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Driver licensing, motor vehicle crashes, and moving violations among older adults

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Abstract

Introduction: Driving is important for well-being among older adults, but age-related conditions are associated with driving reduction or cessation and increased crash risk for older drivers. Our objectives were to describe population-based rates of older drivers' licensing and per-driver rates of crashes and moving violations.

Methods: We examined individual-level statewide driver licensing, crash, and traffic citation data among all New Jersey drivers aged ≥65 and a 35- to 54year-old comparison group during 2010–2014. Rate ratios (RR) of crashes and moving violations were estimated using Poisson regression.

Results: Overall, 86% of males and 71% of females aged ≥65 held a valid driver's license. Older drivers had 27% lower per-driver crash rates than middle-aged drivers (RR: 0.73, 95% CI: 0.73, 0.74)—with appreciable differences by sex—but 40% higher fatal crash rates (RR: 1.40 [1.24, 1.58]). Moving violation rates among older drivers were 72% lower than middle-aged drivers (RR: 0.28 [0.28, 0.28]).

Conclusion: The majority of older adults are licensed, with substantial variation by age and sex. Older drivers have higher rates of fatal crashes but lower rates of moving violations compared with middle-aged drivers.

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Practical applications: Future research is needed to understand the extent to which older adults drive and to identify opportunities to further reduce risk of crashes and resultant injuries among older adults.

Keywords

Driving; epidemiology; elderly drivers; population aging; travel behavior

1. Introduction

The U.S. Census Bureau estimates that the population of adults over age 65 grew from 35 million in 2000 to 49 million in 2016 and is projected to be over 85 million in 2050 (Ortman, Velkoff, & Hogan, 2014; U.S. Census Bureau, 2017). As the number of older adults increases, the number of older adults who drive will likely also increase. Indeed, the Federal Highway Administration (FHWA) has indicated that older adults make up an increasing proportion of all drivers, up to one in four by 2050 (National Center for Statistics and Analysis, 2016; National Highway Traffic Safety Administration, 2015). Driving is critical for well-being and quality of life for older adults as it promotes ongoing independence and mobility (Fonda, Wallace, & Herzog, 2001; Marottoli et al., 2000). Conversely, driving cessation has been associated with increased depression and decreased psychological well-being, and has been shown to be a predictor of death among older adult populations (Dickerson et al., 2017; Fonda et al., 2001).

Although there are numerous benefits for older adults who maintain a driver's license, issues associated with advancing age potentially heighten susceptibility to crashes. A study of critical driver errors that occurred in the moments before a crash found that inadequate surveillance of surroundings was more prevalent among older drivers than middle-aged drivers (Cicchino & McCartt, 2015). This type of error—which involves looking but not seeing another vehicle or traffic signal—may be related to diminished visual abilities and processing speed that occur with aging. Indeed, surveys of self-reported driving habits found that vision impairment, cognitive decline, falls, and other age-related conditions have been associated with difficulties in certain driving situations (i.e., driving at night, in the rain, or during rush hour) and with driving reduction or cessation (Dugan & Lee, 2013; Emerson et al., 2012). Furthermore, although nonfatal crash involvement among older drivers is lower than that of middle-aged drivers, older drivers are still at higher risk of dying in a car crash (Cheung & McCartt, 2011; Cicchino, 2015; Cicchino & McCartt, 2014). The risk of driver or front seat passenger fatality increases by approximately 3% with each year of age and may be attributed to physical health, including changes in muscle mass, bone density, and bone geometry (Kahane, 2013; Wang et al., 2007).

Given the importance of ensuring continued independence among older adults as well as the safety of all road users, it is essential that we have a full understanding of the extent to which older adults are licensed to drive and their risk of adverse driving outcomes. However, researcher access to state-level data on driver licensing is rare. State licensing agencies do provide age group- and sex-specific counts of licensed drivers annually to FHWA (U.S. Department of Transportation & FHWA, 2016). However, these data—which have been used in several previous crash studies to account for the number of licensed drivers (Cheung & McCartt, 2011; Cicchino & McCartt, 2014)—have been shown to be inaccurate; some researchers have strongly cautioned against use of these data (Curry et al., 2014; Foss & Martell, 2013; Insurance Institute for Highway Safety, 2006). Furthermore, studies of older driver crashes have been limited in that they have not examined sex-specific crash rates or the severity of crash-related injuries (Cheung & McCartt, 2011; Cicchino & McCartt, 2015, 2014; Insurance Institute for Highway Safety, 2015; Lombardi et al., 2017).

Finally, traffic violations may provide insight into driver behavior, but few recent studies have examined moving violation rates among older drivers. One study explored the association between crashes or moving violations and cognitive impairment among 104 older drivers, and found that a history of crashes or violations was associated with amyloid brain depositions that may be indicative of preclinical Alzheimer's disease, but did not explore violations separately (Ott et al., 2017). On a larger scale, one study from the early 1970s has suggested that per-driver moving violations decrease with age (Harrington & McBride, 1970). Given the introduction of in-vehicle technology and electronic equipment use over the last several decades, updated rates of moving violations are needed to understand risky driving behaviors and guide future crash prevention efforts.

