Characteristics Of Older Drivers Who Self-Limit Their Driving

Keli A. Braitman and Anne T. McCartt
Insurance Institute for Highway Safety, Arlington, Virginia

ABSTRACT – Driver age, gender, medical conditions, and impairments in memory, vision, and physical functioning as predictors of self-limited driving were examined among a sample of 2,650 drivers 65 and older from Kentucky (n=1,337), Connecticut (n=828), and Rhode Island (n=485). Drivers were recruited while renewing their driver's licenses and were interviewed by telephone about their current driving patterns (e.g., whether they self-limit their driving and, if so, how), functional abilities related to driving (vision, memory, physical functioning, and diagnosed medical conditions), transportation options, and driver characteristics. The prevalence of driving-related impairments generally increased with driver age group, and memory impairment and medical conditions were more common than vision or physical functioning impairments among drivers in all three states. Adjusting for several factors including state, gender, and marital status, logistic regression analysis indicated that the likelihood of participants self-limiting their driving was increased by 19 percent with each additional memory impairment item on which they reported increased difficulty compared with 5 years ago, 19 percent with each additional visual impairment item, 32 percent with each additional physical functioning impairment item, and 13 percent with each additional diagnosed medical condition. Drivers 80 and older were more than twice as likely as drivers ages 65-69 to self-limit their driving.

INTRODUCTION

Proportionally fewer people 70 and older are licensed to drive compared with those ages 20-69, and they drive fewer miles per licensed driver. However, older drivers are keeping their licenses longer and driving more miles than ever before. Older drivers have low rates of police-reported crashes per capita, but per mile traveled their crash rates increase starting at age 70 and increase markedly after age 80 [Insurance Institute for Highway Safety, 2008].

Recently there has been increased concern about older drivers' risk of crash involvement, particularly because of their elevated crash rates per mile driven and the growing number of older drivers. It is believed that older drivers' increased crash risk results from age-related declines in performance abilities necessary for safely operating a motor vehicle [Stalvey and Owsley, 2000]. Sensational crashes highlighted in the media fuel public concern about the safety of older drivers and those with whom they share the road. It generally is assumed, however, that some older drivers may self-regulate their driving as a strategy for maintaining their mobility while reducing crash risk. This self-regulation may explain the relatively low crash rates of older people per licensed driver and per capita. Researchers have begun to explore the association between age-related self-regulated driving practices, such as reducing the amount of driving and avoiding higher risk driving situations (e.g., driving at night), and a variety of driver characteristics.

Two studies reported that among older drivers in Alabama [Ball et al., 1998] and North Carolina [Stutts, 1998], reduced driving exposure (e.g., avoiding certain driving situations, driving fewer miles) was associated with lower cognitive and visual functioning. Stutts also reported that men were more likely than women to reduce their annual miles traveled. Similarly, Lyman et al. [2001] reported that among older drivers in Alabama, lower annual mileage was associated with greater cognitive impairment and poor distance vision, and driving difficulty was associated with medical conditions such as kidney disease and injuries sustained from recent falls. Women were more likely than men to report lower mileage and difficulty with driving.

West et al. [2003] found that older drivers in California who reported self-limited driving tended to be female, have lower memory scores, and have higher prevalence of stroke, arthritis, and hearing impairment. Drivers who reported self-limited driving due to vision impairment tended to be older, female, and have more medical conditions. Among a sample of older drivers in Maryland, Vance et al. [2006] reported that cognitive impairments and poorer health, but not physical functioning, were related to reduced mileage and avoidance of challenging driving situations. A study of older drivers in Victoria, Australia, reported that lower-mileage drivers tended to be female, age 75 or older, not married, not the principal driver in the household, and arthritic [Charlton et al., 2003]. Those who reported some avoidance of challenging driving situations also tended to be female,

age 75 or older, and not the principal driver, and were at greater odds of having a vision impairment and having had a crash during the prior 5 years. In contrast to these findings, Stalvey and Owsley [2000] studied visually-impaired older drivers in Alabama who had had a crash during the prior year. Most drivers did not recognize their own visual impairments and rarely or never avoided more complex driving situations such as driving on high-speed roads or making left turns.

