Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

Fit for the road

Older drivers' crash rates continue to drop

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Today's older drivers are not only less likely to be involved in crashes than prior generations, they are less likely to be killed or seriously injured if they do crash, a new Institute study shows. That's likely because vehicles are safer and seniors are generally healthier. It's a marked shift that began to take hold in the mid-1990s and indicates that the growing ranks of aging drivers aren't making U.S. roads deadlier.

The Institute first noted the improving picture for older drivers in 2008 (see *Status Report*, Dec. 27, 2008, at iihs.org). The latest analysis bolsters the evidence that drivers 70 and older have enjoyed bigger declines in fatal crash rates per licensed driver and per vehicle miles traveled than drivers ages 35-54, referred to in the study as middle-age drivers, since 1997. A new finding is that progress appears to have slowed in recent years, with the biggest improvements in older drivers' fatal crash rates relative to middle-age drivers occurring between 1997 and 2007.

The crash outlook is improving for both older and younger drivers. During 1997-2012, fatal crash rates per licensed driver fell 42 percent for older drivers and 30 percent for middle-age ones. Looking at vehicle miles traveled, fatal crash involvement rates fell 39 percent for older drivers and 26 percent for middle-age ones from 1995 to 2008. A breakdown of the results for older drivers by age group shows that fatal crash involvement rates per licensed driver fell 36 percent for drivers ages 70-74, 46 percent for drivers 75-79 and 49 percent for drivers 80 and older during 1997-2012.

There were similar declines in older drivers' involvement rates in injury crashes that weren't fatal during the same periods.

"This should help ease fears that aging baby boomers are a safety threat. Even crashes among the oldest drivers have been on a downswing," says Anne McCartt, the Institute's senior vice president for research and a co-author of the study.

At the beginning of the study period, drivers 80 and older had by far the highest fatal crash rate, at nearly twice the rate of drivers ages 35-54 and 70-74. By 2012, the fatal crash involvement rate for drivers 80 and older improved to 1.4 times the rate of the other two age groups.

"Older drivers are not only less likely to crash in recent years, they also are sharing in the benefits of newer and safer vehicles. It also helps that older people in general are more fit than in years past, with better access to emergency services and health care," McCartt says.

These factors may be contributing to a change in travel patterns. Older drivers covered fewer miles per year on average than middle-age drivers during 1995, 2001 and 2008, data from the federal government's National Household Travel Survey show. However, older drivers increased their annual mileage by bigger percentages than middle-age drivers from 1995 to 2008. This is especially the case for drivers 75 and older, who lifted their average annual mileage by more than 50 percent from 1995 to 2008.

The fact that older drivers increased their average mileage during 1997-2012 may indicate that they are remaining physically and mentally comfortable with driving tasks. When older adults reduce their trips, there's evidence that it is often because they are self-regulating their driving in response to impairments. IIHS research has found that the more memory and physical mobility problems people develop over time, the more limits they place on their driving (see *Status Report*, Sept. 28, 2011).

Older drivers are not only less likely to crash than in recent years, they also are less likely to be injured or killed.

Graying population

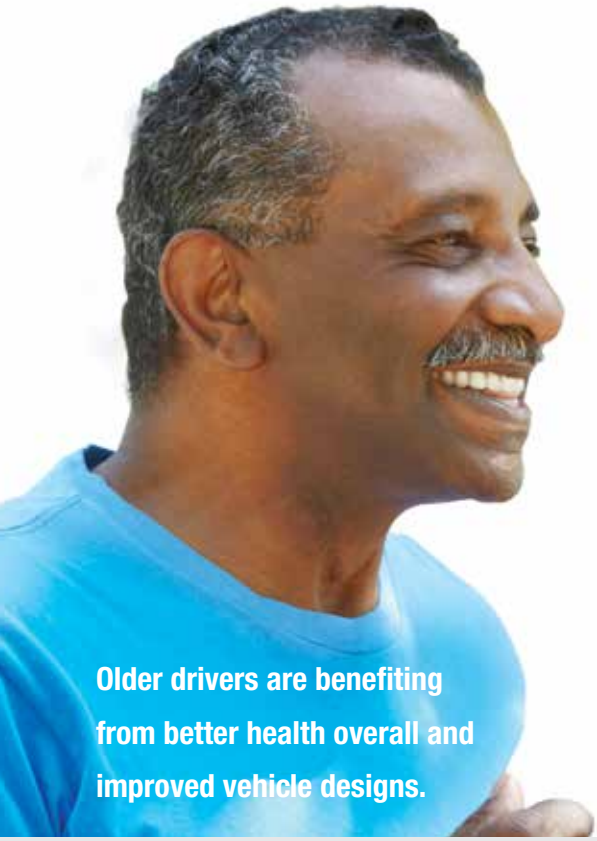
Like many Western countries, the U.S. is seeing its population skew older. From 1997 to 2012, the population of adults 70 and older rose 19 percent. By 2050 the population of adults 70 and older is expected to reach 64 million, comprising 16 percent of the U.S. population, compared with 29 million, or 9 percent of the population, in 2012, U.S. census data indicate. The 80 and older population is expected to nearly triple to 31 million.

