

Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

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Automatic braking cuts crashes for large trucks

Teen vehicles: recommendations versus reality

Alcohol-detection systems could slash crash rates

Improved outlook for older drivers



Study shows front crash prevention works for large trucks too

Equipping large trucks with forward collision warning and automatic emergency braking (AEB) systems could eliminate more than 2 out of 5 crashes in which a large truck rear-ends another vehicle, a new IIHS study suggests.

IIHS Director of Statistical Services Eric Teoh examined data on crashes per vehicle mile traveled from 62 carriers operating tractor-trailers and other trucks weighing at least 33,000 pounds. He found that trucks equipped with forward collision warning had 22 percent fewer crashes and trucks with AEB had 12 percent fewer crashes than those without either technology. Forward collision warning and AEB reduced rear-end crashes — the specific type of collision

they're designed to prevent — by 44 and 41 percent, respectively.

Although their drivers crash less often per mile traveled, large trucks can be especially deadly because they can weigh 20-30 times as much as passenger vehicles. U.S. crashes involving large trucks have risen by nearly a third since hitting an all-time low in 2009, killing 4,136 people in 2018. Among those fatalities, 119 deaths resulted from large trucks rear-ending passenger vehicles.

Overall, Teoh's study covered some 2,000 crashes that occurred over more than 2 billion vehicle miles traveled during 2017-19. The analysis excluded incidents that weren't serious enough to result in injury or significant property damage.

"This study provides evidence that forward collision warning and AEB greatly reduce crash risk for tractor-trailers and other large trucks," Teoh says. "That's important information for trucking companies and drivers who are weighing the costs and benefits of these options on their next vehicles."

Front crash prevention systems use cameras, radar or other sensors to monitor the roadway ahead. Some include only forward collision warning, which alerts the driver to obstacles in the roadway. AEB systems go further — automatically applying the brakes to prevent the collision or reduce its severity.

The European Union has required AEB with forward collision warning on most new heavy trucks since November 2013.

In the U.S., neither truck nor passenger-vehicle manufacturers are required to equip vehicles with any kind of front crash prevention. However, 20 automakers that account for 99 percent of the U.S. market are moving toward making AEB standard on virtually all new passenger vehicles by Sept. 1, 2022, under a voluntary commitment brokered by IIHS and the National Highway Traffic Safety Administration.

For passenger vehicles, studies conducted by IIHS and the Highway Loss Data Institute have documented significant benefits from AEB. An IIHS study of police-reported

/i\ IIHS RESEARCH

"Effectiveness of front crash prevention systems on large trucks" by E.R. Teoh

To request this paper, email researchpapers@iihs.org.

crashes showed that front AEB cuts rear-end crash rates in half and rear-end crashes involving injuries by 56 percent. Meanwhile, HLDI has found that AEB cuts property damage liability claims, as well as claims for injuries to people in other vehicles.

The number of large trucks equipped with AEB has been increasing, but there have been few studies of its effect on crash rates.

For the new study, Teoh compared trucks from the same carriers that were equipped with forward collision warning alone, AEB, and no front crash prevention at all. AEB systems generally include forward collision warning too.

For the first time, the Institute drew on data compiled by SmartDrive Systems, a video-based safety program for commercial fleets. SmartDrive was able to determine which trucks were equipped with forward collision warning and AEB and collect detailed information about crashes. Using data collected by a third party helped

to minimize data differences among carriers that might have influenced the results.

“The transportation intelligence we’ve gathered over the past 15 years provides unique and deep insights on the trucking industry,” says Jason Palmer, chief operating officer of SmartDrive Systems. “We’re proud to put this data to use to support IIHS with this important and timely study of the benefits of front crash prevention.”

The similar benefits of forward collision warning and AEB that Teoh observed for rear-end crashes were unexpected, since studies of passenger vehicles have shown AEB to be much more effective than systems that only issue warnings. That could reflect differences in how and by whom trucks and passenger vehicles are driven, or it might be connected to variations among the specific systems used by each carrier.

The study indicated that AEB and forward collision warning are both likely to have benefits beyond the reduction in crashes. Some

Forward collision warning and AEB reduced rear-end crashes by 44 and 41 percent, respectively.

crashes that aren’t prevented by the systems are made less severe, thanks to a reduction in impact speed. This is true whether it’s the automated system applying the brakes or a human driver who has more time to react because of a warning.

In reviewing the trucks that rear-ended other vehicles, Teoh found that either system resulted in speed reductions of more than 50 percent between the warning or automatic braking and the impact.

“The potential benefits are great enough that these crash avoidance systems should be standard equipment on all new large trucks,” says IIHS President David Harkey. ■



A tractor-trailer performs well in a recent front crash prevention test at the IIHS-HLDI Vehicle Research Center.