Although researchers have begun to explore age-related changes in self-limited driving, much remains unknown about this process. Most of the previous studies were based on data that were collected more than a decade ago. Since the mid 1990s crash deaths and fatal crash involvements among older drivers gradually have been declining. Accordingly, more current research on driving patterns and self-regulation among older drivers is warranted. The present study is the first phase of a larger longitudinal study designed to examine changes in driving patterns over the next five years among a sample of older drivers. Unlike many prior studies, incremental age groups were examined to study specific age-related changes. The primary goal of the present study was to determine whether and to what extent self-limited driving is related to age, gender, medical conditions, vision, memory, physical functioning, and other driver characteristics. Analyses also explored patterns such as the types and model years of vehicles driven.

METHOD

Drivers 65 and older who were renewing their driver's license between November 2006 and December 2007 were invited to participate in a study of driving habits. Drivers were offered $10 for completing a 20-25 minute telephone interview. Limited resources and practical considerations were balanced with the desire for a representative sample of older drivers. Accordingly, participants were recruited from two AAA offices in Connecticut and from the Department of Motor Vehicle offices in Connecticut (three offices), Rhode Island (two offices), and Kentucky (one office). Connecticut allows drivers to renew their licenses in AAA offices whether they are AAA members or not. At all locations trained local residents served as recruiters. In all three states in-person license renewal is required except for special circumstances (e.g., in Kentucky military personnel are eligible for mail renewal). On average, participants were called within 33 days of being recruited.

The standardized, comprehensive interview consisted of questions on topics such as current driving patterns, recent changes in driving, functional abilities related to driving (vision, memory, physical functioning, diagnosed medical conditions), transportation options, prior crash involvement, and driver characteristics such as marital status. The questionnaire items on limited driving, vision, memory, physical functioning, and diagnosed medical conditions are shown in Appendix A.

Memory Impairment

Extent of memory impairment was determined based on nine items from the Short Term Memory Questionnaire [Maher, 2001] that asked participants to compare certain aspects of their current memory with their memory 5 years ago (e.g., Do you have more trouble recalling words than you did 5 years ago?). Responses were scored as 1 (yes) and 0 (no) and were summed to generate a memory impairment score (range 0-9).

Vision Impairment

Extent of vision impairment was determined based on seven items selected from the National Eye Institute Visual Functioning Questionnaire [Mangione et al., 2001] to assess near vision, distance vision, and peripheral vision (e.g., How much difficulty do you have reading street signs or the names of stores?). Response options ranged from 1 (no difficulty) to 4 (extreme difficulty) but were recoded as 0 (no difficulty) or 1 (at least some difficulty). A vision impairment score was calculated as the sum of the seven recoded items (range 0-7).

Physical Functioning Impairment

Extent of physical functioning impairment was determined based on five items selected from the Guttman Health Score for the Aged [Rosow and Breslau, 1966]. The items assessed the physical capacity to complete certain activities such as walking a half mile, climbing up and down a flight of stairs, and doing heavy housework. Response options ranged from 1 (very easy) to 4 (very difficult) but were recoded as 0 (no difficulty) and 1 (some difficulty). A physical functioning impairment score was calculated as the sum of the four recoded items (range 0-4).

Medical Conditions

Participants were asked if they had been diagnosed with any of the following medical conditions: Alzheimer's disease or other memory disorder, arthritis, diabetes, osteoporosis, hearing impairment, stroke, or heart attack. Scores were calculated as the sum of conditions with which participants were diagnosed (range 0-7).

Self-Limited Driving Practices

Participants were asked in an open-ended question whether they had begun to limit their driving and, if so, how. Responses were coded into categories such as avoid driving at night, drive less often, and drive shorter distances.

Additional items were developed by the researchers to assess the remaining topics of interest (e.g., use of alternative transportation, prior crash involvement).

