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Federal Highway Traffic Safety Policies: Impacts and Opportunities

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Summary

In 2017, 37,133 Americans were killed in crashes involving motor vehicles. Motor vehicle crashes are a leading cause of death for Americans overall, and the number one cause of death for teenagers. Millions of people are injured in crashes annually, and motor vehicle crashes are estimated to have cost some $242 billion in 2010 in lost productivity, medical costs, legal costs, property damage, and time lost in congestion caused by crashes. As measured by the number of deaths per mile people are driving, the rate at which people are killed in traffic crashes declined significantly from 1929, when records began to be kept, until 2014, but has risen by almost 10% between 2014 and 2016.

Congress has played a role in improving highway safety. Making road travel safer was one of the responsibilities Congress gave to the federal Department of Transportation (DOT) when it created the department in 1966. Congress has directed DOT to improve the safety of automobile design and of road design, as well as to support programs to improve driver behavior.

An oft-cited statistic in traffic safety is that as many as 90% of road deaths are due at least in part to driver error or misbehavior (such as driving too fast for conditions or driving while drunk or distracted). Driver behavior is a state, not federal, matter; in an effort to address it, Congress has enacted programs that encourage states to pass laws to promote safer driving. The role of driver behavior versus road design and traffic management is a subject of debate. Some analysts note that road designs and traffic management arrangements often allow, or even encourage, driver error and misbehavior, and so play a larger role in crashes than is often recognized. One of the core highway capital improvement programs authorized by Congress is intended to fund safety improvements to highway infrastructure.

A federal study estimated that half of the improvement in highway fatality rates between 1960 and 2012 was attributable to improvements in vehicle safety technologies, with social and demographic changes, driver behavior interventions, and improvements in road design playing smaller roles. Most of the vehicle safety technologies analyzed in the study increased the likelihood that vehicle occupants would survive a crash. More recently, technological improvement has focused on preventing crashes. While some crash-prevention technologies, such as automatic braking and lane departure warnings, are available now, others, such as vehicle-to-vehicle communication and vehicles that can operate without human intervention, are not yet on the market. Even when these become commercially available, given that most vehicles remain in use for well over a decade, it may be many years before the majority of cars on the road incorporate these technologies.

While U.S. crash and injury rates are no longer declining, and even rising, several other nations have significantly improved their highway safety rates in the past few years, surpassing the U.S. rates. The International Transport Forum's Road Safety Annual Report 2018 found that between 2010 and 2016, 26 of the 32 nations tracked in the report had reduced their number of traffic deaths, some by over 30%; during the same period, the number of U.S. deaths increased by 14%.

Policy options that might further reduce traffic crashes, injuries, and fatalities include encouraging states to adopt stronger laws regarding use of seat belts and motorcycle helmets and encouraging the use of automated traffic enforcement to reduce speeding and failure to stop at red lights and stop signs. While a majority of the population supports mandatory motorcycle helmet laws and automated traffic enforcement, and these measures are demonstrably effective in reducing deaths, these measures provoke opposition from a smaller but vociferous portion of the population.

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Introduction

In 2017, 37,133 Americans were killed in crashes involving motor vehicles. Motor vehicle crashes are a leading cause of death for Americans overall, and the number one cause of death for teenagers. Millions of people are injured in crashes annually, and motor vehicle crashes are estimated to have cost some $242 billion in 2010 in lost productivity, medical costs, legal costs, property damage, and time lost in congestion caused by crashes.[1] As measured by the number of deaths per mile people are driving, the rate at which people are killed in traffic crashes declined significantly from 1929, when records began to be kept, until 2014, but has risen by almost 10% between 2014 and 2016. Although preliminary figures indicate the fatality rate declined slightly in 2017 (from 1.19 to 1.16),[2] that is still higher than at any time since 2008.

Congress has played a role in improving highway safety. Making road travel safer was one of the responsibilities Congress gave to the federal Department of Transportation (DOT) when it created the department in 1966. Congress has directed DOT to improve the safety of automobile design and of road design, as well as to support programs to improve driver behavior.

An oft-cited statistic in traffic safety is that as many as 90% of road deaths are due at least in part to driver error or misbehavior (such as driving too fast for conditions or driving while drunk or distracted).[3] Driver behavior is a state, not federal, matter, as it does not involve interstate commerce (save for commercial truck drivers); lacking direct authority over driver behavior, Congress has attempted to address it by encouraging states to pass laws to promote safer driving.

The role of driver behavior versus vehicle design, road design, and traffic management in improving highway safety is a subject of debate. Some analysts note that road designs and traffic management arrangements often allow, or even encourage, driver error and misbehavior, and so play a larger role in crashes than is often recognized. Responsibility for promoting safety through improved road design is exercised by the Federal Highway Administration; one of the core highway capital improvement programs authorized by Congress is intended to fund safety improvements to highway infrastructure.

This report focuses primarily on the driver behavior aspect of highway safety. Within the DOT, the National Highway Traffic Safety Administration (NHTSA) administers programs that address general driver behavior, and the Federal Motor Carrier Safety Administration (FMCSA) administers programs that address the behavior of commercial truck drivers.

Traffic Safety Trends

There are several ways to measure traffic safety. Measures include the number of highway fatalities; the number of serious injuries from crashes; the economic loss to people involved in crashes; and the social cost of emergency response and accident-induced traffic delays. To understand these numbers in context, other measures are often applied to produce rates such as number of events (e.g., accidents, injuries, fatalities) per million miles traveled, per million

[1] National Highway Traffic Safety Administration, *The Economic and Societal Impact Of Motor Vehicle Crashes, 2010 (Revised)*, DOT HS 812 013, May 2015 (Revised).

[2] NHTSA, *Traffic Safety Facts Research Note: 2017 Fatal Motor Vehicle Crashes: Overview*, DOT HS 812 603, October 2018.

[3] NHTSA, *Tri-Level Study of the Causes of Traffic Accidents*, DOT HS 805 099, May 1979; NHTSA, *Traffic Safety Facts Crash-Stats: Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey*, DOT HS 812 115, February 2015.

registered drivers, and per million persons in the total population. Similar measures can reveal trends for narrower categories such as vehicle occupants and bicyclists, though the information necessary to produce rates is not always available for narrower categories.

The quality of data is critical to analysis, but changes in data collection methods may result in data that are not comparable to previously collected data. In 2011 the U.S. Department of Transportation (DOT) revised the methodology for collecting registration information and vehicle miles traveled by vehicle type. This revision was applied to data from 2007 onwards. In some cases, the revised numbers are significantly different from those for 2006 and previous years.[4] Thus, when examining trend data for specific vehicle types, a break in the trend line may be shown between 2006 and 2007, or trend data may begin at 2007.

The fatality rate per 100 million vehicle miles traveled (VMT) is the most commonly cited measure of traffic safety, due in part to the seriousness of that outcome and in part to the fact that fatalities are closely tracked and unambiguous. Every crash involving a fatality is supposed to be investigated and clearly identified as a vehicle-related incident. In contrast, crashes involving injuries or property damage may be reported inconsistently by local public safety agencies or may not come to the attention of authorities; reported data on the numbers of serious crashes and of crashes involving injuries are estimated based on sampling.

U.S. Fatality Rate Trending Downward Over Time, But Rising Recently

The fatality rate has improved significantly since detailed statistics began to be kept in 1966, dropping from around 5.5 deaths per 100 million VMT to around 1.1 in 2011 (see **Figure 1**). Since 2014, however, the fatality rate has risen from 1.08 to 1.18, a 9% increase (see **Figure 2**).[5] As noted by some economists, there have been four periods of abrupt declines in the fatality rate since 1970, all of which coincided with recessions; in each instance, the decline was followed by a period of little improvement or even an increase in the fatality rate as the economy emerged from recession, before the fatality rate resumed its downward trend.[6]

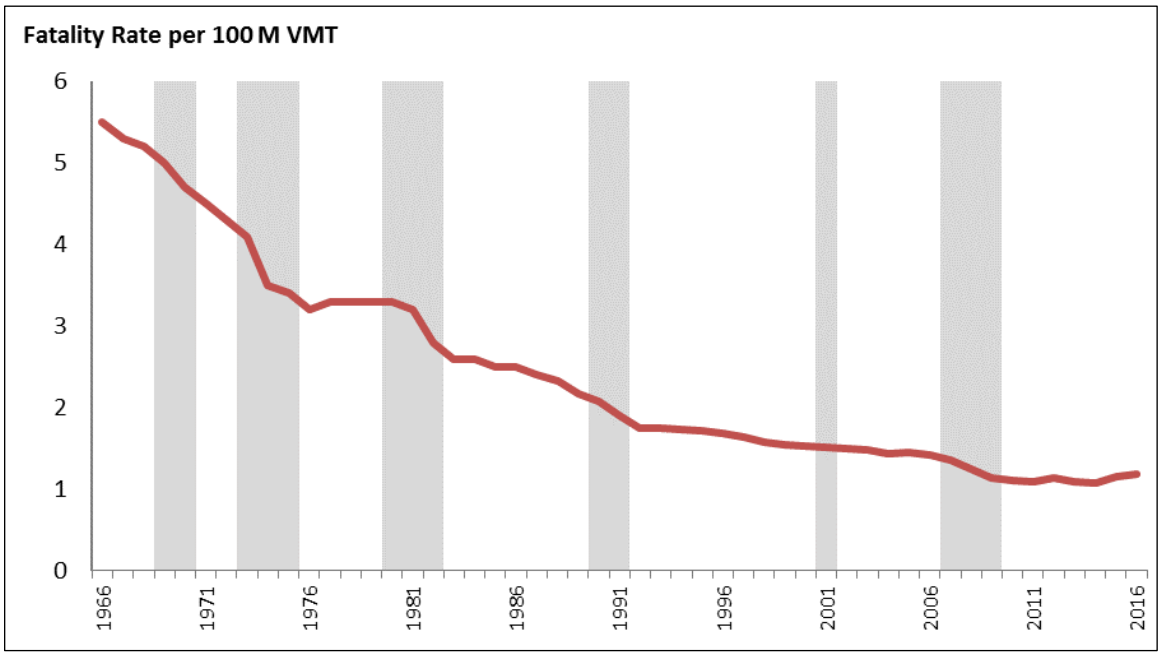
[4] For example, the estimated vehicle miles traveled (VMT) for motorcycles went from 12 billion in 2006 to 21 billion in 2007, the first year of the new methodology. VMT is the denominator for one of the most widely cited rates, fatalities per VMT, and greatly increasing the estimated VMT number significantly reduces the fatality rate, which accordingly dropped from 40 per 100 million VMT in 2006 to 24 in 2007. The number of motorcyclist fatalities comes from a different source, police-reported fatal crashes, and the fatality trend was relatively stable. Such a significant drop in the fatality rate is likely to be largely a result of the changed methodology, rendering a trend analysis spanning both periods unreliable.

[5] The preliminary estimate for 2017 is 1.16, but the figure for 2016 was revised upward to 1.19; NHTSA, *Traffic Safety Facts Research Note: 2017 Fatal Motor Vehicle Crashes: Overview*, DOT HS 812 603, October 2018.

[6] Monica M. He, "Driving Through the Great Recession: Why Does Motor Vehicle Fatality Decrease When the Economy Slows Down?" *Social Science & Medicine*, v. 155, April 2016, pp. 1-11. The author notes that the unemployment rate is the primary explanatory variable.

Figure 1. U.S. Highway Fatality Rate, 1966-2016

Fatality Rate per 100 million vehicles miles traveled



Source: CRS, based on data from National Highway Traffic Safety Administration (NHTSA), *Traffic Safety Facts 2016*, DOT HS 812 554, Table 2.

