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The Maryland House of Delegates
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Testimony of Delegate Dana Stein in Support of House Bill 296

Chairman Barve and members of the Environmental and Transportation Committee:

This is a re-introduction of a bill from last year, which this committee approved and the House approved 130 to 0.

I've introduced this bill in response to the tragedy that befell the Friedman family, who lost a family member in 2019 to the poor driving of an elderly driver.

Several states have implemented measures to try to ensure that older drivers still have the ability to drive safely. For example, a dozen states require more frequent license renewal for older drivers.

In Maryland, older drivers aren't required to renew their license more frequently. Just like everyone, older drivers renew their licenses every eight years and have the option of renewing by mail every other renewal. As to vision testing, everyone over 40 has to pass a vision test or provide proof when renewing via mail.

One other measure that some states have implemented is a requirement that older drivers renew in person for each renewal – the mail-in option is not available. There are 13 states that have this requirement, including Virginia, California, Texas, Georgia, and Illinois.

It turns out there's proof that this requirement is effective. *The Journal of the American Medical Association* found in a 2004 study that of these different measures—in-person renewal requirements, more frequent renewals, vision tests, road tests—the in-person renewal requirement actually has an impact in reducing elderly driver fatalities. *It reduces fatalities by 17%.* [1]

The study didn't identify the reasons for which in-person license renewal is related to a reduced fatality rate among elderly drivers. But the authors had a couple of theories, one of which is that "potentially unsafe older drivers may be less likely to re-apply for a license when facing in-person renewal. That is, potentially unsafe older adults may recognize the low likelihood of re-licensure and forego the license renewal process altogether." [2]

House Bill 296 would implement a requirement that drivers age 85 and above should renew in person for each renewal. MVA's most recent statistics on crashes involving drivers age 65 and older shows that between 2015 and 2019, the total number of crashes went up by 24%, from 12,736 to 15,795. While the number of fatal crashes remained about the same, the number of injuries went up by 19%, from 4,936 to 5,886 (see attached).

For all these reasons, I urge favorable consideration of House Bill 296.

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[1] "Elderly Licensure Laws and Motor Vehicle Fatalities," JAMA, June 16, 2004 – Vol. 191, No. 23, 2840-2846.

[2] JAMA Article at 2844.

Driver Age 65 - 110 Involved

County

County	2015	2016	2017	2018	2019	AVG.	%
Allegany	107	96	126	118	121	114	0.8
Anne Arundel	1,232	1,350	1,400	1,473	1,527	1,396	9.5
Baltimore	2,325	2,518	2,594	2,876	2,866	2,636	17.9
Calvert	172	160	175	189	197	179	1.2
Caroline	69	76	82	88	73	78	0.5
Carroll	325	329	364	362	395	355	2.4
Cecil	203	264	244	304	266	256	1.7
Charles	326	377	384	412	423	384	2.6
Dorchester	77	89	116	118	115	103	0.7
Frederick	427	465	553	522	524	498	3.4
Garrett	65	67	94	75	67	74	0.5
Harford	513	520	585	591	552	552	3.8
Howard	454	505	583	575	576	539	3.7
Kent	46	42	40	45	54	45	0.3
Montgomery	1,847	2,164	2,179	2,262	2,271	2,145	14.6
Prince George's	1,596	1,886	2,000	2,167	2,367	2,003	13.6
Queen Anne's	119	137	168	137	143	141	1.0
St. Mary's	184	237	233	236	269	232	1.6
Somerset	53	46	69	47	56	54	0.4
Talbot	187	152	180	189	172	176	1.2
Washington	341	417	409	404	406	395	2.7
Wicomico	308	414	378	441	393	387	2.6
Worcester	227	292	268	261	285	267	1.8
Baltimore City	1,533	1,876	1,787	1,707	1,677	1,716	11.7
Total Crashes	12,736	14,479	15,011	15,599	15,795	14,724	100.0

