more times in one day. This finding about trip frequency is important in the determination of vehicle miles traveled (VMT) by older drivers. Those who drove a car more than once in a given day were identified, and this proportion was determined to be approximately 15 percent.

Trip Purpose

The predominant trip purpose for the most recent trip was grocery and personal shopping (45 percent), followed by personal business (15 percent) and recreational or social trips (12 percent). A relatively small percentage (8 percent) reported going to work as the main driving reason, 6 percent reported medical or dental appointments, and 7 percent reported more than one purpose.

The frequency of work and recreational and social trips decreased, whereas that of grocery and shopping and multipurpose trips increased as the age of drivers went up (Figure 4). The χ^2 tests indicated a statistical difference among the four age groups with regard to trip purpose. The purpose of trips within the four age groups varied significantly, without showing, however, a specific age-related trend. In addition, a significant difference was observed in the comparison between the youngest and oldest age groups, since the work and recreational and social trips significantly decreased with age.

The distributions of trip purposes for male and female drivers were also different. More female drivers responded that their main trip purpose was grocery and shopping. Conversely, more male drivers than female drivers reported medical and dental and recreational and social as their main trips. Age group analyses for different gender categories did not show any significant trends besides the results already mentioned.

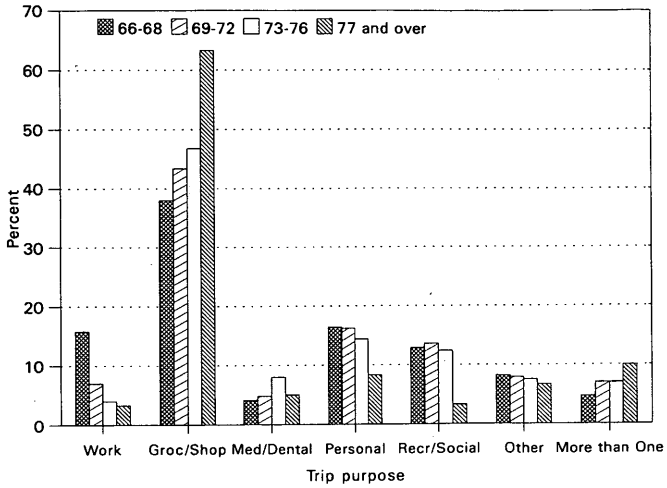

FIGURE 4 Purpose of most recent trip.

For the second most recent trip, the predominant purpose was still grocery and shopping (29 percent), followed by recreational and social (22 percent), personal business (17 percent), and medical and dental (10 percent). However, compared with the results for the most recent trip, the proportion of recreational and social and medical and dental trips increased, whereas that of grocery and shopping trips decreased. For the second most recent trip, 7 percent of the elderly drove to work, and 4 percent drove because of multipurpose trips.

The χ^2 analysis did not show any statistically significant difference among the four age groups in terms of trip purposes for the second most recent trip. However, a *t*-test between the oldest and the youngest groups showed significant differences with a 95 percent confidence level. Gender difference was not significant.

Trip length of grocery and personal shopping (9.1 mi) was significantly different from the others (ranging from 11.3 to 13.7 mi) for the most recent trip.

Trip Length

The mean of a sample of observations is the most widely used and often the most precise indicator for inferential purposes for distributions with a central tendency (*8*). However, the mean lies far from the bulk of observations in extremely skewed distributions, in which the mean is influenced by extreme values in the sample. Trip length distributions are very skewed and show no central tendency. Consequently, in skewed distributions the mean is drawn toward the elongated tail that is the median or mode. When the mean and median differ greatly, the median is usually the most meaningful measure of central tendency for descriptive purposes (*8*). However, the median does not provide the average values one may need for analyzing a distribution, such as the average VMT.