Thus, we conducted a rigorous examination of population-based rates of older drivers' licensing, police-reported crashes, and moving violations using individual-level data. Specifically, we aimed to estimate age group- and sex-specific rates of these outcomes among licensed drivers aged 65 and older, as well as among a 35- to 54-year-old ("middle-aged") comparison group (Cheung & McCartt, 2011; Cicchino & McCartt, 2015, 2014). To do this, we analyzed data from a five-year period (2010–2014) from a unique, comprehensive data warehouse that contains the full driver licensing, police-reported crash, and moving violation history of every driver in the state of New Jersey (NJ).

2. Materials and Methods

2.1 Data Sources

Licensing, crash, and violation data were from the New Jersey Traffic Safety Outcomes (NJ-TSO) data warehouse, which includes linked data from two administrative databases —the NJ Motor Vehicle Commission's licensing database and the NJ Department of Transportation's crash database. Full details of this linkage are described elsewhere (Curry, Pfeiffer, Localio, & Durbin, 2013). Briefly, the NJ driver licensing database contains the driver licensing history for each NJ driver through 2014—including dates of birth, death, initial licensure, suspensions and restorations, and license expiration. The licensing database also includes the date and reason for all traffic violations issued to each driver, populated directly by the NJ Administration of the Courts. In NJ, moving violations are citations for infractions that add points to an individual's driving record and include speeding, careless driving, failure to stop or yield, and use of electronic devices while driving (DMV.ORG, 2018). The crash database contains data collected on the NJ police crash report for each police-reported crash occurring in NJ through 2014. A crash in NJ is reportable if it results in an injury or over $500 worth of property damage. These two databases were linked via a hierarchical deterministic linkage; in total, 98% of crash-involved NJ drivers matched to a unique licensing record (Curry et al., 2013).

2.2 Study Outcomes

The primary licensing outcome was the proportion of NJ's older population (aged 65 and older) with a valid driver's license; we used NJ's middle-aged population (aged 35 to 54) as a comparison group. We estimated licensing proportions for each month of the study period (January 2010December 2014) using the total number of drivers with valid licenses divided by the total estimated population for that month. To calculate population denominators, we estimated the monthly sex-specific NJ population by single year of age for 35- to 84-year-olds and grouped age for those age 85 and older using linear interpolation of annual estimates and decennial counts from the Census Bureau for July 2009 through July 2015 (U.S. Census Bureau, 2016b, 2016a). For the numerator, we used licensing data to determine the number of licensed drivers in a given month—that is, the number of drivers who held a valid driver's license on the 15^{th} of that month. Sex and age were also ascertained from the licensing record. Deceased and unlicensed drivers, or those whose license was expired or suspended on the 15^{th} of the month, were not included as licensed for that month.

The primary driving outcomes were crash and moving violation rates. We calculated crash rates as the total number of police-reported crashes among licensed drivers divided by the total number of licensed drivers for each month. Fatal crashes were those that resulted in a fatality to anyone involved in the crash, as noted on the crash report; injury crashes were those that resulted in a moderate or greater severity injury. We calculated moving violation rates as the total number of moving violations issued to drivers with a valid license divided by the total number of licensed drivers for a specific month; the specific type of each issued moving violation was also identified.

2.3 Other Variables

The residential address (as of 2014) from the licensing record was used to define zip code-level indicators for median household income and population density for each driver. We used the 2007–2011 American Community Survey (ACS) and 2010 Census Gazetteer Files to categorize NJ zip codes into quintiles of median household income and population density (people per square mile), respectively (U.S. Census Bureau, 2015, 2010). In addition, we used 5-year zip code- and age group-specific population estimates from the 2010–2014 ACS to estimate licensing rates across income and population density quintiles.

2.4 Statistical Analysis

Analyses were limited to drivers aged 105 or younger as date of death may have been incompletely obtained in licensing data. Sex-specific licensing proportions and monthly rates of crashes per 10,000 licensed drivers over the study period were calculated for all 35- to 54-year-old drivers, 65- to 84-year-old drivers in 5-year age groups, and all drivers aged 85 and older. Average monthly rates of crashes (overall and by sex) and select moving violations per 10,000 licensed drivers over the study period were calculated for the same age groups. We used Poisson regression to calculate adjusted rate ratios (aRR) and 95% confidence intervals (CI) for crashes and moving violations. Models examined differences between age groups (older vs. middle-aged drivers) and sex while also controlling for income and population density areas of driver residence. We assessed statistical interactions between age groups (older vs. middle-aged drivers) and sex, as well as age-group trends within older drivers, using likelihood ratio tests. All analyses were conducted using SAS software, Version 9.4 (SAS Institute, Inc., Cary, NC, USA). This study was approved by the Children's Hospital of Philadelphia Institutional Review Board.

3. Results

3.1 Licensing.

On average, 86% of older males (452,884 of 525,424) and 71% of older females (515,892 of 722,536) held a valid NJ driver's license each month over the 5-year study period (Table 1). Notably, while the proportion of older males that were licensed remained generally stable across older age groups, the proportion of females that were licensed decreased from 85% among 65- to 69-year-olds to 43% at age 85 and older (Figure 1). The proportion of the population with a valid license also declined as median household income of the residential neighborhood declined among both sexes and age groups (Table 1). We also observed an inverse relationship with neighborhood population density, in which residents of higher density areas had lower proportions of licensed drivers than less dense area, except among residents of the least dense areas. Generally, the proportion licensed was higher among older males than middle-aged males across all population density and income areas, except for the highest two quintiles of income areas. Conversely, middle-aged females had a higher proportion of licensing compared with older females across all population density and income areas.