Data Analysis

Multivariate binary logistic regression models examined driver characteristics associated with self-limited driving [Statistical Analysis System software (SAS), version 9.1]. Variables were included on the basis of prior research and/or and their predicted relationships with self-limited driving. State was included as a control variable to account for potential state differences. First, a full model was run to quantify the independent effects of memory, vision, physical functioning, and medical conditions while adjusting for driver age group (65-69, 70-74, 75-69, 80 and older), gender, marital status, state, and potential interactions of each impairment with driver age group. An iterative process was used where the statistical significance of the interaction terms were examined, and those with the largest p-values were iteratively removed. Chi-square analyses also were conducted to explore the driving behaviors and other characteristics of the sample. The Mantel-Haenszel chi-square statistic, rather than the Pearson chi-square statistic, was used when appropriate to test for linear trends among ordinal variables. P-values of 0.05 were used to evaluate all statistical tests. Analyses were conducted within each state rather than combining states' data because of potential state differences, including different licensing procedures for older drivers. For example, in Rhode Island drivers 70 and older must renew their driver's license every two years, whereas all drivers must renew every four years in Kentucky and every four or six years in Connecticut.

RESULTS

In total, 5,356 drivers were invited to participate in the study. Table 1 lists for each state the number of people invited to participate and the numbers who agreed to be called, were reached by telephone, and completed the telephone survey. Participation varied by state and was highest in Kentucky (58 percent) and lowest in Rhode Island (35 percent) ($\chi^2(2)=207.0$, $p<0.001$). Participation declined with driver age group only in Kentucky (Mantel-Haenszel: $\chi^2(1)=17.1$, $p<0.001$), where 64 percent of people ages 65-69 participated compared with 52 percent of people 80 and older. There was a significant relationship between driver gender and participation in Rhode Island ($\chi^2(1)=4.4$, $p=0.035$) and Kentucky ($\chi^2(1)=6.1$, $p=0.013$). In both states women were more likely than men to participate. In Kentucky, for example, 61 percent of women participated compared with 56 percent of men.

Driver age group and gender. Tables 2 and 3 list the percent distribution of participants in each state by driver age group and gender, respectively. The distribution of participants by age group was approximately equal for the three states combined but varied by state ($\chi^2(6)=89.1$, $p<0.001$). The percentage of participants who were women also varied by state ($\chi^2(2)=16.0$, $p<0.001$). In all three states more women were interviewed than men, with the largest difference in Kentucky, where 61 percent of participants were women.

Table 1 – Numbers of drivers asked to participate in study and those who participated by state

	Connecticut	Rhode Island	Kentucky
Invited to participate	1,656	1,392	2,308
Agreed to be called	1,174	649	1,604
Were reached by telephone	959	568	1,431
Participated in survey	828	485	1,337

Table 2 – Percent distribution of participating drivers by age group and state

Driver age group	Connecticut (n=828)	Rhode Island (n=485)	Kentucky (n=1,337)	Total (n=2,650)
65-69	23	15	33	26
70-74	26	25	26	26
75-79	21	31	19	22
80+	30	30	22	26
	100	100	100	100

Primary transportation mode. Overall 93 percent of participants reported that their primary mode of transportation was to drive themselves, and this varied somewhat by gender (Table 4). A greater percentage of women than men reported that they ride as passengers. Transportation mode varied by driver age group only in Kentucky ($\chi^2(6)=18.0$, p=0.006). Among 65-69-year-old participants, 97 percent reported they primarily drive themselves and 2 percent tended to ride as passengers. Among 80-year-old participants, 91 percent reported they primarily drive themselves and 8 percent primarily ride as passengers.

Vehicle type and model year. The vast majority of participants in each state reported driving cars (Table 5). However, there was a significant relationship between driver age group and vehicle type in all three states. The percentage of participants who reported driving cars increased with driver age group, and the percentages driving SUVs and pickups generally decreased with driver age group. There was a significant relationship between driver age group and vehicle model year in Connecticut and Kentucky (Table 6). In both states the proportion of newer model year vehicles decreased with driver age group.

