SENATE HIGHWAYS AND TRANSPORTATION
EXHIBIT NO. 10
DATE: 4/5/05
BILL NO. HB 673

U.S. Department of Tranportation

National Highway Traffic Safety Administration

Addressing the Safety Issues Related to Younger and Older Drivers

A Report to Congress
January 19, 1993
on the
Research Agenda
of the
National Highway Traffic Safety Administration

This Report Was Prepared by the
Office of Program Development and Evaluation
Traffic Safety Programs

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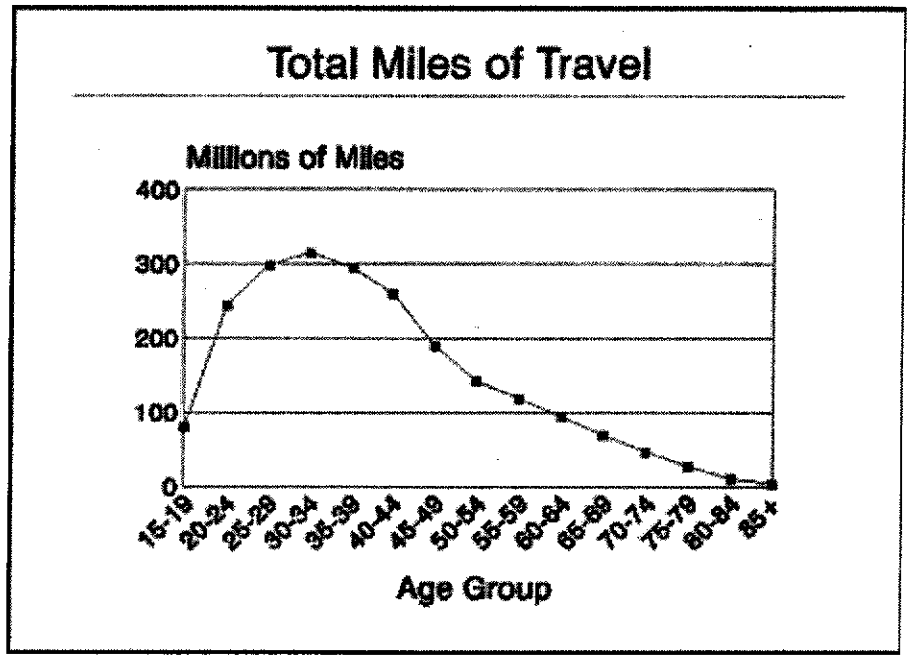
Figure 2. Total Miles of Travel by Age Group



Figures 3 and 4 show, respectively, the number of drivers in reported crashes and the number of fatalities resulting from those crashes. The shapes of these two curves are also nearly parallel, showing that the relationship between crashes and fatalities is roughly the same for all but the older drivers. Younger drivers were involved in four times as many reported crashes as the older group. They also were involved in three times as many fatal crashes as older drivers. Compared with older drivers, more than twice as many younger drivers died.