Consumer Reports, IIHS team up to recommend used vehicle options for teens

IIHS and Consumer Reports teamed up for the first time this summer to recommend safe, reliable and affordable used vehicles for teenage drivers.

In the past, both organizations have released lists of recommended vehicles for teens, using slightly different selection criteria. By joining forces, CR and IIHS are making it even easier for young drivers or their parents to find a vehicle that checks all the boxes for safety, performance and reliability.

Teenagers are among the riskiest drivers, but they frequently end up with vehicles that don't provide adequate protection in a crash (*see facing page*). Often, they find themselves driving old cars that lack modern safety features like side airbags or electronic stability control (ESC). When teenagers do get behind the wheel of a new car, it's usually one of the smallest models, which don't protect as well as larger vehicles in crashes.

Reliability is another key consideration. A young driver's first car will probably need to

last for years, and parents don't want their teen stranded because of a breakdown.

The list of 65 recommended used vehicles, ranging from \$5,300 to \$19,600, shows that safety can be both affordable and practical.

"Our focus has always been safety, as reflected in our vehicle ratings, but we recognize that a lot of other factors go into families' purchasing decisions," says IIHS President David Harkey. "This partnership with Consumer Reports will help new drivers and their parents zero in on the best used vehicles overall."

Although the list is intended specifically for teen drivers, the organizations emphasize that it can be a resource for anyone looking for a safe, reliable and affordable used car.

Consumers who consult the list won't find any sports cars or other vehicles with excessive horsepower because these vehicles can tempt teens to test the limits. In addition, there are no minicars or vehicles under 2,750 pounds. The biggest, heaviest vehicles,

including those in the large SUV class, have also been left off the list because they can be hard to handle and often have increased braking distances.

The list of recommended vehicles is divided into Good Choices and Best Choices, which offer a slightly higher level of safety.



Both Good Choices and Best Choices have:

- ▶ **standard ESC**
- ▶ **above-average reliability**, based on CR's member survey, for the majority of the years listed
- ▶ **average or better scores** from CR's emergency handling tests
- ▶ **dry braking distances of less than 145 feet** from 60 mph in CR's brake tests
- ▶ **good ratings** in four IIHS crashworthiness tests — moderate overlap front, side, roof strength and head restraints
- ▶ **four or five stars** from the National Highway Traffic Safety Administration (if rated)

In addition, the Best Choices have a good or acceptable rating in the IIHS driver-side small overlap front test, which was launched in 2012. The test replicates what happens when the front left corner of a vehicle collides with another vehicle or an object like a tree or utility pole.

The top tier also excludes vehicles that have substantially higher than average insurance claim rates under medical payment or personal injury protection coverage. Both coverage types pay for injuries to occupants of the insured vehicle. The Highway Loss Data Institute, an IIHS affiliate, collects and publishes insurance loss data by make and model every year. The results are adjusted for driver age, gender and other factors that could affect risk. ■

The list of 65 recommended used vehicles, ranging from \$5,300 to \$19,600, shows that safety can be both affordable and practical.

See the entire list at [iihs.org/teenvehicles](https://www.iihs.org/teenvehicles).

Teens are the riskiest drivers, but they drive the least safe vehicles

/i\ IIHS RESEARCH

“Characteristics of vehicles driven by teens and adults killed in crashes, 2013–2017” by R.A. Weast and S.S. Monfort

To request this paper, email researchpapers@iihs.org.

The proportion of U.S. teens killed driving older, smaller vehicles has remained virtually unchanged over the past decade, a new study from IIHS shows.

More than a quarter of teen drivers killed in crashes during 2013-17 were driving micro, mini or small cars, and nearly two-thirds were driving 6-15-year-old vehicles, indicating almost no change compared with 2008-12. In both periods, fatally injured adults crashed in newer, larger vehicles much more often than teens.

Data on vehicle miles traveled from the 2017 National Household Travel Survey also suggest teens tend to drive older cars than adults, though the survey doesn't include information about vehicle size. Teens logged more than half of their miles in vehicles more than 11 years old, compared with less than 30 percent for adults.

A shorter front end means small cars offer less protection than larger ones, and their lesser mass means they absorb more force in collisions with larger vehicles. Newer vehicles are also generally safer than older ones, as safety features that were less common a decade ago are now universal.

Previous research has shown that teens drive less than older drivers, but they crash about 4 times as often, relative to the number of miles they drive.

To determine how often teens are killed in different types of vehicles, researchers compared data on fatal crashes with vehicle information from HLDI.

The researchers examined how the vehicles involved in fatal crashes differed for drivers ages 15-17 and 35-50. They also compared their results to those from an earlier study of crashes that occurred in 2008-12 to find out if the types of vehicles that teens drive have changed over time.

