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Frequent Falling and Motor Vehicle Collision Involvement of Older Drivers

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Abstract

OBJECTIVES—To examine the relationship between frequent falls in older drivers and motor vehicle collision (MVC) involvement.

DESIGN—Cross-sectional.

SETTING—North central Alabama.

PARTICIPANTS—Population-based sample of 2,000 licensed drivers aged 70 and older.

MEASUREMENTS—Self-reported history of falling two or more times in the prior year was the main predictor. Outcomes were any MVC or at-fault MVC in the prior year.

RESULTS—Approximately 9% of older drivers reported having fallen two or more times in the prior year. Logistic regression models indicated that frequent falling was associated with having any MVC (crude odds ratio (OR) = 1.53, 95% confidence interval (CI) = 0.77–3.02) and an at-fault MVC (OR = 2.21, 95% CI = 0.97–5.06). Adjustment for the potentially confounding effects of demographic, health, visual, and driving characteristics did not meaningfully affect the association with any MVC, whereas the association with at-fault MVC was weakened (adjusted OR = 2.03, 95% CI = 0.84–4.90).

CONCLUSION—Frequent falling was associated with at-fault MVC involvement of older drivers, especially whites. History of falling can be used to identify individuals at risk of MVC involvement and to begin a dialogue about driver safety. J Am Geriatr Soc 2013.

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Keywords

falls; aging; driver safety

Identifying risk factors for motor vehicle collision (MVC) involvement of older adults is a major public health concern because older drivers have among the highest MVC and MVC fatality rates per mile driven.[1] The risk of crashing increases rapidly after age 70,[1] and crashes in older drivers are more likely to result in injury, hospitalization, or death.[2] There is a need to understand the factors that negatively affect driving performance of older adults to make travel safer for seniors.[2]

Falls are an enormous threat to the health and well-being of elderly adults. Approximately one-third of community-dwelling older individuals fall each year,[3] with half of these having multiple falls.[4] Several studies have documented falls as a predictor of adverse driving events in older adults. One study reported that the odds of crash involvement were 50% higher for older drivers reporting a history of falling in the previous year.[5] In a prospective study, the same authors found that older drivers reporting frequent tripping or falling experienced an 85% greater risk of crashing, although they did not specify whether the driver was at fault.[6] Another study documented a similar relationship between occurrence of falls and future MVCs in elderly female drivers.[7] Still other studies have shown an association between proxies for falling (physical functional impairment and mobility limitations) and MVCs.[8,9]

Although prior research has indicated a positive association between falling and MVC involvement, no prior study, to the knowledge of the authors, has examined whether those who have frequent falls are at greater risk of MVC involvement than single or never fallers. In addition, no extant study on frequent falling has distinguished between any or at-fault MVC involvement. There is reason to believe that frequent falling is more strongly associated with MVC involvement because prior research suggests that frequent fallers are more likely to have evidence of frailty,[10] multiple chronic medical conditions, physiological impairments, and functional decline[11] than those who have fallen once, and many of these factors have also been associated with MVC risk.[12] In addition, the American Geriatrics Society has recommended that people who report two or more falls in a year have a clinician perform a comprehensive multifactorial fall risk assessment.[13] Therefore, frequent fallers may be an important high-risk cohort for refining and targeting prevention efforts.

To address this gap in the literature, the purpose of this cross-sectional study was to examine the relationship between frequent falling and history of MVC involvement using a large population-based study of older drivers from central Alabama.