At the same time, an increasing number of people 70 and older are holding on to their driver licenses longer than before. The number of licensed drivers this old climbed 30

National fatal passenger vehicle driver crash involvements per 100,000 licensed drivers by age, 1997-2011

National fatal passenger vehicle driver crash involvements per 100 million vehicle miles traveled by age group, 1995, 2001, 2008

Projected population of people 70 and older in millions, 1980-2050



Older drivers are benefiting from better health overall and improved vehicle designs.

percent during 1997-2012, and the percentage of older people who were licensed edged higher from 73 to 79 percent. Licensure rates also increased more with age, from 86 to 89 percent for 70-74 year-olds, from 77 to 84 percent for 75-79 year-olds and from 55 to 68 percent for drivers 80 and older.

More than a decade ago, the Institute was among the highway safety groups initially expressing concern about the risk of having so many people 65 and older on U.S. roads (see *Status Report*, Sept. 8, 2001). By 2006, the predicted problem hadn't shown up in fatal crash data. A follow-up study of data through 2008 confirmed the trend (see *Status Report*, Dec. 27, 2008, and June 19, 2010).

Recent trends

A total of 4,079 people ages 70 and older died in crashes in 2012. That's 31 percent fewer than in 1997, when older driver fatal crash involvements peaked in the United States.

In the new study, IIHS researchers compared trends for drivers ages 70 and older with those for drivers ages 35-54 for national fatal passenger vehicle crash involvements per 100,000 licensed drivers during 1997-2012 and per vehicle miles traveled from 1995 to 2008. Researchers used fatal crash data from the National Highway Traffic Safety Administration's Fatality Analysis Reporting System, driver license data from the Federal Highway Administration, information on vehicle miles traveled from the highway administration's national household travel surveys and data on police-reported crashes from the National Automotive Sampling System General Estimates System and crash databases from 20 states.

"No matter how we looked at the fatal crash data for this age group — by licensed

Safer vehicles benefit all occupants

Both older and younger passenger vehicle occupants are benefiting from efforts to improve protection in crashes, a National Highway Traffic Safety Administration (NHTSA) study confirms.

Researchers estimated the effectiveness of various occupant protection technologies in preventing deaths of drivers and right front-seat passengers ages 13-49 and 70-96 in 1960-2011 model passenger vehicles in crashes during 1975-2010.

Safety belts have historically been somewhat less effective for older occupants than younger ones, the authors note. For example, some earlier belt designs were more likely to cause rib and other injuries in older occupants than younger adults in crashes. In older model cars, two-point automatic belts were less effective for people 70-96 years old than for occupants ages 13-49.

The latest generation of belts with pretensioners and load limiters in vehicles with dual airbags may be just as effective for adults of all ages, as well as for both men and women, the study found. Belt pretensioners tighten up slack when triggered by vehicle sensors and retract the belt almost instantly in a crash. Load limiters manage the force that belts apply to occupants' chests in a crash by allowing some of the webbing to spool out when the forces exceed levels that can cause injuries.

Prior IIHS research has indicated in certain severe crashes, including small overlap front crashes, shoulder belts with load limiters may spool out too much, allowing occupants to move enough to strike hard surfaces inside the vehicle (see *Status Report*, Oct. 13, 2007, at iihs.org). Still, NHTSA's study suggests that these features are evening out protection for all occupants and supports a new IIHS analysis suggesting that safer vehicles are helping to reduce older drivers' risk of dying in a crash.