3.2 Crashes.

Older drivers aged 65 and over had lower overall crash rates compared with middle-aged drivers (33.9 vs. 46.4 per 10,000 licensed drivers, respectively; aRR: 0.73, 95% CI: [0.73, 0.74]). Conversely, the rates of fatal crashes were higher among older drivers (0.08 and 0.05, respectively; aRR: 1.40, [1.24, 1.58]). Across all age groups, males had higher overall and fatal crash rates than females (Figures 2 and 3; Table 2). After adjusting for quintiles of zip code-level income and population density, both older male and older female drivers had lower crash rates than their middle-aged counterparts (aRR: 0.77, 95% CI: [0.77, 0.78] and aRR: 0.69, 95% CI: [0.68, 0.69], respectively; Table 2). Among older drivers, crash rates were higher among males compared with females for all crashes (aRR: 1.31, 95% CI: [1.30, 1.33]), injury crashes (aRR: 1.54, 95% CI: [1.48, 1.60]), and fatal crashes (aRR: 2.16, 95% CI: [1.78, 2.62]). Within older age groups, overall crash rates were uniform (test for trend, $p=0.33$ for males, $p=0.08$ for females, Figure 2, Table 2), while fatal crashes were highest among 75- to 79-year-old male drivers and 85 and older female drivers (test for trend, $p=0.02$ for males, $p<0.01$ for females, Figure 3, Table 2).

3.3 Moving Violations.

Overall, the rate of per-driver moving violations among all older drivers aged 65 and over was lower than the rate of violations among middle-aged drivers (19.9 vs. 71.3; aRR: 0.28, 95% CI: [0.28, 0.28]). Compared with middle-aged drivers of the same sex, the rate of moving violations was 70% lower (aRR: 0.30, 95% CI: [0.30, 0.31]) for older male drivers and 75% lower (aRR: 0.25, 95% CI: [0.24, 0.25]) for older female drivers (Table 3). Among older drivers, rates of moving violations decreased with increasingly older age groups for both males and females (test for trend, $p<0.01$ for both sexes, Figure 4, Table 3). The most common type of moving violation among drivers aged 65 and older was careless driving, which made up 31% of all moving violations (compared with 24% among drivers aged 35–54). The proportions of violations for electronic device use among older female (8%) and male (9%) drivers were approximately half that of middle-aged female (20%) and male (16%) drivers.

4. Discussion

This study utilized individual-level data to examine driver licensing, crash, and moving violation rates among a statewide population. Overall, we found that licensing rates remain relatively stable for males but sharply decline for females in older age groups. Further, while older licensed drivers have lower crash rates than middle-aged drivers, their rate of being involved as a driver in a fatal crash is 30% to 50% higher. Finally, older drivers had moving violation rates 70% to 75% lower than middle-aged drivers.

4.1 Licensing.

The different trends in licensing rates across age groups for men and women were notable. Previously studies describing licensing rates among the older population have either not distinguished between men and women nor between age groups within older drivers (Cicchino & McCartt, 2014), did not distinguish between adults over age 70, (Eby, Molnar, & Kartje, 2009), or were conducted a decade ago. Reported trends in licensing rates may be related to the fact that women experience more physical difficulties as they age (Blackwell, Lucas, & Clarke, 2014). Men who survive to older ages may be healthier and more able to maintain a valid license than women who survive to similar ages. Since women tend to live with disabilities in older ages, possibly foregoing licensure renewal, we would expect to see lower licensing rates among older women. However, licensed older drivers may self-regulate by reducing driving time or mileage, or stop driving altogether, so estimates using licensing data may overestimate the number of older drivers on the road. Implications of these findings may be particularly relevant in car-dependent settings, such as rural or suburban neighborhoods without a robust public transportation network. Loss of licensure may have important implications for the ability of older adults in these settings to maintain practical independence and social connections (Zeitler & Buys, 2015). Although lower licensing rates in high population density areas suggest that more older adults without licenses live in urbanized areas that may have more public transit options, we are unable to explore causal mechanisms in this analysis; more research is needed to understand if older adults in rural and suburban areas are actually more fit to drive or simply maintain their license out of necessity.

