U.S. Department of Transportation
National Highway Traffic Safety Administration

TRAFFIC SAFETY FACTS
Research Note

NHTSA
www.nhtsa.gov

DOT HS 811 825 August 2013

How Vehicle Age and Model Year Relate to Driver Injury Severity in Fatal Crashes

Summary

This analysis examines how the age of the vehicle at the time of the crash and the vehicle's model year are correlated with the injury outcome of the driver of a passenger vehicle involved in a fatal crash. A multivariate logistic regression model was constructed to model the relationship between injury outcome (fatally injured versus survived) of the driver and the independent variables vehicle age (0–3 years, 4–7, 8–11, 12–14, 15–17, and 18+) and vehicle model year (MY 2008–2012, MY 2003–2007, MY 1998–2002, MY 1993–1997, and MY 1985–1992) while accounting for many other crash factors. Based on criteria described in the Data and Methodology section, 117,957 fatally injured passenger vehicle drivers and 133,869 surviving passenger vehicle drivers are examined using data from the Fatality Analysis Reporting System (FARS) for 2005 to 2011.

The analysis shows that conditional on being involved in a fatal crash, the driver of an older vehicle is more likely to be fatally injured as compared to the driver of a newer vehicle. In fact, the model estimates that the driver of a vehicle that was 18+ years old at the time of the crash was 71 percent more likely to be fatally injured than the driver of a vehicle that was 3 years old or less. The model also produces an estimate for the driver of a vehicle 4 to 7 years old, being 10 percent more likely to be fatally injured than the driver of a vehicle that was 3 years old or newer; a driver of a vehicle 8 to 11 years old (19% more likely); a driver of a vehicle 12 to 14 years old (32% more likely); a driver of a vehicle 15 to 17 years old (50% more likely); and a driver of a vehicle 18 or older (71% more likely). Each estimate represents a comparison to the baseline vehicle age category of 3 years old or newer.

The analysis also shows that conditional on being involved in a fatal crash, the driver of an older MY vehicle is more likely to be fatally injured as compared to the driver of a newer MY vehicle. In fact, the regression model estimates that a driver in a MY 2003–2007 vehicle was 20 percent more likely to be fatally injured than a driver in the baseline vehicle MY category of 2008–2012. The model produced comparable estimates for drivers of MY 1998–2002 vehicles (32%), drivers of MY 1993–1997 vehicles (41%), and drivers of MY 1985–1992 vehicles (76%). Each estimate represents a comparison to the baseline vehicle model year category of MY 2008–2012.

The report also shows that driver restraint use plays a large role in the relationship between vehicle age and the percentage of drivers who were fatally injured. In vehicles of age less than 1, about 72 percent of the unrestrained drivers were fatally injured as compared to only 26 percent among restrained drivers. While the percent killed among restrained drivers climbed fairly steadily with increasing vehicle age, this pattern was seen less among unrestrained drivers. Among vehicles age 3 all the way up to age 19, the percentage killed among unrestrained drivers varied little, remaining between 76 and 78 percent. This pattern among fatal crashes suggests that a driver's choice of being unrestrained removes many of the safety benefits that are provided by a newer vehicle.

This report does not analyze all passenger vehicle drivers in the United States in order to measure the overall risk of a driver in this population being fatally injured. The report merely analyzes the experience that passenger vehicle drivers in fatal crashes have had.

Introduction and Background

This report examines the injury outcome of drivers of passenger vehicles from MY 1985 to 2012 who were involved in fatal crashes during the 7-year time period 2005 to 2011. During that range of vehicle model years, many safety improvements occurred. These safety improvements include the number and quality of frontal and side air bags; seat belt quality (including seat belt load limiters and pretensioners); electronic stability control; antilock braking systems; roof crush strength; energy-absorbing steering assemblies; traction control; lane departure warnings; and forward collision warnings. Driver behavior improvements including increased seat belt use have also occurred. This report does not attempt to isolate the safety benefits of each improvement. The summarized benefit estimates of vehicle age and model year in this report are assumed to be due to many improvements in vehicle design.