County	2015	2016	2017	2018	2019	AVG.	%
Allegany	43	48	57	53	59	52	0.9
Anne Arundel	493	535	577	585	581	554	9.9
Baltimore	855	870	920	1,020	956	924	16.5
Calvert	75	69	77	56	65	68	1.2
Caroline	26	37	31	30	35	32	0.6
Carroll	119	120	126	124	133	124	2.2
Cecil	86	98	92	107	105	98	1.7
Charles	125	155	141	138	157	143	2.6
Dorchester	38	40	54	51	53	47	0.8
Frederick	195	196	250	198	212	210	3.7
Garrett	29	22	54	25	34	33	0.6
Harford	204	185	230	203	196	204	3.6
Howard	157	184	192	164	190	177	3.2
Kent	20	17	16	20	24	19	0.3
Montgomery	778	947	886	878	929	884	15.8
Prince George's	614	752	734	725	770	719	12.8
Queen Anne's	44	58	57	48	46	51	0.9
St. Mary's	84	108	98	101	123	103	1.8
Somerset	21	25	30	20	35	26	0.5
Talbot	85	70	82	74	79	78	1.4
Washington	120	149	155	142	156	144	2.6
Wicomico	126	182	162	203	172	169	3.0
Worcester	82	110	104	99	102	99	1.8
Baltimore City	517	660	704	694	674	650	11.6
Injury Crashes	4,936	5,637	5,829	5,758	5,886	5,609	100.0

County	2015	2016	2017	2018	2019	AVG.	%
Allegany	2	0	2	0	0	1	0.9
Anne Arundel	5	9	4	10	8	7	7.9
Baltimore	19	9	11	16	17	14	15.8
Calvert	2	1	3	2	0	2	1.8
Caroline	3	1	0	3	1	2	1.8
Carroll	6	5	9	3	2	5	5.5
Cecil	2	5	1	2	2	2	2.6
Charles	2	7	2	4	1	3	3.5
Dorchester	1	0	3	1	2	1	1.5
Frederick	6	3	6	7	6	6	6.2
Garrett	2	3	1	0	0	1	1.3
Harford	3	2	4	2	4	3	3.3
Howard	3	5	0	1	7	3	3.5
Kent	1	1	1	1	1	1	1.1
Montgomery	11	8	7	5	8	8	8.6
Prince George's	12	7	9	11	10	10	10.8
Queen Anne's	1	0	4	1	2	2	1.8
St. Mary's	3	2	1	1	3	2	2.2
Somerset	1	0	3	1	2	1	1.5
Talbot	1	0	2	1	2	1	1.3
Washington	2	9	2	2	9	5	5.3
Wicomico	5	2	3	2	3	3	3.3
Worcester	3	2	3	1	2	2	2.4
Baltimore City	6	7	4	4	7	6	6.2
Fatal Crashes	102	88	85	81	99	91	100.0

Elderly Licensure Laws and Motor Vehicle Fatalities

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Context Little is known about how state-level driver licensure laws, such as in-person renewal, vision tests, road tests, and the frequency of license renewal relate to the older driver traffic fatality rate.

Objective To determine whether state driver's license renewal policies are associated with the fatality rate among elderly drivers.

Design, Setting, and Population Retrospective, longitudinal study conducted January 1990 through December 2000 of all fatal crashes in the contiguous United States identified in the Fatality Analysis Reporting System, which involved either an older (ages 65-74 years, 75-84 years, and ≥85 years) or middle-aged (ages 25-64 years) driver. Two regression approaches were used to study the effect of state laws mandating in-person renewal, vision tests, road tests, and frequency of license renewal on driver fatalities, controlling for state-level factors including the number of licensed elderly drivers, primary and secondary seatbelt laws, maximum speed limit laws, blood alcohol level of 0.08, and administrative license revocation drinking and driving laws, per capita income, and unemployment rate. The first regression approach examined only elderly driver fatalities and the second approach examined daytime elderly driver fatalities and used daytime fatalities among middle-aged drivers as a general control for unobserved variation across states and over time.

Main Outcome Measures Older driver fatalities and older and middle-aged daytime driver fatalities.

Results Among individuals aged 85 years or older, there were a total of 4605 driver fatalities and 4179 daytime driver fatalities during the study period. For this age cohort, after controlling for middle-aged daytime driver deaths, states with in-person license renewal were associated with a lower driver fatality rate (incident rate ratio [RR], 0.83; 95% confidence interval [CI], 0.72-0.96). This was the only policy related to older drivers that was significantly associated with a lower fatality risk across both regression models. Thus, state-mandated vision tests, road tests, more frequent license renewal, and in-person renewal (for individuals aged 65-74 years and 75-84 years) were not found to be independently associated with the fatality rate among older drivers in the 2 models.