4.2 Crashes.

Even though older drivers with visual and cognitive impairments may limit their driving frequency, they may still be at higher crash risk than older drivers without such impairments

(Ball et al., 2006; Ross et al., 2009). The findings that overall crash rates were lower among older drivers than middle-aged drivers while fatal crash rates were higher is consistent with previous studies that found older drivers have higher rates of fatal crash involvement even though they have lower rates of involvement in nonfatal crashes (Cicchino, 2015; Cicchino & McCartt, 2014). Unlike previous studies, we were able to examine differences in crash and moving violation rates by sex, an important contribution given the high risk of fatal crash involvement among older male drivers. Sex differences in fatal crash risk are likely not explained by greater frailty in men compared with women in the same age group (Evans, 2001). Furthermore, although we were not able to take driver exposure into account, higher crash rates among men may not be explained by higher exposure to driving. In fact, older drivers with the lowest annual miles driven have been shown to have higher per-mile crash rates than older drivers with more annual miles; thus, limiting driving exposure may not reduce crash risk for some older drivers (Langford, Methorst, & Hakamies-Blomqvist, 2006). When vehicle-miles traveled is taken into account, women may actually have higher crash rates than men, though men may still have higher fatality rates (Li, Braver, & Chen, 2003). Driver behavior may also explain some of the differences in fatal crash rates among male and female older drivers. Males are more likely than females to self-report risky driving behaviors such as speeding, driving while intoxicated, running red lights, and making rolling stops, though the frequencies of these behaviors decreased with age (Gallup Organization, 2003). The extent to which there are differences in risky driving behaviors between female and male older drivers is not well understood. Finally, previous studies have shown that both crash risk and the odds of sustaining a fatal injury when involved in a crash have declined over time (Cheung & McCartt, 2011). How much of this change is due to improvements in vehicle safety features such as Advance Driver Assitance Systems (ADAS) is not well understood. However, data on consumer satisfaction suggest that older drivers particulary appreciate the presence of ADAS such as blind spot warnings and backup cameras (Consumer Reports, 2017). Thus, more studies are needed to understand how improvements in vehicle safety and advanced safety features influence both older drivers' crash risk and survivability and how older adults interact with these features.

4.3 Moving Violations.

In contrast to the steady crash rates and increasing fatal crash rates, moving violations decreased in each older age group. This is consistent with the self-reported decline in these behaviors mentioned above and suggests that older drivers—especially older female drivers—may engage in less risky driving behavior than middle-aged drivers. Alternatively, the difference may in part be explained by police discretion, as previous studies have found that police may be less likely to issue violations to older drivers (Girard, 2010; Lovrich, Gaffney, Mosher, Pickerill, & Smith, 2003). In particular, citation rates for electronic device use among older drivers were substantially lower than among middle-aged drivers, suggesting that older drivers may be less likely to engage in this behavior that has been shown to increase crash risk even among experienced drivers (Klauer et al., 2014). However, such rates may increase in future years as drivers who have been accustomed to using cell phones become older adults; thus, it will be important to continue to assess the impact of electronic equipment use on driving outcomes among older drivers. Finally, as with crash rates, these violation rates are per-licensed driver and do not account for driving exposure. A previous study has shown that greater driving frequency among older adults was associated with a higher odds of receiving a citation but was not associated with higher rates of police-reported crashes (Ross, Dodson, Edwards, Ackerman, & Ball, 2012). Although the trends we observed may reflect driving frequency, the contrast of the moving violation trends across older age groups with the trends in crash rates suggests that older driver behaviors may be putting themselves and others at risk, but these behaviors either are not being recognized or not being cited. Thus there may be missed opportunities for identifying higherrisk older drivers before they experience a crash.

4.4 Limitations.

This study has several potential limitations. Most importantly, we were not able to take driver exposure into account. Several previous crash studies have used self-reported survey data of driver exposure (Cicchino, 2015; Ross et al., 2009, 2012). However, even rigorously conducted surveys, like the National Household Travel Survey (NHTS) have not been designed to provide state-level estimates and data are only collected sporadically, limiting our ability to extrapolate NHTS results for state-specific population-level analyses. Furthermore, the reliability of self-reported exposures have been questioned and may not accurately reflect objectively captured data (Staplin, Gish, & Joyce, 2008). Other methods of estimating driving exposure come from in-vehicle monitoring devices (Coxon et al., 2015; Payyanadan et al., 2017), which are expensive to deploy and therefore only include small, non-representative samples of drivers. Thus there is a critical need to develop novel methods—e.g., use of quasi-induced exposure techniques—to adjust risk comparisons for relative differences in driving exposure. Second, individual-level demographics other than age and sex were not available; zip code-level median household income may not necessarily reflect the incomes of individual drivers who live in those neighborhoods. Furthermore, driver's zip code in 2014 may not reflect their true residence throughout the 5-year study period. However, the vast majority of drivers in this study (~90%) had only one zip code throughout the study period or had multiple addresses that were all in the same zip code quintile. Third, deaths to license holders may not always be reported; some people who were in fact deceased could have been classified as licensed for the period between their (unreported) date of death and their license expiration. In addition, because inter-jurisdiction reporting is uncommon, we were not able to account for drivers who migrated out of NJ or crashes and moving violations among NJ drivers that occurred outside of the state. This combination of overestimating our licensed population and underestimating crashes and citations suggests the true licensure rates may be slightly lower and the true crash and citation rates may be higher than what we reported.

5. Conclusions and Practical Applications

This study is a rigorous examination of population-based age group- and sex-specific rates of licensing, police-reported crashes, and moving violations using individual-level data. Our results have important implications for understanding baseline rates of crashes and moving violations among older drivers. Low licensing rates among older women and high licensing rates among adults living in rural areas suggests the need for more research to explore the role of vehicles in balancing maintenance of practical independence and social connections with complex roadway driving as people age. Higher rates of fatal crashes among older drivers, despite having lower overall crash rates, highlight the need to identify driving exposure and other factors, including in-vehicle safety technology, that influence risk of crash involvement and survivability.