An approach based on systematic deletion of extremely large trip lengths was used to compute average trip length, which was based on the remaining data. In Figure 5, 100 percent indicates that all of the trip length data was used, and 80 percent indicates that 20 percent of the extremely large trip length data was not used in finding the average values. Figure 5 shows the change in

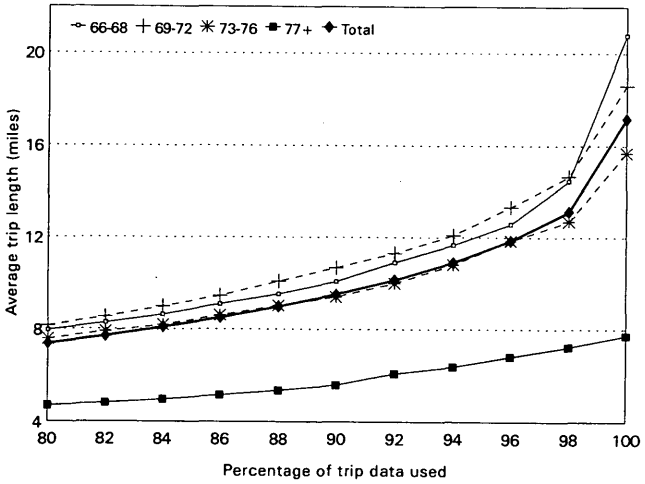

FIGURE 5 Average trip length versus percentage of trip data used.

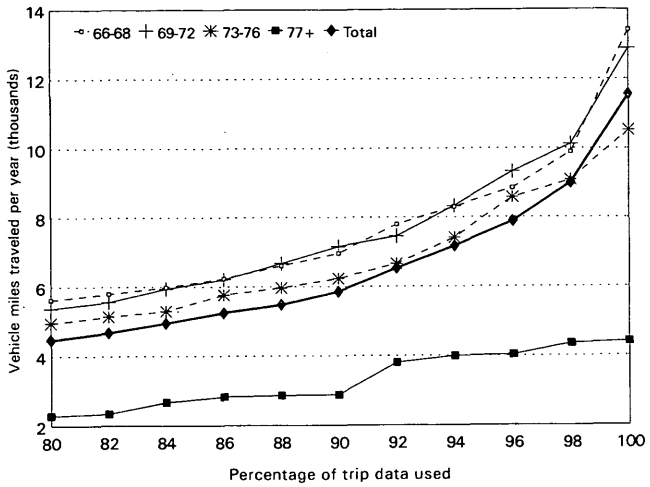

FIGURE 6 Average VMT per year versus percentage of trip data used.

the average trip length when up to 20 percent of the extremely large values observed was deleted from the total sample size. As Figure 5 shows, the average trip length reduces very rapidly when the first 5 percent of the data was deleted, continuing to decrease almost constantly thereafter. It should be noted that the average trip length for the 77+ age group was far less than those of the other three groups. The average trip length when 95 percent of the data was used turned out to be 11.4 mi (Figure 5). Nationwide data for 1983 indicated that among the elderly (65 years and over), average local daily person-miles of travel in privately owned vehicles were 13.4 mi for men and 9.0 mi for women (*9*).

Vehicle Miles Traveled

The survey did not directly ask older drivers to estimate the average VMT per year because the estimated VMT tends to be less precise. Figure 6 shows the change in VMT versus the percentage of trip data used. Instead, it was attempted to calculate VMT on the basis of trip length and trip frequency data from this survey. Vehicle miles driven (VMD) for each of the two most recent trips and for the average of those trips was computed for each individual driver from the following equation:

$$\text{VMD (each driver)} = (\text{trip length})(2)(\text{days driven})(\text{TRIP})(52)$$

where

Trip length = one-way trip length driven by a driver, miles (there were three trip length values: most recent trip, second most recent trip, and average of the two trip lengths);

Days driven = number of days drivers drove a car per week; and

TRIP = number of time drivers drove in one day (1 if they drove once and 2 if they drove more than once).

The factor 2 was applied to make it a round trip, and the factor 52 to convert it to miles driven per year. Then the average VMT for all participants was calculated from the following equation:

$$\text{VMT} = \Sigma\ (\text{VMD by each driver})/(\text{total sample size})$$

The average VMT was computed as a function of the percentage of trip length data used. As discussed above, 100 percent indicates that all of the trip length data was used to compute the VMT. Similarly, 80 percent trip length data used indicates that the 20 percent of extremely long trips was not included.

From the questionnaire, it was not possible to determine the number of drivers who use their cars more than twice a day. However, it was possible to determine the number of drivers who drove exactly twice a day. To find daily trip frequency, the number of drivers who drove twice on the same day was computed. The number of drivers who responded that they had driven twice that day or the day before was determined. It was found that about 15 percent of the total participants drove at least twice in one day. The number of drivers who may have driven twice two days or more before the day of the survey was very small. Thus, it was assumed that this group did not make two or more trips in one day. The average VMT per year was 7,522 mi in this study when 95 percent of the data was used (Figure 6).