METHODS

Study Population

The institutional review board of the University of Alabama at Birmingham approved the study, which was consistent with the Declaration of Helsinki. This study involved a population-based sample of older drivers (N = 2,000) as described previously.[14] To summarize, the source population consisted of adults aged 70 and older who resided in Jefferson County, Alabama, or the border areas of surrounding counties. Jefferson County is home to Birmingham, the most populous city in the state. According to the 2010 Census, there were 119,661 adults aged 70 and older residing in the recruitment area, of whom 80% were white, 19% were black, and fewer than 2% were of another race. Approximately 0.5% reported two or more races. Potential participants were randomly selected from a list obtained from a direct marketing company (Pinpoint Technologies, Tustin, CA). After driver's license status was confirmed through the Alabama Department of Public Safety, potential participants were mailed a letter about the study, followed by a telephone call to confirm eligibility. Persons were excluded if they had not driven in the last 3 months, were younger than 70, lived in a nursing home, or did not speak English. For individuals who were eligible and agreed to participate, an appointment was scheduled at the Clinical Research Unit in the Department of Ophthalmology, University of Alabama at Birmingham. Participants were enrolled between October 2008 and August 2011. For those who declined to participate, information on basic demographic characteristics (age, race and ethnicity, sex) and driving status were obtained. The final sample included 2,000 older adults; 82% were white and 18% were nonwhite, which is consistent with the demographic characteristics of the recruitment area.

Demographic and Health Characteristics

After written informed consent was obtained, a trained interviewer administered a series of questionnaires. The demographic review included questions on age, sex, race and ethnicity, education, and marital status. The general health questionnaire asked about 15 chronic medical conditions (Has a doctor ever told you that you have?…). Self-reported information was collected on smoking,[15] alcohol use,[16] and common chronic age-related eye conditions. All prescription and over-the-counter medications were recorded. The Mini-Mental State Examination (MMSE) was used to assess general cognitive status. Reduced cognitive status was defined as a MMSE score of 23 or less.

Participants were asked whether they had fallen in the previous 12 months. If yes, they were asked to report how many falls they had experienced. Frequent fallers were those who reported two or more falls within the prior year; infrequent or nonfallers were defined as those reporting one or no falls.

Visual Characteristics

The presence of five chronic age-related eye conditions was determined by obtaining a copy of participants' most recent eye examination performed by an ophthalmologist or optometrist. Participants completed a signed medical record release authorizing the study to obtain these records. An experienced coder of eye medical records recorded whether the participant had diagnoses of cataract, age-related macular degeneration, diabetic retinopathy or diabetic macular edema, or glaucoma or had an intraocular lens (IOL; meaning that cataract surgery had been performed). All diagnoses were coded separately for each eye. Participants were defined as having these age-related eye conditions in one or both eyes. A prior study reported that stereoacuity remained at a poor level after first-eye cataract surgery and IOL insertion, but improved to a near-normal level after second-eye surgery[17];

furthermore, poor stereo acuity was associated with poor mobility orientation and toe clearance. For the purpose of this analysis, IOLs were defined as having an IOL in one or both eyes. The coder was masked to all other data collected on the participant, and agreement with a second coder was high (91.4%). For the 101 participants whose most recent eye medical record could not be procured, self-reported eye condition was used, which has been shown to have moderate to substantial correspondence to medical record information for glaucoma ($\kappa = 0.73$), macular degeneration ($\kappa = 0.40$), and diabetic retinopathy ($\kappa = 0.47$) and slight correspondence for cataracts ($\kappa = 0.18$).[18]

Visual sensory tests for central vision and visual processing speed tests were administered. The specific tests were selected because of their established relevance to driving performance, licensure, or driving safety in older drivers.[19,20] For all testing, measurements were made under "habitual correction" if they had one, that is, participants wore whatever eye glasses or contact lenses they would normally wear for that viewing distance. All tests were administered under binocular viewing unless noted.

Visual acuity was assessed using the Electronic Visual Acuity (EVA) system, which was expressed as logarithm of the minimum angle resolvable (logMAR).Contrast sensitivity was estimated using the Pelli-Robson Contrast Sensitivity Chart and was scored using the letter-by-letter scoring method and expressed as log sensitivity. Visual acuity impairment was defined as 0.3 logMAR or less and contrast sensitivity impairment as less than 1.5 log sensitivity. The Visual Closure Subtest of the Motor-free Visual Perception (MVPT) was used to assess visual–spatial ability. Impaired MVPT performance was defined as fewer than eight cards correct.[19]