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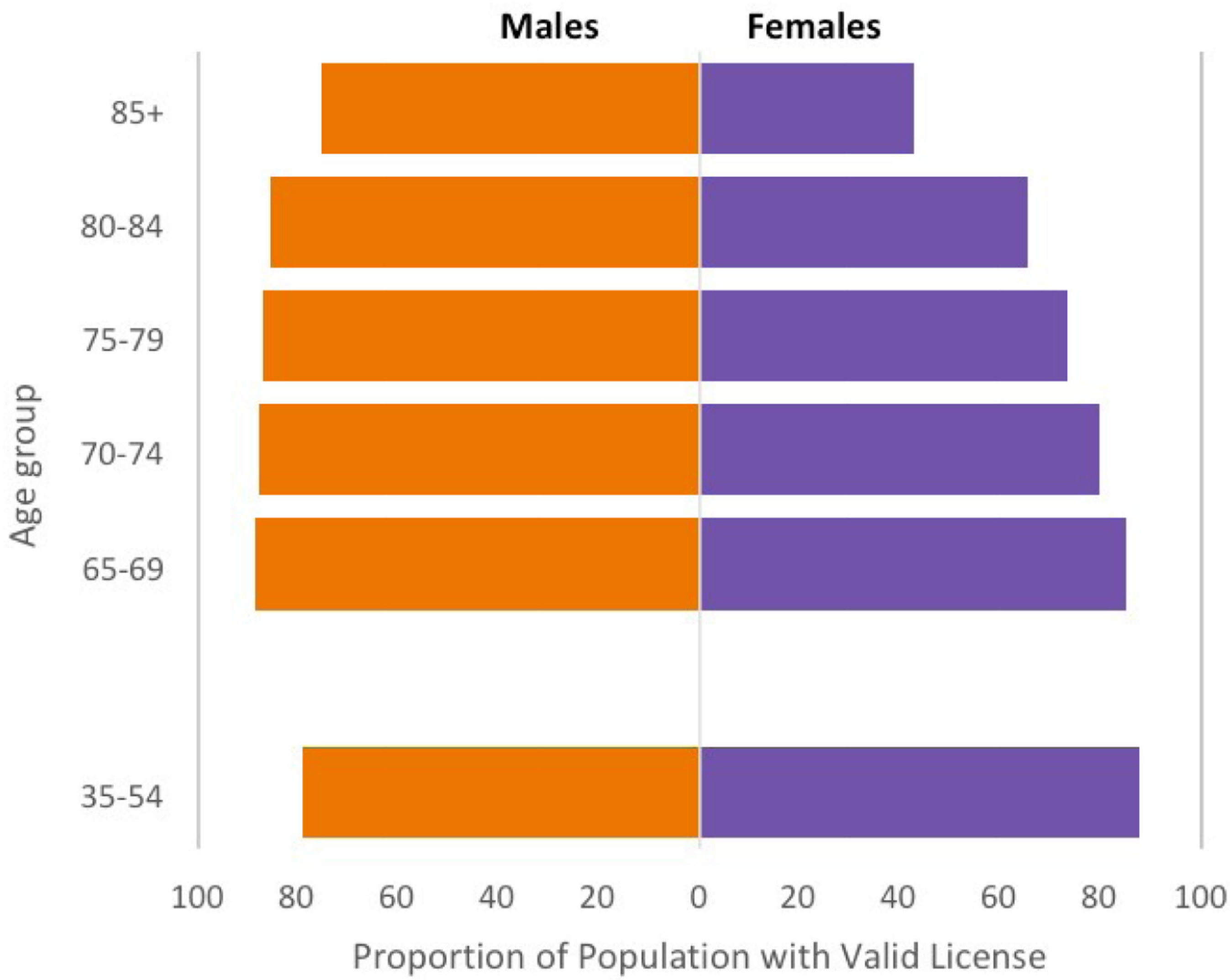

Figure 1.
Licensing proportions by sex and age groups, New Jersey, 2010–2014.