Notes: Shaded columns are recessions as determined by the National Bureau of Economic Research, US Business Cycle Expansions and Contractions, http://www.nber.org/cycles.html.

The number of people killed in traffic-related crashes dropped from a high of around 55,000 in 1972 to around 33,000 per year in the 2009-2014 period, against a background of increases in both number of drivers and vehicle miles traveled (see **Table 1**). From 2014 to 2016, however, the number of fatalities rose 14%, from 32,744 in 2014 to 37,461 in 2016. Preliminary figures for 2017 indicate a decline in fatalities to 37,133 (a decrease of less than 1% from the original 2016 number), the fatality rate also declined to 1.16.[7]

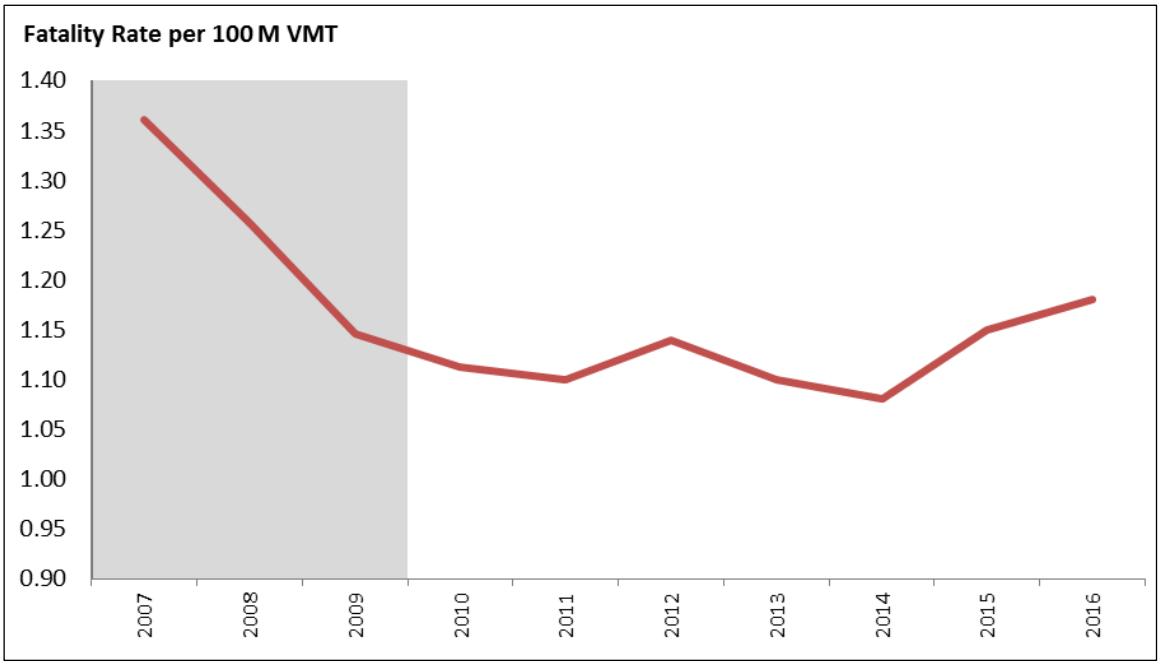
Table 1. Traffic Deaths, Licensed Drivers, and Vehicle Miles Traveled, 1972 and 2016

	1972	2016
Traffic deaths	54,589	37,461
Licensed drivers	118 million	222 million
Vehicle miles traveled (VMT)	1.26 trillion	3.2 trillion
Deaths per million licensed drivers	461	169
Deaths per 100 million VMT	4.33	1.18

Source: CRS; data from NHTSA, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 2.

[7] NHTSA, *Traffic Safety Facts Research Note: 2017 Fatal Motor Vehicle Crashes: Overview*, DOT HS 812 603, October 2018. This report also revised upward the number of fatalities and the fatality rate from what was reported in NHTSA's 2016 edition of the annual *Traffic Safety Facts* report, making the 2017 decline larger (almost 2%) than it is when compared to the original 2016 numbers.

Figure 2. Fatality Rate per 100 Million Vehicle Miles Traveled, 2007-2016



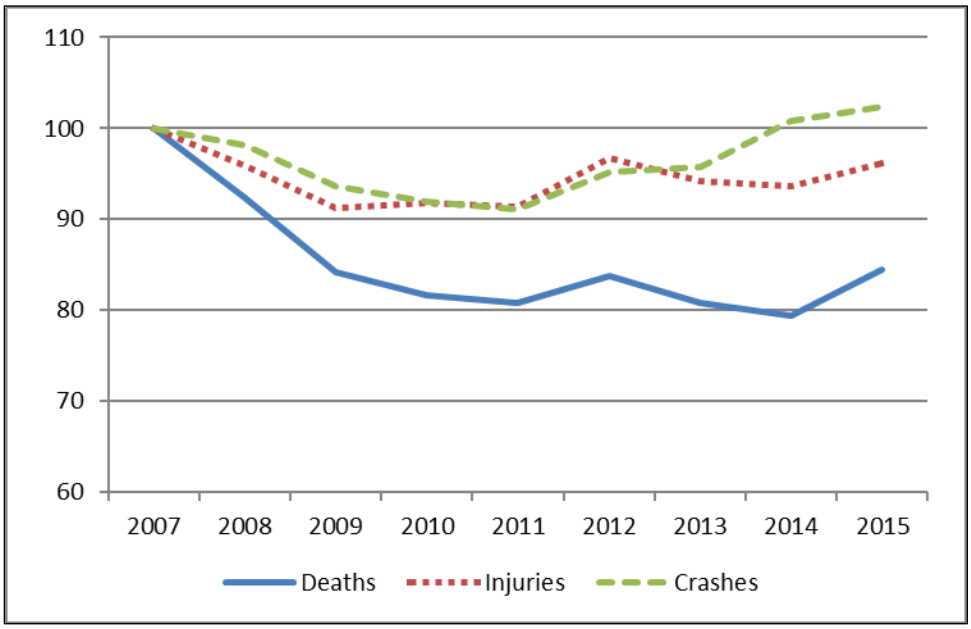
Source: CRS, based on data from National Highway Traffic Safety Administration (NHTSA), *Traffic Safety Facts 2016*, DOT HS 812 554, Table 2.

Notes: The shading for the years 2007-2009 represents the recession as determined by the National Bureau of Economic Research, US Business Cycle Expansions and Contractions, http://www.nber.org/cycles.html.

Other highway safety indicators also have deteriorated in recent years. The rate of crashes was higher in 2015 than in 2007 (**Figure 3**).

Figure 3. Trends in Rates for Crashes, Injuries, and Deaths, 2007-2015

Index, 2007=100; Incidents per 100 million VMT



Source: CRS; data from NHTSA, *Traffic Safety Facts 2016*, DOT HS 812 554, Tables 1 and 2.

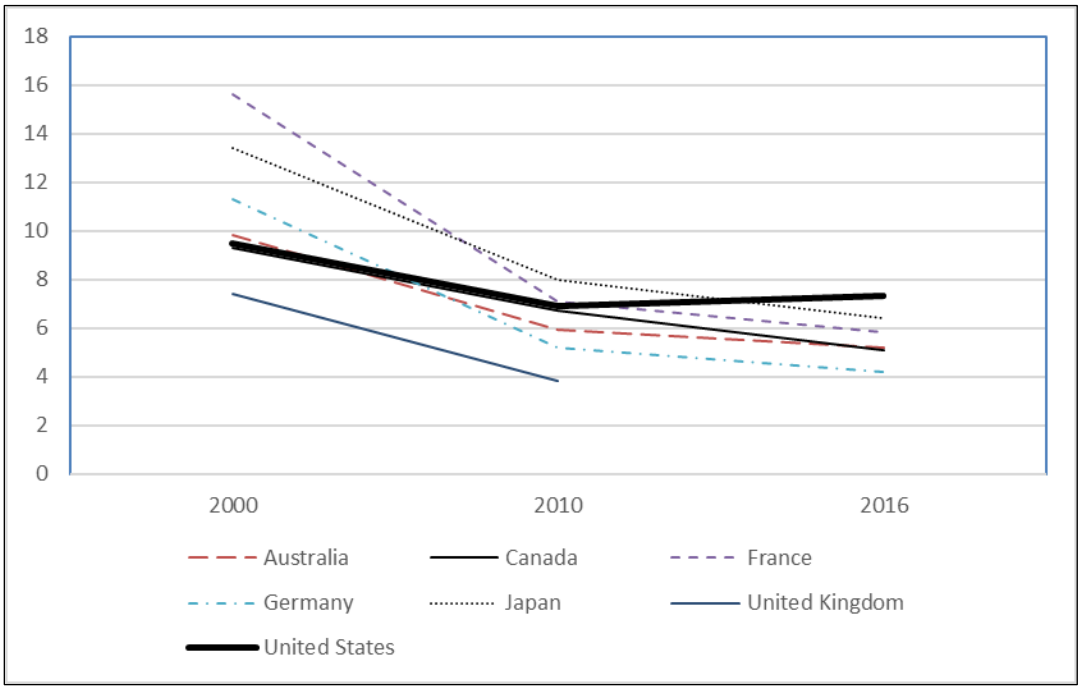
Notes: Injury estimates are produced on a different timetable than fatality counts; 2016 injury data was not available at the time of the publication of the source, The rates are indexed to their 2007 level for ease of visual comparison. The actual rates for injuries and crashes per 100 million VMT are many times larger than the fatality rate: in 2015, the fatality rate per 100 million VMT was 1.15, the injury rate was 79, and the serious crash rate was 203 (calculated by CRS).

Highway safety rates and trends vary by state. Fatality rates tend to be lower in more urbanized states (for example, in 2016 the fatality rate per 100 million VMT in South Carolina, 1.86, was three times that of Massachusetts, at 0.63). In addition, some states have relatively strict laws concerning safety matters, such as enforcement of mandatory seat belt use and requirements that motorcyclists wear helmets, while other states have fewer or less strict safety laws or enforce such laws less vigorously.

U.S. Fatality Rate Now Higher Than Some Other Wealthy Countries

As **Figure 4** shows, certain selected countries have significantly improved their safety performance (as measured in fatalities per billion vehicle-kilometers traveled) since 2000, dropping below the U.S. fatality rate for the first time. Significantly, they continued to show improvement after 2010, when, like the United States, they experienced economic growth after the recession of the late 2000s. This is significant because during periods of economic growth following recessions, road safety in the United States has often gotten worse (as it has done in the past few years) before returning to the long-term trend of improvement. The example of the other countries in **Figure 4** shows that experiencing worsening safety figures coming out of a recession may be preventable.

Figure 4. Fatalities per Billion Vehicle-Km, Selected Countries



Source: International Transport Forum, *Road Safety Annual Report 2018*, Table 3.