Conclusions In-person license renewal was related to a significantly lower fatality rate among the oldest old drivers. More stringent state licensure policies such as vision tests, road tests, and more frequent license renewal cycles were not independently associated with additional benefits.

JAMA. 2004;291:2840-2846 www.jama.com

Motor vehicle fatality rates among older drivers have been increasing since 1980, particularly among those aged 85 years or older.[1] Moreover, elderly individuals have more fatal crashes per mile driven than any other group except teenage males.[2] The aging of the US population over the next 25 years makes these statistics particularly distressing. According to the Insurance Institute for Highway Safety: "Drivers aged 65 and older . . . are expected to account for as much as 25 percent of total driver fatalities in 2030, compared to 14 percent currently."[3] Although there is debate among clinicians about the appropriate role of public policy in regulating older drivers,[4,5] the American Medical Association recently released a report calling on physicians to help older motorists drive more safely by testing motor skills and by regulating medications.[6] Growing public concern over this issue is reflected in newspaper editorials calling for stricter licensure laws among the elderly.[7-9]

State governments have a variety of methods for increasing the stringency of the licensure process for elderly individuals, including the adoption of in-person renewal requirements, vision tests, road tests, and the implementation of a shorter renewal period. To our knowledge, there is no study that examines the relationship of these 4 features of licensure laws with elderly driver fatalities using recent data.[10-12] Therefore, we conducted a retrospective, longitudinal study using recent data of all fatal crashes in the contiguous United States to provide a comprehensive examination of the relationship between licensure laws and safety among elderly drivers.

METHODS

Study Population

This study uses motor vehicle fatality information from the 1990 through 2000 Fatality Analysis Reporting System (FARS). FARS, which is collected by the National Highway Traffic Safety Administration, is a census of all motor vehicle crashes on a trafficway cus-

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tomarily open to the public that resulted in the death of a person within 30 days of the crash.[13] FARS contains detailed information on the vehicles, drivers, occupants, and nonoccupants involved in the crash. We construct age, state, and year-specific fatality counts from FARS. The 11 years of FARS data encompass a total of 74428 driver fatalities among individuals aged 65 years or older within the contiguous United States, excluding Washington, DC. However, to ascertain the effects of certain motor vehicle licensure laws on older drivers, we also include a comparison group of all fatal crashes involving drivers aged 25 to 64 years. There were 231488 fatalities for this cohort during the study period. State-year is the unit of analysis; there were 528 observations (48 states × 11 years) in the complete dataset.

Data on motor vehicle laws and their dates of enactment were obtained from several sources. We began with compilations of laws from the Insurance Institute for Highway Safety.[14] We then conducted a telephone survey of all state departments of motor vehicles to confirm the laws, resolve inconsistencies, and obtain the dates of changes in the laws. In several instances, we used codes of annotated state statutes and specific legislative acts available on the Internet to determine when laws were implemented.

Annual state unemployment rate data and information on the consumer price index were obtained from the US Bureau of Labor Statistics.[15,16] Annual per capita income data were collected from the US Bureau of Economic Analysis and adjusted for inflation using the consumer price index.[17] Data on the number of licensed drivers by age group, state, and year were collected by the Federal Highway Administration and compiled in multiple editions of *Highway Statistics*.[18]

Study Variables

The number of overall and daytime (7 AM to 7 PM) driver fatalities were computed by age cohort for each year in each state. Separate computations were made for drivers aged 25 to 64 years, 65 to 74 years, 75 to 84 years, and 85 years or older.

Both the specific licensing requirements and the length of the renewal period may be related to older driver safety. The first binary variable measures whether a state has in-person renewal. In 2000, 45 states were in this category. The other 2 binary licensure variables measure whether the state used vision or road tests at the time of license renewal. In 2000, 40 states required vision testing for older drivers renewing their licenses and 2 states required road tests. Importantly, the in-person renewal, vision, and road tests are not mutually exclusive categories. Each binary variable captures the independent effect of the particular policy on the traffic fatality rate holding the other 2 policies constant. These laws are expected to have meaningful effects in reducing fatalities among older drivers because they either demonstrate impaired driving ability, as in the case of vision and road tests, or they provide an opportunity for the license examiner to observe potentially impaired drivers, as in the case of in-person renewals. Since 1990, there has been only minimal change in these laws within states over time.