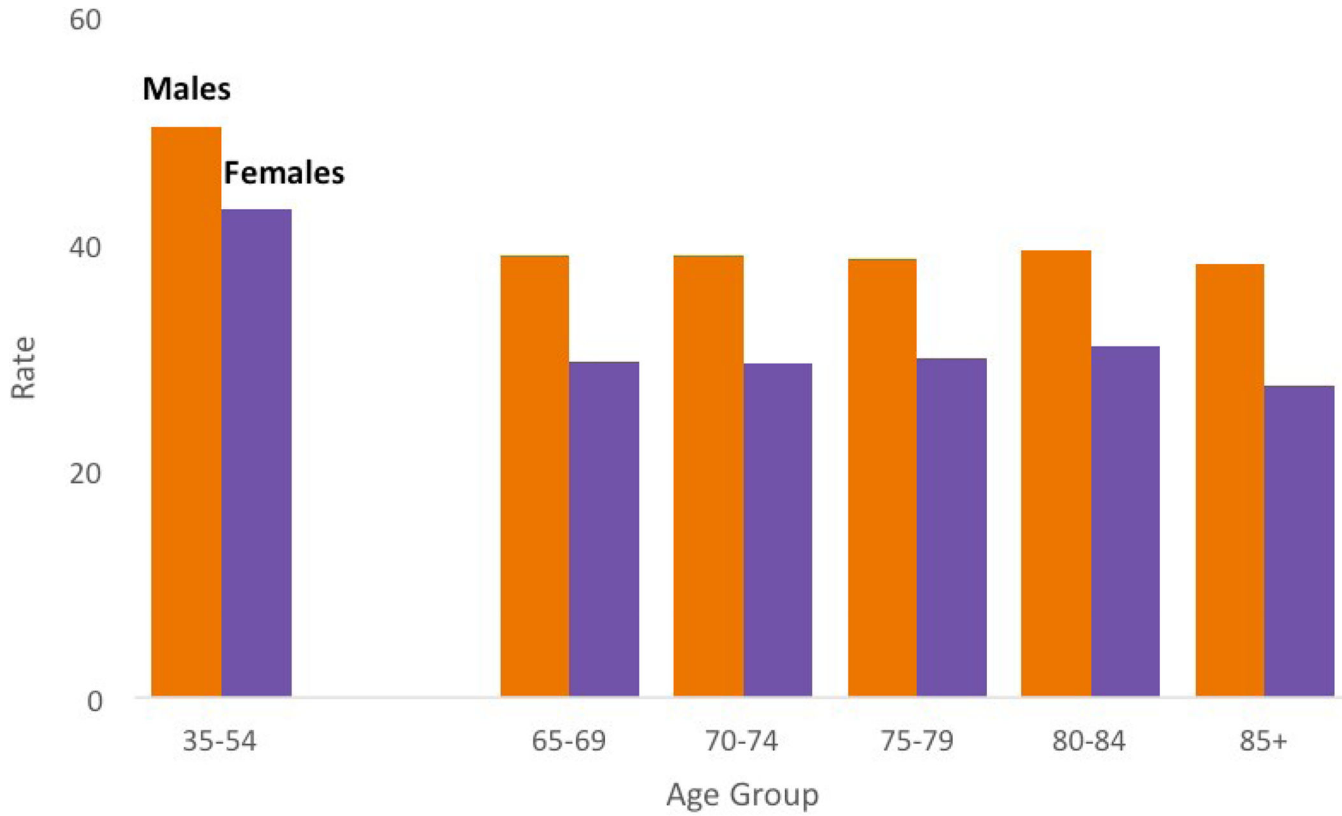

Figure 2.

Average monthly crash rates per 10,000 licensed drivers by sex and age groups, New Jersey, 2010–2014.