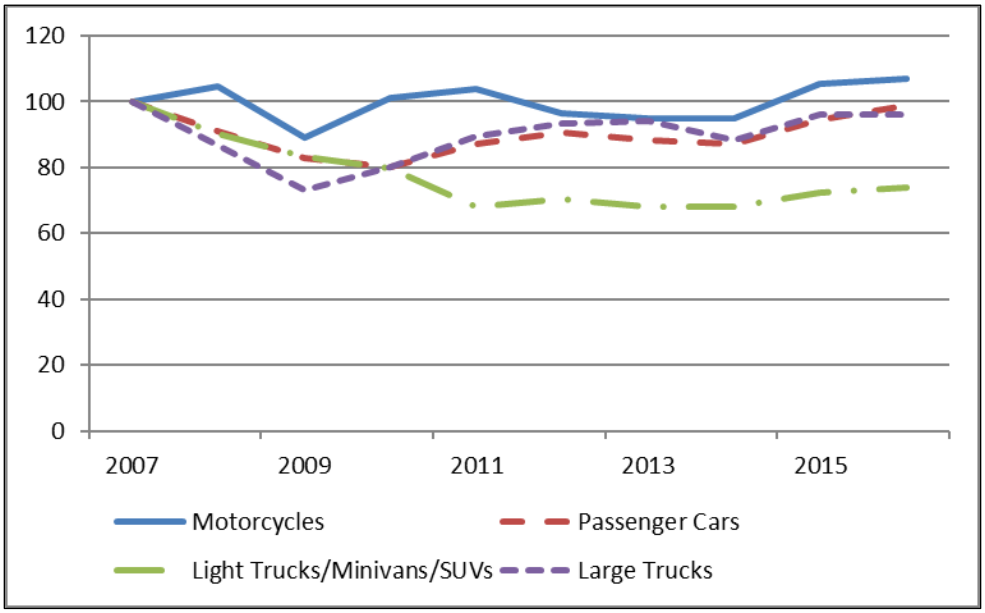
Notes: 2016 data for UK not included in source.

Motorcycle Fatality Rates Remain Steady

The fatal crash rates for passenger cars, light trucks, and large trucks have fallen steadily since the 1980s. The same is not true for motorcycles. The fatal crash rate for motorcycles doubled between 1997 and 2005, then fell sharply in 2006. Between 2007 and 2016, there was no further improvement. The motorcycle fatal crash rate in 2016 was higher than in 2007, while the crash rates for other types of vehicles were at or below their 2007 rate (see **Figure 5**).

Figure 5. Trends in Fatal Crash Rates by Vehicle Type, 2007-2016

Index, 2007=100



Source: CRS; data from NHTSA, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 3.

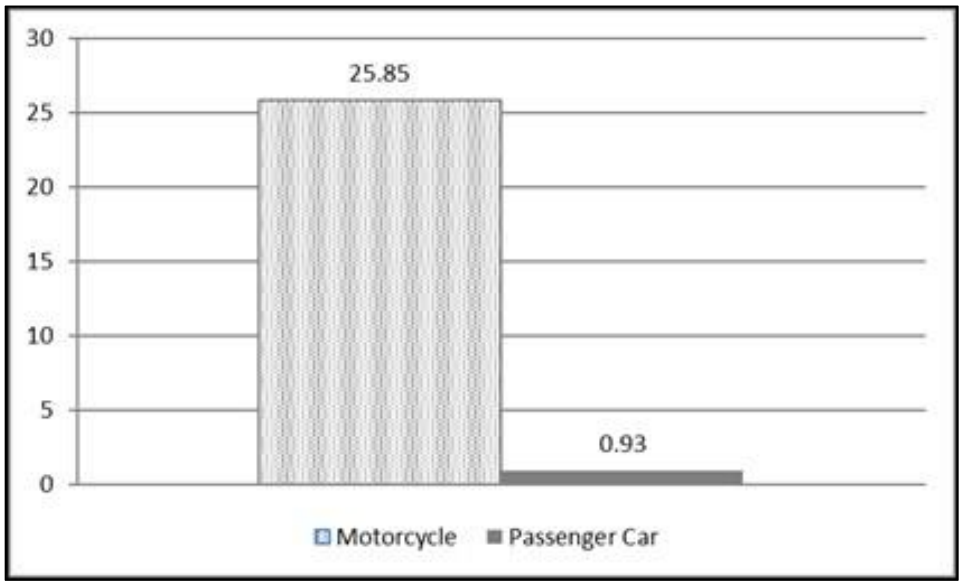
Notes: VMT data collection for passenger vehicles and light trucks changed in 2010, and data were recalculated beginning with 2007; this change had the effect of reducing the VMT of passenger vehicles (thus slightly increasing their fatality rate) and increasing the VMT of light trucks (thus slightly decreasing their fatality rate). The data-collection change greatly altered the motorcycle data. This chart thus omits data before 2007. The index of rates given in this figure are based on the number of vehicles involved in crashes relative to their 2007 level, not to the number of individuals involved; in the case of a multivehicle crash, more than one vehicle may be included in the count. Passenger cars are vehicles such as convertibles, sedans, and station wagons; light trucks/minivans/SUVs are trucks under 10,000 pounds, including pickups, vans, truck-based station wagons, and utility vehicles; and large trucks are trucks over 10,000 pounds.

Motorcyclists are somewhat more likely to be involved in a crash than other drivers on a per vehicle-mile-traveled basis.[8] However, a motorcyclist is much more likely to die as a result of a crash than is a driver of a car or light truck; in 2016 the likelihood of a motorcyclist dying in a crash was more than 27 times that of a passenger car occupant. **Figure 6** compares the fatality rate for occupants of motorcycles and passenger cars.

[8] The total crash rate per VMT for motorcycles is estimated to be about 28% higher than for passenger cars. Calculations by CRS based on data from NHTSA, *Traffic Safety Facts 2013*, DOT HS 812139, Table 3, except passenger car VMT from Table 7 and motorcycle VMT from Table 10.

Figure 6. Fatality Rate for Motorcycle and Passenger Car Occupants, 2016

Rate per 100 million V



Source: CRS; data from NHTSA, *Traffic Safety Facts 2016 Data: Motorcycles*, DOT HS 812 492, June 2018, Table 2.

The causes of the recent trend in the motorcycle fatality rate—dropping during the recession, then rising again since 2014 (see **Figure 7**)—are not clear. Motorcycle registrations increased during this period even as the fatality rate declined immediately after the recession. The median age of motorcyclists has increased from 41 in 2003[9] to 50 in 2018[10]—a change that would be expected to reduce fatality rates, as older drivers are generally less likely to be involved in crashes than younger ones—but the proportion of motorcyclists over 50 dying in crashes has exceeded the proportion of those under 30 every year since 2009.[11] The proportion of fatally injured motorcycle operators who were riding bikes with an engine size greater than 1,400 cubic centimeters has risen from 1% in the mid-1990s to around 30% today, suggesting that the combination of older riders and larger, heavier bikes may be a factor in rising fatality rates.[12]

[9] Bureau of Transportation Statistics, U.S. Department of Transportation, *Special Report: Motorcycle Trends in the United States*, SR-014, May 2009.

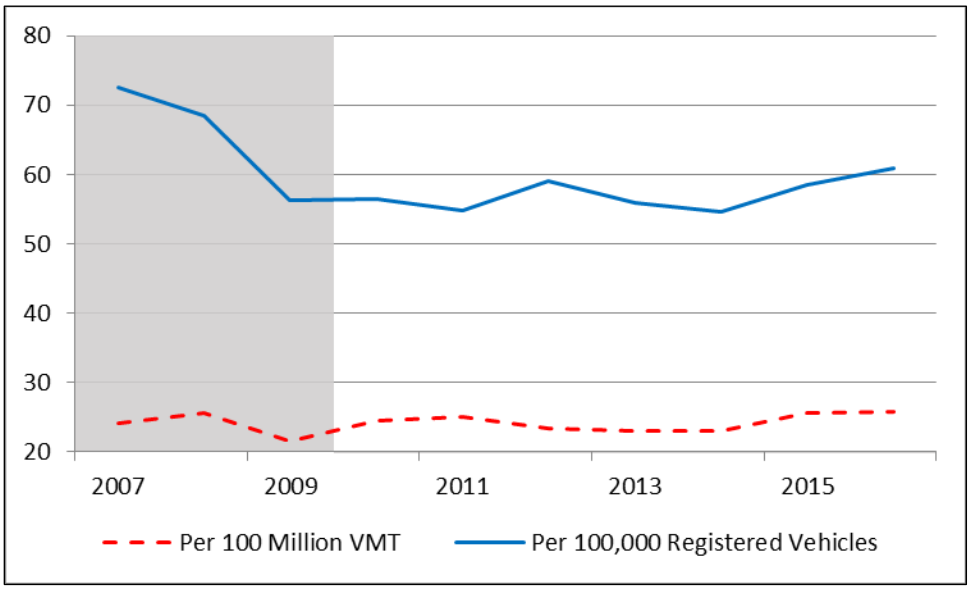
[10] Kate Murphy, Motorcycle Industry Council's 2018 Stats: Who Are We? RideApart.com, February 6, 2019, https://www.rideapart.com/articles/304226/mic-2018-stats-who-are-we/. The Motorcycle Industry Council's annual survey is the source of the age data in the BTS Special Report: Motorcycle Trends in the United States cited at #2.

[11] In 1975, 80% of motorcyclists dying in crashes were under 30, and 3% were over 50; in 2017 28% were under 30 and 36% were over 50. Insurance Institute for Highway Safety, *Fatality Facts: Motorcycles*, "Percentage of motorcyclist deaths by age, 1975-2017," https://www.iihs.org/topics/fatality-statistics/detail/motorcycles-and-atvs.

[12] The role of engine size as a risk factor is contested, with some analysts contending that the power-to-weight ratio of a motorcycle is a greater risk factor.

Figure 7. Motorcyclist Fatality Rates, 2007-2016

Rate per 100 million VMT



Source: CRS; data from NHTSA, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 3.

Notes: The shading for the years 2007-2009 represents the recession as determined by the National Bureau of Economic Research, US Business Cycle Expansions and Contractions, http://www.nber.org/cycles.html.

One factor that appears to be important in motorcycle deaths is alcohol. While 24% of passenger car drivers involved in fatal crashes in 2016 had alcohol in their system,[13] the figure for motorcyclists was 32% (though this was down from 42% in 1995).[14] Another risk factor is wearing, or not wearing, helmets: 39% of motorcyclists (and 55% of motorcycle passengers) killed in crashes were not wearing helmets.[15] Nineteen states, the District of Columbia, and three territories require all motorcyclists to wear helmets (a requirement often referred to as a "universal helmet law"); most other states require helmets only for motorcyclists under age 18, and three (Illinois, Iowa, and New Hampshire) have no helmet requirement.[16]

Large Trucks and Highway Safety

Large trucks—vehicles with a gross vehicle weight rating greater than 10,000 pounds—represented only around 4% of registered vehicles in 2016. But the average large truck is driven far more than the average passenger vehicle, and large trucks are involved in crashes at a rate proportionate to the distance they are driven rather than their proportion of vehicles on the road. Large trucks accounted for 9% of total vehicle miles traveled in 2016 and represented 9% of vehicles involved in fatal crashes.[17] The crash involvement rate of large trucks, like that of most

[13] That is, a blood alcohol content of .01% or more.

[14] National Highway Traffic Safety Administration, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 17.

[15] Ibid., Table 92.