Visual processing speed under divided attention conditions was examined using the Useful Field of View (UFOV) subtest 2 (Visual Awareness Research Group, Punta Gorda, FL) and Trail-Making Test Part B (TMT-B). Impaired UFOV subtest 2 performance was defined in terms of moderate (150–350 ms) and severe (>350 ms) impairment.[19] Impaired performance on TMT-B was defined as a score of 2.47 minutes or greater.[19]

Driving Characteristics and MVC Involvement

The Driving Habits Questionnaire was used to collect information about annual mileage and number of places, trips, and days driven per week.[21] The Alabama Department of Public Safety provided accident reports for the 5 years before each participant's enrollment date. These reports provided information about the MVCs incurred in the previous 5 years in which the participant was the driver, the date of the MVC, and whether the police officer who came to the scene deemed the participant to be at least partially at fault. The criteria for this judgment have been used previously with excellent interrater agreement. To ensure overlap between self-reported fall information and driving history, the analysis focused on participants who had any MVC in the year before enrollment.

Statistical Analysis

T-tests were used for continuous variables and chi-square tests for categorical variables to compare characteristics between participants with and without a history of falling. Logistic regression was used to calculate odds ratios (ORs) and corresponding 95% confidence intervals (CIs) for the association between falling and occurrence of any and at-fault MVC involvement. Annual mileage was adjusted for to account for on-road driving exposure. Demographic, health, vision, and driving characteristics were included in a separate model to obtain adjusted estimates. Confounding was determined by comparing the crude and adjusted odds ratios; a difference of 10% or greater was considered evidence of confounding.[22] Statistical significance was defined as $P \leq .05$. Data were analyzed using SAS version 9.3 (SAS Institute, Inc., Cary, NC).

RESULTS

Of the 2,000 participants, 291 (14.6%) reported having one fall in the previous year, and 174 (8.7%) reported having two or more falls. Tables 1 and 2 compare the demographic, health, vision, and driving characteristics of frequent fallers with those of infrequent or nonfallers. Those defined as frequent fallers were more likely to be older and white. There were no differences according to sex, marital status, or educational attainment. There were more health problems among frequent fallers than infrequent or nonfallers with respect to number of self-reported medical conditions and hearing impairments. Frequent fallers were less likely to have cataracts and more likely to have IOLs in both eyes. Contrast sensitivity, UFOV, and TMT-B scores were poorer in frequent fallers. Frequent fallers reported driving fewer miles per year than those falling once or not at all.

Table 3 presents the association between frequent falls and MVC involvement. Overall, a history of frequent falling was associated with a nonsignificant 53% greater odds of MVC involvement in the prior year (95% CI = 0.77– 3.02). After adjusting for annual mileage and the potentially confounding effects of age, number of medical conditions, cataracts, IOLs, hearing impairment, contrast sensitivity, UFOV, and TMT-B, the association with any MVC involvement did not meaningfully change (OR = 1.55, 95% CI = 0.76–3.18). For at-fault MVCs, the association was stronger (OR = 2.21, 95% CI = 0.97– 5.06). After adjusting for annual mileage and potential confounders, frequent falling was associated with twice the odds of at-fault MVC (OR = 2.03, 95% CI = 0.84–4.90).

The positive association between frequent falling and MVCs appeared to be restricted to whites. During the prior year, none of the 17 African Americans who fell two or more times were involved in a MVC, compared with 19 of the 343 (5.5%) infrequent or nonfallers. For whites, 10 of the 157 (6.4%) frequent fallers had an MVC, compared with 51 of the 1,483 (3.4%) infrequent or nonfallers. After adjusting for annual mileage, in whites, frequent falling was associated with an OR of 1.84 (95% CI = 0.91–3.72, $P = .09$) and at-fault MVCs with an OR of 2.64 (95% CI = 1.12–6.24, $P = .03$). Adjusting for all potential confounders did not meaningfully affect the association with any MVC involvement, whereas the adjustment weakened the association with at-fault MVC involvement to 2.41 (95% CI = 0.97–6.00, $P = .06$).