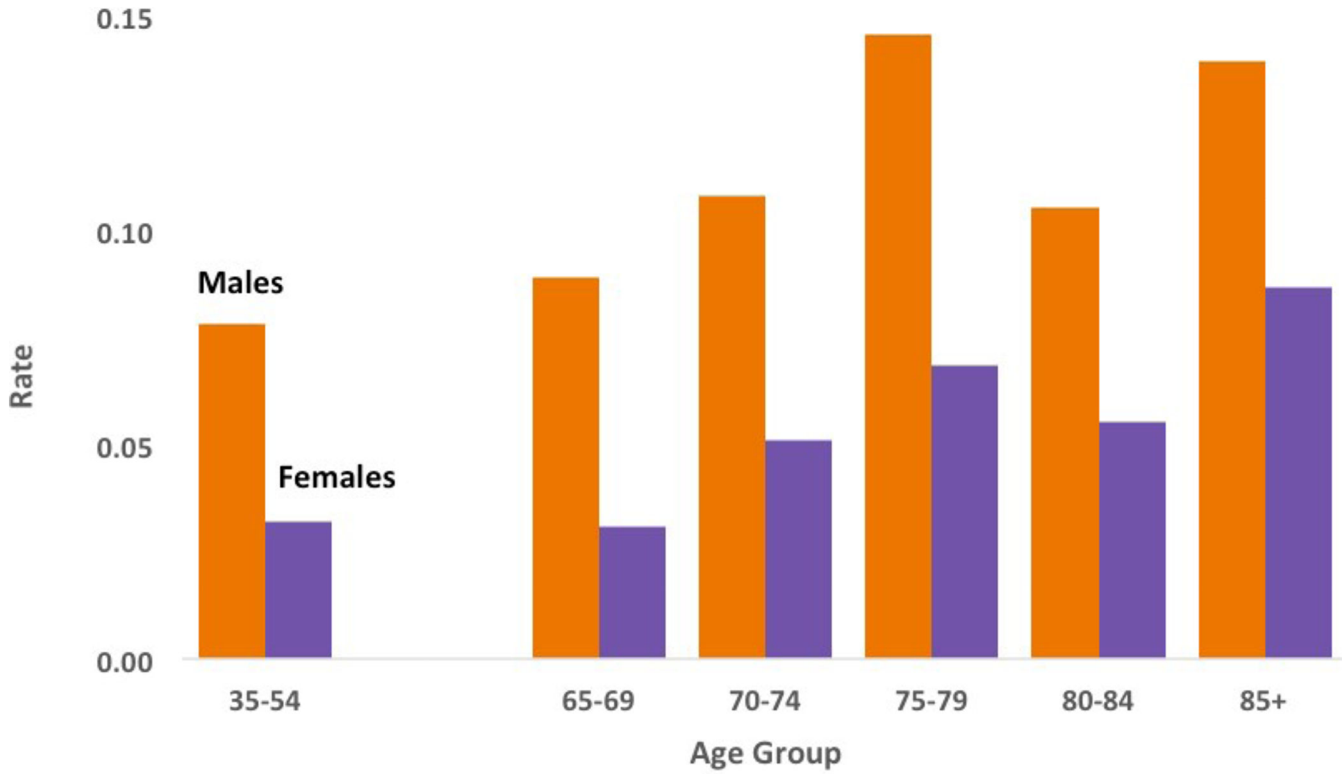

Figure 3.
Average monthly fatal crash rates per 10,000 licensed drivers by sex and age groups, New Jersey, 2010–2014.

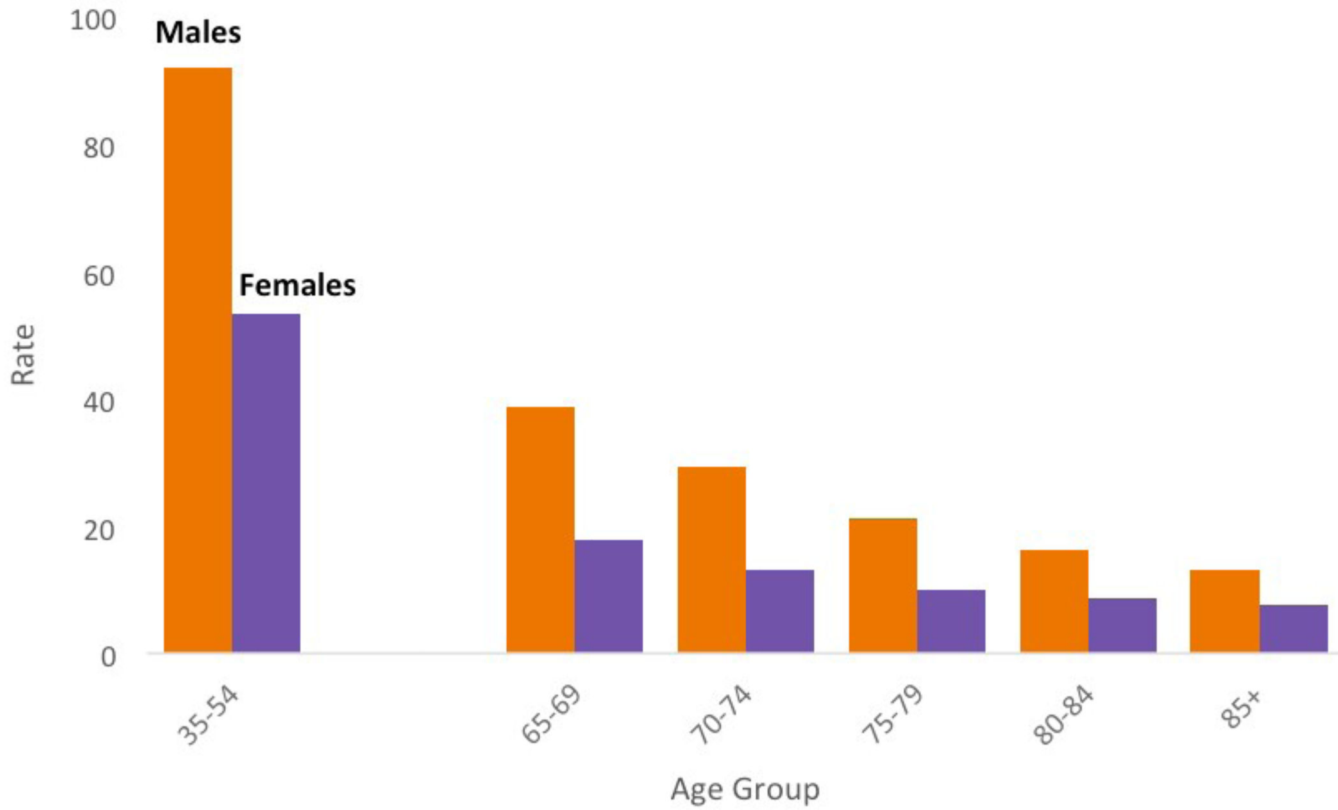

Figure 4.
Average monthly moving violation rates per 10,000 licensed drivers by sex and age groups, New Jersey, 2010–2014

Table 1.

Proportion of New Jersey residents with a valid driver's license, by sex, age, and neighborhood characteristics, 2010–2014

	Males aged 65+	Males aged 35–54	Females aged 65+	Females aged 35–54
Average monthly population (N)	525,424	1,253,784	722,536	1,308,226
Average licensed population (%)	86	79	71	87
Zip code-level population density, population per square mile (% licensed)				
Q1 (≤ 408.6)	87	74	81	95
Q2 (408.7–1,223.6)	93	89	83	98
Q3 (1,223.7–2,615.8)	89	88	75	96
Q4 (2,615.9–4,876.8)	89	82	73	91
Q5 (≥ 4,876.9)	74	66	55	70
Zip code-level median household income (% licensed)				
Q1 (≤ $57,226)	75	59	58	64
Q2 ($57,227-$72,857)	87	76	73	88
Q3 ($72,858-$87,222)	88	84	76	94
Q4 ($87,223-$105,888)	88	89	75	97
Q5 (≥ $105,889)	94	98	80	100

Table 2.