Drivers were also asked to compare the number of miles driven now and 10 years ago. Nearly half responded that they drive less now than they did 10 years ago. However, 37 percent drive the same amount and 14 percent said that they drive more now. There was no significant difference between male and female drivers, but the difference among the four age groups was significant. The respondents affirmed that they drove fewer miles as their age increased. The average ages of the above three categories were 72.6 (for the fewer-miles-driven group), 71.3 (for the same-miles-driven group), and 70.3 years (for the more-miles-driven group).

The average trip lengths (most recent trip) were 9.3 for the fewer-miles-driven, 12.2 for the same-miles-driven, and 14.9 for the more-miles-driven groups. The trip length differences among these groups were statistically significant. Furthermore, VMT

(based on the most recent trip) for the three groups were 5699, 8404, and 13,131 mi, respectively. The VMT for the senior drivers in the more-miles-driven group was significantly higher than that for the same-miles-driven group, which in turn was significantly higher than that for the fewer-miles-driven group. Therefore, the group who had a higher VMT had also a higher trip length as well as higher trip frequency.

Travel Time

The majority of older drivers (87 percent) drove frequently in off-peak hours. However, over half of them (56 percent) also drove in the afternoon peak period (3:00 to 6:00 p.m.), over one-fourth drove in the morning peak period (6:00 to 9:00 a.m.) or during the evening and at night (6:00 to 12:00 p.m.), but less than 1 percent drove after midnight. It was also noted that some study participants had driven in more than one time period, so the percentages do not sum to 100.

Age was a factor in deciding when to drive during a day. In general, as the age of drivers increased, they drove more in off-peak hours and less during the morning or at night (Figure 7). Statistical analyses have shown that all age groups presented significant differences within the same driving period.

More women drove in the off-peak hours (9:00 a.m. to 3:00 p.m.) as compared with men, and such a difference was found statistically significant.

Conditions Avoided

The elderly drove when conditions were the safest. The most-often-mentioned condition in which older drivers purposely avoid driving was ice and snow, followed by peak hours, night, and rain. Only 3 percent avoided driving on the weekends. About 11 percent replied that they did not purposely avoid any of the aforementioned conditions. More male drivers avoided peak-hour traffic and more female drivers avoided the ice and snow and evening and night driving. As their age increased, they avoided peak-hour traffic, ice and snow, and night driving conditions (Figure 8).

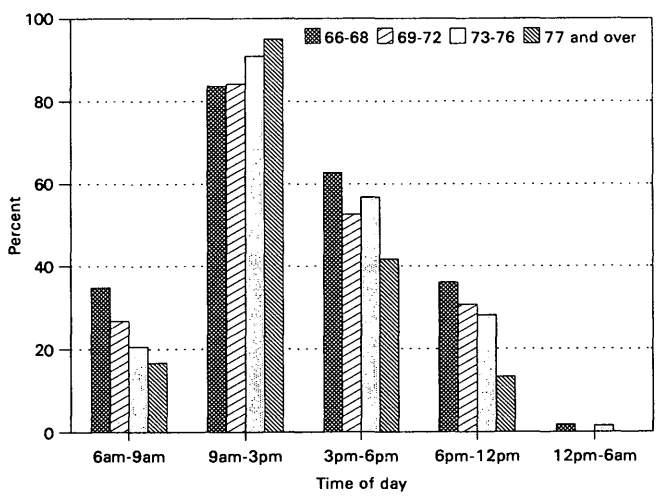

FIGURE 7 Road conditions avoided by older drivers.