Front airbags are about equally effective across all age groups for both drivers and right front passengers, NHTSA's study indicates. Side airbags with head and torso protection provide a much bigger benefit for older occupants than younger ones. Researchers estimated that side airbags lower fatalities in nearside impacts by 45 percent for people 70 and older in front seats, compared with an estimated 30 percent reduction for front-seat occupants ages 13-49.

Front airbags have been required since the 1999 model year. Side airbags aren't mandated, but the majority of 2008 and later models have them as standard to meet federal side protection requirements and to earn a good rating in the IIHS side crash test.

NHTSA also calculated the odds of dying in a crash by driver age and gender. Starting at about age 21, the risk of dying in a crash rises about 3 percent with each birthday. A 75-year-old man is, on average, 5 times as likely to die as a 21-year-old man in a similar crash. A 75-year-old woman is 4 times as likely to die in a crash as a 21-year-old woman in a similar crash.

Women have about a 25 percent higher risk of death than male drivers of the same age in the same type of crash, up to about age 35. Then men's advantage starts to slip, and by the time they reach age 70, both men and women have similar risk.

Women in particular have benefited from safety improvements, especially airbags and belts with pretensioners and load limiters. The estimated increase in fatality risk for females relative to males of the same age fell sharply beginning with mid-1990 models and had dropped by half in 2005-11 models.

Fatal injuries to the thorax, abdomen and neck increased the most with age; fatal head

drivers or miles driven — the fatal crash involvement rates for drivers 70 and older declined, and did so at a faster pace than the rates for drivers ages 35-54," McCartt says.

More recently, the downward trend in older drivers' fatal crash involvements per licensed driver has slowed, while the declines in fatal crash involvement rates among middle-age drivers have accelerated. From 2007 to 2012, declines for older and middle-age drivers were the same at 18 percent each. This may be a byproduct of the U.S. recession, which likely affected driving patterns for middle-age people more than older people. Studies indicate that traffic fatalities fall during recessions and rise when the economy improves. That may be due to a drop in commuting, discretionary trips and alcohol-impaired driving.

Researchers also examined trends in involvement rates in nonfatal crashes of various severities per 100,000 licensed drivers during 1997-2008 between older and middle-age drivers.

The state data indicate that crash involvement rates per licensed driver for adults 70 and older also decreased in nonfatal crashes, and the declines were bigger as driver age increased. From 1997 to 2008, involvement rates in nonfatal injury crashes fell by a third for drivers 35-54, 36 percent for drivers 70-74, 38 percent for drivers 75-79 and 45 percent for drivers 80 and older. The pattern held when examining declines in property-damage-only crash involvement rates for older drivers vs. middle-age drivers.

Reduced odds of dying

Older people are generally frailer than younger adults, and this fragility makes them more vulnerable to injuries and raises their risk of dying in a crash. To gauge whether changes in relative frailty also contributed to the decline in fatal crash risk, IIHS researchers compared changes in the odds of death or serious injury among older and middle-age crash-involved drivers using the state crash data.

During 1997-2008, the odds that crash-involved drivers age 35-54 or 70 and older sustained a fatal injury declined, and the decrease was significantly larger for older drivers than for middle-age drivers. In 1997, drivers 70 and older were 3.5 times as likely to die in a crash as drivers ages 35-54, and drivers 80 and older were 5.4 times as likely to die in a crash as middle-age drivers. By 2008, drivers 70 and older were 3.2 times as likely to die in a crash as drivers 35-54, and drivers 80 and older were 4.3 times as likely to die in a crash as middle-age drivers.

For a copy of "Trends in older driver crash involvement rates and fragility: an update" by J.B. Cicchino and A.T. McCartt, email publications@iihs.org. ■

injuries increased the least. Females were much more likely than males of the same age in similar crashes to sustain fatal neck and abdominal injuries and moderately more likely to have head or chest injuries.

NHTSA has proposed adding a so-called silver car rating to the New Car Assessment Program (safercar.gov) to help older drivers choose potentially safer vehicles. Since the agency's new analysis indicates that both older and younger occupants are benefiting from safer vehicles, a silver car rating might not be any more beneficial than NHTSA's 5-star safety ratings program. Although it is possible that some crash protection designs might protect older and more fragile people better than other designs, such features help younger drivers, too.