Rates per 10,000 licensed drivers and adjusted rate ratios[a] (aRR, 95% CI) of crashes by sex and age group, New Jersey, 2010–2014.

		Males		Females		Males vs Females
	Age Group	**Rate**	**aRR[a] (95% CI)**	**Rate**	**aRR[a] (95% CI)**	**aRR[a] (95% CI)**
Total crashes	35–54	50.3	(reference)	43.0	(reference)	1.17 (1.16, 1.17)
	≥65	39.0	0.77 (0.77, 0.78)	29.6	0.69 (0.68, 0.69)	1.31 (1.30, 1.33)
	65–69	38.9	0.78 (0.77, 0.78)	29.6	0.69 (0.68, 0.70)	1.31 (1.29, 1.33)
	70–74	39.0	0.78 (0.77, 0.79)	29.3	0.68 (0.67, 0.69)	1.33 (1.30, 1.35)
	75–79	38.5	0.77 (0.76, 0.78)	29.8	0.69 (0.68, 0.70)	1.29 (1.26, 1.32)
	80–84	39.3	0.78 (0.77, 0.80)	30.9	0.72 (0.71, 0.73)	1.27 (1.24, 1.30)
	≥85	38.2	0.76 (0.74, 0.77)	27.5	0.64 (0.63, 0.65)	1.38 (1.35, 1.42)
Injury crashes	35–54	2.1	(reference)	1.5	(reference)	1.46 (1.43, 1.50)
	≥65	2.0	0.90 (0.87, 0.93)	1.3	0.85 (0.82, 0.89)	1.54 (1.48, 1.60)
	65–69	1.7	0.78 (0.74, 0.82)	1.1	0.74 (0.70, 0.79)	1.54 (1.43, 1.66)
	70–74	1.9	0.86 (0.81, 0.91)	1.1	0.77 (0.72, 0.83)	1.62 (1.49, 1.77)
	75–79	2.1	0.95 (0.89, 1.01)	1.4	0.92 (0.86, 0.99)	1.50 (1.36, 1.65)
	80–84	2.3	1.05 (0.98, 1.13)	1.5	1.02 (0.94, 1.10)	1.52 (1.37, 1.68)
	≥85	2.4	1.13 (1.04, 1.22)	1.6	1.10 (1.00, 1.20)	1.51 (1.34, 1.69)
Fatal crashes	35–54	0.08	(reference)	0.03	(reference)	2.47 (2.10, 2.90)
	≥65	0.11	1.34 (1.16, 1.55)	0.05	1.53 (1.25, 1.88)	2.16 (1.78, 2.62)
	65–69	0.09	1.08 (0.86, 1.36)	0.03	0.93 (0.65, 1.34)	2.87 (1.92, 4.29)
	70–74	0.11	1.31 (1.02, 1.68)	0.05	1.52 (1.08, 2.15)	2.13 (1.43, 3.15)
	75–79	0.15	1.77 (1.38, 2.28)	0.07	2.01 (1.42, 2.86)	2.17 (1.46, 3.24)
	80–84	0.10	1.27 (0.91, 1.77)	0.05	1.64 (1.07, 2.52)	1.91 (1.13, 3.21)
	≥85	0.14	1.64 (1.18, 2.30)	0.09	2.58 (1.74, 3.82)	1.58 (0.96, 2.57)

[a]Rate ratios were adjusted for area-level income and population density

Table 3.

Rates per 10,000 licensed drivers and adjusted rate ratiosa (aRR, 95% CI) of moving violations by sex and age group, New Jersey, 2010–2014.

		Males		Females		Males vs Females
	Age Group	**Rate**	**aRR[a] (95% CI)**	**Rate**	**aRR[a] (95% CI)**	**aRR[a] (95% CI)**
Moving violations	35–54	92.0	(reference)	53.3	(reference)	1.72 (1.72, 1.73)
	≥65	28.6	0.30 (0.30, 0.31)	13.1	0.25 (0.24, 0.25)	2.12 (2.10, 2.15)
	65–69	38.6	0.42 (0.42, 0.43)	17.9	0.34 (0.33, 0.34)	2.15 (2.11, 2.19)
	70–74	29.2	0.32 (0.31, 0.32)	13.2	0.25 (0.24, 0.25)	2.21 (2.16, 2.27)
	75–79	21.2	0.23 (0.23, 0.24)	10.0	0.19 (0.18, 0.19)	2.11 (2.04, 2.18)
	80–84	16.3	0.18 (0.17, 0.18)	8.6	0.16 (0.16, 0.17)	1.89 (1.81, 1.97)
	≥85	13.1	0.14 (0.14, 0.15)	7.6	0.14 (0.14, 0.15)	1.71 (1.63, 1.80)

[a]Rate ratios were adjusted for area-level income and population density