Other safety improvements have occurred during the time period covered by this analysis, such as child safety seats, booster seats, and other vehicle occupant protection. However these benefits are not referred to in this report because this analysis only looks at the injury severity of passenger vehicle drivers, and does not include children or other occupants.

A recently completed NHTSA report titled *An Analysis of Recent Improvements to Vehicle Safety* (Glassbrenner, 2012) quantifies the benefits realized due to improved safety of newer vehicles and their contribution to historically low fatality and injury rates that have occurred in the United States in recent years. The report estimated that the likelihood of crashing in 100,000 miles of driving has decreased from 30 percent in a model year 2000 vehicle to 25 percent in a model year 2008 vehicle. This comparison is based on both vehicles being driven as "new." The likelihood of escaping a crash uninjured has improved from 79 to 82 percent as a result of improvements between the 2000 and 2008 car fleets. The report found similar improvements in light trucks and vans. The vehicle improvements from vehicle fleets in 2000 to vehicles in 2008 were estimated to have saved 2,000 lives in the 2008 calendar year.

Another report that looks at vehicle improvements is *Lives Saved by the Federal Motor Vehicle Safety Standards and Other Vehicle Safety Technologies, 1960–2002 — Passenger Cars and Light Trucks — With a Review of 19 FMVSS and Their Effectiveness in Reducing Fatalities, Injuries, and Crashes* (Kahane, 2004). This report used a statistical model to examine in detail the effectiveness of 19 different Federal Motor Vehicle Safety Standards (FMVSS) from 1960 to 2002 . Using NHTSA's published effectiveness estimates, the model estimates how many people would have died if the vehicles had not been equipped with any the safety technologies from the 19 different FMVSSs. The report states that vehicle safety technologies saved an estimated 328,551 lives from 1960 through 2002. The annual estimated number of lives saved increased from 115 in 1960, when few passengers used lap belts, up to 24,561 in 2002, when most cars and light trucks were equipped with numerous safety technologies and seat belt use rose to 75 percent. Information and more recent estimates of lives saved can be found at www-nrd.nhtsa.dot.gov/Cats/listpublications.aspx?Id=5&ShowBy=Category.

Data and Methodology

Fatal crash data from FARS for calendar years 2005 to 2011 was used for this report. 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 travelling on a trafficway customarily open to the public and result in the death of a person (occupant of a vehicle or a non-occupant) within 30 days of the crash.

In order to assist with coding changes in FARS over time, variables existing in the FARS "Auxiliary" files were used in the high majority of the modeling in this report. Information on these auxiliary files as well as information about the entire FARS database are available at www-nrd.nhtsa.dot.gov/Cats/listpublications.aspx?Id=J&ShowBy=DocType. These auxiliary files consist of variables derived from the FARS database that aggregate specific variable categories (i.e. combining the variety of unique rural and urban road type categories into either "rural" or "urban" roads, or combining all various types of restraint use into a FARS definition of "restrained" or "unrestrained"). These auxiliary files also adjust for changes in FARS variables over the different years that FARS data has been collected (i.e., a change in the FARS categories of restraint use between the FARS 2010 files and FARS 2011 files).

Multivariate logistic regression was performed using SAS, with a stepwise selection, and an alpha of .05. The SAS MIAnalyze procedure was used to combine the multiple-imputed blood alcohol concentrations (BACs) from the FARS database. Exploratory data analysis included many FARS variables that were eventually excluded from the final model. Interaction terms were excluded from the model due to the minimal impact these interactions had on the coefficients in the final model.