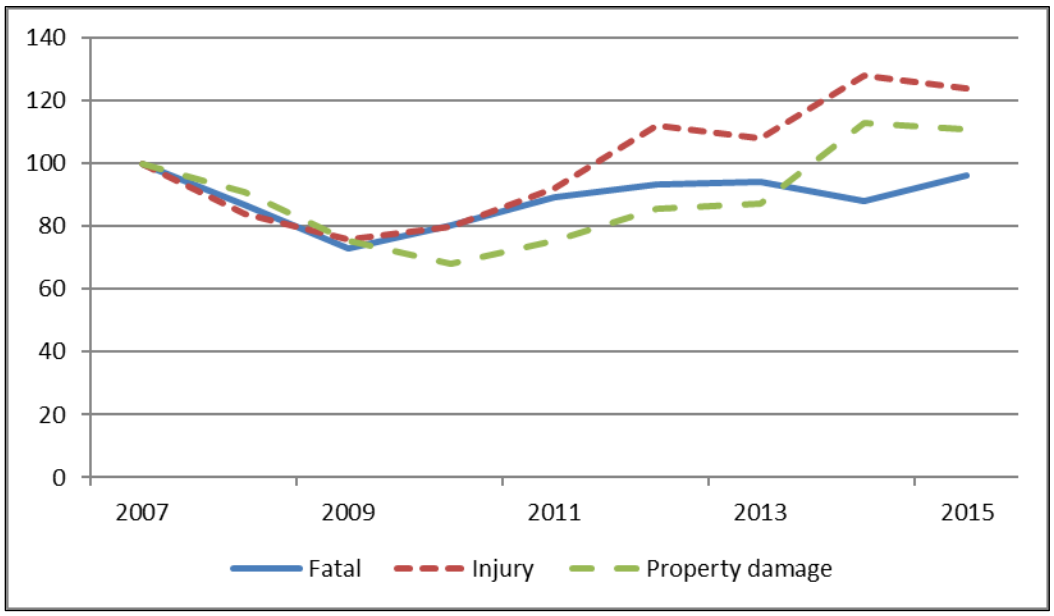
[16] Governors Highway Safety Association, "State Laws: Motorcyclists," https://www.ghsa.org/state-laws/issues/motorcyclists.

[17] National Highway Traffic Safety Administration, *Traffic Safety Facts: Overview, 2017 Data: Large Trucks*, DOT HS 812 663, January 2019, p. 2, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812663.

other types of vehicles, has fallen significantly since 1988, but has risen significantly since the end of the Great Recession (see **Figure 8**).

Figure 8. Large-Truck Crash Involvement Rate Trend by Type of Crash, 2007-2015

Index, 2007=100



Source: CRS; data from NHTSA, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 3.

Large trucks can be divided into two groups: single-unit trucks and combination trucks such as "semi" tractor-trailers. Only around 25% of all large trucks are combination trucks, but these account for 61% of total truck mileage. Combination trucks experience 1.7 fatal crashes per 100 million VMT, compared to 1.1 for single-unit trucks.[18] This is noteworthy, since drivers of combination trucks do most of their driving on the Interstate System (see **Table 2**), on which crash and fatality rates are far lower than on the local roads on which most single-unit truck mileage is logged.[19]

[18] National Highway Traffic Safety Administration, *Large Truck and Bus Crash Facts 2013*, FMCSA-RRA-15-004, April 2015, Figure 7.

[19] A DOT study found that large combination vehicles (combination trucks that are longer or heavier than the standard "semi" tractor-trailer) generally have higher crash rates than standard combination trucks. But the analysis was constrained by data limitations, as most state crash reports do not record a truck's weight or configuration. DOT concluded that nationally representative estimates could not be developed from the available data. U.S. Department of Transportation, *Comprehensive Truck Size and Weight Limits Study: Highway Safety and Truck Crash Comparative Analysis Technical Report*, June 2015.

Table 2. Share of VMT on Interstate Highways by Selected Vehicle Type, 2017

In billions of VMT

Vehicle Type	Total VMT	Interstate VMT	% of VMT on Interstate
All light-duty vehicles	2,877	688	24%
Single-unit trucks	116	28	24%
Combination trucks	181	95	52%

Source: CRS; data from Federal Highway Administration, *Highway Statistics 2017*, Table VM-1.

Note: "Light-duty vehicles" are passenger cars, light trucks (curb weight under 6,000 pounds), vans and sport utility vehicles.

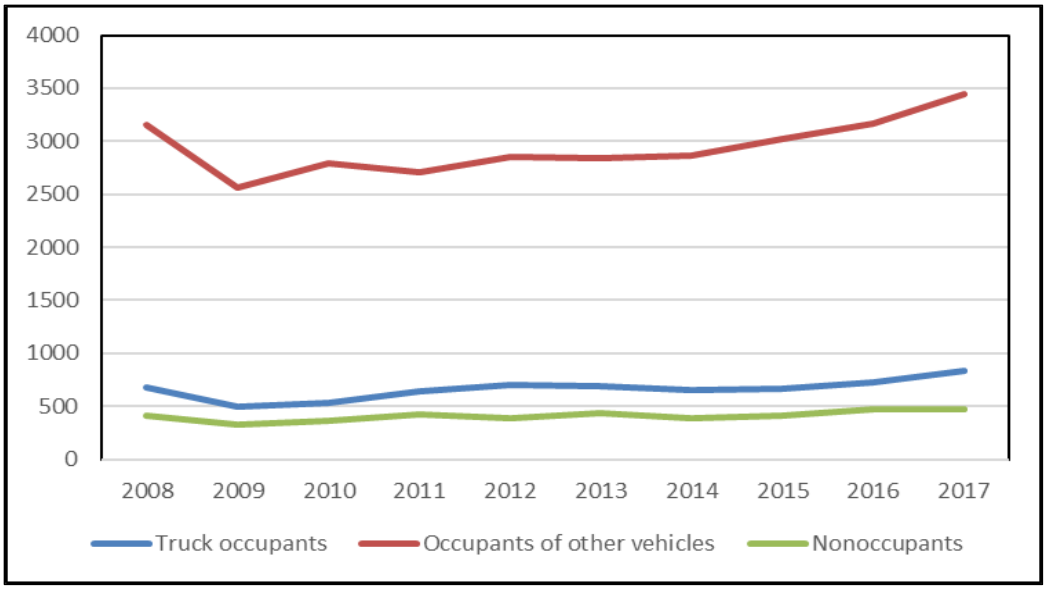
Fatal large truck crashes often involve multiple vehicles. Over 90% of the persons killed in such crashes (72% of people killed in all types of large truck crashes) are occupants of the other vehicle(s) rather than occupants of large trucks (see **Table 3** and **Figure 9**).

Table 3. People Killed in Crashes Involving Large Trucks, 2017

	Number	Percentage of Total
Occupants of large trucks	841	18%
In single-vehicle crashes	*498*	*10%*
In multiple-vehicle crashes	*343*	*7%*
Occupants of other vehicles in crashes involving large trucks	3,450	72%
Nonoccupants (pedestrians, bicyclists, etc.)	470	10%
Total	**4,761**	**100%**

Source: NHTSA, *Traffic Safety Facts: Large Trucks, 2017 Data*, DOT HS 812 663, January 2019, Table 1.

Figure 9. Persons Killed in Large Truck Crashes, 2008-2017



Source: NHTSA, *Traffic Safety Facts: Large Trucks, 2017 Data*, DOT HS 812 663, January 2019, Table 1.

Driver intoxication is far less frequent in large truck crashes than in crashes involving passenger vehicles; 3% of large-truck drivers involved in fatal crashes had a blood alcohol concentration (BAC) of .08 or higher, above the standard for driving under the influence of alcohol in most states, compared to 21% for passenger car drivers.[20] Of greater concern with respect to drivers of large trucks is fatigue. A 2006 study identified fatigue as a contributing factor in 8% of crashes involving commercial drivers.[21] Where the average noncommercial driver might drive for a couple of hours, divided into two or more periods, on a typical day, a commercial driver might spend up to 12 hours driving. One survey of commercial drivers found that 25% reported having fallen asleep while driving at least once during the previous year.[22] However, fatigue is not a risk confined to commercial drivers with fatigue identified as a contributing factor in 15% of crashes involving passenger vehicle drivers.[23]

In 2018, a congressional mandate took effect requiring that most commercial trucks be equipped with electronic logging devices (ELDs). The purpose was to reduce fatigued driving among commercial drivers through better enforcement of federal hours of service limits. Previously, truckers had been allowed to fill out their time logs by hand, and it was an open secret that drivers often falsified their logs to make it appear that they were complying with the hours of service time limits when they were in fact driving more hours than permitted. The Federal Motor Carrier Safety Administration (FMCSA) estimated that the mandate would prevent 1,844 crashes each year and save 26 lives each year.[24] Data for large truck crash involvement and vehicle miles traveled in 2019 are not yet available to see if these benefits were realized. Other factors, such as

[20] NHTSA, *Traffic Safety Facts: Large Trucks, 2017 Data*, DOT HS 812 663, January 2019, p. 5.

[21] Federal Motor Carrier Safety Administration, *Large Truck Crash Causation Study: Report to Congress*, 2006, Table 10, https://www.fmcsa.dot.gov/safety/research-and-analysis/report-congress-large-truck-crash-causation-study.

[22] Anne T. McCartt et al., "Factors Associated with Falling Asleep at the Wheel Among Long-Distance Truck Drivers," *Accident Analysis and Prevention*, Vol. 32, no. 4 (July 2000), pp. 493-504.

[23] Federal Motor Carrier Safety Administration, *Large Truck Crash Causation Study: Report to Congress*, 2006, Table 10, https://www.fmcsa.dot.gov/safety/research-and-analysis/report-congress-large-truck-crash-causation-study.

[24] Federal Motor Carrier Safety Administration, Electronic Logging Devices and Hours of Service Supporting Documents; Final Rule, 80 Fed. Reg. 78292 (December 16, 2015).

variations in large truck VMT, weather conditions, and random variations in crashes from year to year, may obscure the safety effectiveness of ELDs.

Commercial drivers and vehicles are subject to random roadside inspections by law enforcement personnel checking for compliance with federal and state regulations. Each year safety officials sponsor "Roadcheck," a three-day event where roadside inspectors from across North America perform truck and bus roadside inspections of commercial vehicles. The dates the Roadcheck will be conducted are announced months in advance, so while the inspections during that period are still random, drivers and trucking companies could be aware of a heightened possibility of being inspected and prepare. During the 2018 Roadcheck, roughly 68,000 vehicles and their drivers were inspected; 4% of the drivers and 22% of the vehicles were found to have violations so serious that they were placed out of service. The most common cause of out-of-service orders for drivers was violations of hours-of-service regulations; for vehicles, it was brake problems.[25]

Some portions of the trucking industry, including the American Trucking Association, a group representing large trucking companies, has long asserted that there is a shortage of commercial drivers, and have asked Congress to lower the minimum age at which drivers are allowed to operate in interstate commerce from 21 to 18 in order to increase the pool of eligible drivers. Other portions of the industry, including the Owner-Operator Independent Driver Association, a group representing drivers who own their own vehicles, assert that any shortage is a result of low pay and difficult working conditions offered by the trucking companies, and that the appropriate solution is not to lower the minimum age for commercial drivers but to make the job more attractive. The industry has sought to lower the minimum age of commercial drivers for many decades, but studies consistently show that young commercial drivers, like young drivers overall, are much more likely to be involved in crashes than their older counterparts.[26] In the Fixing America's Surface Transportation Act (FAST Act, P.L. 114-94), the surface transportation reauthorization enacted in 2015, Congress authorized a pilot program to allow veterans under age 21 who were trained as heavy truck drivers in the military to work as commercial drivers in interstate commerce.

Pedestrians and Bicyclists

Miles-traveled exposure data are not available for pedestrians, so pedestrian fatality rates are typically reported as a proportion of the total population. The pedestrian fatality rate fell by more than half between 1975 (7,516 pedestrians were killed, a rate of 4 per 100,000 population) and 2013 (4,735 pedestrians were killed, a rate of 1.5 per 100,000 population).[27] How much of this reduction is due to safety measures (such as additional sidewalks, pavement markings, and lower speed limits) and how much to a reduction in exposure (as the proportions of workers walking to their workplaces and students walking to school have declined)[28] is not known; in 2016, the rate

[25] Commercial Vehicle Safety Alliance, *CVSA Releases 2018 International Roadcheck Results*, September 12, 2018, https://cvsa.org/news-entry/2018-roadcheck-results/.