Figure 3. Number of Drivers in Reported Crashes by Age Group

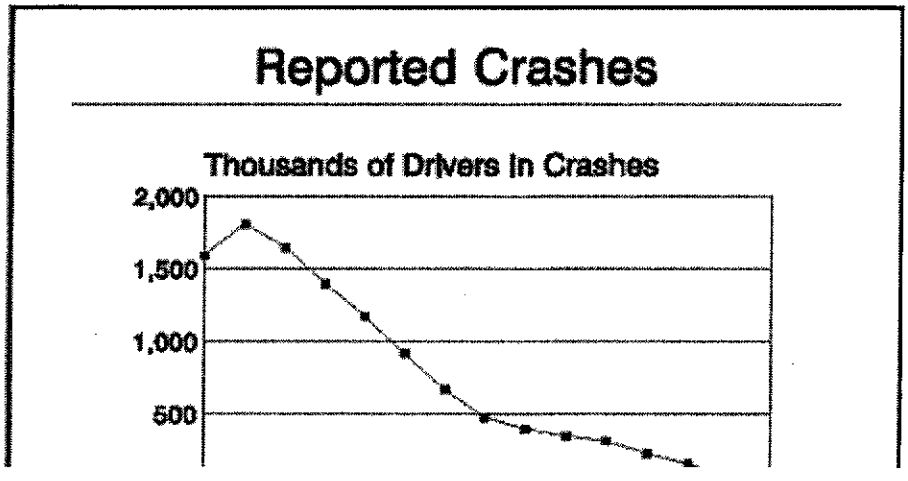


Figure 4. Number of Driver Fatalities by Age Group

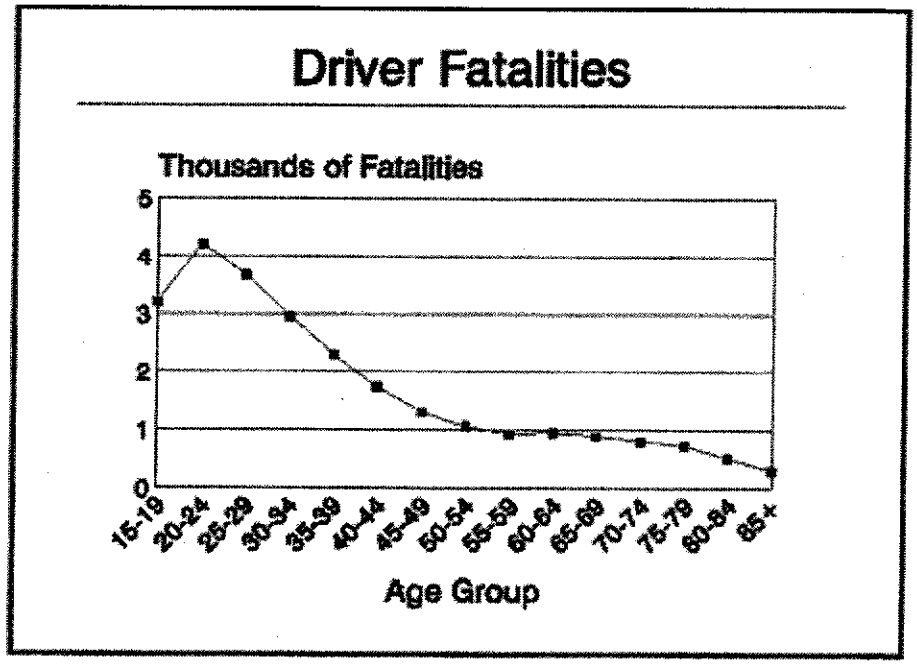
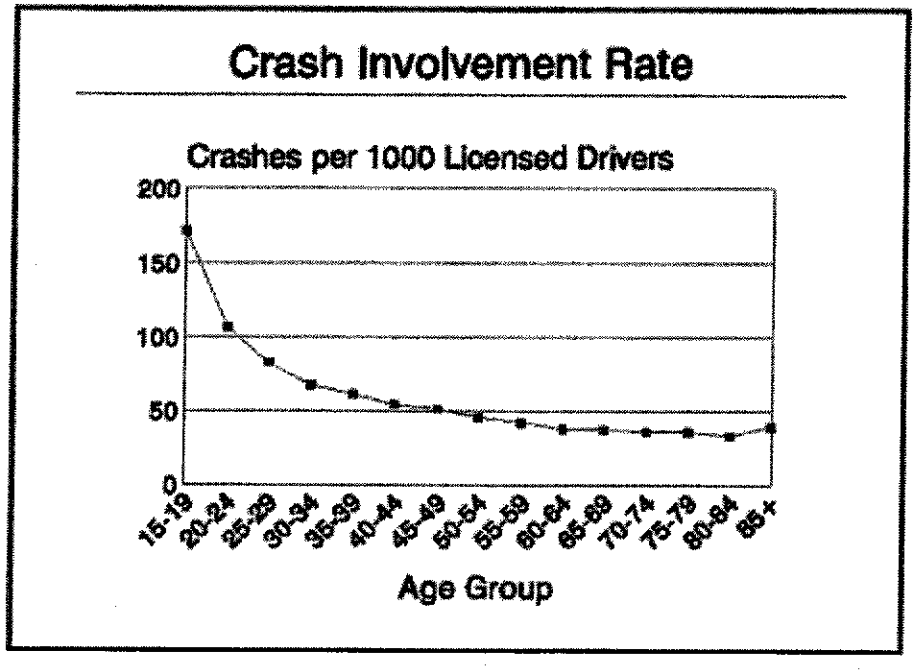


Figure 5 shows that after the number of crashes is adjusted for the number of licensed drivers in the age group, younger drivers are considerably more likely to be involved in a crash than are older drivers. In fact, the **per-person** crash involvement rate decreases as age increases until drivers reach 85 or more years of age. Even this age group has a per-driver crash rate lower than drivers younger than 50 years of age.