Table 3 – Percent distribution of participating drivers by gender and state

Gender	Connecticut (n=828)	Rhode Island (n=485)	Kentucky (n=1,337)	Total (n=2,650)
Male	48	44	39	43
Female	52	56	61	57
	100	100	100	100

Table 4 – Percent distribution of participating drivers by primary transportation mode, state, and gender

	Connecticut (n=828)		Rhode Island (n=485)		Kentucky (n=1,337)	
Primary transportation mode	Male	Female	Male	Female	Male	Female
Drive self	95	91	96	86	97	92
Ride as passenger	3	7	2	12	3	8
Other	2	2	2	3	<1	<1
	100	100	100	100	100	100
	$\chi^2(2)=8.0$, $p=0.018$		$\chi^2(2)=15.1$, $p<0.001$		$\chi^2(1)=16.9$, $p<0.001$	

Table 5 – Percent distribution of vehicles driven by participating drivers by vehicle type, state, and driver age group

	Connecticut (n=828)				Rhode Island (n=485)				Kentucky (n=1,337)			
Vehicle type	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+
Cars	77	80	87	96	75	87	91	94	75	76	88	93
SUVs	6	7	5	<1	6	6	1	3	11	9	5	2
Pickups	17	13	7	4	19	6	7	2	14	15	7	5
	100	100	100	100	100	100	100	100	100	100	100	100
	$\chi^2(6)=37.8$, $p<0.001$				$\chi^2(6)=23.0$, $p<0.001$				$\chi^2(6)=52.9$, $p<0.001$			

Table 6 – Percent distribution of vehicles driven by participating drivers by vehicle model year, state, and driver age group

	Connecticut (n=828)				Rhode Island (n=485)				Kentucky (n=1,337)			
Model-year	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+
2003-07	42	34	29	25	35	41	28	32	35	36	35	29
1998-2002	36	36	40	29	28	31	32	29	41	40	36	33
1997 and older	22	30	31	46	38	28	40	38	24	25	29	38
	100	100	100	100	100	100	100	100	100	100	100	100
	$\chi^2(1)=27.0$, $p<0.001$				$\chi^2(1)=1.5$, $p=0.216$				$\chi^2(1)=11.4$, $p<0.001$			

Note. The Mantel-Haenszel chi-square statistic is reported.

Driving status and miles driven. Less than two percent of participants had not driven within the past six months, and less than one percent reported that they had given up driving (table not shown). The percentage of participants who reported driving 100 or more miles per week generally decreased with driver age in all three states (Table 7).

Planning for driving cessation. Fewer than 1 percent of participants said they had been advised by family, friends, or a physician to give up driving, and this did not vary significantly by driver age group or state. (table not shown). However, the percentage of drivers who reported planning for a time when they no longer will drive increased with driver age group in all three states (Table 8).

Driving-related impairments. Participants who reported having at least some impairment in memory, vision, or physical functioning, or having at least one diagnosed medical condition are listed in Table 9. The prevalence of driving-related impairments generally increased with driver age group. For example, in Kentucky 55 percent of participants ages 65-69 reported some memory impairment, compared with 74 percent of those 80 and older. Memory impairments and medical conditions were more common than vision or physical fitness impairments among participants in all states.

Self-limited driving. The percentage of participants who reported self-limiting their driving increased with driver age group in Connecticut and Kentucky (Table 10). The percentage of participants 80 and older who reported self-limiting their driving ranged from 37 percent (Rhode Island) to 49 percent (Connecticut). The most common ways participants reported self-limiting their driving were avoiding driv-

Table 7. Percent distribution of participating drivers by miles driven in a typical week, state, and driver age group

Miles driven in typical week	Connecticut (n=828)				Rhode Island (n=485)				Kentucky (n=1,337)			
	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+
<25	19	19	20	27	27	20	18	34	14	20	22	27
25-49	14	22	23	25	10	21	17	17	17	17	18	23
50-99	20	17	21	28	13	22	28	21	27	24	33	27
100+	47	42	36	21	50	37	38	28	42	39	27	22
	100	100	100	100	100	100	100	100	100	100	100	100
	$\chi^2(9)=36.1$, $p<0.001$				$\chi^2(9)=20.8$, $p=0.014$				$\chi^2(9)=46.5$, $p<0.001$			

Note. The Mantel-Haenszel chi-square statistic is reported.