The response variable in this study was the injury severity of the passenger vehicle driver. A passenger vehicle driver (a_body = 1, 2, 3, 4 and a_ptype=1) who was fatally injured (inj_sev = 4) was coded as injury severity=1 (n=117,957). Surviving (inj_sev = 0, 1, 2, 3, 5) passenger vehicle drivers (n=133,869) were coded as injury severity=0. Surviving passenger vehicle drivers in single-vehicle fatal crashes where the only fatality was a pedestrian were removed from this study. Passengers in the vehicles were not examined due to the fact that BAC was a variable in the study and the BACs of passengers are not typically recorded in FARS crashes. The seat position variable was not included in the model since only drivers were examined. A fatality occurring in a crash involving a driver with a BAC of .08 g/dL or higher is considered to be an "alcohol-impaired-driving" fatality. Passenger vehicles consist of passenger cars, pickup trucks, sport utility vehicles, and vans.

Independent variables (and their categories) that remained in the final model are listed below. For each variable, the reference category that is used to define the model odds ratio estimates is underlined (i.e., the reference category for the vehicle age variable is <u>3 years old or newer</u>).

- vehicle age (<u>0–3 years old</u>, 4–7, 8–11, 12–14, 15–17, and 18+)
- vehicle model year (<u>2008–2012</u>, 2003–2007, 1998–2002, 1993–1997, and 1985–1992)
- vehicle body type (<u>passenger car</u>, sport utility vehicle, van, pickup)
- air bag deployed (yes, <u>no</u>)
- BAC (<u>.00</u>, .01 to .07, .08+)
- roadway function class (rural, <u>urban</u>)
- day/night (<u>6 a.m. to 5:59 p.m.</u>, 6 p.m. to 5:59 a.m.)
- occupant age (16–20, 21–24, <u>25–34</u>, 35–44, 45–54, 55–64, 65–74, 75+)

- gender (male, <u>female</u>)
- number of vehicles in the crash (<u>single vehicle</u>, multivehicle)
- restraint use (yes, <u>no</u>)
- principal impact point (<u>frontal</u>, right side, left side, rear, non-collision)
- speeding involved in the crash (yes, <u>no</u>)
- speed limit of the crash location (55 mph or greater, <u>less than 55 mph</u>)
- ejection status (yes, <u>no</u>)
- rollover (yes, <u>no</u>)
- interstate road (yes, <u>no</u>)
- occurring at an intersection (yes, <u>no</u>)
- motorcycle involved in the crash (yes, <u>no</u>)
- roadway departure (yes, <u>no</u>)
- number of occupants in the vehicle (<u>single occupant</u>, multiple occupants)

These reference categories are also shown in parentheses in each row of Table 1. For example, the reference category for driver age is 25 to 34, and the reference vehicle model year category is 2008 to 2012. Unless otherwise stated, a category of unknown was included for each independent variable, and these cases were included in the analysis.

The age of a vehicle is measured by subtracting the vehicle model year from the calendar year at the time of the crash. For example, a 2001 MY vehicle that crashed in 2009 was age 8 at the time of the crash. A vehicle whose age was calculated to be negative one, such as a 2012 MY vehicle crashing in late 2011, was recoded to be age zero.

Results

This report examines how a vehicle's age and model year relate to a driver's injury severity in a fatal crash. Crashes in the FARS database from 2005 through 2011 were examined, with results limited to drivers of 1985 through 2012 MY passenger vehicles. Figures 1 and 2 include percentages of drivers fatally injured stratified by vehicle age and driver restraint use (Figure 1), and percentages of drivers fatally injured stratified by vehicle age and vehicle model year (Figure 2). The remainder of this Results section focuses on the logistic regression model described in the Data and Methodology section.

Figure 1 shows vehicle age, by year, on the x-axis and the percentage of drivers fatally injured on the y-axis. This graph separates drivers into two groups: restrained and unrestrained. Overall, 33 percent of restrained drivers were killed, compared to 77 percent of unrestrained drivers. Figure 1 shows that an increase in vehicle age has a larger impact among restrained drivers, compared to a smaller impact among unrestrained drivers.