Figure 5. Crash Involvement Rate per Thousand Licensed Drivers by Age Group

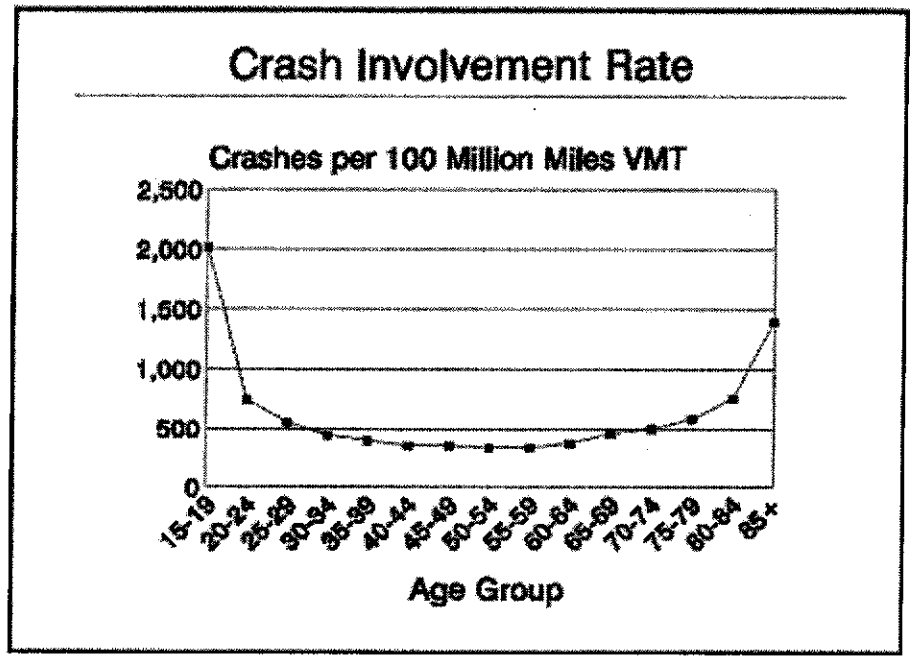


While the **per-person** rates reflect a smaller proportion of older drivers involved in crashes than younger drivers, adjusting the number of crashes by the total mileage traveled by members of each age group reveals a different pattern. Figure 6 shows the number of crashes per 100-million

miles traveled. This curve indicates that the highest **per-mile** crash rates occur among the youngest and the oldest age groups. This demonstrates that an "average mile" driven by a member of one of these two groups is more dangerous than an "average mile" driven by a member of an intermediate age group.

However, since drivers at either end of the age range drive far fewer miles than those in between, researchers have questioned the equality of those "average miles" across age groups. Unlike younger and older drivers, drivers in the intermediate age groups travel a sizeable proportion of their annual miles on expressways and other inter-city roadways. These types of roads typically offer fewer hazards than do roads in urban areas. Most of the miles driven by younger and older drivers involve congested areas and heavy concentrations of intersections that offer relatively more opportunities for conflict with pedestrians and other vehicles.

Figure 6. Crash Involvement Rate per 100 Million Miles VMT by Age Group



Fatality rates reveal that older drivers are at increased risk of dying, whether the rate is based on the number of licensed drivers (shown in Figure 7) or on the total vehicle miles traveled (shown in Figure 8).

Figure 7. Fatality Rate per Thousand Licensed Drivers by Age Group

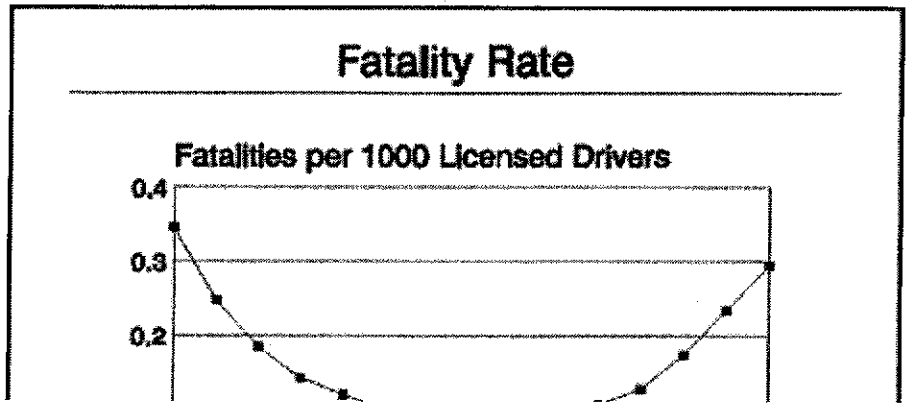
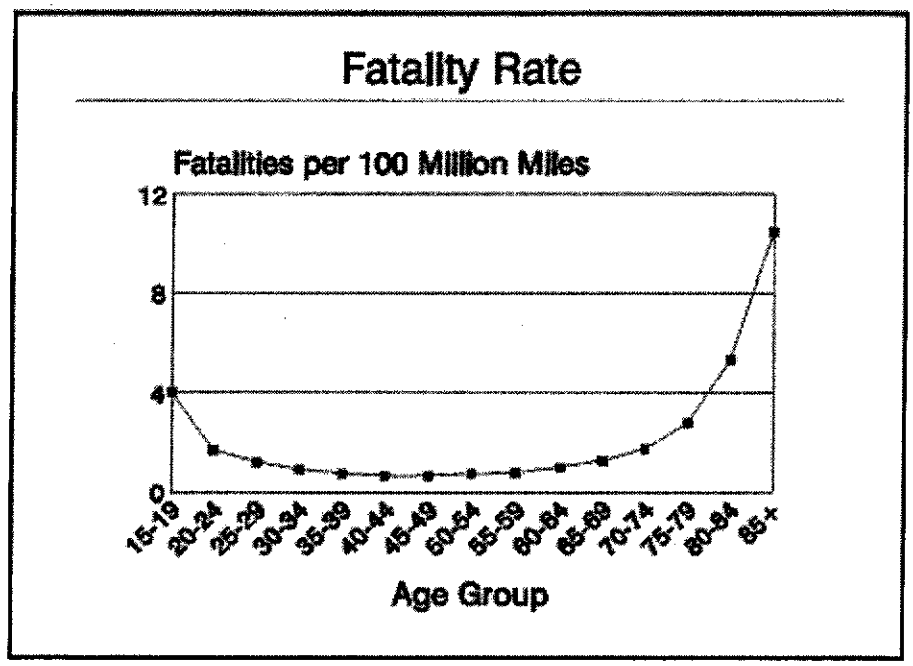