[26] Janine Duke, Maya Guest, May Boggess, "Age-related safety in professional heavy vehicle drivers: A literature review," *Accident Analysis & Prevention*, Vol. 42, No.2, March 2010, pp. 364-371.

[27] 1975 rate: U.S. Center for Disease Control and Prevention, "Achievements in Public Health, 1900-1999 Motor Vehicle Safety: A 20th Century Public Health Achievement," *Morbidity and Mortality Weekly Report*, vol. 48, no. 18 (May 14, 1999), pp. 369-374, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4818a1.htm. May 14, 1999; 2013 rate: National Highway Traffic Safety Administration, *Traffic Safety Facts 2013*, DOT HS 812139, Table 97.

[28] Noreen C. McDonald, "Active Transportation to School: Trends Among U.S. Schoolchildren, 1969–2001," *American Journal of Preventive Medicine*, v. 32 no. 6, June 2007, pp. 509-516.

rose to 1.85 killed per 100,000 population (a total of 5,987).[29] In 2016, 5% of pedestrians killed were children under the age of 16.[30]

Consistent miles traveled exposure data is not available for bicyclists, and highway safety organizations, including DOT's National Highway Traffic Safety Administration (NHTSA), tend to report the number of bicyclist fatalities rather than calculating a rate based on population.[31] The number of bicyclists killed in traffic crashes has generally declined since 1975, and has risen following the Great Recession. Data indicate that 722 cyclists were killed in 2004 (0.25 per 100,000 population), 628 in 2009 (0.20), and 840 in 2016 (0.26).[32] The recent increase may simply be tracking the general increase in vehicle-related crashes and fatalities following the 2007-2009 recession, but it may also be related to increased bicycle usage. Although there are no reliable data on bicycle VMT, the proportion of American workers who bicycle to work rose from 0.4% in 2000 to 0.6% in the 2008-2012 period.[33]

The average age of bicyclists killed in crashes increased from 24 in 1988 to 44 in 2013. At least three in five bicyclists killed in crashes were not wearing helmets. Intoxication is a factor in both pedestrian and bicyclist fatalities; one-third of pedestrians 14 and older[34] and 11% of bicyclists killed in 2016 were legally intoxicated.[35]

Social Factors That Affect Road Safety Trends

Government policies influence highway safety in important ways. However, some of the change in accident and fatality rates over the past several decades is attributable to factors beyond the scope of federal highway safety policies.

Declining Share of Young Drivers

The risk of a crash is not uniform for all drivers. Drivers under age 25 have significantly higher crash rates and rates of involvement in fatal crashes than drivers 25 or over, and young male drivers have the highest rates of any age group (see **Table 4**).

[29] National Highway Traffic Safety Administration, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 97.

[30] Ibid., calculation by CRS.

[31] This may reflect differences in the extent of walking and bicycling. According to the National Household Travel Survey, in 2009 10.5% of all trips were done by walking, while 1.0% of all trips were done by bicycling. It is likely that the proportion of the population that ever bikes is much smaller than the proportion that ever walks. John Pucher et al., "Walking and Cycling in the United States, 2001-2009: Evidence from the National Household Travel Surveys," *American Journal of Public Health*, v. 101 (July 2011). http://bloustein.rutgers.edu/wp-content/uploads/2014/10/NHTS_TRB_25Jan2011.pdf.

[32] National Highway Traffic Safety Administration, *Traffic Safety Facts* annual report for 2004, 2009, and 2016, Table 102.

[33] Brian McKenzie, "Modes Less Traveled—Bicycling and Walking to Work in the United States: 2008-2012," Washington, DC: U.S. Census Bureau, May 2014, http://www.census.gov/hhes/commuting/files/2014/acs-25.pdf, p. 3.

[34] National Highway Traffic Safety Administration, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 20.

[35] Ibid, Table 77.

Table 4. Driver Involvement Rates in Fatal Crashes by Age and Sex, 2016

Rate per 100,000 registered drivers in age-group

Age	Rate	
	Male	Female
16-20	50.24	22.81
20-24	52.68	19.29
All Drivers	34.28	11.84

Source: Adapted from NHTSA, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 62.

In 1975 the proportion of male licensed drivers under 25—those with the highest rate of crashes—peaked at 13%, with 15.8 million males in that cohort. Since then the number has fallen has fallen by nearly 2.4 million, representing 6% of all licensed drivers in 2017.[36] The spread of stricter licensing requirements for the youngest drivers plays some role in this decline, but so do economic factors and personal preferences that lead young people to obtain driver's licenses at later ages or to drive less frequently. The impact of these factors on reducing the number and proportion of the highest risk drivers has likely improved highway safety statistics.

Smaller Share of Drivers in Rural Areas

The proportion of the U.S. population that lives in rural areas declined by seven percentage points, from 26.4% to 19.3%, between 1970 and 2010.[37] Drivers in rural areas have higher fatality rates per 100 million VMT than drivers in urban areas, so a reduction in the proportion of VMT by rural drivers would tend to lower the overall fatality rate. However, some part of the decline in the proportion of rural dwellers resulted not from people relocating to urban areas but from rural areas being reclassified as part of urban areas due to economic and demographic changes,[38] so the smaller proportion of drivers in rural areas may have little impact on overall safety trends.

Increasing Share of Travel on Interstate Highways

Interstate System highways are among the safest roads in the nation due to design characteristics that eliminate intersections and separate opposing lanes by a median or barrier. In 1975, the proportion of all VMT that took place on Interstate highways was 17%; in 2017, it was 26%.[39] All else being equal, the greater share of driving occurring on Interstate highways would be expected to lead to lower accident and fatality rates.

[36] Calculated by CRS using data from FHWA, *Highway Statistics 2017*, Table DL220, Licensed drivers by sex and age group, 1963-2017, https://www.fhwa.dot.gov/policyinformation/statistics/2017/.

[37] "Urban Percentage of the Population for States, Historical," Iowa State University, http://www.icip.iastate.edu/tables/population/urban-pct-states.

[38] United States Department of Agriculture, Economic Research Service, Rural America at a Glance, 2017 Edition, Economic Information Bulletin 182, November 2017, https://www.ers.usda.gov/webdocs/publications/85740/eib-182.pdf.

[39] Calculated by CRS; data from Federal Highway Administration, *Highway Statistics* series, various years, Table VM-1: Annual Vehicle Distance Traveled in Miles and Related Data.

Fuel Prices

Generally, as fuel prices rise, people respond by driving less. This leads to a smaller number of fatalities, but the effect of fuel price changes on the fatality rate is small. One study estimated that a 10% decrease in the price of gasoline is associated with a 1.6% increase in fatal crashes.[40] However, another study found that higher fuel prices lead some drivers to shift from cars to motorcycles, leading to an increase in motorcycle VMT, which in turn is associated with a higher fatality rate.[41]

Economic Recessions

Periods of economic recession are associated with declines in traffic crashes, injuries, and deaths. VMT also tends to decline in recessions, but the proportional reductions in deaths, injuries, and serious crashes are much greater than the reduction in VMT (see **Table 5**). Similarly, as the economy emerges from recessions, crashes, injuries, and deaths from vehicle accidents increase at greater rates than the increase in VMT. Studies of the possible causes for the sharp decline in fatalities during recessions find that rising unemployment is associated with reductions in both vehicle miles traveled and the number of crashes per 100 million VMT.[42] The decline in fatal crashes per 100 million VMT during recessions is associated with a decline in fatal crashes involving a drunk driver.[43]

Table 5. Change in VMT, Fatalities, and Injuries During the Great Recession

Percentage change from previous year

	VMT	Fatalities	Injuries
2008	-1.8%	-9.3%	-5.8%
2009	-0.7%	-9.5%	-5.5%

Source: CRS; data from NHTSA, *Traffic Safety Facts 2013*, DOT HS 812139, Tables 1 and 2.

Note: The "Great Recession" lasted from December 2007 to June 2009, according to the National Bureau of Economic Research.

In the late 2000s, the general long-term downward trend in U.S. traffic deaths was punctuated by two consecutive years (2008-2009) of dramatic year-over-year decreases coinciding with the period of the Great Recession and resulting in the lowest fatality rate recorded to that point. The Secretary of Transportation cited the improvement as evidence that DOT's efforts to improve

[40] David C. Grabowski and Michael A. Morrisey, "Gasoline Prices and Motor Vehicle Fatalities," *Journal of Policy Analysis and Management*, Vol. 23, No. 3 (Summer 2004), pp. 575-593.

[41] He Zhu et al., "Rising Gasoline Prices Increase New Motorcycle Sales and Fatalities," *Injury Epidemiology*, vol. 2 (2015), p. 23. The authors estimated that a $1 per gallon increase in gasoline prices would result in the purchase of 295,000 new motorcycles and lead to 233 additional motorcycle deaths annually.

[42] Christopher J. Ruhm, "Are Recessions Good For Your Health?" National Bureau of Economic Research, Working Paper 5570, May 1996. Ruhm found that a 1% increase in a state's unemployment rate was associated with a 2.4% reduction in motor vehicle crash fatalities; he attributed the effect to changes in alcohol consumption and distances driven during recessions.

[43] Chad Cotti and Nathan Tefft, "Decomposing the Relationship between Macroeconomic Conditions and Fatal Car Crashes during the Great Recession: Alcohol- and Non-Alcohol-Related Accidents," *B.E. Journal of Economic Analysis & Policy*, vol. 11, no. 1 (2011), p. 5, http://www.degruyter.com/view/j/bejeap.2011.11.issue-1/bejeap.2011.11.1.2860/bejeap.2011.11.1.2860.xml.

safety were succeeding.[44] The improvement stopped in 2010 and the traffic death and injury rates have risen since 2014. This may raise the question of the effectiveness of DOT safety efforts in the context of larger socio-economic changes. To date, researchers have not found definitive evidence that explains the recent increases in fatality and injury rates.

The Impact of Federal Traffic Safety Policies

There are four basic tools available to government to improve traffic safety: engineering, education, enforcement, and emergency response. These tools may be used, in different ways, to achieve three traffic safety goals: reducing the number of crashes; reducing the severity of crashes; and improving medical care for people injured in crashes. As indicated in **Table 6**, each of these tools is better suited to achieving some goals than others.

Table 6. Categories of Traffic Safety Efforts and Their Effects

	Effect		
	Reduce Incidence of Crashes	**Reduce Severity of Crashes**	**Improve Medical Care for Crash Victims**
Engineering (both of vehicles and the roadway)	X	X	
Education of drivers	X		
Enforcement of traffic laws	X	X	
Emergency response			X

Source: CRS.

Federal policy efforts fall primarily into the categories of engineering and enforcement. Driver education and emergency response to traffic incidents are handled largely by state and local governments with little federal involvement or funding.

Federal involvement in education and enforcement of safe driving practices has come through funding for state activities. As behavior of passenger car drivers is largely under the authority of states, not of the federal government, Congress is not able to mandate driver behavior. Instead, it has had to rely on both carrots (incentive grants) and sticks (penalties that reduce federal transportation funding) to influence state governments to adopt and enforce traffic safety measures affecting driver behavior. In recent years, Congress has largely restricted itself to using incentives rather than penalties to influence state enforcement efforts.

Engineering

Federal involvement in engineering has proceeded by way of establishing standards for highway and vehicle designs and funding safety-related improvements in highway infrastructure.

[44] U.S. Department of Transportation, "U.S. Transportation Secretary LaHood Announces Lowest Level Of Annual Traffic Fatalities In More Than Six Decades," http://www.nhtsa.gov/About+NHTSA/Press+Releases/2012/U.S.+Transportation+Secretary+LaHood+Announces+Lowest+Level+Of+Annual+Traffic+Fatalities+In+More+Than+Six+Decades.