Among **restrained** drivers, the percentage killed was 26 percent in vehicles less than 1 year old, increasing steadily up to 47 percent in vehicles age 21 or older. This pattern among fatal crashes shows that restrained drivers in lesser aged vehicles were much less likely to be killed than restrained drivers in older vehicles.

The pattern was quite different among **unrestrained** drivers. For unrestrained drivers, the percentage killed was 72 percent in vehicles newer than 1 year-old, compared to only 26 percent among restrained drivers in vehicles newer than 1 year-old. While the percentage killed among restrained drivers rose with increasing vehicle age, this pattern was not as evident among unrestrained drivers. Among vehicles of age 3 all the way up to 19, the percentage killed among unrestrained drivers varied little, remaining between 76 and 78 percent. This pattern among fatal crashes suggests that a driver's choice of being unrestrained removes much of the safety benefits that are provided by a newer vehicle.

Figure 1
Percentage Killed by Vehicle Age and Restraint Use. FARS 2005–2011

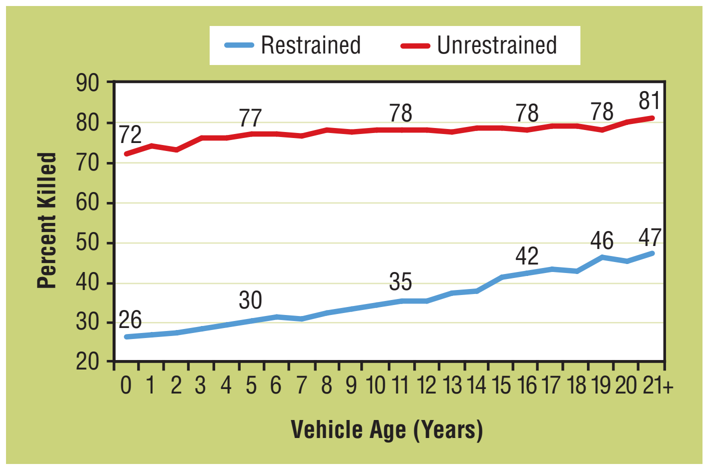


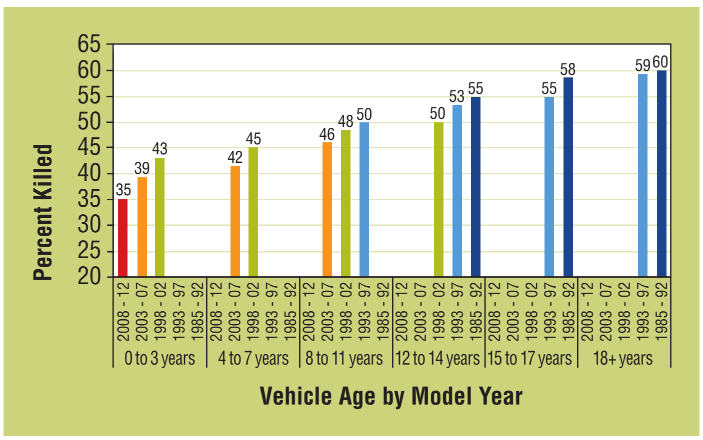
Figure 2 shows the combined impact of vehicle age and vehicle MY on crash survivability. In Figure 2 each of the six categories of vehicle age (0–3, 4–7, 8–11, 12–14, 15–17, and 18+) are stratified into five categories of MY (MY2008–2012, MY2003–1007, MY1998–2002, MY1993–1997, and MY1985–1992). Several bars are not displayed because no vehicles of this type exist in this study (i.e. no MY 2008–2012 vehicles of age 18+ years). For ease of comparison, the bars are colored uniquely according to MY, i.e., all MY 1998–2002 bars are colored green and all MY 2003–2007 are colored orange.