To further explore this issue, IIHS researchers updated a prior analysis of driver death rates (see *Status Report*, June 9, 2011). IIHS calculated standardized death rates per vehicle registration by make and model for 2006-08 vehicles during calendar years 2006-09 for a hypothetical population 65 and older and a hypothetical younger population. Researchers adjusted for other factors that affect crash risk, including calendar year, vehicle age, driver gender and the vehicle density in the areas where each vehicle is typically registered. These are known to affect the likelihood of a crash and the likelihood that it will be fatal. Differences in these variables can affect driver death rates in ways that don't reflect the vehicle's inherent safety.

The estimated driver death rates for every model were higher for the hypothetical group of older drivers than the younger drivers. However, the rank order of vehicles by driver death rates was highly correlated for both groups, suggesting that the safest vehicles apply to younger and older drivers alike.

Access "Injury vulnerability and effectiveness of occupant protection technologies for older occupants and women" by C. J. Kahane at www-nrd.nhtsa.dot.gov/pubs/811766.pdf. ■

Minicars fall short for small overlap frontal protection

Only 1 minicar out of 11 tested achieves an acceptable rating in the Institute's small overlap front crash test, making these tiny vehicles the worst performing group of any evaluated so far.

The Chevrolet Spark's acceptable rating in the test, along with good ratings in the Institute's four other crashworthiness evaluations, earns the new minicar a 2014 *TOP SAFETY PICK* award. The Spark was among the initial award winners announced in December. The new small overlap test results for the rest of the minicar group mean that no other models in this size category join the Spark in the winner's circle yet. (Go to iihs.org/ratings to view details for individual vehicles.)

Fiat 500

Introduced in 2012, the small overlap test replicates what happens when the front corner of a vehicle collides with another vehicle or an object such as a tree or pole. In the test, 25 percent of a vehicle's front end on the driver's side strikes a rigid barrier at 40 mph. The test is more difficult than the head-on crashes conducted by the government or the IIHS moderate overlap test because most of the vehicle's front-end crush zone is bypassed. That makes it hard for the vehicle to manage crash energy, and the occupant compartment can collapse as a result. Nevertheless, in many size categories, manufacturers have found ways to improve vehicle structures to meet this challenge.

"Small, lightweight vehicles have an inherent safety disadvantage. That's why it's even more important to choose one with the best occupant protection," says Joe Nolan, the Institute's senior vice president for vehicle research. "Unfortunately, as a group, minicars aren't performing as well as other vehicle categories in the small overlap crash."

In contrast to the minicar group's performance, most models in the Institute's small car category, which are a little larger, have done well in the test. There are five good ratings and five acceptable ratings among 17 small cars evaluated so far.

Looking at the component ratings that make up the overall marks, every minicar, including the Spark, rates either marginal or poor for structure, the most fundamental element of occupant protection. When a vehicle's structure doesn't hold up, there is a high risk of injuries. Collapsing structures can knock frontal airbags and seats out of position, exacerbating the problem.

All the vehicles except the Spark and the Mazda 2 also earn low ratings for restraints and kinematics. Seven of the 11 were downgraded for allowing too much occupant forward motion during the crash. In these cases, either the safety belt didn't do a good enough job holding the dummy in place, or the dummy's head missed or slid off the frontal airbag. The side curtain airbag, which has an important role to play in small overlap frontal crashes, provided insufficient forward coverage in eight of the minicars and didn't deploy at all in the Toyota Yaris. In many models, the steering column moved sideways, and in three cars the seat tipped.

The two worst performers are the Honda Fit and the Fiat 500. In both cases, intruding structure seriously compromised the driver's space, and the steering column was pushed back toward the driver. In the case of the Fit, the dummy's head barely contacted the frontal airbag before sliding off and hitting the instrument panel. During the test of the 500, the driver door opened after the hinges tore. An open door creates a risk that the driver could be ejected.

Injury measures on the dummy's left legs are marginal or poor for many models. In most cases, potential injuries involved the lower leg, but the Fit, 500 and Hyundai Accent were downgraded for left thigh or hip injury. The Fit and 500 were the only vehicles to record elevated injury risk to the right leg as well.

Despite its marginal structure, the Spark achieves an acceptable overall rating because the dummy's movement was fairly well controlled and its injury measures were low. The Spark is the only vehicle with good injury measures for all body regions, including the lower leg and foot, generally a problematic area in the small overlap test. This may be related to the fact that the structure around the lower part of the occupant compartment held up better than other minicars, despite intrusion in the upper part.