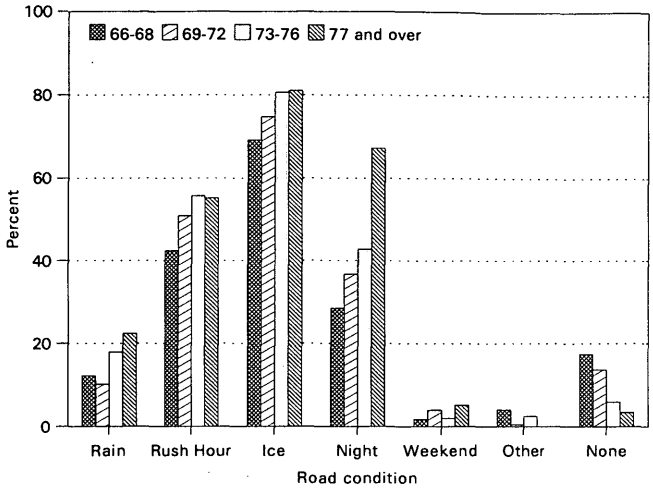

FIGURE 8 Avoided road conditions by older drivers.

Driving Difficulty

Participants were asked to take everything into consideration and compare driving difficulty now and 10 years ago. About 63 percent replied that the difficulty is about the same, and 26 percent said that it has become more difficult now. On the other hand, 11 percent reported that driving now has become less difficult.

The differences between genders or among age groups were not statistically significant. This results supports the theory that chronological age alone may not be a good predicator of physical, mental, or social competence (2). Driving difficulty varied from one person to another within the same age group. The average ages of three categories of driving difficulty were 72.0 (more-difficulty group), 71.8 (same-difficulty group), and 71.2 (less-difficulty group).

There are two interesting findings about the perception of overall driving difficulty among the respondents. First, differences in trip frequency, trip length, and VMT for the drivers in the three difficulty groups (more-, same-, and less-difficulty groups) were not statistically significant. Thus, trip frequency, trip length, and VMT are not based on the perceived overall driving difficulty. Second, when participants were asked detailed questions about driving difficulty—for example, about nighttime driving or left turns at intersections—they recognized that they are having increased difficulty. Hence, they did not realize driving difficulty when an overall question was asked, but they did when specific questions were asked. They may have had to drive in more complex driving conditions (e.g., work trips) when they were younger, but now they have more freedom to select less complex driving conditions (less crowded road and off-peak hours).

FOCUS GROUP FINDINGS

Focus group meetings were conducted for both the Chicago metropolitan area and the Champaign-Urbana area in Illinois.

Nighttime driving was avoided by most elderly participants, but a small number liked it because of less traffic and higher driving speeds. Nighttime driving in town was not a problem when there were few surrounding lights, but participants avoided nighttime highway driving.

The two groups, urban and rural, had significant differences in their responses. As it might be expected, the urban group was more concerned about traveling in high-volume traffic and more on urban arterials than on freeways. In general, their trips were shorter than those of the rural group, but the driving environments were more complex. The rural group tended to avoid peak-hour travel and the more complex driving environments. The rural group also tended to be more concerned about driving at night than the urban group. A greater proportion of the comments of the urban group was focused on driver behavior in traffic, mainly other drivers. Thus, much of their concerns were related to speed, weaving behavior, drunk driving, and police enforcement.

Both groups were concerned with managing in complex traffic environments. Rural drivers generally avoided such situations—for example, driving during off-peak hours, taking alternate routes, or avoiding certain areas. Urban drivers, for whom such avoidance was less possible, tended to focus on external control of other drivers for their benefit and safety.

In general, the older drivers in both groups have adapted their driving behavior to the basic sensory, cognitive, and motor changes they have experienced. They were aware of some of the changes but appeared to have adapted without conscious awareness. The urban group as a whole was less aware of changes in capacity than the rural group. Older drivers in the urban group were also more competitive in their approach to driving than the rural group and saw their problems in driving more nearly due to the behavior of others rather than to themselves. However, it was clear from the analysis that significant decrements in driving performance had occurred. There were significant differences in attitude toward driving between the two groups. The rural drivers perceived driving as a necessity, a cost to be paid. For the urban group driving had a personal and social significance, what appeared to be a means of staying involved, or "young." This was especially obvious among the male members of the urban group.