Road Design

The way roads are designed has a significant impact on their safety. For example, as noted earlier, the Interstate Highway System, although it typically carries a high density of traffic at high speeds, has relatively few crashes thanks in large part to its design elements, including the absence of intersections and the physical separation of vehicles moving in opposite directions. Reconstructing roads to reduce crash risks can be as simple as adding traffic-calming features such as speed humps or as extensive as adding lanes for passing or turning. Since road design improvements have a continuing effect, in contrast to enforcement efforts, even relatively costly improvements may be cost-effective when considered in light of the number of drivers affected.

The vast majority of federal-aid highway funding is available for road design improvements. One of the core highway formula programs is the Highway Safety Improvement Program, which provides funding to eliminate hazardous road locations or features. In FY2019, the Highway Safety Improvement Program distributed $2.4 billion to the states.[45]

Improvements in Vehicle Design

The fact that injury and fatality rates have fallen much more steeply than crash rates since the mid-1990s suggests that changes in motor vehicle design have improved occupant protection, reducing the probability of a fatality in a serious crash.

The federal government has mandated vehicle safety improvements since 1966, when DOT required seat belts as standard equipment on all passenger vehicles beginning with the 1967 model year. Since then, NHTSA has mandated a number of other vehicle design standards to improve safety. These standards, published in NHTSA's Federal Motor Vehicle Safety Standards (FMVSS), require now-familiar equipment such as airbags, high-mount brake lights, antilock brakes, and electronic stability control. They also govern vehicle design in less obvious ways such as a regulation standardizing headlight placement. NHTSA spent $190 million to oversee motor vehicle design and engineering in FY2019, including defect investigations and recalls.[46]

Estimates of the safety impact of these standards vary, in part because a number of the safety standards were mandated beginning with model year 1967 vehicles, eight years before the establishment of the nationwide system for reporting fatal crashes. Another complication is that it is difficult to differentiate the effects of vehicle improvements from other factors that affect crash and fatality rates. For example, the introduction of safety belts was a significant safety improvement[47]—wearing a safety belt reduces the risk of injury in a crash by around 42%—but safety belts are effective only when worn, and increasing use of seat belts is not always correlated with significant reductions in crash fatalities.[48] One theory to explain this discrepancy is that the type of person who is more likely to wear a seat belt may also be the type of person who is less

[45] Federal Highway Administration, *Notice: Revised Apportionment of Federal-Aid Highway Program Funds for Fiscal Year (FY) 2019*, Table 1, N 4510.831, December 6, 2018, https://www.fhwa.dot.gov/legsregs/directives/notices/n4510831/n4510831_t1.cfm.

[46] The comparison of $190 million in federal spending on vehicle design versus $2.4 billion on safe road design understates the impact of federal vehicle regulations; much of the cost of investment in vehicle safety engineering as a result of federal mandates has been borne by automakers and their customers.

[47] Several researchers have suggested that safety belts may be the single most effective safety feature added to vehicles in the 20th century, and certainly the most cost-effective: Rune Elvik and Truls Vaa, *The Handbook of Road Safety Measures* (Oxford: Elsevier, 2004), pp. 615-616, 619-620.

[48] Ibid., pp. 614-615.

likely to engage in other risky driving behavior, such as speeding or driving while intoxicated.[49] The theory that vehicle safety improvements lead drivers to drive in a riskier manner—variously called the Peltzman effect, risk compensation, or risk homeostasis—does not appear to apply to seat belt use; studies have found little or no evidence that belted drivers are more likely to be involved in a crash.[50]

Yet another complicating factor is that similar vehicle improvements might have become widespread even in the absence of federal standards. Early federal motor vehicle safety standards forced automakers to add equipment that the industry had been resisting, such as seat belts and airbags. More recently, perhaps influenced by the safety rating programs of NHTSA and other entities, automakers have been adding safety features beyond those required by federal standards, such as side-impact airbags, adaptive cruise control, and automatic braking.

Yet another complicating factor is that the safety impact of vehicle improvements is not simply cumulative. For example, by reducing the number of single-vehicle crashes, electronic stability control also reduces the safety impact of safety belts and air bags, which protect occupants from injury in the event of a crash. Thus the total safety impact of a combination of vehicle safety features may be much less than the sum of the impacts of each feature.[51]

NHTSA has estimated that vehicle safety technologies are responsible for roughly half of the reduction in the risk of death for vehicle occupants between 1960 and 2012, with "everything else," which includes social and demographic changes such as those previously discussed, improved road designs, efforts to make drivers drive more safely, and improvements in emergency medical response, accounting for the other half.[52]

The most effective of the initial safety improvements—such as collapsible steering columns that reduced injuries to drivers in head-on collisions, safety belts, and roof crush resistance standards—protected vehicle occupants from the effects of crashes. In recent years the availability of electronic sensors and controls enabled manufacturers to add features that can help to avoid crashes altogether. These include electronic stability control,[53] adaptive cruise control, automatic braking, and, on the horizon, the integration of these and other features to produce a self-driving car. In one study, researchers estimated that improvements made in passenger vehicles after the 2000 model year prevented 700,000 crashes, prevented or reduced the severity of injuries to 1 million vehicle occupants, and saved 2,000 lives in calendar year 2008.[54]

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[49] Lenard Evans, *Traffic Safety* (Bloomfield, Mich: Science Serving Society, 2004), pp. 290-291, estimated, using crash data from 2002, that unbelted drivers had a crash risk 70% higher than belted drivers.

[50] Alma Cohen and Liran Einav, "The Effects of Mandatory Seat Belt Laws on Driving Behavior and Traffic Fatalities," *Review of Economics and Statistics*, vol. 84, no. 4 (November 2003), pp. 828-843. The Peltzman effect was described by Sam Peltzman, professor emeritus of economics at the University of Chicago.

[51] Leonard Evans, *Traffic Safety*, pp. 114-115.

[52] C.J. Kahane, *Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012—Passenger Cars and LTVs—With Reviews of 26 FMVSS and the Effectiveness of Their Associated Safety Technologies in Reducing Fatalities, Injuries, and Crashes*, January 2015, DOT HS 812069, National Highway Traffic Safety Administration, p. xii. This analysis considers safety belts as a vehicle safety technology.

[53] Electronic stability control (ESC) became available on some popular vehicle models in 2000; it was phased in as a federal standard beginning with model year 2009 noncommercial vehicles: 55% of a manufacturer's model year 2009 vehicles had to have ESC, rising to 100% of model year 2012 noncommercial passenger vehicles.

[54] National Highway Traffic Safety Administration, *An Analysis of Recent Improvements to Vehicle Safety*, DOT HS 811572, June 2012, p. 1 (http://www-nrd.nhtsa.dot.gov/Pubs/811572.pdf).

Education and Training of Drivers

Educating and training road users seems an obvious way to improve their safety. But there is little evidence that education is effective in reducing crashes.[55] In large part this is because the vast majority of crashes are due to driver behaviors such as driving while intoxicated, driving too fast for conditions, and becoming distracted, and these are errors of judgment rather than of ignorance or lack of skill. Although motorcycle advocacy groups often call for more education of motorcyclists and of drivers as alternatives to mandatory helmet laws, there is no evidence that such efforts have an effect on motorcycle safety. Safety-related education is primarily the responsibility of state governments, and federal spending for this purpose is minimal.

Enforcement

The establishment and enforcement of rules governing road use, such as limiting speeds, prohibiting driving while intoxicated, and requiring the wearing of safety belts, is a proven method of improving road safety. However, these are areas over which Congress does not have authority with respect to drivers not engaged in interstate commerce; rather, they are under the control of the states. The federal government is directly involved in enforcement with respect to commercial vehicles that operate across state lines, though even in this case most of the enforcement is done by state law enforcement agencies. Federal spending on enforcement, through both NHTSA and the Federal Motor Carrier Safety Administration, which regulates truck and intercity bus safety, came to $1.3 billion in FY2019. Much of this went for grants to states to support their enforcement efforts. Congress has employed two approaches to influence states to act on traffic safety issues: penalties and incentives.

Encouraging State Enforcement—Penalties

Penalties have been of two types: the loss of a portion of a state's federal highway funding (a "strong" penalty), and the transfer of a portion of a state's highway funding to highway safety purposes (a "weak" penalty). Of these two approaches, the strong penalty appears to have been more effective in influencing state legislatures to act.

One example of a strong penalty law, adopted by Congress in 1966, provided that states that did not require motorcyclists to wear helmets within 10 years could lose a portion of their federal highway funds. In response, 48 states adopted such laws between 1966 and 1975. After the threat of losing federal highway funding was removed in 1976, 27 states repealed those laws by 1979, illustrating the power of federal financial sanctions in overcoming state-level opposition.[56] Language in the FY2001 DOT appropriations act provided that states that did not make it illegal to drive with a blood alcohol content (BAC) of .08% or higher would lose a portion of their federal highway funding beginning in 2004.[57] At the time of enactment, 19 states had such laws; by the end of FY2004, every state had such a law (see **Table 7**).

[55] Education has not proved effective in increasing rates of seat belt use or motorcycle helmet use; driver education programs have not been shown to reduce crashes, and, by enabling young drivers to get licenses sooner, may actually contribute to increasing the number of crashes. NHTSA, *Countermeasures That Work* (Ninth Edition, 2017), pp. 5-11, 6-3, 6-19 - 6-21, 7-10–7-13, 9-19.

[56] As of July 2019, 19 states had universal helmet laws.

[57] The penalty was 2% of federal highway funding in FY2004, increasing by 2% each year to a maximum of 8% in FY2007 and after, though states that adopted the .08% BAC limit by 2007 would get back all of the funds withheld in the previous years.

Table 7. Highway Safety Laws Enforced with Loss of Highway Funding

Law	Year Adopted	Number of States Responding	Notes
Mandatory motorcycle helmet law	1966	47	Penalties would have taken effect in 1976; Congress repealed the law in 1975
National maximum speed limit	1973	50	Repealed in 1995
National minimum drinking age	1984	50	The act actually set a minimum age for purchasing or publicly possessing alcohol, not for drinking; 23 U.S.C. §158
National .08% blood alcohol content (BAC) per se law	2000	50	P.L. 106-346, §351; 23 U.S.C. §163

Source: CRS, based on information from the Governors Highway Safety Association and the United State Code.

Strong enforcement, however, can evoke resistance, which may lead to the enforcement effort being scaled back or eliminated. This has occurred at both the federal and state levels. For example, two of the four laws in **Table 7** were repealed by later Congresses, and when Congress repealed the penalty for not mandating motorcycle helmets, many states then repealed the universal helmet law they had enacted in response to the prospect of that penalty.

The "weak" penalty—having a small portion of a state's federal highway funding transferred from other programs to highway safety activities—appears to have less influence on the actions of state legislatures. There are currently two transfer penalty statutes: one requires a state to have a law making it illegal for an occupant of a motor vehicle to have an open container of alcohol; the other requires a state to have a law requiring a repeat offender convicted of driving under the influence of alcohol (DUI) to use an ignition interlock device for one year or have his or her license suspended for at least one year. The penalty for a state not having such laws is that, in each case, the Federal Highway Administration will require that a small portion of the state's federal-aid highway funding be used for certain safety-related purposes;[58] there is no overall loss of federal highway funding. These two penalties have been in effect since FY2000.