Table 8. Percent distribution of participating drivers who reported planning for time when they no longer will drive by state and driver age group

Planning for driving cessation	Connecticut (n=828)				Rhode Island (n=485)				Kentucky (n=1,337)			
	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+
Yes	11	16	17	24	13	12	16	26	13	11	18	24
No	89	84	83	76	87	88	84	74	87	89	82	76
	100	100	100	100	100	100	100	100	100	100	100	100
	$\chi^2(1)=11.2$, $p<0.001$				$\chi^2(1)=8.5$, $p=0.004$				$\chi^2(1)=16.9$, $p<0.001$			

Note. The Mantel-Haenszel chi-square statistic is reported.

Table 9 – Percent of participating drivers who reported having at least some impairment by state and driver age group

Impairment	Connecticut (n=828)				Rhode Island (n=485)				Kentucky (n=1,337)			
	65-9	70-74	75-79	80+	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+
Memory	57	58	61	66	55	60	52	64	55	59	68	74
Vision	24	29	37	33	29	28	28	34	31	31	40	36
Physical functioning	20	26	24	40	36	33	24	46	28	29	37	46
Medical condition	50	58	69	69	65	71	72	74	62	69	75	80

Note. Cochran-Mantel-Haenszel chi-square test indicates relationship between driver age group and impairment was statistically significant in at least one state ($p<0.05$)

ing at night, driving less often, and driving shorter distances, although there were variations among the states (Table 11).

Variables Predicting Self-Limited Driving

The initial logistic regression model used to predict self-limited driving included the following variables: age group, gender, state, marital status, crash involvement in prior year, vision impairment, memory impairment, physical functioning impairment, and number of diagnosed medical conditions. The model also included the following interaction terms: age by vision impairment, age by memory impairment, age by physical functioning impairment, and age by number of medical conditions. After the iterative process, only main effects remained in the analysis. One main effect, crash involvement in prior year, was excluded because only 4 percent of participants reported a prior crash and the effect was nonsignificant (Table 12).

Participants with impairments in memory, vision, and physical functioning, and those with medical conditions were more likely to report self-limited driving. Specifically, the likelihood of participants self-limiting their driving was increased by 19 percent with each additional memory impairment item on which they reported increased difficulty compared with 5 year ago, 19 percent with each additional visual impairment item, 32 percent with each additional physical functioning impairment item, and 13 percent with each additional diagnosed medical condition.

Participants ages 75-79 and 80 and older were more likely than those ages 65-69 (reference category) to report self-limited driving. Participants 80 and older were more than twice as likely as those ages 65-69 to self-limit their driving. Participants who were widowed, single, or divorced were 53 percent more likely than those who were married (reference category) to self-limit their driving.

DISCUSSION

Memory impairment and medical conditions were more common than vision or physical functioning impairments among survey participants, and all impairment types generally increased with driver age group. Self-limited driving increased with driver age group, and the most common forms were avoiding driving at night, driving less often, and driving shorter distances. Few participants reported avoiding driving during rush hour or in busy traffic, driving alone,

Table 10 – Percent distribution of participating drivers who reported self-limiting their driving by state and driver age group

	Connecticut (n=828)				Rhode Island (n=485)				Kentucky (n=1,337)			
Limit driving	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+	65-69	70-74	75-79	80+
Yes	15	27	35	49	32	20	33	37	19	21	32	39
No	85	73	65	51	68	80	67	63	81	79	68	61
	100	100	100	100	100	100	100	100	100	100	100	100
	$\chi^2(1)=60.9$, $p<0.001$				$\chi^2(1)=3.7$, $p=0.053$				$\chi^2(1)=43.4$, $p<0.001$			

Note. The Mantel-Haenszel chi-square statistic is reported.