The frequency of the driver's license renewal cycle was measured in years; the average renewal cycle in 2000 was 4.35 years. Two states have shortened the period of renewal for older drivers since 1990 and 3 states have lengthened the renewal period for younger drivers, but not for older drivers. In 2000, 36 of the 48 contiguous states used the same renewal provisions for middle-aged and elderly drivers and 14 states lengthened the renewal period for all adult drivers between 1990 and 2000. A longer period between license renewals is expected to increase fatalities. The longer interval is hypothesized to reduce the opportunity for license officials to observe the physical and mental condition of older license applicants whose abilities may rapidly decline over time. Additionally, a more frequent interval may discourage some older drivers from attempting to renew their license.

There are 6 other motor vehicle laws that may affect fatalities among older drivers that we include as covariates in the model, which are measured as state-year specific dichotomous variables.[10,19-21]

First, primary enforcement of mandatory seatbelt laws allows the police to stop vehicles solely for belt-law violations; 16 states had such laws in 2000. Second, secondary enforcement of seatbelt laws allows police to issue a ticket for a seatbelt violation, but only if there was another infraction; by 2000, 31 states had enacted such laws. Third, states have had the option to increase the maximum speed limit to 65 mph on rural interstate highways since 1987. In 1995, Congress repealed federal legislation limiting speed limits. In 2000, 19 states had a rural speed limit of 65 mph on rural interstates. Fourth, 29 states had a rural speed limit of 70 mph or higher on rural interstates in 2000. Fifth, by 1988, all states except Massachusetts had per se laws that made it a crime to drive with a blood alcohol level above 0.10. Between 1988 and 2000, 14 states lowered the legal threshold from 0.10 to 0.08. In 2000, Congress made the lower level the national standard. Sixth, in 2000, 39 states had administrative license suspension in which a driver's license may be taken before a conviction if a driver's blood alcohol level exceeds 0.08 or if the driver refuses to take the test.

Earlier studies of motor vehicle fatalities report the importance of controlling for the state of the economy.[22,23] Thus, the inflation-adjusted mean per capita income and the unemployment rate are included for each state-year observation.

The number of licensed drivers was reported by state and year for each of the age cohorts. For the period 1990 through 1993, there were 40 missing state-year observations for the cohort aged 75 to 84 years and 69 missing observations for the cohort aged 85 years or older. This variable was the only source of missing data in this

Table 1. State-Level Descriptive Statistics for 2000 (N = 48)

Statistic	Value
Motor vehicle fatalities by age of driver, mean (SD)	
Total	
25-64 y	315.23 (285.06)
65-74 y	36.38 (32.81)
75-84 y	34.60 (30.24)
≥85 y	11.90 (11.39)
Daytime	
25-64 y	149.33 (128.27)
65-74 y	27.98 (24.24)
75-84 y	28.90 (25.44)
≥85 y	10.65 (10.32)
Licensed drivers by age, median (25%-75%)	
25-64 y	1 997 700 (900 617-3 460 082)
65-74 y	235 067 (106 565-362 750)
75-84 y	136 552 (55 270-203 484)
≥85 y	30 896 (14 538-52 401)
Elderly licensure laws	
In-person renewal, No. (%)	45 (0.94)
Vision test, No. (%)	40 (0.83)
Road test, No. (%)	2 (0.04)
Renewal period, mean (SD), y	4.35 (1.06)
Other state laws, No. (%) of states	
Speed limit, mph	
65	19 (0.40)
≥70	29 (0.60)
Seatbelt	
Primary	16 (0.33)
Secondary	31 (0.65)
Blood alcohol level of 0.08	16 (0.33)
Administrative license suspension	39 (0.81)
Other, mean (SD)	
Per capita income	$16 226 ($2599)
Unemployment rate	3.84 (0.88)

Table 2. Number of State-Years That Policy in Effect (1990-2000)

Law	No. of State-Years
In-person renewal	495
Vision test	440
Road test	22
Speed limit, mph	
65	344
≥70	131
Seatbelt	
Primary	122
Secondary	357
Blood alcohol level of 0.08	111
Administrative license suspension	371
Total*	528

*Total number of annual state-year observations for which a policy was applicable to older drivers. The total sample includes 11 annual observations for each of the 48 contiguous states included in the study.

study. The natural log of age-specific licensed drivers is included as a measure of exposure in the multivariate model. TABLE 1 reports the means and SDs of the variables used in our analysis for 2000. TABLE 2 summarizes the number of state-year observations for which the various state laws were applicable to older drivers during the study period.