Consumers should remember that the Spark, while offering more small overlap protection than other minicars, weighs less than 2,500 pounds and doesn't protect as well as a larger vehicle with a comparable rating. Frontal crash test results can't be compared across weight classes.

In addition, neither the Spark nor the other minicars in the test group offer front crash prevention, an increasingly common safety feature that can prevent or mitigate a frontal crash. For 2014, vehicles must be available with front crash prevention to qualify for the highest safety award from IIHS, *TOP SAFETY PICK+*. ■

Easy-to-spot anchors boost tether use

Parents are more likely to use top tethers when installing a child restraint with a vehicle's LATCH system and attach the safety strap correctly if the attachment anchor is easy to find, a new study by the Institute and the University of Michigan Transportation Research Institute (UMTRI) indicates.

This is most often the case in sedans. Most tether anchors in sedans are on the rear shelf, also called the rear deck, behind the back seat, where they are easy to see. In SUVs and minivans, parents usually have to search for the anchors because they are typically on the floor, middle or lower seat back, in the cargo area or on the ceiling.

The findings complement earlier IIHS and UMTRI research of the key vehicle factors that make lower LATCH anchors easier to use (see *Status Report*, April 12, 2012, at iihs.org).

It's well established that parents only use top tethers with forward-facing child restraints about half the time despite the fact that passenger vehicles have had corresponding anchors to attach the straps for more than a decade (see *Status Report*, Sept. 8, 2010).

Tethers are part of a child restraint attachment system called Lower Anchors and Tethers for Children, or LATCH. All forward-facing child restraints made since 1999 have a built-in top tether typically located just behind the upper back of the child restraint. Top tethers should be used with all forward-facing child restraints, whether they are secured by safety belts or with a vehicle's lower anchors. Some manufacturers also recommend using a tether with a few rear-facing child restraints.

In a 2013 IIHS survey, certified child passenger safety technicians observed parents and caregivers using the top tether 56 percent of the time with forward-facing child restraints. When parents neglected to attach the tether, it was most often because they didn't know about it. Using the LATCH lower anchors increased the likelihood that drivers would use the top tether. Child restraints installed with lower anchors were more than twice as likely to be tethered as child restraints secured with safety belts (see *Status Report*, April 25, 2013). This also was the case in the earlier IIHS-UMTRI study.

In the latest study, researchers recruited 37 parents and specifically told them to use LATCH to install two different forward-facing child restraints in four different vehicles for a total of eight installations. The 16 vehicles used in the study had a range of tether anchor characteristics.

Parents used the top tether in 89 percent of the 294 forward-facing child restraint installations and attached the tether correctly 57 percent of the time. Because the instructions were designed to encourage tether use, the rate of tether installations was higher than recorded in field observations. Tether use rates improved from 83 percent to 95 percent after researchers in the study gave parents specific instructions on using LATCH and tethers halfway through their installations.

In sedans with tether anchors located on the rear deck, 95 percent of parents used tethers, compared with 79 to 89 percent of parents when the anchors were located on the floor, ceiling or seat back.

What's more, parents in the study were more likely to correctly attach tethers when anchors were on the rear deck or at the middle of the seat back than those located in other spots in the vehicle.

When vehicles had hooks for tying down cargo or other confusing hardware that could be mistaken for a tether anchor, the chances that parents would use and correctly install tethers were lower than in vehicles without such gear. This was most often the case in SUVs and minivans, while sedans were less likely to have confusing hardware. If parents did use top tethers in vehicles with confusing hardware, just 47 percent of the straps were attached correctly, compared with 70 percent of installations when there was no confusing hardware.

For a copy of "Vehicle factors affecting tether use and misuse" by J.S. Jermakian et al., email publications@iihs.org or download the report at iihs.org. ■

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1005 N. Glebe Road
Arlington, VA 22201 USA
t 703/247-1500
f 703/247-1588

Inquiries/print subscriptions:
StatusReport@iihs.org

Editor: Kim Stewart
Writer: Sarah Karush
Art Director: Steve Ewens

www.iihs.org
iihs.org/rss
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@IIHS_autosafety
m.iihs.org

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The **Highway Loss Data Institute** shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

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