



Passenger Vehicle Occupant Injury Severity by Vehicle Age and Model Year in Fatal Crashes

Summary

This study is a descriptive assessment of the relationship between a vehicle's age and model year to its occupant's injury severity in a fatal crash, using the most recent data from NHTSA's Fatality Analysis Reporting System (FARS) 2012–2016. The analysis shows that among all passenger vehicle (passenger cars, SUVs, pickup trucks or vans) occupants involved in a fatal crash, the proportion who were fatally injured increases with vehicle age, i.e., the proportion was higher among occupants of older vehicles as compared to the occupants of newer vehicles. Also, the proportion of occupants who were fatally injured was higher among occupants of older model year vehicles as compared to the occupants of newer model year vehicles.

Introduction

Previous studies, either through descriptive analysis or by statistical modeling that takes into consideration other vehicle, driver, and environment characteristics, have shown that an occupant's injury severity increases with increasing vehicle age. This trend was also observed in vehicles of older model years, i.e., the injury severity of occupants of newer vehicles is lower than that of occupants of older model year (MY) vehicles.^{1,2,3,4} These findings were supported by studies focused either on fatal crashes (e.g., FARS dataset) or on all injury severity level crashes (e.g., NASS-CDS dataset).

This Research Note simply aims to conduct a descriptive examination of the passenger vehicle occupant injury severity by vehicle age and model year in fatal crashes. Most recent fatal crash data reported in FARS from 2012 to 2016 was used to further confirm that the occupant injury severity increased as vehicle age increased and in earlier MY vehicles.

Data and Methodology

Fatal crash data from FARS for the most recent calendar years 2012 to 2016 was used for this analysis. FARS contains data on a census of fatal traffic crashes from the 50 States, the District of Columbia, and Puerto Rico. To be

included in FARS, a crash must involve a motor vehicle traveling on a trafficway primarily open to the public and result in the death of a person within 30 days of the crash. The variable examined in this study is the injury severity of the passenger vehicle occupant. Descriptive statistics of the *percentage killed* (i.e., $\{[\text{fatally injured occupants (inj_sev = 4)}] / [\text{fatally injured occupants} + \text{survived occupants (inj_sev = 0, 1, 2, 3, 5)}]\} \times 100\%$) were presented. The age of a vehicle is measured by subtracting the vehicle MY from the calendar year at the time of the crash (vehicle whose age was calculated to be -1 was recoded to be age 0). In the study, the vehicle age is grouped as 0–3 years, 4–7 years, 8–11 years, 12–14 years, 15–17 years, and 18+ years. The MY is categorized as 2013–2017, 2008–2012, 2003–2007, 1998–2002, 1993–1997, 1985–1992, and 1984 & Earlier.

Results

The relationship between a vehicle's age and MY to an occupant's injury severity in a fatal crash, using the most recent fatal crash data, is illustrated in Figure 1. Figure 1a shows that the percentage of occupants fatally injured increased as the vehicle age increased: from 27 percent for 0–3 age group to 50 percent for 18+ age group. The data in Figure 1b shows that the percentage of occupants who were fatally injured was higher among occupants of older MY vehicles than those of newer MY vehicles: from 55 percent for MY 1984 & Earlier vehicles to 26 percent for MY 2013–2017 vehicles.