The bars consistently get higher from left to right **within** each of the 6 vehicle age categories. This pattern shows that within each vehicle age category, the percentage killed is lowest among newer MY vehicles and highest among older

MY vehicles. For example, among vehicles of age 12 to 14 years, 50 percent of drivers in MY 1998–2002 vehicles were killed, compared to 53 percent of drivers in MY1993–1997 vehicles, and 55 percent of the drivers in MY 1985–1992 vehicles. Vehicle MY can be controlled for between vehicle age categories by comparing bars of the same color. For example, the three orange bars in Figure 2 each show vehicles of MY 2003–2007. These three orange bars increase as the vehicle age increases, from 39 percent killed in vehicles age 0 to 3, to 42 percent killed in vehicles age 4 to 7, up to 46 percent killed in vehicles age 8 to 11.

The results from Figure 2 show that the lesser age of a vehicle, as well as the more recent MY of a vehicle, both independently depict smaller percentages of drivers being fatally injured in fatal crashes. See the Results section of this report to see how vehicle age and vehicle model year contributed to the probability of drivers being fatally injured, **after adjusting for many other crash factors**. These results are derived from a multivariate logistic regression that examined how these factors affected the odds of a passenger vehicle driver in a fatal crash being killed (versus surviving).

Figure 2
Percentage Killed by Vehicle Age and Model Year. FARS 2005–2011



The 251,826 passenger vehicle drivers examined in this study consisted of two groups: 47 percent (117,957) were fatally injured, and 53 percent (133,869) survived. These drivers were in fatal crashes from 2005 through 2011. "Fatally Injured" and "Survived" were the two categories of the dependent variable of the model in this report. Readers may refer to the Data and Methodology section for details on drivers included in this analysis.

Many crash factors were significantly associated with whether the driver was fatally injured or survived. Table 1 lists the variable categories that were used in this logistic regression model and shows the odds ratio estimate and 95 percent Wald confidence interval for each independent variable from the model used in this report. The model shows the impact of each variable on the odds that a passenger vehicle driver was coded as fatally injured or survived. Each variable in Table 1 was significant at the alpha=.05 level. Example odds ratios are discussed below.

An odds ratio (OR) of 1.19, which is displayed in Table 1 for the age 8–11 category of the vehicle age parameter (reference category: age 0–3) indicates the odds that a driver was fatally injured (versus survived) was 1.19 times as likely when the vehicle was 8 to 11 years old as compared to the reference category of a vehicle 0–3 years old, after adjusting for other variables in the multivariate logistic regression model.

The MY parameter produced an OR of 1.32 for the MY 1998–2002 category (reference category: MY 2008–2012). This model coefficient of 1.32 means that the odds that the driver was fatally injured was 1.32 times as likely when he or she was driving a MY 1998–2002 vehicle, as compared to when the driver was in a MY 2008–2012 vehicle, after adjusting for the other variables in the model.

By comparison, the restraint use parameter (reference category: unrestrained) had an OR of 0.30. Therefore, the odds that the driver was fatally injured was 0.30 times as likely when the driver was restrained, compared to when s/he was unrestrained, after adjusting for the other variables in the model.

Vehicle Age and Model Year

In the first five rows of Table 1, the model shows OR parameter estimates for vehicles in five older vehicle age groups compared to the baseline/reference vehicle age group of 0–3 years old. These OR estimates, shown in Table 1, range from 1.10 for vehicle age 4–7, 1.19 for vehicle age 8–11, 1.32 for vehicle age 12–14, up to 1.50 for vehicle age 15–17, and 1.71 for vehicle age 18+. Therefore, the study shows that a driver in a vehicle of age 15–17 was 1.50 times as likely to be fatally injured, compared to a driver in a vehicle of age 0–3 (after adjusting for the other variables in the multivariate logistic regression model). Similarly, a driver in a vehicle of age 18+ was 1.71 times as likely to be coded as fatally injured, compared to a driver in a vehicle of age 0–3 (after adjusting for other variables in the model).