Of a total of 528 state-years in the data set, in-person renewal was in effect for 495 state-years, vision tests were in effect for 440 state-years, and road tests were in effect for 22 state-years. The 65 mph speed limit was in effect for 344 state-years; 70 mph or higher speed limit, 131 state-years; primary enforcement of seatbelt laws, 122 state-years; secondary enforcement of seatbelt laws, 357 state-years; blood alcohol level of 0.08, 111 state-years; and administrative license revocation, 371 state-years.

Statistical Analysis

The relationship of licensure laws and fatalities was examined using 2 separate estimation strategies. First, the effect of licensure laws on the number of elderly driver fatalities for the 3 older age cohorts (65-74 years, 75-84 years, ≥85 years) was examined in a multivariate regression framework, controlling for the other state laws, macroeconomic factors, and the number of age-specific licensed drivers.

The second estimation strategy recognizes that these other covariates included in the first multivariate specification may not adequately control for unobserved state-level factors that may be correlated with both elderly licensure laws and traffic fatalities. For instance, the degree of state law enforcement may be correlated with both the stringency of elderly licensure laws and the number of traffic fatalities. Thus, we use an alternate specification that relies on comparing the gap in fatalities between older and middle-aged drivers in states with and without these laws. This approach has been used in other contexts including the labor market effects of mandated maternity benefits and the effects of the minimum legal drinking age on teen childbearing.[24,25] The model assumes that middle-aged drivers should be subject to the same unobserved state-specific factors as older drivers (eg, the presence of law enforcement), but road tests, vision tests, in-person renewal, and the renewal frequency are predominantly important for the safety of the older age cohorts because of the frequency of detecting impairment is likely to be small for the middle-aged cohort. Because the majority of driver fatalities among older adults occur during daylight hours, we restrict the model to fatalities among older and middle-aged adults that occur between the hours of 7 AM and 7 PM. Thus, by comparing the differential effect of these laws on older relative to middle-aged daytime drivers in the state, we account for unobserved state-level factors in estimating the relationship between licensure laws and driver safety among the elderly.

We implement this strategy by including state-year observations representing both older and middle-aged driver fatalities (ages 25-64 years) within the regression model. Thus, the complete data set includes 1056 observations (ie, 11 years × 48 states × 2 age groups). The statistical test is accomplished by interacting the 4 state laws with age-cohort dichotomous variables. It is the interaction of older age and the presence of one of these laws that measures the estimated additional impact on older drivers relative to middle-aged ones.

It should be noted that this approach assumes that the same factors influence daytime traffic fatality rates among both middle-aged and older adults in a given state and year. The first specification, which includes state-year observations from the elderly age cohorts only may actually be preferable. There is little basis for distinguishing the approaches a priori. Therefore, the models are best viewed as complementary approaches for exploring the validity of this study's key findings.

To account for zero values in some state-year traffic fatality observations for the older age categories, all the equations are estimated as count models using negative binomial models. We used STATA regression statistical software (version 8.0, STATA Corp, College Station, Tex). Because of the likely presence of heteroskedasticity in the grouped state-year data, the Huber-White estimator was used to obtain robust SEs.[26]

Table 3. Association of Licensure Laws With Older Adult Driver Fatalities

	Total No. of Deaths Among Older Drivers		
	States With Law	States Without Law	Adjusted Incident RR (95% CI)*
Age 65-74 y (528 state-years)			
In-person renewal	18186	1502	1.05 (0.95-1.16)
Vision test	16454	3234	0.92 (0.85-0.99)
Road tests	720	18968	1.09 (0.97-1.21)
Renewal period, y†	NA	NA	1.01 (0.99-1.03)
Age 75-84 y (488 state-years)			
In-person renewal	15000	1297	0.95 (0.86-1.05)
Vision test	13678	2619	0.95 (0.87-1.04)
Road tests	621	15676	0.98 (0.87-1.12)
Renewal period, y†	NA	NA	1.01 (0.98-1.03)
Age ≥85 y (459 state-years)			
In-person renewal	4275	330	0.83 (0.71-0.96)
Vision test	3911	694	1.07 (0.95-1.20)
Road tests	142	4463	1.01 (0.79-1.28)
Renewal period, y†	NA	NA	1.02 (0.99-1.05)

Abbreviations: CI, confidence interval; NA, not applicable; RR, rate ratio.
*Adjusted for the natural log of licensed drivers in the given age cohort, the state unemployment rate, the real per capita state income, and binary indicators for primary seatbelt, secondary seatbelt, 65 mph rural speed limit, 70 mph or higher rural speed limit, blood alcohol level of 0.08, and administrative license suspension laws, and year dummy variables. Models are estimated using negative binomial regression. Each regression includes state and year cells representing the older age group (65-74 years, 75-84 years, or ≥85 years). The dependent variable is the count of fatalities in the given age group. The CI was constructed using Huber-White adjusted SEs.
†Based on the increment of 1 year.