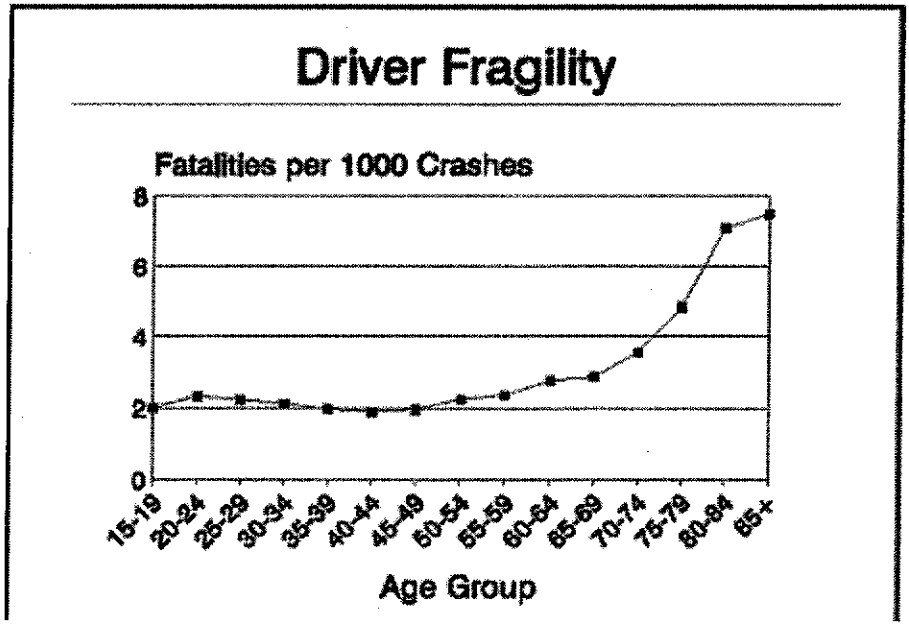
Figure 8. Fatality Rate per 100 Million Vehicle Miles Traveled by Age Group



If drivers of any age were equally likely to die from crash injuries, then the shape of Figure 7 should be the same as Figure 5. This condition appears to hold for drivers below the age of 60 or so. However, drivers older than 60 years of age show increasing fatality rates, indicating that older drivers suffer more serious injuries in crashes than do younger drivers. This increase in driver fragility with age is shown more clearly by plotting the rate of fatalities per crash by age, as in Figure 9.

On a per-mile basis, older drivers have a greater fatality rate than other-aged drivers. But by any other measure, younger drivers outnumber, out-travel, out-crash, and out-die older drivers. However, once they are in a crash, older drivers are more than three times as likely to die than are younger drivers.