The transfer penalties appeared to have a significant impact initially; almost half the states changed their laws to comply with the federal requirements within the first three years that the transfers were applied (see **Table 8**). But in the succeeding 13 years, almost none of the remaining states have changed their laws to comply with the requirements. The Government Accountability Office (GAO) interviewed state safety officials in a handful of states about the impact of the transfer penalties; some felt that the penalties had been important in motivating their legislatures to enact laws complying with the federal requirement, but officials in New York State, which had complied with the open container requirement but not the repeat offender

[58] Currently, the penalty is 2.5% of the funding from two of the four core federal-aid highway programs; this amounts to roughly 2% of a state's total federal highway funding.

requirements, felt that the transfer penalty amount was too small to influence the state legislature.[59]

Table 8. Number of States Complying with Federal Open Container and Repeat Offender Requirements, Selected Years FY1998-FY2016

States Complying with	1998 (Requirements Enacted)	FY2001 (First Transfers Applied)	FY2002 (Second Transfers Applied)	FY2003 (Third Transfers Applied)	FY2019 (Nineteenth Transfers Applied)
Open container requirement (§154)	14	31	35	37	39
Repeat offender requirements (§164)	5	24	28	33	34
Both requirements	3	19	23	25	27

Source: Adapted from General Accounting Office (now the Government Accountability Office), *Highway Safety: Better Guidance Could Improve Oversight of State Highway Safety Programs*, GAO-03-474, April 2003; 2019 data from Federal Highway Administration, "Apportionment of Federal-Aid Highway Program Funds for Fiscal Year (FY) 2019," Notice N 4510.831, December 6, 2018.

Notes: Table includes compliance status of all states and the District of Columbia. Both the Open Container and Repeat DUI Offender requirements were expanded beginning in FY2013, and the number of states penalized increased, though some then changed their laws in response and were no longer penalized in subsequent years. Several states that are penalized have open container and repeat offender laws, but those laws do not comply with federal requirements.

As of FY2019, 12 states were not in compliance with the requirement concerning open containers, and 17 states were not in compliance with the requirement regarding repeat DUI offenders (see **Table 9**). This suggests that the "transfer of funding" penalty is less effective at influencing state legislators than is the "loss of funding" penalty, although it is possible that the transfer of funding penalty would be more effective if the penalty amount were larger.

[59] Government Accountability Office, *Highway Safety: Better Guidance Could Improve Oversight of State Highway Safety Programs*, GAO-03-474, April 2003, p. 31. New York State is now in compliance with both requirements.

Table 9. States Subject to Federal Highway Funding Penalties for Noncompliance with Open Container and Repeat DUI Offender Requirements, FY2019

States subject to both penalties marked with asterisk

State	Open Container Penalty	Repeat DUI Offender Penalty
Alaska*	X	X
California		X
Colorado		X
Connecticut	X	
Delaware	X	
Hawaii*	X	X
Indiana		X
Louisiana*	X	X
Maine	X	
Minnesota		X
Mississippi	X	
Missouri	X	
Montana		X
New Mexico		X
Ohio*	X	X
Oregon		X
Rhode Island		X
South Carolina		X
South Dakota		X
Tennessee	X	
Vermont		X
Virginia	X	
Washington		X
Wyoming*	X	X
Total	**12 states**	**17 states**

Source: Federal Highway Administration, "Apportionment of Federal-Aid Highway Program Funds for Fiscal Year (FY) 2019," Notice N 4510.831, December 6, 2018.

Notes: Both penalties began in FY2000. Both the Open Container and Repeat DUI Offender requirements were expanded beginning in FY2013, and the number of states penalized increased, though some then changed their laws and came back into compliance in subsequent years.

Congress has not adopted a new loss-of-funding penalty related to traffic safety since 2000.[60] This may reflect, in part, a growing deference to state discretion on the part of Congress in the area of traffic safety, though there is also evidence against that interpretation; Congress has, for example, taken away state discretion to use federal highway funding to support automated traffic enforcement, forbidding states to use any of their federal highway funding for that purpose.[61]

Encouraging State Enforcement—Incentive Grants

The incentive approach has had inconsistent impacts. In the 2012 surface transportation authorization legislation, Congress created or extended seven highway safety incentive grant programs.[62] In the three years following its passage, as **Table 10** shows, these incentive programs had little impact in inducing states to enact legislation that would qualify them to receive the grants: in FY2013, states received 195 grants out of a possible 350,[63] while two years later states received 193 grants.[64] Three years later, in FY2018, after changes to several of the grant programs[65] the number of grants received by states out of the possible total rose from 55% in 2015 (193 out of 350) to 58% (204 out of 350).

Table 10. Number of States Qualifying to Receive NHTSA Safety Incentive Grants, by Program, FY2013, FY2015, and FY2018

Incentive Grant Program	Number of States Receiving Grants		
	FY2013	FY2015	FY2018
Impaired Driving	47	50	49
Ignition Interlock	2	4	5
Occupant Protection	44	47	48
Traffic Data Collection	49	49	50
Distracted Driving	7	1	7
Graduated Driver's Licenses	0	0	0
Motorcycle Safety	46	42	45
Total Grant Recipients	**195**	**193**	**204**

Source: CRS; data from Governors Highway Safety Association, Section 405 National Priority Safety Program, Funding tables; 2018 data from NHTSA Office of Grants Management and Operations, FY 2018 S. 402, 405, 1906 and 154/164 Authorized Grant Amounts, April 19, 2018.

[60] Congress has made changes to the two existing penalties—for open containers and repeat DUI offenders—since 2000.

[61] P.L. 112-141, §1533 and §31102(c); P.L. 114-93, §1401.

[62] These programs provide grants to states if the states meet certain criteria specified by Congress; for example, a state may qualify for a grant by having a law that requires that all drivers convicted of driving under the influence be required to have an ignition interlock system installed in their car for a period of time.

[63] Fifty states were eligible for these seven grant programs.

[64] In several grant programs, the qualifications to receive a grant increased over time, which may explain why in some programs fewer states qualified for grants in FY2015 than in FY2013.

[65] In §4005 of the FAST Act, P.L. 114-94.

Notes: The District of Columbia and certain territories were also eligible for grants, but are omitted from this table. The criteria for several grant programs were amended in 2015, so the 2018 numbers are illustrative rather than exactly comparable. For example, the decline in distracted driving grants from 2013 to 2015 is partly explained by the fact that the qualifying standard rose over time, so a state that qualified for a grant in FY2013 would not automatically qualify in FY2015; in 2015 Congress amended the standard to make it easier for states to qualify for a grant.

Federal Policy Efforts on Key Dimensions of Driver Behavior

Occupant Protection/Safety Belts

Federal motor vehicle safety standards have required that lap and shoulder belts be provided in cars manufactured since the 1960s.[66] Seat belts are the simplest way to reduce deaths in traffic crashes; NHTSA estimates that more than 10,000 lives are saved each year because occupants of vehicles in crashes wear safety belts.[67] But safety belts have no safety benefit if they are not used.

Congress created an occupant protection incentive grant program in 2000 to make grants to states that adopt various measures in order to improve the rate of seat belt (or child restraint) use. There was also a one-time grant to encourage states to adopt a primary enforcement law.[68] These programs have granted well over $1 billion to states since 2000. Prior to 2000, 49 states and the District of Columbia had seat belt laws, but only 14 states had primary enforcement laws; as of June 2019, 34 states and the District of Columbia had primary enforcement laws.[69] As the number of states with primary enforcement seat belt laws has increased, the nationwide seat belt use rate has gone up (see **Table 11**).

Table 11. States with Primary Enforcement Seat Belt Laws and Nationwide Observed Belt Use

Year	States With Primary Enforcement Seat Belt Laws	Nationwide Observed Seat Belt Use
1995	9	60%
2018	35	90%

Source: NHTSA, *Traffic Safety Facts Research Note, Seat Belt Use in 2018–Overall Results*, DOT HS 812 662, January 2019; 1995 data from NHTSA, *Traffic Safety Facts Research Note, Seat Belt Use in 2014–Overall Results*, DOT HS 812 113, February 2015.

Note: "States" includes District of Columbia.

[66] All new passenger vehicles were required to have shoulder belts as of 1968 and integrated lap and shoulder belts as of 1974.

[67] NHTSA, *Traffic Safety Facts: Estimating the Lives Saved by Restraint Use and Minimum Drinking Age Laws*, DOT HD 812137, April 2015.

[68] This allows a law enforcement officer to stop a vehicle to issue a citation for failing to wear a seat belt; in states without a primary enforcement law, occupants may be cited for failing to wear a seat belt if the vehicle is stopped for some other violation, but an officer cannot stop a vehicle solely for violation of a seat belt law.

[69] New Hampshire has no seat belt law. Sources: primary law states before 2000 from Centers for Disease Control and Prevention, "Injury Prevention and Control: Motor Vehicle Safety: Intervention Fact Sheets: Primary Enforcement of Seat Belt Laws," Table B.5, http://www.cdc.gov/motorvehiclesafety/calculator/factsheet/seatbelt.html; laws as of 2019 from, Governors Highway Safety Association, "Seat Belt Laws," https://www.ghsa.org/state-laws/issues/seat%20belts.

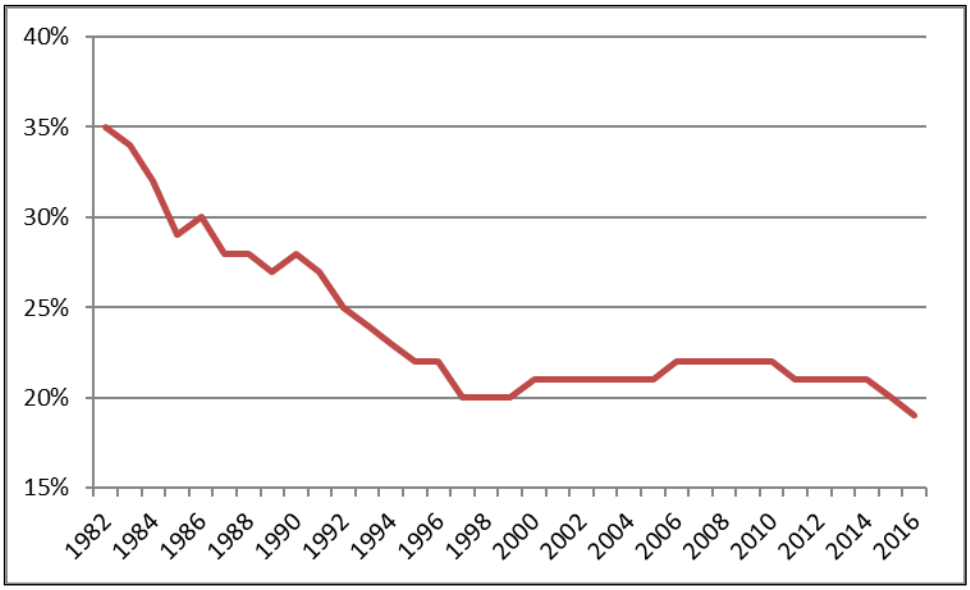
Impaired Driving

Alcohol

Almost one-third of traffic fatalities involve an alcohol-impaired driver (one with a blood alcohol content [BAC] above the legal limit, currently .08%).[70] The proportion of drivers involved in fatal crashes who were impaired by alcohol declined from 35% in 1982 to 20% in 1997; since 1999 the proportion has remained around 20% (see **Figure 10**).

Figure 10. Percentage of Drivers Involved in Fatal Crashes Who Were Alcohol-Impaired, 1982-2016

Impaired = BAC .08%+



Source: NHTSA, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 15.

Note: Blood alcohol content information was not generally collected before 1982.