In summary, the results of both the survey and the focus group meetings suggested that the older drivers recognized significant changes in their driving capabilities. The responses to these changes can be categorized in three ways: compensatory behavior, self-imposed restrictions on driving, and increased anxiety levels. Older drivers select routes, for example, that are of lower complexity and avoid unpredictabilities. Similarly, night driving is significantly more difficult for older drivers, so they avoid driving at night, especially in unfamiliar areas. Many of these drivers exhibit higher levels of anxiety about driving itself, as well as sharing the roadway with other drivers. They frequently see themselves at a disadvantage in dealing with younger drivers in traffic and unable to keep up. All these factors condition older drivers and constrain the timing and place of the trips they will make. Since almost all these drivers are out of the labor force, all their travel is for personal trips as well as being discretionary. Consequently, they are free to adapt their trip making to their perceived limitations. For example, they do not need to drive cars in the morning peak hour unless they go to work or are on urgent business. It is interesting to note that the focus groups suggested that the elderly find this kind of adaptive behavior quite acceptable.

CONCLUSIONS

A statewide survey of Illinois older drivers (66 years and over) who had valid driver's licenses was conducted. The survey results indicated that older drivers used their cars on a regular basis. About 70 percent used their cars at least 5 days a week and 42 percent used their cars daily. Frequency of daily driving decreased and driving of 2 or 3 days a week increased as age increased. Driving frequencies were 4.4 and 5.7 days a week for the oldest group (77+) and the other three groups (66 to 76), respectively. This decrease was mainly due to the reduction in driving frequency with age for male drivers.

The majority of older drivers did most of their driving in a town or a city, and as age increased, urban road use increased and highway use decreased.

The predominant trip purpose was grocery and personal shopping. The frequency of work and recreational and social trips decreased, whereas that of grocery and shopping and multipurpose trips increased as age increased. Trip purposes for male and female drivers were different. More female drivers responded that their main trip purpose was grocery and shopping, whereas more male drivers reported their main trip purposes to be medical and dental and recreational and social.

The average trip length was 11.4 mi, and the average VMT per year was 7,522 mi when 5 percent of the extremely large trip length data was deleted. Nearly half of the older drivers drove less than they did 10 years ago, and statistical analysis showed that they drove fewer miles as their age increased.

Age was also a factor in deciding when to drive during a day. In general, as the age of drivers increased, they drove more in off-peak hours and less during the morning or at night. Conditions under which older drivers purposely avoided driving are ice and snow, followed by peak hours, night, and rain.

When asked what the overall driving difficulty was compared with 10 years ago, most participants (74 percent) replied that it was about the same or less. However, when they were asked detailed questions about driving difficulty (e.g., nighttime driving or left turns at intersections), they recognized the increasing difficulty they had. The results of both the survey and the focus group meetings suggested that older drivers recognized significant changes in their driving capabilities. Their responses to these changes can be categorized in three ways: compensatory behavior, self-imposed restrictions on driving, and increased anxiety levels.

Finally, the focus groups suggested that the elderly see driving not only as a necessity but also as a routine that they regard as a measure of their own freedom of action.

REFERENCES

1. Bureau of the Census. *1990 Census of Population: General Population Characteristics in Illinois.* U.S. Department of Commerce, June 1992.
2. *Special Report 218: Transportation in an Aging Society: Improving Mobility and Safety for Older Persons,* Vol. 1, TRB, National Research Council, Washington, D.C., 1988.
3. Bureau of the Census. *1970 Census of Population: General Population Characteristics in Illinois.* U.S. Department of Commerce, Feb. 1972.
4. *Summary of Discussions and Recommendations: Workshop on Roadway Improvements for the Mobility and Safety of Older Drivers and Pedestrians.* Highway Users Federation and Automotive Safety Foundation; FHWA, U.S. Department of Transportation, Oct. 1989.
5. Rosenbloom, S. The Mobility Needs of the Elderly. In *Special Report 218: Transportation in an Aging Society: Improving Mobility and*

Safety for Older Persons, Vol. 2, TRB, National Research Council, Washington, D.C., 1988.
6. Yee, D. A Survey of the Traffic Safety Needs and Problems of Drivers Age 55 and Over. In *Proceedings of the Older Driver Colloquium—Needs and Problems of Older Drivers: Survey Results and Recommendations*. AAA Foundation for Traffic Safety, 1985.
7. *SAS/STAT User's Guide*, Release 6.03. SAS Institute, Inc., Cary, N.C., 1988.
8. Snedecor, G. W., and W. G. Cochran. *Statistical Methods*, 8th ed. Iowa State University Press, Ames, 1989.
9. Reno, A. T. Personal Mobility in the United States. In *Special Report 220: A Look Ahead: Year 2020,* TRB, National Research Council, Washington, D.C., 1988.

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