Among the drivers killed in fatal crashes during 2013-17, 28 percent of the teens were driving a micro, mini or small car, compared with 19 percent of adults. The vehicles in which teens were killed were 250 pounds lighter, on average.

Less than 4 percent of the teen drivers killed were behind the wheel of vehicles under 3 years old, compared with 9 percent of adults. Meanwhile, 38 percent of the teens were killed while driving 11-15-year-old vehicles, compared with 32 percent of the adult drivers. ■

Full story at [go.iihs.org/teen-vehicle-research](https://www.go.iihs.org/teen-vehicle-research)



Alcohol-detection systems could prevent more than a fourth of U.S. road fatalities

Alcohol-detection systems that stop people from drinking and driving could prevent more than a quarter of U.S. road fatalities and save upwards of 9,000 lives a year, a new study from IIHS shows.

“We haven’t made much progress in the fight against drunk driving since the mid-1990s,” says Charles Farmer, IIHS vice president of research and statistical services and the author of the paper. “This is something that could put a real dent in the alcohol-impaired driving problem.”

Alcohol has been a factor in 30 percent of U.S. roadway deaths every year for the past decade. Meanwhile, police arrest about 1 million people a year for alcohol-impaired driving. Systems that can detect the percentage of alcohol in the driver’s blood and prevent the vehicle from moving if it is higher than a predetermined limit could slash those numbers. The technology is already available in the form of an ignition interlock attached to a breath-testing unit. Many jurisdictions require these interlocks for people convicted of alcohol-impaired driving.

In a 2009 survey of U.S. drivers, nearly two-thirds of the respondents said they would support the installation of similar systems in all vehicles, as long as they were fast, accurate and unobtrusive.

Manufacturers such as Volvo have experimented with offering alcohol-detection systems as optional equipment. A public-private partnership called the Driver Alcohol Detection System for Safety (DADSS) project is also road-testing a passive alcohol sensor that detects the driver’s blood-alcohol content (BAC) by measuring the ambient air in the vehicle. How many lives the technology might save would depend on how it is implemented.

To determine the potential impact of different rollouts, Farmer applied the most recent risk calculations for alcohol-impaired

driving to U.S. fatal crashes recorded over 2015-18 in which alcohol was detected in the blood of at least one involved driver.

These risk calculations account for the possibility that some of these crashes might have occurred even if all the drivers involved had been sober. The relative risk changes with driver age and BAC. At a BAC of 0.09 percent, for instance, a 16-21-year-old driver is 60 times as likely to die in a crash as a sober driver in the same age group. For 22-34-year-olds, that number is 21 times. For drivers 35 and older, it’s 16 times.

Farmer determined that 37,636 crash deaths, or around a quarter of the total number of crash deaths during 2015-18, could have been prevented if the most impaired drivers’ BAC levels had been below 0.08 percent (the legal limit in most states). That works out to an average of 9,409 lives saved every year.

If the same drivers had a BAC of zero, nearly a third of the total deaths, or about 12,000 a year, might have been averted.

If alcohol-detection systems were required for all new vehicles beginning this year, some lives would be saved immediately. However, using data on the age of vehicles in crashes, Farmer found it would be 12 years before the systems became common enough in the U.S. fleet to save 4,596 lives a year — less than half their potential.

If the systems were only required for drivers with an alcohol-impaired driving conviction within the past five years and only

blocked them from driving at a BAC above 0.08 percent, they would avert a maximum of 837 crash deaths per year. If they were only required for commercial, government and rental vehicles, the number of lives saved per year would top out around 348.

If systems blocked drivers with any alcohol in their blood, requiring them for those with alcohol-impaired driving convictions would save 986 lives. Requiring them for fleet vehicles would save 465 lives.

The fastest way to reach any of those milestones would be through federal regulation, and bills designed to eventually make alcohol-detection systems mandatory safety features have been introduced in both the House and Senate over the past year. For now, the DADSS project envisions that some manufacturers will begin offering the ambient-air-based system as an option as early as 2025.

But there are ways to encourage manufacturers to make the technology standard, as was done with side airbags and automated emergency braking. IIHS and similar groups could encourage manufacturers to make alcohol-detection more readily available by requiring such systems for top safety ratings, for example.

“A lot of safety features that start out as options quickly come to be seen as essential,” Farmer says. “It will take time for this technology to reach its full potential, but it is an important part of the overall strategy to reduce impaired driving.” ■

/i\ IIHS RESEARCH

“Potential lives saved by in-vehicle alcohol detection systems” by C.M. Farmer

To request this paper, email researchpapers@iihs.org.