Figure 9. Driver Fragility by Age Group



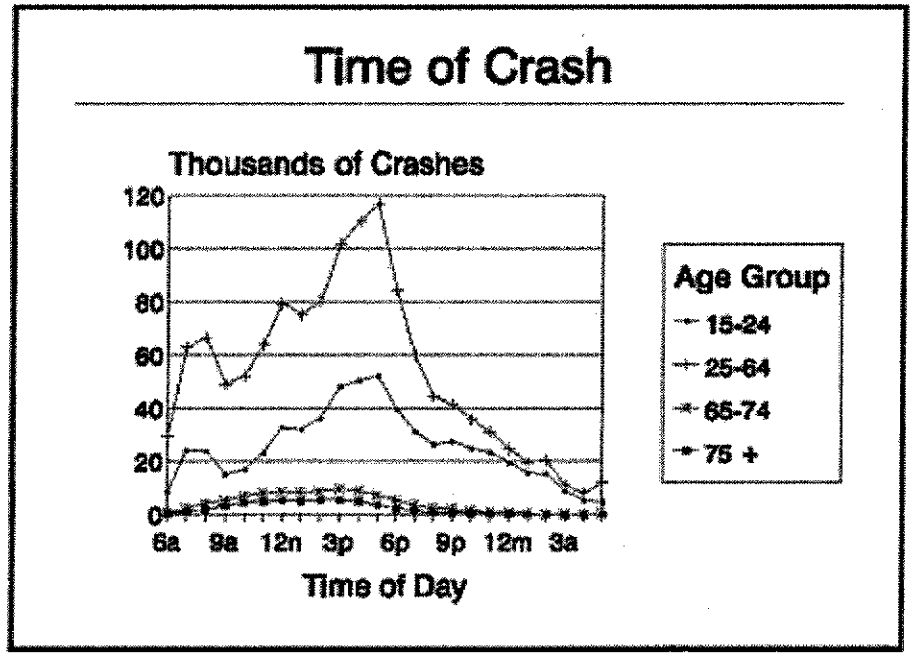
Characteristics of Crashes

By looking at the *relative proportions* of involvement in different types of crashes, it is possible to gain some understanding of the differences and similarities between age groups, independent of the *absolute levels* of involvement. Analysis of police crash reports contained in NHTSA's 5-State Crash Avoidance Research Data File (CARDFILE) reveals some striking differences and some surprising similarities between the crash patterns of younger and older drivers.

Time of Day

Figure 10 shows the hour-by-hour pattern of crashes by drivers of different ages. The younger-driver crash pattern does not differ much from that of drivers between the ages of 25 and 64, showing the majority of crashes occurring between 7:00 a.m. and 8:00 p.m., with a small peak during the hours of morning rush hour and a large peak during evening rush hour. After 8:00 p.m., the number of crashes declines slowly to a minimum around 4:00 a.m. (for 25 to 64 year-old drivers) or 5:00 a.m. (for 15-24 year-old drivers). Older drivers, on the other hand, have few crashes between 8:00 p.m. and 7:00 a.m. The crash patterns of older drivers do not show rush-hour peaks, but rather a slow increase in number from 7:00 a.m. to about 11:00 a.m., remaining flat until about 4:00 p.m., and slowly decreasing until around 8:00 p.m.

Figure 10. Number of Crashes by Time of Crash and Age Group

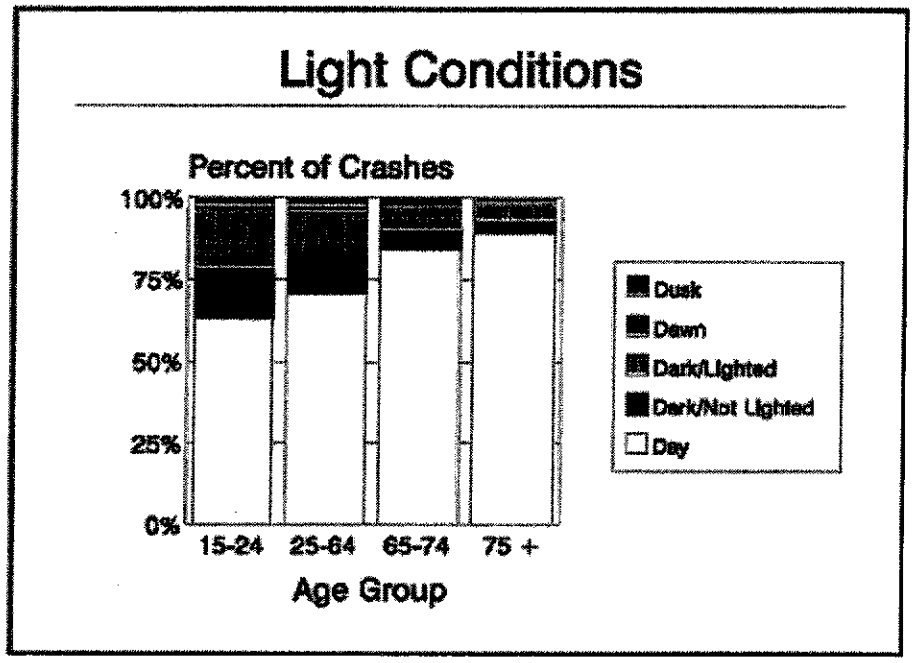


Light Conditions

The relationship between crashes and lighting parallel the patterns of crashes by time of day. Well over half of all crashes occur during daylight hours. However, the relative proportions of daylight and dark crashes vary with age, as shown in Figure 11. The 15 to 24 age group has one in three (33 percent) of their crashes after dark. Drivers between 25 and 64 have

one in four (25 percent) crashes after dark. Drivers between 65 and 74 have one in eight (12.5 percent) of their crashes after dark, and the oldest group (75 years of age or older) has one in twelve (8.3 percent) crashes after dark. These results follow the reported driving habits of older drivers: they tend to drive less and less after dark as they get older. Many do not drive after dark at all.