As a comparison, the analysis was repeated to assess the overall association between any fall (≥1 falls in the previous year) and MVC involvement. Potential confounders (age, race, number of medical conditions, cataracts, presence of IOL, hearing impairment, contrast sensitivity, UFOV, TMT-B, a diagnosis of age-related macular degeneration, and use of sleep medications) were included in the adjusted analysis. After adjustment, a history of falling was associated with 10% greater odds of having any MVC involvement (*P* = .74) and 35% for at-fault MVC (*P* = .44).

DISCUSSION

Motor vehicle collisions and falls are two major public health problems affecting older adults. Recurrent fallers make up a significant proportion of all fallers. Given the number of falls and MVCs that occur among older adults each year, a better understanding of the relationship between them may help identify strategies to reduce their likelihood of occurrence. The goal of this study was to evaluate the association between frequent falling and MVC involvement. The results of the present study indicate that older drivers who reported falling two or more times in the prior year were 1.55 times as likely to be involved in a MVC and 2.03 times as likely to be involved in an at-fault MVC, although neither association was significant.

To the knowledge of the authors, this is the first study to examine frequent falling and MVC involvement. In one prospective study, older drivers reporting “frequent tripping or falling” had an 85% greater risk of a MVC (95% CI = 0.93–3.68), although the authors did not specify how frequent was defined, whereas the current study defined it as two or more falls.[6] In addition, the previous study did not limit MVCs to those wherein the driver was at fault. Additionally, the differences in the results may be a function of sample size; their study included 174 subjects, whereas the current study included 2,000 participants, which resulted in slightly narrower CIs. When the analyses were repeated using any falls (≥1) in the prior year, a considerably weaker association with MVC involvement (10%) and at-fault MVC (35%) was observed. Several studies have demonstrated a positive association between falling and MVC involvement, but the magnitudes are less consistent, ranging from 1.40 to 2.60.[5,7,19,23] Differences may also be due to recruitment and analyses that did not account for important confounders, such as contrast sensitivity or MVC measurement (any, at fault, or injury related). Although the current study’s estimates were considerably weaker, they still fell within the 95% CIs that previous studies reported. These results add to a growing literature that indicates that these two sources of unintentional injury are related.

The findings from this study confirm a number of demographic, health, and visual factors related to frequent falling. Consistent with other studies, frequent fallers were more likely to be older, perform worse on visual tests, and have multiple medical conditions.[23,24] Although it was not possible to assess physical functioning directly, frequent fallers had significantly lower annual mileage, which suggests they may exercise or venture out less, with consequent loss of strength and balance.[25] Cataracts were associated with infrequent or no falling, although it is likely that this is because frequent fallers were older and probably had cataracts extracted at an earlier age. Frequent fallers in the current study were also more likely to be white, although conflicting findings have been reported as to whether race is associated with greater risk of recurrent falls.[26,27] Mean MMSE scores were slightly lower in frequent fallers but did not differ significantly, although impaired cognition has also been shown to be associated with falls.[23,24]

The precise relationship between falls and MVCs is not completely clear, although the link is probably because of the number of shared risk factors, including visual, cognitive, and physical impairments.[12,25,28] Because of this overlap, it has been suggested that falling may be a proxy to identify older drivers with multiple risk factors that also impede driving ability.[7] As the number of factors increases, so does fall risk, so it appears logical that frequent falling is associated with MVC risk in older drivers, although in the current study, even after accounting for individual differences in many of these risk factors, frequent falling remained associated with MVC involvement, especially at-fault MVCs. Driving safety is multifaceted, so it is possible that there are other aspects of MVC involvement that were not explored, such as self-monitoring behaviors.[28] Further research is necessary to determine whether frequent fallers are less aware of their limitations and inadvertently put themselves at risk of a MVC.