RESULTS

TABLE 3 contains results from the first multivariate specification examining the relationship of licensure laws and the elderly driver fatality rate. In this model, only 2 statistically significant findings emerge across the 3 age cohorts. First, those states with a law mandating in-person renewal were associated with a lower fatality rate for drivers aged 85 years or older relative to states without in-person renewal (incident rate ratio [RR], 0.83; 95% confidence interval [CI], 0.71-0.96). During the study period, there were 4605 total driver fatalities within this age cohort. Second, those states with vision tests laws were associated with a lower (incident RR, 0.92; 95% CI, 0.85-0.99) fatality rate for drivers aged 65 to 74 years relative to states without vision test laws. During the study period, there were 19688 total driver deaths within this age cohort. Road test laws and the state-mandated length of the renewal period were not independently associated with fatalities in any of the 3 age cohorts.

TABLE 4 contains results from the second multivariate specification, which accounts for omitted variables by exploiting variation in daytime fatality rates among middle-aged drivers across states. Once again, a state law mandating in-person renewal was associated with a lower driver fatality rate for those aged 85 years or older compared with those aged 25 to 64 years (incident RR, 0.83; 95% CI, 0.72-0.96). This result is based on 4179 daytime driver deaths within this age cohort. However, a state law mandating in-person renewal was not significantly associated with the fatality rate for the 2 other age cohorts. State laws pertaining to vision tests, road tests, and the length of the renewal period were not statistically associated with the fatality rate among older drivers for any of the 3 age cohorts.

COMMENT

This study represents the first comprehensive analysis of licensure laws and the fatality rate among older drivers using recent national data. Across 2 alternative multivariate specifications, states with in-person license renewal were found to be associated with a lower driver fatality rate for the cohort aged 85 years or older. The estimates from the 2 model specifications were remarkably similar. That is, the relative incidence rate for states with in-person license renewal was roughly 17% lower than those states with no in-person renewal. However, in-person renewal was not associated with a lower fatality rate among the 2 relatively younger cohorts. Moreover, taken together, our 2 alternative estimation strategies indicated that state laws mandating vision tests, road tests, and more frequent renewals were not associated with a lower

Table 4. Association of Licensure Laws With Daytime Driver Fatalities

	Total Older Driver Daytime Deaths		
	States With Law	States Without Law	Adjusted Incident RR (95% CI)*
Age 65-74 y (1056 state-years)			
In-person renewal	13995	1157	1.06 (0.96-1.16)
Vision tests	12661	2491	0.94 (0.87-1.02)
Road tests	540	14612	1.08 (0.96-1.22)
Renewal period, y†	NA	NA	1.00 (0.98-1.03)
Age 75-84 y (976 state-years)			
In-person renewal	12767	1126	0.93 (0.84-1.02)
Vision tests	11636	2257	0.98 (0.89-1.07)
Road tests	545	13348	1.13 (1.00-1.27)
Renewal period, y†	NA	NA	1.00 (0.98-1.03)
Age ≥85 y (918 state-years)			
In-person renewal	3869	310	0.83 (0.72-0.96)
Vision tests	3535	644	1.07 (0.94-1.21)
Road tests	127	4052	1.10 (0.87-1.40)
Renewal period, y†	NA	NA	1.02 (0.98-1.05)

Abbreviations: CI, confidence interval; NA, not applicable; RR, rate ratio.
*Adjusted for the natural log of licensed drivers in the given age cohort, the state unemployment rate, the real per capita state income, and binary indicators for primary seatbelt, secondary seatbelt, 65 mph rural speed limit, 70 mph or higher rural speed limit, blood alcohol level of 0.08, and administrative license suspension laws, and year and age cohort dummy variables. Models are estimated using negative binomial regression. Each regression includes state and year cells representing both a middle-aged (25-64 years) and older age group (65-74 years, 75-84 years, or ≥85 years). The dependent variable is the count of fatalities in the given age group. The CI was constructed using Huber-White adjusted SEs.
†Based on the increment of 1 year.

fatality rate among older drivers. Thus, the bottom line from this study is that in-person renewal is associated with a lower fatality rate among the oldest old drivers, but vision tests, road tests, and more frequent renewals are not independently associated with additional safety benefits.