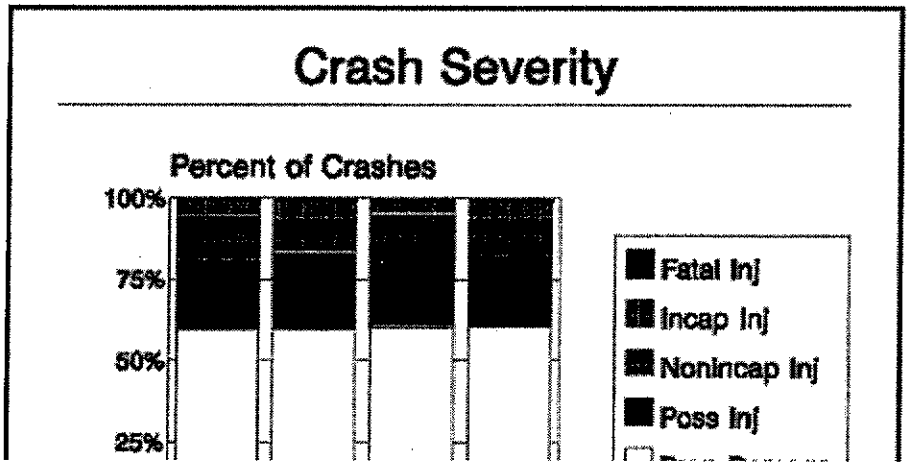
Figure 11. Percent of Crashes by Light Conditions and Age Group



Crash Severity

Remarkably, the distribution of crash severity is almost identical across age groups, as shown in Figure 12. About 60 percent of all crashes involve property damage only; 22 to 23 percent involve possible injury; 12 percent non-incapacitating injury; 5 percent incapacitating injury; and fewer than one percent of crashes involve fatal injury. Among the fatal-injury crashes, the level of involvement increases with age, with 0.6 percent for drivers 15 to 64; 0.7 percent for drivers 65 to 74; and 0.9 percent for drivers 75 and older.

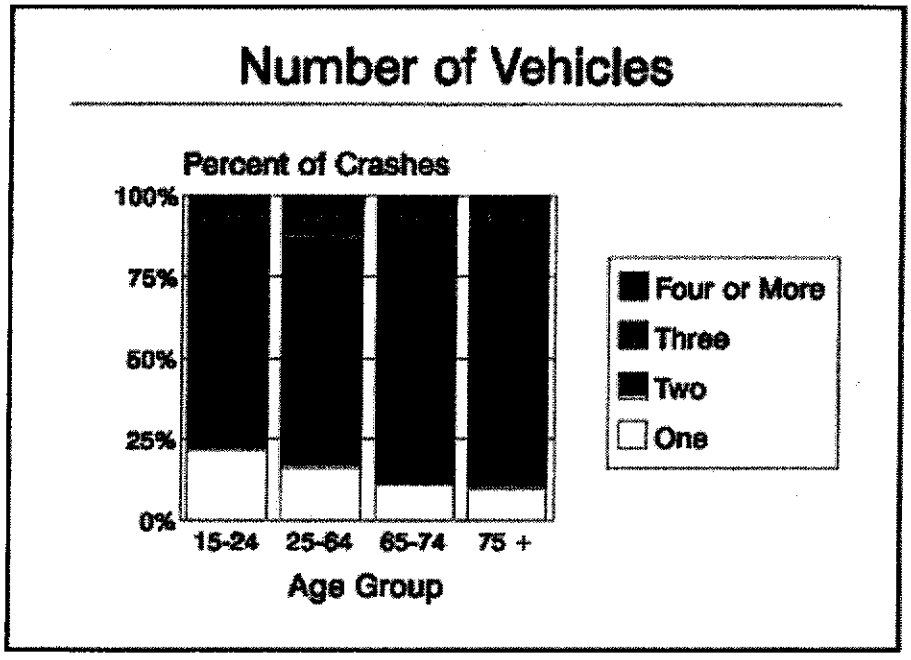
Figure 12. Percent of Crashes by Severity Level and Age Group



Number of Vehicles Involved

The majority of crashes involve two vehicles, regardless of drivers' age, as shown in Figure 13. Among younger drivers, two-vehicle crashes account for 68 percent of all crashes, compared with 71 percent of drivers 25 to 64, and 80 percent of drivers 65 and older. The percentage-point differences between age groups on two-vehicle crashes are largely made up in single-vehicle crashes. Proportions of single-vehicle crashes from the youngest to the oldest are 21 percent, 16 percent, and 10 percent, respectively.