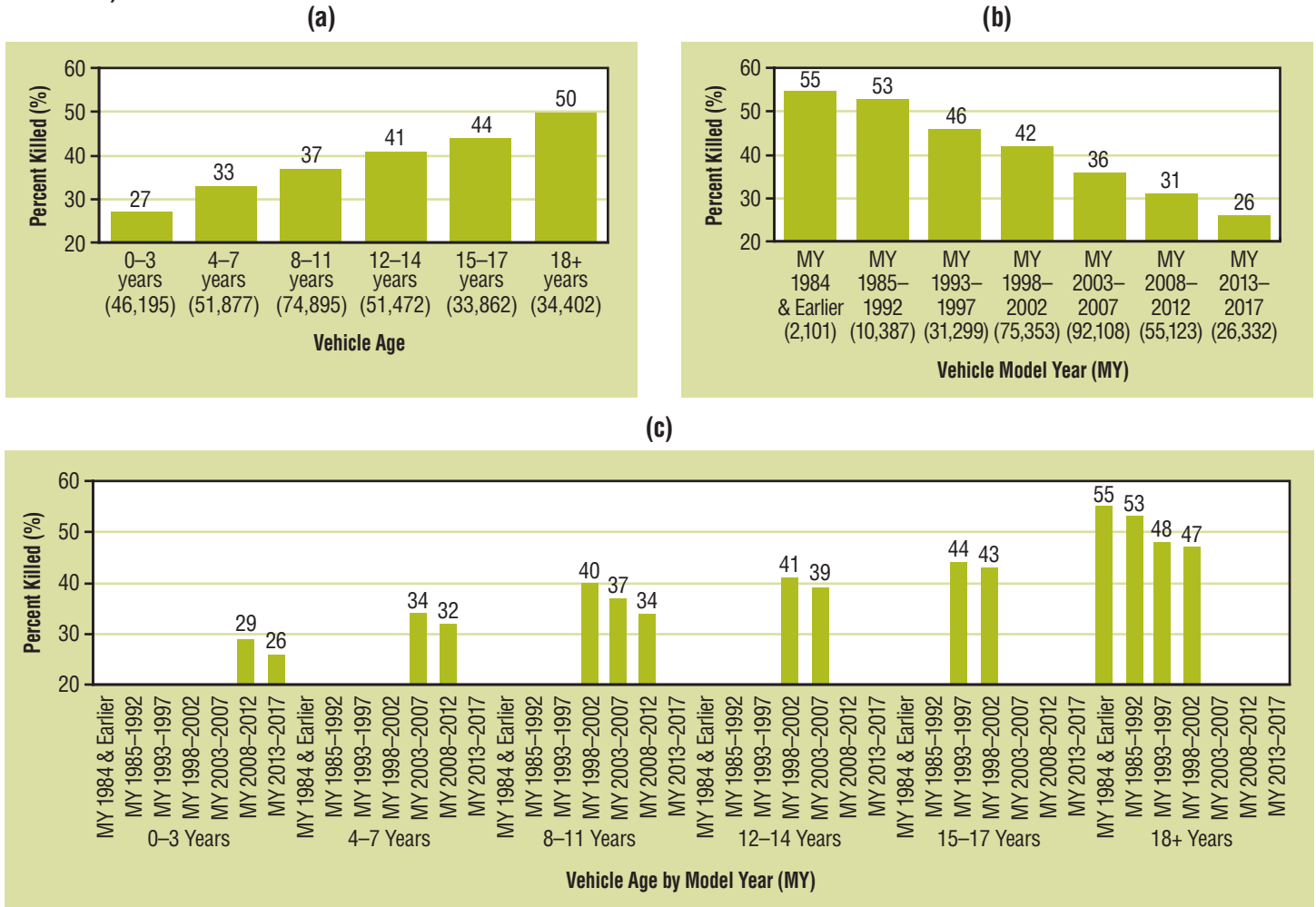
Further analysis examines the occupant fatality rate within each age group. Figure 1c shows a consistent pattern that the percentage of occupants fatally injured was higher among occupants of older model year vehicles than those of newer model year vehicles in every age group examined. Note that each of the six categories of vehicle age are stratified into seven categories of MY. Bars in certain categories are not displayed because no vehicles of this type exist in the data. The bars consistently get lower from left to right within each of the six vehicle age categories, which indicates the percentage killed is highest among older MY vehicles and lowest among newer MY vehicles.

Conclusions

Using the most recent fatal crash data, this analysis supports previous research in finding that a higher proportion of the occupants of older MY vehicles suffered a fatal injury. In addition, the proportion of vehicle occupants who were fatally injured increases with the age of the vehicle.

The limitation of this study is that it is only a descriptive assessment of the relationship between an occupant’s injury severity and the vehicle’s age and MY. Statistical model analysis of the relationship between the fatality risk and vehicle age/MY that control¹⁴ for other factors (e.g., Delta-V, seat belt use, age, sex) could be part of future analysis.

Figure 1
Total Occupants (Shown in Label Text) and Percent Killed by Vehicle Age and Model Year (FARS 2012–2015 Final and 2016 ARF)



References

- ¹National Center for Statistics and Analysis. (2013, August). *How Vehicle Age and Model Year Relate to Driver Injury Severity in Fatal Crashes* (Traffic Safety Facts Research Note. Report No. DOT HS 811 825). Washington, DC: National Highway Traffic Safety Administration. Available at <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811825>.
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This research note and other general information on highway traffic safety may be found at: <https://crashstats.nhtsa.dot.gov/#/>.



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