The association between frequent falling and MVC involvement was confined to white participants, which the higher annual mileage that whites (10,169.4 miles/yr) drove than African Americans (6,604.3 miles/yr) in this study population may partly explain. It is not clear why the driving patterns were different according to race, although the African Americans in this study were more likely to have other characteristics associated with lower mileage, including being female, having multiple medical conditions, and having visual deficits.[29] Therefore, it is possible that African Americans who were fallers were more likely to restrict their time and miles on the road and limit their exposure to situations on the road in which collisions are more likely to occur. It is also possible that the study was not powered to detect an association because the number of frequent fallers in the African-American group was small and the incidence of MVC rare, so the lack of association between falling and history of MVCs in African Americans should be interpreted with caution.

There are some clinical and public health implications of these findings. From a clinical point of view, these results suggest that clinicians should be encouraged to educate people who report frequent falling about driving safety. Public health resources can be allocated, and prevention programs can be developed to target individuals at risk of MVC involvement. In addition, interventions need to be developed to improve balance and reduce the risk of falling in older adults, thereby potentially also reducing the risk of MVCs.

The results of this study must be interpreted in light of several strengths and limitations. First, this study design is cross-sectional in nature. The precise timing of the fall and crash events was not known, which precludes the determination of falling as a precursor to the MVC. Although a number of prospective studies suggest that falling predicts subsequent crash risk, it is plausible that older drivers may experience multiple falls after a MVC, perhaps because of decline in physical functioning and health-related quality of life.[30] Second, although this study had a large sample size, crashes are infrequent, so there were a limited number of crash events in the outcome. Examining the previous 5 years of crashes was considered, but the timeline with the exposure would not overlap, and the interpretation would be difficult. Another limitation is that this study may not be generalizable to older adults who are in poorer health or living in an institution. The cohort was similar to the recruitment area in terms of demographic characteristics, but only 465 (23%) of the 2,000 participants reported falling in the previous year, and 174 of those (37%) fell more than once, whereas roughly 30% of community-dwelling older adults fall each year, and approximately half of those fall more than once. Thus, recruitment resulted in a sample that appears to have a slightly lower prevalence of falling and recurrent falls than in previously published studies. This is not surprising given that the participants were ambulatory and community dwelling when initially recruited to participate; issues such as volunteer bias might have resulted in a sample that was healthier than the population as a whole. This would be expected to bias the results toward the null, so the results underestimate any true association. Lastly, this study relied on self-reported driving exposure, although other studies have reported good agreement between self-report and actual driving behavior.

This study also has several strengths. It included a large population-based sample of drivers aged 70 and older. Information on a large number of factors known to affect MVCs were included and adjusted for in the analysis. The use of police-investigated crash records and the ability to assess at-fault MVCs strengthened the study. The measure of fall status was similar but not identical to that of other studies, although two or more falls in the previous years was used because of its clinical relevance.

CONCLUSION

Falling two or more times in the previous year may be associated with at-fault MVC involvement, especially in white drivers. This finding has practical and clinical relevance for those caring for older adults. History of frequent falling can be used to identify individuals at risk of MVC involvement but also to begin a dialogue about driver safety.

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Table 1

Demographic and Health Characteristics of Older Drivers According to Frequent Fall Status at Baseline