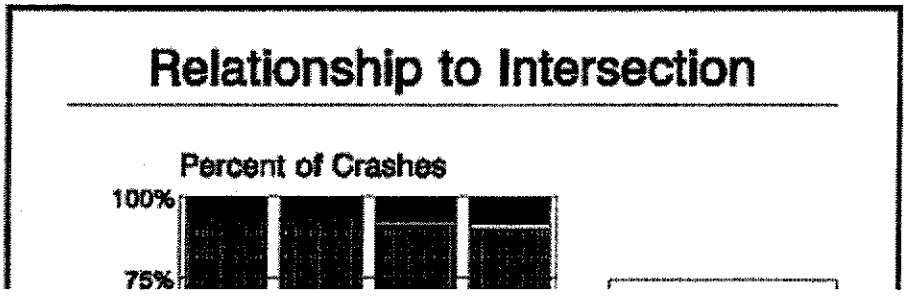
Figure 13. Percent of Crashes by Number of Involved Vehicles and Age Group



Relationship to Intersection

Most crashes for all age groups occur at intersections, although the proportions are somewhat different for the different groups, as shown in Figure 14. About 50 percent of crashes of the youngest and middle groups occur at intersections, whereas about 60 percent of older drivers' crashes occur at intersections. Younger drivers show a greater tendency than other age groups to be involved in non-intersection crashes, with 15-24 age group showing 43 percent, the 25-64 group showing 41 percent, and the 65-74 group showing 31 percent.

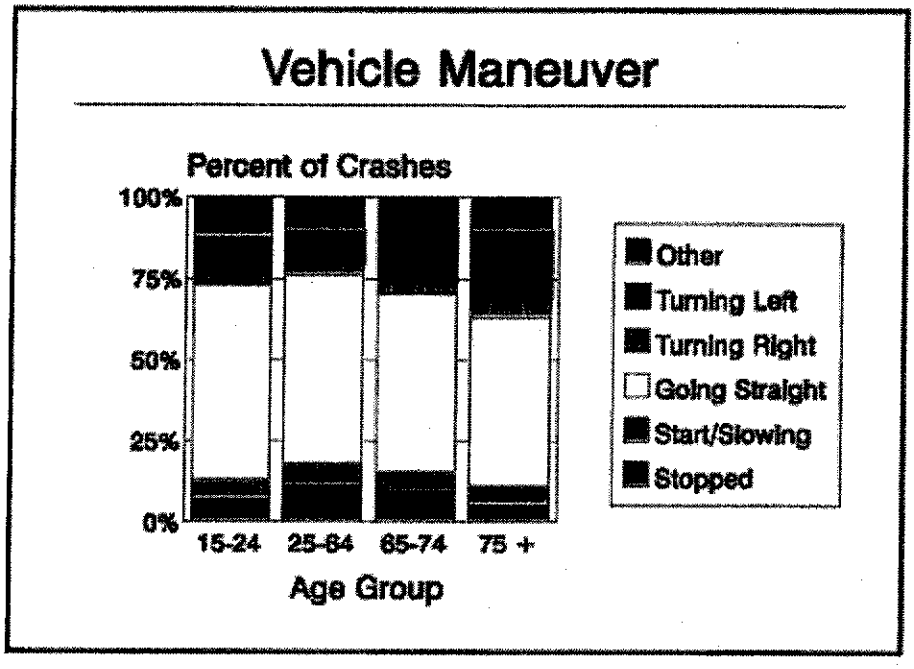
Figure 14. Percent of Crashes by Relationship to Intersection and Age Group



Pre-crash Maneuver

More than half of the crashes of all age groups involve the vehicle going straight just prior to the crash, accounting for 59 percent of the youngest group's crashes, 57 percent of the middle group's crashes, and 53 percent of the oldest group's crashes. These proportions are shown in Figure 15. The most striking difference between the groups is in the proportion of crashes involving left turning. While 11 percent of younger drivers' crashes involved left-turning, 17 percent of older drivers' crashes involved left-turning. Within the older driver group, the oldest drivers show the greatest proportion of crashes in this category, involving 16 percent of 65-74 year-old drivers' crashes and 21 percent of the crashes of drivers 75 years old or more.