Table 11 – Percent of participating drivers who reported how they self-limit their driving among those who reported doing so by state

How driving has been self-limited	Connecticut (n=270)	Rhode Island (n=150)	Kentucky (n=354)	Total
Avoid night driving*	47	35	38	40
Drive less often	30	40	34	34
Drive shorter distances	30	27	30	30
Avoid interstates*	13	9	5	9
Avoid driving in ice	7	6	4	5
Avoid driving in snow	7	6	5	5
Avoid rush hour traffic	5	4	5	5
Avoid driving in rain	3	2	5	4
Avoid driving in unfamiliar places	2	1	4	3
Avoid busy roads	1	2	3	2
Avoid driving alone	2	1	1	1

*Statistically significant state difference.

Note. Multiple responses were allowed so percents sum to more than 100.

Table 12 – Summary of binary logistic regression model to predict whether participating drivers self-limit their driving

Variable	Reference category	Adjusted odds ratio	95% CI for odds ratio	
			Lower	Upper
Age	65-69			
80+		2.12	1.56	2.90
75-79		1.67	1.21	2.30
70-74		1.17	0.86	1.61
Female	Male	1.16	0.91	1.47
Widowed, single, or divorced	Married	1.53	1.21	1.95
State	Kentucky			
Connecticut		1.28	1.00	1.65
Rhode Island		1.12	0.83	1.51
Memory impairment		1.19	1.12	1.26
Vision impairment		1.19	1.08	1.30
Physical functioning impairment		1.32	1.18	1.48
Medical conditions		1.13	1.01	1.27

in unfamiliar places, or in the rain. These findings differ from some previous findings that drivers commonly avoid driving in the rain, during rush hour, and in busy traffic [e.g., Ball et al., 1998; Lyman et al., 2001; Stutts, 1998]. Reasons for the differences are not immediately clear, but may relate to sampling from different populations. Variables that predicted self-limited driving included older age; increased degrees of memory, vision, physical functioning impairments; number of medical conditions; and being not married (i.e., widowed, single, divorced). These findings are similar to those of earlier studies that vision and cognitive impairments are predictive of decreased driving and avoidance of certain driving situations [Ball et al., 1998; Lyman et al., 2001; Stutts, 1998]. However, in contrast to previous research [Charlton et al., 2003; Lyman et al., 2001; Stutts, 1998 West et al., 2003], driver gender was not predictive of self-limited driving. To better understand this finding we examined the percentages of men and women who reported limiting their driving. Across the three states combined the percentage was higher among women (32 percent) than men (25 percent) ($\chi^2(1)=13.7$, $p<0.001$. Marital status was a strong predictor of limited driving, and in our sample, 78 percent of men were married versus 46 percent of women. When the model was reanalyzed excluding marital status, gender was a significant predictor of limited driving (adjusted odds = 1.32, 95% CI = 1.07, 1.64). It is not clear why non-married drivers limit their driving more than married drivers, and this should be explored in future research.

For many Americans driving is the primary source of transportation. Public or alternative transportation that would meet daily travel needs is not widely available in many parts of the country. Strategies are needed to ensure the safety of older drivers and those with whom they share the road while balancing safe mobility needs. Researchers have begun to explore potential driver screening and assessment tests for determining high-risk drivers, but it is not clear whether these tests can be sufficiently sensitive to predict future crash risk with the accuracy required to justify suspending licensing privileges. It is unknown whether self-limited driving is associated with lower crash rates. If it is, interventions to promote self-limited driving among high-risk drivers may provide an alternative to state regulation, such as decisions by licensing authorities to restrict, suspend, or revoke a driver's license.