Following the vehicle age OR estimates, the vehicle model year OR estimates are seen in rows 6 through 9 of Table 1. These OR estimates are 1.20 for vehicle MY 2003–2007 (compared to the baseline category of MY 2008–2012), and 1.32 for vehicle MY 1998–2002, 1.41 for vehicle MY 1993–1997, up to 1.76 for vehicle MY 1985–1992. Therefore, the study shows that a driver in a MY 2003–2007 vehicle was 1.20 times as likely to be fatally injured, compared to a driver in a MY 2008–2012 vehicle (after adjusting for the other variables in the multivariate logistic regression model). Similarly, a driver in a 1985–1992 MY vehicle was 1.76 times as likely to be coded as fatally injured, compared to a driver in a 2008–2012 MY vehicle (after adjusting for other variables in the model).

Consider the crash scenario **where a driver met the reference categories of every variable in the logistic regression**

Table 1

Odds Ratio Estimates From Logistic Regression Model. Reference Categories Are Listed in Parentheses

— Results for Vehicle Age and Model Year Variables —			
	OR Estimate	**95% CI Lower Bound**	**95% CI Upper Bound**
Vehicle Age 4–7 (vs 0–3)	1.10	1.06	1.15
Vehicle Age 8–11 (vs 0–3)	1.19	1.13	1.25
Vehicle Age 12–14 (vs 0–3)	1.32	1.24	1.41
Vehicle Age 15–17 (vs 0–3)	1.50	1.39	1.62
Vehicle Age 18+ (vs 0–3)	1.71	1.57	1.88
Model Year 03–07 (vs 08–12)	1.20	1.13	1.27
Model Year 98–02 (vs 08–12)	1.32	1.23	1.41
Model Year 93–97 (vs 08–12)	1.41	1.30	1.52
Model Year 85–92 (vs 08–12)	1.76	1.60	1.94
— Results for Other Independent Variables Included in Model —			
	OR Estimate	**95% CI Lower Bound**	**95% CI Upper Bound**
Pickup (vs PC)	0.47	0.46	0.48
SUV (vs PC)	0.50	0.49	0.52
Van (vs PC)	0.50	0.48	0.52
Airbag Deployed (vs not)	1.57	1.53	1.61
BAC .01 to .07 (vs .00)	1.29	1.21	1.37
BAC .08+ (vs .00)	1.79	1.73	1.86
Rural (vs Urban)	1.42	1.39	1.45
Nighttime (vs Day)	0.92	0.90	0.95
Age 16–20 (vs 25–34)	0.90	0.86	0.93
Age 21–24 (vs 25–34)	0.91	0.87	0.95
Age 35–44 (vs 25–34)	1.18	1.13	1.22
Age 45–54 (vs 25–34)	1.57	1.51	1.63
Age 55–64 (vs 25–34)	2.17	2.08	2.26
Age 65–74 (vs 25–34)	3.57	3.40	3.75
Age 75+ (vs 25–34)	6.64	6.31	6.98
Male (vs Female)	0.91	0..89	0.94
Multi-Vehicle (vs SV)	0.56	0.54	0.58
Restraint_Used (vs not)	0.30	0.29	0.30
Non Collision (vs Front)	1.32	1.25	1.41
Right Side Impact (vs Front)	1.76	1.69	1.82
Rear Impact (vs Front)	1.33	1.26	1.40
Left Side Impact (vs Front)	6.54	6.30	6.80
Speeding Involved Crash (vs not)	1.14	1.11	1.17
Speed Limit 55+ MPH (vs 0–54)	1.23	1.18	1.24
Ejected (vs not)	4.52	4.31	4.74
Rollover (vs not)	1.46	1.41	1.51
Interstate (vs not)	1.20	1.16	1.25
Intersection (vs not)	0.92	0.89	0.95
Motorcycle Involved Crash (vs not)	0.02	0.02	0.02
Roadway Departure (vs not)	2.17	2.11	2.24
Multiple Occupants (vs Single)	0.21	0.20	0.21