Figure 15. Percent of Crashes by Vehicle Maneuver and Age Group

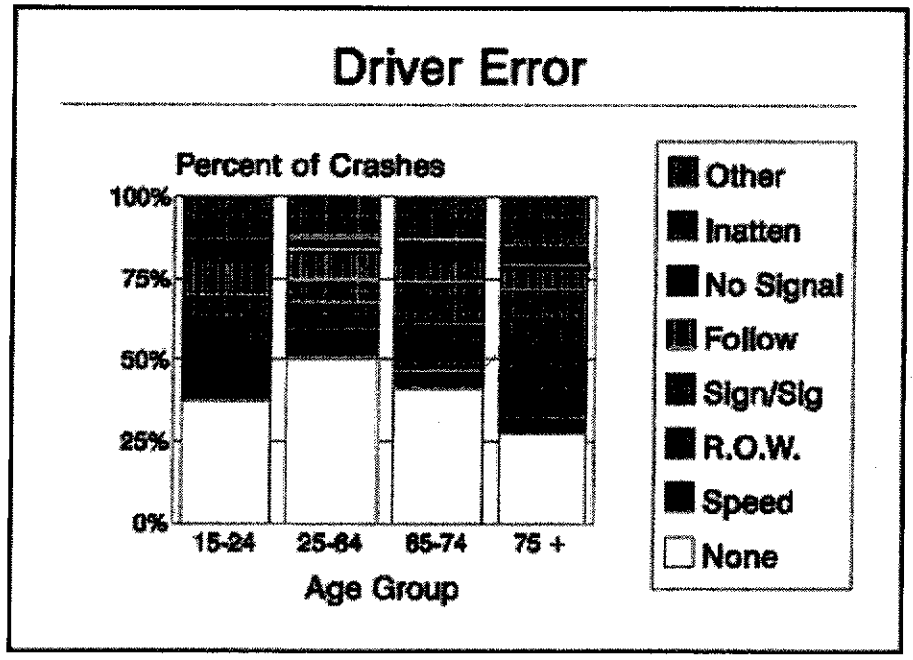


Driver Error

Excessive speed is the primary error in 15 percent of younger-driver crashes, but only in about 5 percent of older-driver crashes, as shown in Figure 16. Right-of-way violations are the primary error in 18 percent of older-driver crashes, but only in about 9 percent of younger-driver crashes.

Older drivers also make more errors at signed or signalized intersections than do younger drivers: 14 percent and 9 percent respectively. Driver inattention, which includes falling asleep at the wheel, was about equally likely among younger and older drivers, accounting for slightly more than 5 percent of crashes in each group.

Figure 16. Percent of Crashes by Driver Error and Age Group

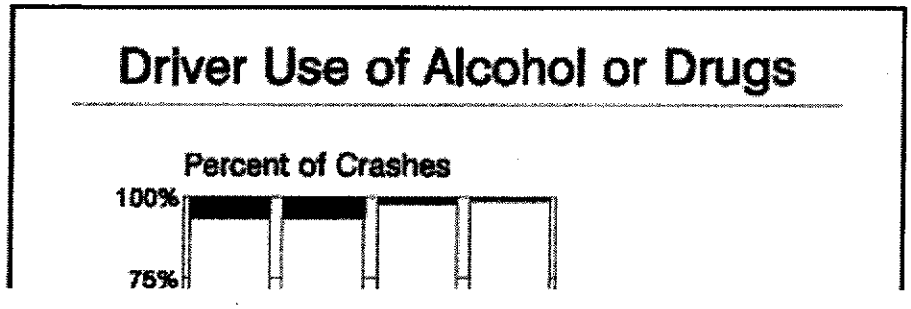


Alcohol Involvement

Blood Alcohol Concentrations (BAC) at or above .10 percent are detected in about 6.5 percent of crash-involved younger drivers. Drivers between 25 and 64 years of age also show BACs at or above .10 percent in 6.5 percent of their crashes. Older drivers, however, show BACs at or above .10 percent in less than 2 percent of their crashes. These relationships are shown in Figure 17.

Alcohol plays a much larger role in **fatal** crashes. One out of 10 fatal crashes in 1990 involved drivers or pedestrians with BACs between .01 and .09 percent, while 4 of 10 involved drivers or pedestrians with BACs at or above .10 percent. Twenty-seven percent of young drivers in fatal crashes had BACs at or above .10 percent, compared with 26 percent of drivers between 25 and 64, and 6 percent of drivers 65 years old or older.

Figure 17. Percent of Crashes by Driver Use of Alcohol or Drugs and Age Group



Sources of Risk for Younger Drivers: Problem Behaviors

The primary problems of drivers between 15 and 25 years of age appear to be related to lack of experience, immature judgment, and risk taking. Younger drivers have limited life experience to rely upon in developing responses to the driving environment.

Some researchers contend that younger persons, especially in the teen years, have a sense of immortality and invulnerability to danger that carries over into their driving behaviors. Younger drivers tend to believe that crashes only happen to others. Some younger individuals also tend to display other characteristics that foster unsafe driving. Younger drivers perceive risk differently than older drivers. A NHTSA study found that younger drivers rated speeding as less dangerous than did their more experienced counterparts. There also was evidence that young drivers saw themselves as more skillful than their peers, and that young drivers' increased familiarity with a driving location reduced their perception of danger in that situation. This was not found for more experienced drivers. The findings suggested that, relative to drivers over 25 years of age, young drivers associated lower risks with certain driving acts and underestimated their personal risk of being involved in a crash. .

Personality factors, particularly among males, may also contribute to the young driver problem. The literature includes references to over-expression of impulsiveness, daredevil driving, anger in traffic situations, and driving to let off steam after arguments. There also are weak but consistent correlations between various "anti-social" personality traits (more common among the young than other age groups) and higher crash rates.

Sources of Risk for Older Drivers: Declining Capabilities

The research literature confirms conventional knowledge about the effects of aging on cognitive, perceptual, and motor abilities.

Age-related changes in vision make it more difficult for older adults to accommodate to darkness, recognize objects under low lighting conditions, recover from glare, and search their environment. Virtually all