This study cannot address the exact mechanism by which in-person license renewal is related to the fatality rate among elderly drivers (aged ≥85 years), but we can speculate on 2 causal pathways. Both hypotheses stem from previous research that has found that states with more stringent license renewal requirements are associated with lower rates of licensed elderly drivers.[27] First, in-person renewal requirements provide an opportunity for license inspectors to either refuse to grant licenses to obviously impaired drivers or to refer such persons for medical evaluation prior to receiving a new license. Thus, it may be the case that greater numbers of potentially unsafe older drivers are detected and refused a license within the in-person renewal process.

Given this explanation, one may expect state laws mandating vision and road tests to be associated with additional safety gains independent of in-person license renewal, but our findings did not support such a relationship. Recent research has argued that vision acuity is only weakly related to crash involvement.[28] Thus, the vision acuity tests used by most states in the license renewal process may not detect additional unsafe drivers relative to in-person renewal without such a vision test requirement. However, it is important to note that in-person renewal allows driver license examiners the opportunity to refer certain older drivers for medical evaluation, and some of these evaluations may include more sophisticated testing such as neurological examinations, comprehensive visual examinations, simulator tests, and road tests. Thus, it would be a mistake to conclude based on our results that there is never a benefit to a comprehensive medical evaluation. On an individual basis, these evaluations may be important toward identifying potentially unsafe drivers. However, our interpretation of the findings is that in-person license renewal effectively captures the "going to the department of motor vehicles" phenomenon and that state laws mandating vision and road tests for all older drivers do not offer independent benefits toward lowering the fatal crash rate among older drivers.

A second hypothesis consistent with our findings is that potentially unsafe older drivers may be less likely to reapply for a license when facing in-person renewal. That is, potentially unsafe older adults may recognize the low likelihood of relicensure and forego the license renewal process altogether. Unfortunately, state-level data on the number of elderly applicants for licenses are not available nationally over time, but this explanation would fit into the broader literature showing that older drivers impose many restrictions on their own driving behavior. For example, older drivers have been found to limit driving at night, in poor weather, on highways, during rush hour, and following at-fault crashes.[29] Moreover, other research has shown that older adults limit their driving with early changes in their spatial vision function and depth perception.[30] In the broad continuum of driving behaviors, the self-restriction of driving may culminate in the cessation of driving altogether. Although we cannot test this relationship directly with our current data, an in-person license renewal requirement may serve as a deterrent to relicensure for potentially unsafe elderly drivers.

Our findings differ in some respects from the earlier literature on licensure laws and older driver fatalities. In contrast to our findings, the existing literature has generally argued that vision tests are associated with lower elderly driver fatality rates. In a multivariate study of the national FARS data for the 5-year period (1985-1989) directly preceding our study period, Levy et al[2] found that state-mandated tests of visual acuity were associated with a lower fatal crash risk for elderly drivers aged 70 years or older. In a multivariate study of FARS data for the period 1989 through 1991, Shipp[12] found that vision test laws were significantly associated with lower vehicle occupant fatality rates among drivers aged 60 years or older. Finally, in a bivariate study of FARS data from 20 states for the period 1986 through 1988, Nelson et al[31] found that states with vision test laws were associated with a lower fatal crash involvement rate for drivers aged 65 years or older.

There are several explanations for the different conclusions regarding vision tests between our study and previous work. First, we have specified our model differently from earlier work by separately examining the effects of in-person license renewal and vision test laws. The previous studies of vision test laws have neglected to account for in-person renewal by grouping all states without vision test laws together in the control group, regardless of whether the state had in-person license renewal or not. In 2000 for example, 5 states had in-person renewal requirements without mandating vision tests. Thus, the negative association we observe between in-person renewal and the driver fatality rate among the elderly in our study may have been misattributed to vision test laws in earlier studies.