Note: In each row of Table 1, the reference categories are listed in parentheses. For example, the reference category for driver age is 25–34, the reference category for vehicle age is 0–3, and the reference category for vehicle model year is 2008–2012.

model, with the exception of the varying vehicle ages and vehicle model years. Specifically passenger car driver, airbag not deployed, BAC of .00 g/dL, urban crash, daytime crash, age 25 to 34, etc. Using this crash scenario, and allowing the vehicle age and model year to vary, Table 2 shows the model results of the estimated probability (0.29) that this driver was fatally injured if driving a vehicle age 0–3 and MY 2008–2012 (shown at the top left of Table 2). Other probabilities of being fatally injured, for differing vehicle age and vehicle MY categories, are displayed in Table 2 below. Figure 3 is a graphical display of the data shown in Table 2. These probabilities are determined from the regression model.

Limitations

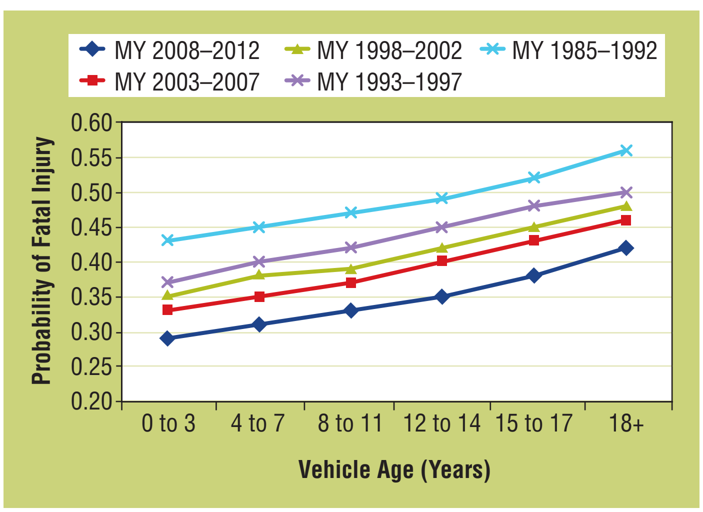
This report examines vehicle age and model year, adjusting for many other crash factors, to show improvements in vehicle safety. Many pieces of crash information are not accounted for in the logistic regression model. These include the number of miles that the vehicle has traveled, how the vehicle owners have maintained their vehicle, and many improvements in newer vehicles (i.e. improved roof crush strength and anti-lock brakes). It is also likely that changes and improvements in driver behavior over time account for some of the improvements in safety that are correlated with vehicle model year. Many of these behavior and driver patterns (restraint use, speeding involvement, BAC, etc) are included in this model. Others, such as graduated driver licensing and cell phone, use are not.

Table 2
Probabilities of Passenger Vehicle Driver Being Fatally Injured, by Vehicle Age And Vehicle Model Year. Reference Categories Coded for All Other Regression Variables

Vehicle Age (years) by Vehicle MY	MY 2008–2012	MY 2003–2007	MY 1998–2002	MY 1993–1997	MY 1985–1992
Age 0–3	0.29	0.33	0.35	0.37	0.42
Age 4–7	0.31	0.35	0.38	0.40	0.45
Age 8–11	0.33	0.37	0.39	0.42	0.47
Age 12–14	0.35	0.40	0.42	0.45	0.49
Age 15–17	0.38	0.43	0.45	0.48	0.52
Age 18+	0.42	0.46	0.48	0.50	0.56

For example, 0.56 (shown at the bottom right of Table 2) is the estimated probability of being fatally injured in a vehicle of age 18+ years and model year 1985–1992. This estimated probability of 0.56 is nearly twice the 0.29 estimated probability of being fatally injured in a vehicle of age 0–3 and model year 2008–2012. See Table 2 above for additional probabilities, which are all based on the reference categories of each variable in the logistic regression model in Table 1, with the exception of varying vehicle age and model year.