Crash rates for drivers in their 70s drop below those of middle-aged drivers

Drivers in their 70s are now less likely to be involved in a fatal crash than those in their prime working years, a new IIHS study has found. That's a remarkable reversal for a generation of drivers once thought to be an outside threat to themselves and others.

The number of older drivers has grown rapidly over the past two decades. But better health and safer vehicles, as well as possible benefits from infrastructure improvements and changes to licensing policies, have prevented an accompanying spike in crashes. Not only do drivers in their 70s now have fewer fatal crashes per licensed driver, but they also have fewer police-reported crashes per mile traveled than middle-aged drivers.

"Although efforts to address the 'silver tsunami' were largely ad hoc, in hindsight what we ended up with was a systems approach," IIHS President David Harkey says. "And it worked."

Historically, older drivers were more likely to crash than other age groups, and they were less likely to survive if they did crash. With the aging of the Baby Boom generation, a potential road safety crisis loomed on the horizon, the National Academies warned in 1988.

For the new study, IIHS researchers compared trends among drivers 70 and over with drivers ages 35-54. The number of older licensed drivers rose almost twice as fast from 2010 to 2018 as it had in the previous decade, while older drivers' average annual mileage also continued to grow.

"Improvements in healthcare mean that older Americans are remaining active and

staying in the workforce," says Jessica Cicchino, IIHS vice president for research and a co-author of the study. "It follows that they're not only keeping their licenses longer but also driving more miles."

At the same time, improved health means older drivers are less likely to crash because the onset of problems like failing eyesight and impaired cognitive function is delayed. Seniors who are in better shape are also more likely to survive if they do crash.

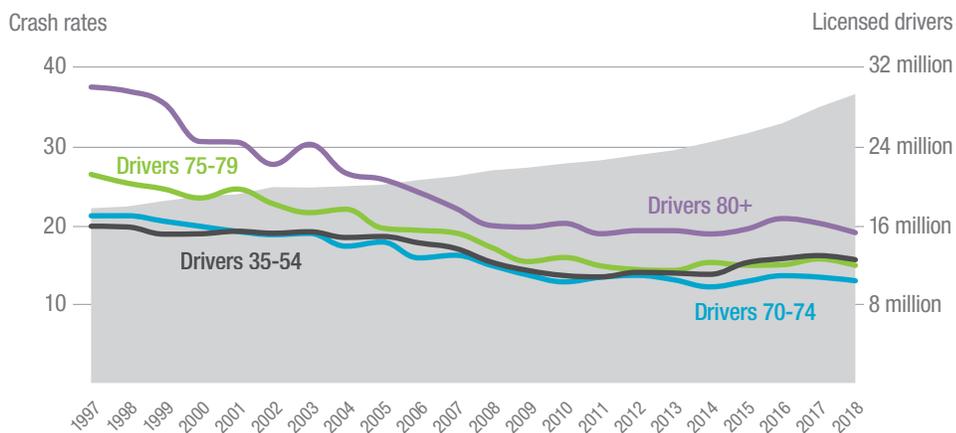
Vehicles have gotten safer, too. The proportion of registered vehicles that earn good ratings in IIHS crash tests increases each year, and safety innovations like side

remained steady for older drivers, while those of middle-aged drivers increased.

Per mile traveled, both fatal crashes and police-reported crashes of all severities rose substantially for middle-aged drivers in recent years and declined for drivers 70 and over. As a result, septuagenarians had fewer police-reported crashes per mile than middle-aged drivers for the first time in 2017.

Looking at the number of driver deaths per 1,000 police-reported crashes, the researchers found substantial improvements for all but the oldest drivers between 2009 and 2017, following little change over the previous decade.

Licensed drivers over 70 and fatal crashes per 100,000 licensed drivers by age group



airbags have been especially beneficial for older drivers. Infrastructure changes such as making traffic signs easier to see and converting intersections to roundabouts may have had an impact as well.

For drivers 70 and over, fatal crash rates per licensed driver fell 43 percent from 1997 to 2018, compared with a decline of 21 percent for drivers ages 35-54. However, virtually all those reductions occurred during the first half of the study period. More recently, fatal crash involvements per driver

Drivers 70 and over are still more fragile than younger people, so they're more likely to die if they do crash. Vehicle age is another factor.

"Older adults hold onto their vehicles longer, so it takes longer for them to reap the benefits of safety advancements," Cicchino says. "That means we're likely to see survival rates continue to improve as these advancements work their way into the U.S. fleet." ■

Full story at go.iihs.org/older-drivers-update

IIHS RESEARCH

"Continued trends in older driver crash involvement rates in the United States: data through 2017-2018" by A.E. Cox and J.B. Cicchino

To request this paper, email researchpapers@iihs.org.



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HLDI 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.

Both organizations are wholly supported by auto insurers and insurance associations.

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