Our multivariate estimates also differ from the earlier literature in several other significant ways. Our data are more recent (1990-2000) than the other studies. Other investigators generally examined data from the 1980s and early 1990s. Given the trends toward increased licensure rates and higher annual mileage driven among older persons,[3] the earlier data may be less relevant for today's elderly driving population. The investigators in earlier studies also did not control for state traffic laws unrelated to licensure such as seatbelt, speed limit, and alcohol-control laws. Our study is the also first to recognize potential heterogeneity in the response to licensure laws in the younger old and the older old. Earlier work, which grouped all elderly above a particular age together, might have masked or distorted relationships within different elderly age groups. For example, we found a statistically significant relationship between in-person license renewal and the elderly driver fatality rate for the cohort aged 85 years or older, but no significant relationship among the cohort aged 65 to 74 years or the cohort aged 75 to 84 years.

A final distinction between this article and the earlier literature is the use of the middle-aged daytime driver fatality rate as a control for unobserved variation in driving conditions across states and over time. Because it is difficult to construct a fully specified model due to data limitations, omitted variable bias is always a concern when modeling state motor vehicle rates. Only 1 previous study in the literature explored a similar model specification as a (unreported) sensitivity check to their main results.[2] Importantly, our main results remained essentially stable when we introduced middle-aged daytime drivers as a general control within the model. This sensitivity check supports the idea that unobserved heterogeneity is not the underlying source of our findings.

In regard to road test laws, previous research generally supports our current finding that these laws are not independently associated with lower fatality rates among older adults. Levy et al[2] found no significant association between road test laws and the driver fatality rate among older adults. Similarly, Rock[11] found that eliminating a state law mandating road tests in Illinois for drivers aged 69 to 74 years in late 1989 did not increase the fatality crash rate among elderly Illinois drivers in this age group relative to a control group that experienced no change in requirements. However, in contrast to our findings, increasing the frequency of renewal from 4 years to 2 years for those aged 81 to 86 years and 1 year for those aged 87 years or older was found to significantly decrease the fatality crash rate relative to the control group. One explanation for the difference in findings relative to our study is that Illinois is one of the most stringent states in terms of the frequency of license renewal. By comparison, only 11% of the state-year observations in our study had a renewal period of less than 4 years. For those older drivers with rapidly declining driving skills, more frequent renewals may be necessary to observe a significant decrease in the fatality rate. Further work examining this issue is necessary.

The current study has limitations. Some of the laws evaluated in this study, such as road tests, have only been implemented in a handful of states. This makes it difficult to obtain precise estimates of their relationship with older driver safety. In addition, little is known about the degree of enforcement of the license renewal tests across states and over time. Moreover, we broadly classified states with and without vision test laws without considering the level of visual acuity required by states. In terms of the FARS data, we can only measure the year of the fatal crash, not the year in which the driver involved renewed his/her license. Although there were few changes in state licensure laws during our study, any changes during the study (or in the years immediately preceding the study) may have led us to misclassify the state licensure laws in effect at the time of license renewal. Finally, FARS data only allow an investigation of fatalities; research also is needed on the nonfatal consequences of licensure laws for older drivers.

Across 2 different estimation strategies, the results of this study support the importance of in-person license renewal for older adults as a potential mechanism toward decreasing the fatality crash rate among the oldest old drivers. However, more stringent state licensure laws mandating vision tests, road tests, and shorter renewal cycles were not independently associated with a decrease in the older driver fatality rate.

Author Contributions: Dr Grabowski had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Grabowski, Morrisey.
Acquisition of data: Grabowski, Morrisey.
Analysis and interpretation of data: Grabowski, Campbell, Morrisey.
Drafting of the manuscript: Grabowski, Morrisey.

Critical revision of the manuscript for important intellectual content: Grabowski, Campbell, Morrisey.
*Statistical expertise:*Grabowski, Morrisey.
Obtained funding: Grabowski, Morrisey.
Administrative, technical, or material support: Campbell.
Supervision: Morrisey.
Funding/Support: This research was supported in part by grant 01230 from the University Transportation Center for Alabama and by grant R49/CCR403641 from the Centers for Disease Control and Prevention, National Center for Injury Prevention and Control to the Injury Control Research Center at the University of Alabama at Birmingham.
Role of the Sponsor: Other than providing financial support, the University Transportation Center for Alabama and the Injury Control Research Center at the University of Alabama, Birmingham, played no part in the collection or analysis of these data or approval of publication.

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