Characteristic	All Participants, N = 2,000	Frequent Faller, n = 174[a]	Infrequent or Nonfaller, n = 1,826	*P*-Value
Age, n (%)				
70–79	1,433 (71.7)	113 (64.9)	1,320 (72.3)	.01
80–89	527 (26.4)	53 (30.5)	474 (26.0)	
≥90	40 (2.0)	8 (4.6)	32 (1.8)	
Age, mean ± SD	77.2 ± 5.0	78.5 ± 5.6	77.1 ± 4.9	.002
Sex, n (%)				
Female	870 (43.5)	78 (44.8)	792 (43.4)	.71
Male	1,130 (56.5)	96 (55.2)	1,034 (56.6)	
Race, n (%)				
African American	360 (18.0)	17 (9.8)	343 (18.8)	.003
White	1,640 (82.0)	157 (90.2)	1,483 (81.2)	
Marital status, n (%)				
Married	1,092 (54.6)	98 (56.3)	994 (54.4)	.63
Not married	908 (45.4)	76 (43.7)	832 (45.6)	
Education, n (%)[b]				
<high school	632 (31.6)	58 (33.3)	574 (31.5)	.96
High school or GED	51 (2.6)	4 (2.3)	47 (2.6)	
1–4 years of college	1,018 (50.9)	86 (49.4)	932 (51.1)	
Postgraduate degree	298 (14.9)	26 (14.9)	272 (14.9)	
Smoking status, n (%)[c]				
Never	944 (47.3)	81 (46.8)	863 (47.4)	.99
Former	958 (48.0)	84 (48.6)	874 (48.0)	
Current	93 (4.7)	8 (4.6)	85 (4.7)	
Alcohol use, drinks/week, n (%)				
0	947 (47.4)	88 (50.6)	859 (47.0)	.57
1–7	856 (42.8)	67 (38.5)	789 (43.2)	
8–13	120 (6.0)	13 (7.5)	107 (5.9)	
≥14	77 (3.9)	6 (3.5)	71 (3.9)	
Number of medical conditions, n (%)				
0–2	632 (31.6)	30 (17.2)	602 (33.0)	<.001
3–4	863 (43.2)	57 (32.8)	806 (44.1)	
≥5	505 (25.3)	87 (50.0)	418 (22.9)	
Eye conditions, n (%)				
Cataract in one or both eyes[b,d]	1,090 (54.5)	79 (45.4)	1,011 (55.4)	.01
Glaucoma[b,d]	350 (17.5)	29 (16.7)	321 (17.6)	.76

Characteristic	All Participants, N = 2,000	Frequent Faller, n = 174[a]	Infrequent or Nonfaller, n = 1,826	*P*-Value
Diabetic retinopathy or diabetic macular edema[d]	64 (3.2)	8 (4.6)	56 (3.1)	.27
Age-related macular degeneration[d]	343 (17.2)	29 (16.7)	314 (17.2)	.86
Intraocular lens[e]				
Both eyes	725 (38.2)	86 (50.3)	639 (37.0)	.002
One eye	164 (8.6)	14 (8.2)	150 (8.7)	
MMSE score, n (%)				
>23	1,953 (97.7)	170 (97.7)	1,783 (97.7)	>.99
≤23	47 (2.4)	4 (2.3)	43 (2.4)	
MMSE score, mean ± SD	28.2 ± 1.9	28.0 ± 2.0	28.2 ± 1.9	.21
Sleep medication use, n (%)	240 (12.0)	27 (15.5)	213 (11.7)	.14
Hearing impairment, n (%)	650 (32.5)	73 (42.0)	577 (31.6)	.005
Number of falls, n (%)				
0	1,535 (76.8)	—	1,535 (84.1)	<.001
1	291 (14.6)	—	291 (15.9)	
2	93 (4.7)	93 (53.5)	—	
3	35 (1.8)	35 (20.1)	—	
4	18 (0.9)	18 (10.3)	—	
≥5	28 (1.4)	28 (16.1)	—	

SD = standard deviation; MMSE = Mini-Mental State Examination.

[a] Falling ≥2 times in previous year.

[b] N=1 missing data.

[c] N = 5 missing data.

[d] Includes self-report.

[e] N=101 missing data.

Table 2

Vision and Driving Characteristics of Older Drivers According to Frequent Fall Status at Baseline