Also unknown is whether the appropriate drivers — those with higher crash risk — are the ones self-limiting their driving. There may be groups of high-risk drivers who are unaware of their driving-related impairments and how they may impact their driving [Stalvey and Owsley, 2000], and this should be explored. Because the present study was based on self-report data, it is unknown whether study participants accurately assessed their impairments, particularly those who reported having Alzheimer's disease, who were 0.4 percent of the sample. The validity of the survey instrument is unknown, although the survey items have been used by other researchers. There also is no biological basis to the scales on memory, vision, and physical functioning impairments, so the degree of increase in limiting driving by the level of impairment cannot be quantified specifically. Rather, the odds ratios from the logistic regression model should be interpreted as indicating generally that increased impairments (visual, memory, and physical function-

ing) and increased medical conditions contribute in some significant degree to self-limited driving.

Interventions to improve memory, vision, and physical functioning may be beneficial. Roenker et al. [2003] found that cognitive training to improve speed of processing (i.e., the ability to perceive and process information quickly) resulted in better driving performance on some driving simulator measures and resulted in fewer dangerous maneuvers during driving evaluations, compared with drivers who received only simulator training. Owsley et al. [2002] found that drivers who needed and underwent cataract surgery subsequently reduced by half their crash involvement rates per vehicle miles traveled, compared with drivers with cataracts who did not undergo surgery.

CONCLUSION

Findings of the present study were consistent with prior research, indicating that drivers with reported impairments in memory, vision, physical functioning, and/or medical condition are more likely than other drivers to self-limit their driving. This study is part of a larger effort to study changes in driving patterns over time among older drivers. Strengths of the present study include data obtained from a detailed survey instrument among a large sample of drivers 65 and older from three states. In addition to studying how driving patterns change among drivers over time, future research should explore whether self-limited driving enhances safety.

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APPENDIX A

Select questions from driving questionnaire

Limited driving

Have you limited your driving? If yes, how so?

Vision

Instructions: The next questions are about how much difficulty, if any, you have doing certain activities. If you wear glasses or contact lenses for that activity, assume that you are wearing them.

Response options: no difficulty, a little difficulty, moderate difficulty, or extreme difficulty

- How much difficulty do you have reading ordinary print in newspapers?

- How much difficulty do you have doing work or hobbies that require you to see well up close, such as cooking, sewing, or repairing things around the house?
- Because of your eyesight, how much difficulty do you have finding something on a crowded shelf?
- How much difficulty do you have reading street signs or the names of stores?
- Because of your eyesight, how much difficulty do you have seeing movies, plays, or sports events?
- Because of your eyesight, how much difficulty do you have going down steps, stairs, or curbs in dim light?
- Because of your eyesight, how much difficulty do you have noticing objects off to the side while you are walking along?
- Because of your eyesight, how much difficulty do you have driving during the daytime in familiar places?
- Because of your eyesight, how much difficulty do you have driving at night?

Memory

Instructions: For the next several questions, please compare yourself to 5 years ago.

Response options: yes, no

- Are other people telling you that you are more forgetful?
- Is concentration and focusing more difficult than it was 5 years ago?
- Are you being told that you are repeating yourself?
- Do you forget names, where you have left things, or appointments more than 5 years ago?
- Do you more frequently forget something you have just read compared to 5 years ago?
- Do you lose your train of thought more frequently in conversation than 5 years ago?
- Do you feel you are not as sharp as you were 5 years ago?
- Are simple everyday tasks like playing cards and balancing a checkbook more difficult than they were 5 years ago?
- Do you have more trouble recalling words than you did 5 years ago?

Medical conditions

Have you been diagnosed by a doctor or medical professional as having any of the following?

- Alzheimer's disease or any other memory disorder
- Arthritis
- Diabetes
- Osteoporosis
- Hearing impairment? (If yes, do you use a hearing aid?)
- Stroke
- Heart attack

Physical functioning impairment

Response options: very easy, somewhat easy, somewhat difficult, very difficult.

- How easy is it to turn your head and neck?
- How easy is it climb up and down one flight of stairs?
- How easy is it to walk one-half mile?
- How easy is it to do heavy housework like scrubbing a bathtub?
- How easy is it to do yard work?