Figure 3
Probabilities of Passenger Vehicle Driver Being Fatally Injured, by Vehicle Age And Vehicle Model Year. Reference Categories Coded for All Other Regression Variables



While the relationship between probability of death and vehicle age and model year are measured in this report, the reasons for this relationship are not derived by this analysis. Those reasons would involve analysis based on data that is outside the scope of the FARS database. Some of the results from the odds ratios in Table 1 must be considered with other knowledge. For example, the odds ratio of 1.57 for air bags deploying versus not deploying is not the result of air bags causing fatalities, but the fact that air bags deploy in more severe crashes.

This report does not analyze the population of passenger vehicle drivers in the United States in order to measure the overall risk of a driver in this population being fatally injured. The report merely analyzes the experience that passenger vehicle drivers in fatal crashes have had.

Conclusion

The model in this report shows that, after adjusting for other crash factors, the probability that a driver was fatally injured increased (1) as the age of the vehicle being driven increased, and (2) in vehicles of earlier model year.

In fatal crashes, the study shows that a driver in a vehicle of age 4–7 years was 10 percent more likely to be fatally injured than a driver in the baseline vehicle age category of 0–3. The model produced comparable estimates for drivers of vehicles age 4–7 (10%), 8–11 (19%), 12–14 (32%), 15–17 (50%), and 18+

(71%). Each of these estimates show the increased risk of being fatally injured in older vehicles, compared to the baseline 0–3 vehicle age category.

Similarly, a driver in a MY 2003–2007 vehicle was 20 percent more likely to be fatally injured than a driver in the baseline vehicle MY 2008–2012. This baseline category of MY represents the vehicles in the study with the most recent MY. The model produced comparable estimates for drivers of MY 2003–2007 vehicles (20%), MY 1998–2002 vehicles (32%), MY 1993–1997 vehicles (41%), and MY 1985–1992 vehicles (76%). Each of these estimates demonstrates the increased driver risk of being fatally injured in older MY vehicles, compared to a baseline vehicle MY 2008–2012.

The report also shows that driver restraint use plays a large role in the relationship between vehicle age and the percentage of drivers fatally injured. The percentage killed among restrained drivers dropped fairly steadily from 46 percent among vehicles 19 years old, down to 26 percent among vehicles of age less than 1. This pattern was seen less among unrestrained drivers. Among vehicles of age 19 all the way down to vehicles of age 3, the percentage killed among unrestrained drivers varied little, remaining consistently between 76 and 78 percent. This pattern among fatal crashes suggests that being unrestrained removes much of the safety benefits that are provided by newer vehicles.

References

Glassbrenner, D. (2012, June). *An analysis of recent improvements to vehicle safety*. (Report No. DOT HS 811 572). Washington, DC: National Highway Traffic Safety Administration. Available at www-nrd.nhtsa.dot.gov/Pubs/811572.pdf.

Kahane, C. (2004, October). *Lives saved by the Federal Motor Vehicle Safety Standards and other vehicle safety technologies, 1960–2002 — Passenger cars and light trucks — With a review of 19 FMVSS and their effectiveness in reducing fatalities, injuries and crashes*. (Report Number DOT HS 809 833). Washington, DC: National Highway Traffic Safety Administration. Available in two parts at www.nhtsa.gov/cars/rules/regrev/evaluate/pdf/809833Part1.pdf (main report) and www.nhtsa.gov/cars/rules/regrev/evaluate/pdf/809833Part2.pdf (Appendices)

U.S. Department of Transportation

National Highway Traffic Safety Administration

This research note and other general information on highway traffic safety may be accessed by Internet users at: www-nrd.nhtsa.dot.gov/CATS/index.aspx