Characteristic	All Participants, N = 2,000	Frequent Faller, n = 174[a]	Infrequent or Nonfaller, n = 1,826	*P*-Value
Visual acuity, log of the minimum angle of resolution OU[b]				
>0.3, n (%)	161 (8.1)	15 (8.6)	146 (8.0)	.78
≤0.3, n (%)	1,837 (91.9)	159 (91.4)	1,678 (92.0)	
Mean ± SD	0.05 ≥ 0.14	0.07 ± 0.15	0.05 ± 0.14	.22
Contrast sensitivity, OU[c]				
≥1.5, n (%)	1,867 (93.4)	154 (88.5)	1,713 (93.9)	.007
<1.5, n (%)	132 (6.6)	20 (11.5)	112 (6.1)	
Mean ± SD	1.67 ≥ 0.13	1.64 ± 0.13	1.68 ± 0.13	<.001
Useful Field of View subtest 2, ms[c]				
<150, n (%)	1,125 (56.3)	77 (44.3)	1,048 (57.4)	.002
150–350, n (%)	653 (32.7)	68 (39.1)	585 (32.1)	
>350, n (%)	221 (11.1)	29 (16.7)	192 (10.5)	
Mean ± SD	163.4 ≥ 135.9	206.9 ± 151.5	159.3 ± 133.6	<.001
Trail-Making Test Part B, minutes[d]				
<2.47, n (%)	1,229 (61.6)	92 (53.2)	1,137 (62.4)	.02
≥2.47, n (%)	766 (38.4)	81 (46.8)	685 (37.6)	
Mean ± SD	2.6 ≥ 1.4	2.8 ± 1.6	2.5 ± 1.4	.02
Motor-free visual perception				
11, n (%)	606 (30.3)	52 (29.9)	554 (30.3)	.87
8–10, n (%)	1,094 (54.7)	98 (56.3)	996 (54.5)	
<8, n (%)	300 (15.0)	24 (13.8)	276 (15.1)	
Mean ± SD	9.3 ± 1.7	9.4 ± 1.6	9.3 ± 1.7	.53
Mileage per year				
<7,300, n (%)	966 (49.9)	94 (56.3)	872 (49.3)	.04
7,300–10,999, n (%)	422 (21.8)	40 (24.0)	382 (21.6)	
≥11,000, n (%)	549 (28.3)	33 (19.8)	516 (29.2)	
Mean ± SD	9,527.7 ± 9,420.2	8,059.2 ± 5,893.6	9,667.6 ± 9,679.0	.002
Number of MVCs past 1 year				
0, n (%)	1,920 (96.0)	164 (94.3)	1,756 (96.2)	.29
1, n (%)	79 (4.0)	10 (5.7)	69 (3.8)	
2, n (%)	1 (0.1)	0 (0.0)	1 (0.1)	
Mean ± SD	0.0 ± 0.2	0.1 ± 0.2	0.0 ± 0.2	.31
Number of at-fault MVCs past 1				
0, n (%)	1,959 (98.0)	167 (96.0)	1,792 (98.1)	.08
1, n (%)	41 (2.1)	7 (4.0)	34 (1.9)	

Characteristic	All Participants, N = 2,000	Frequent Faller, n = 174[a]	Infrequent or Nonfaller, n = 1,826	*P*-Value
Mean ± SD	0.0 ± 0.1	0.0 ± 0.2	0.0 ± 0.1	.16

MVC = motor vehicle collision; OU = both eyes (oculus uterque); SD = standard deviation.

[a]Falling ≥2 times in previous year.

[b]N=2 missing data.

[c]N=1 missing data.

[d]N=5 missing data.

Table 3

Crude and Adjusted Association Between Frequent Fall Status[a] and Motor Vehicle Collision (MVC) Involvement in the Previous Year

MVC	Crude	Adjusted[b] Odds Ratio (95% Confidence Interval) *P*-Value	Adjusted[c]
Any	1.53 (0.77–3.02) .22	1.49 (0.75–2.95) .26	1.55 (0.76–3.18) .23
Any at-fault	2.21 (0.97–5.06) .06	2.13 (0.93–4.89) .08	2.03 (0.84–4.90) .11

[a]Frequent faller defined as falling ≤2 times in the previous year.

[b]Adjusted for annual mileage (reference <7,300).

[c]Adjusted for annual mileage and age (continuous), race (reference nonwhite), number of medical conditions (reference 0–2), cataracts (reference none), presence of any intraocular lens (reference none), hearing impairment (reference none), contrast sensitivity (reference ≥1.5), Useful Field of View subtest 2 (reference <150), and Trail-Making Test Part B (reference <2.47).