The impact of federal and state DUI-prevention policies on this trend is not clear. During the period of that decline, from 1982 to 1997, changes in a number of factors may have contributed to the decline: the per-capita consumption of alcohol in the United States declined, the number of young drivers decreased, the proportion of female drivers increased, there was increased publicity about the drunk-driving problem, and national citizen activist groups dedicated to eliminating drunk driving were established.[71] There was also a decline in alcohol-related crashes in other countries, so other factors may have played a role as well.[72] Moreover, as **Figure 10** shows, while the decline in the proportion of drivers involved in fatal crashes who had high blood-alcohol content was quite significant, the decline stopped around 1996.

[70] NHTSA, *Countermeasures That Work* (Ninth Edition: 2017), p. I-1, "Alcohol- and Drug-Impaired Driving."

[71] "Remove Intoxicated Drivers" was established in 1978; in 1980, "Mothers Against Drunk Driving" was formed.

[72] James C. Fell, A. Scottt Tippetts, and Robert B. Voas, "Fatal Traffic Crashes Involving Drinking Drivers: What Have We Learned?" Annals of Advances in Automotive Medicine/Annual Scientific Conference 53 (2009), pp. 63-76, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3256806/.

Congress does not have the power to directly regulate alcohol consumption by the general public; that is a state authority.[73] Hence federal policies concerning impaired driving have sought to influence states to regulate alcohol consumption, especially in connection with driving. In 1984 Congress passed the Minimum Drinking Age Act. The act provides that states that do not set a minimum age for purchasing alcohol and for being in possession of alcohol in public will lose a portion of their federal transportation funding. Within a few years every state had such a law. The impact of this law on reducing drunk driving fatalities, while substantial, is difficult to isolate, as many states enacted other supporting laws (for example, laws setting a minimum age for drinking alcohol and making it illegal for an underage person to have any measurable blood alcohol content). Studies estimate that stiffer laws accounted for less than half of the reduction in the proportion of drunk drivers involved in fatal crashes between 1982 and 1997, with demographic factors accounting for the rest.[74]

In 2000 Congress directed that any state that did not have .08% BAC as its per se threshold for driving while intoxicated would lose a portion of its federal transportation funding beginning in FY2004;[75] all states had enacted such a limit by 2005. A statistical analysis suggests this tightening of the legal intoxication standard for drivers may have made a small contribution to lowering the proportion of alcohol-impaired drivers involved in fatal crashes after 2001.[76]

There have been two significant improvements in alcohol-impaired driving crash numbers since 1997; neither, however, is attributed to policies targeting impaired driving. First, the number of teens involved in alcohol-impaired crashes has declined, but that has been attributed to the introduction of graduated driver-licensing laws, which have reduced the rate of teen driving by delaying the age at which teens can get an unlimited license. Second, there was a significant drop in alcohol-impaired fatalities and the fatality rate per 100 million VMT from 2006 (13,491 deaths, a fatality rate of 0.45) through 2011 (9,845 deaths, a fatality rate of 0.33)[77], which paralleled the overall decrease in crashes and fatalities during that period. From 2011 through 2017 the number of alcohol-impaired fatalities and the fatality rate have remained fairly stable around the 2011 level.[78]

Fatality rates due to alcohol-impaired driving vary significantly from state to state, and even from area to area within states. For example, in 2016 the proportion of drivers involved in fatal crashes who had a blood alcohol content of .08% or higher was 19% nationwide; among the states it varied from a low of 12% (Mississippi, Utah) to a high of 36% (Montana).[79] DUI crash rates also vary by other factors such as rural versus urban population, road conditions, and economic activity, as well as by state laws and programs and socioeconomic factors.

[73] Congress did have the power to directly regulate alcohol consumption by the general public between 1919, when the 18th Amendment to the Constitution was ratified, and 1933, when it was repealed.

[74] J. N. Dang, "Statistical Analysis of Alcohol-related Driving Trends, 1982-2005," National Highway Traffic Safety Administration, DOT HS 810 942, May 2008.

[75] P.L. 106-346, §351.

[76] Ibid. Prior to Congress's action, a few states already had .08% BAC as their threshold, while most others had .10% as their threshold.

[77] National Highway Traffic Safety Administration, *Traffic Safety Facts: Alcohol-Impaired Driving, 2015 Data*, DOT HS 812 360, December 2016.

[78] National Highway Traffic Safety Administration, *Traffic Safety Facts: Alcohol-Impaired Driving, 2017 Data*, DOT HS 812 630, November 2018.

[79] National Highway Traffic Safety Administration, *Traffic Safety Facts 2016*, DOT HS 812 554, Table 118.

Marijuana

Eleven states and the District of Columbia, representing over a quarter of the U.S. population, have decriminalized the recreational use of marijuana, and other states are considering doing so as well. As the opportunity for legal use of marijuana grows, there is concern about the impact of marijuana usage ("drugged driving") on highway safety. Advocates of loosening restrictions on marijuana often compare marijuana usage to drinking alcohol, which may contribute to some stakeholders viewing marijuana use's impairment of driving as similar to alcohol's impairment of driving. Eighteen states have enacted laws declaring that a specified concentration of tetrahydrocannabinol (THC, the primary psychoactive component in marijuana) in a driver's body constitutes evidence of impairment and is inherently illegal, similar to the .08% BAC standard of alcohol impairment.

Research studies indicate that marijuana's effects on drivers' performance may vary from the effects of alcohol, in ways that challenge addressing marijuana-impaired driving similarly to alcohol-impaired driving. Research studies have been unable to consistently correlate levels of marijuana consumption, or THC in a person's body, and levels of impairment. Although laboratory studies have shown that marijuana consumption can affect a person's response times and motor performance, studies of the impact of marijuana consumption on a driver's risk of being involved in a crash have produced conflicting results, with some studies finding some increase in risk of crashing after marijuana usage, while others find little or no increased risk of a crash. Levels of impairment that can be identified in laboratory settings may not have a significant impact in real world settings, where many variables affect the likelihood of a crash occurring. Thus some researchers, and the National Highway Traffic Safety Administration, have observed that using a measure of THC as evidence of a driver's impairment is not supported by scientific evidence to date. Nonetheless, federal laws and regulations prohibit marijuana use by transportation safety-sensitive employees and require mandatory drug testing.

If additional states legalize marijuana, the issue of marijuana impairment of drivers is likely to become more prominent. This may increase the relevance of research on the impact of marijuana on driver performance and on measurement techniques for marijuana impairment, as well as training for law enforcement on identifying marijuana impairment.[80]

Speeding

Speeding is associated with crashes involving injuries and fatalities, since the faster a vehicle is moving, the more energy is absorbed by occupants during a crash and the greater the likelihood of serious injury. Excessive speed has been shown to increase the likelihood of crashes.

There is currently no federal limit on highway speeds. In 1974, Congress adopted a national maximum speed limit of 55 miles per hour (mph).[81] In 1984, the Transportation Research Board estimated this change to have saved 2,000 to 4,000 lives annually due to reductions in the number and severity of crashes.[82] In 1987 Congress amended the law to allow speeds up to 65 mph on qualified segments of rural Interstate System highways; most states responded by raising rural

[80] For more information on this topic, see CRS Report R45719, *Marijuana Use and Highway Safety*, by David Randall Peterman.

[81] As with other aspects of driver behavior, Congress does not have the authority to regulate traffic speeds directly, so this was done by cutting highway funding to states that did not adopt a 55 mph speed limit. The original intent was to temporarily reduce speeds to reduce fuel use in the wake of a fuel shortage after the 1973 oil embargo, but when the safety impact of the speed limit became known, Congress made the speed limit permanent.

[82] Transportation Research Board, *55: A Decade of Experience*, Special Report 204, 1984.

Interstate speed limits.[83] In 1995, Congress repealed the law entirely. After the repeal most states raised speeds on their Interstate highways. Studies suggest that the elimination of the maximum speed limit resulted in an increase in the number of crashes and deaths, especially on Interstate highways.[84] One study estimated that each 5 mph increase in speed limits resulted in an 8% increase in fatalities on interstates and a 4% increase in fatalities on other roads.[85] Thus reinstituting a national maximum speed limit that was lower than current levels would likely save lives. In addition, such a change would also reduce fuel consumption. However, from a cost-benefit perspective, studies suggest that the cost of the additional travel time imposed by a lower speed limit may outweigh the value of the reductions in crashes, injuries, and fatalities.[86]

Congress has made it harder for states to enforce speed limits by barring the use of federal transportation funding for automated speed enforcement, though states may use their own funds for this purpose. Studies indicate that automated speed enforcement is an effective way to enforce speed limits and reduce deaths and injuries.[87]

Distracted Driving

Driver distraction is estimated to be a factor in 10% of fatal crashes.[88] Driver distraction is difficult to detect, as it typically leaves no evidence, and there are disincentives (e.g., financial liabilities) to drivers admitting to being distracted. There are many possible sources of distraction, some of which have been around as long as there have been cars, such as eating while driving, talking to passengers, and gazing at objects outside the driving lane ("rubbernecking"). The recent proliferation of cell phones and smartphones and their use by drivers has led to growing concern about driver distraction.

Studies looking at cell-phone records indicate that cell-phone use increases the risk of being involved in a crash by a factor of four.[89] Many states have passed laws prohibiting hand-held cell phone use by drivers, but allowing hands-free usage. Some studies of driver distraction indicate that it is the driver's attention to the conversation—cognitive distraction—rather than the physical encumbrance of driving with one hand while holding a phone that is the primary source of distraction; hands-free phone use is as distracting to drivers as hand-held phone use.[90] Text

[83] P.L. 100-17, §174.

[84] C. M. Farmer, R. A. Retting, and A. K. Lund, "Changes in Motor Vehicle Occupant Fatalities After Repeal of the National Maximum Speed Limit," *Accident Analysis & Prevention*, vol. 31, no. 5 (September 1999), pp. 537-543; D. C. Grabowski and M. A. Morrisey, "Systemwide Implications of the Repeal of the National Maximum Speed Limit," *Accident Analysis & Prevention*, vol. 39, no. 1 (January 2007), pp. 180-189; Lee S. Friedman, Donald Hedeker, and Elihu D. Richter, "Long-Term Effects of Repealing the National Maximum Speed Limit in the United States," *American Journal of Public Health*, vol. 99, no. 9 (September 2009), pp. 1626-1631.

[85] Charles M. Farmer, *The Effects of Higher Speed Limits on Traffic Fatalities in the United States, 1993–2017*, Insurance Institute for Highway Safety, April 2019.

[86] Transportation Research Board, *55: A Decade of Experience*, Special Report 204, 1984; Thomas H. Forester, Robert F. McNown, and Larry D. Singell, "A Cost-Benefit Analysis of the 55 MPH Speed Limit," *Southern Economic Journal*, V. 50, No. 3 (January 1984), pp. 631-641.

[87] Libby Thomas et al., "Safety Effects of Automated Speed Enforcement Programs: Critical Review of International Literature," *Transportation Research Record: Journal of the Transportation Research Board*, No. 2078 (2008), pp. 117-126.

[88] National Highway Traffic Safety Administration, *Countermeasures That Work* (Ninth Edition), 2017, p. 4–2.

[89] S. P. McEvoy et al., "Role of Mobile Phones in Motor Vehicle Crashes resulting in Hospital Attendance: a Case-Crossover Study," *British Medical Journal*; 331 (2005), pp. 428-430.

[90] D. L. Strayer et al., *Measuring Cognitive Distraction in the Automobile*, AAA Foundation for Traffic Safety, June 2013, p. 28. Cognitive distraction can also occur when a driver talks with another occupant of the vehicle.

messaging, which combines cognitive distraction with diverting the driver's eyes from the road, is significantly more distracting than carrying on a conversation.[91] Internet-connected information/entertainment systems in vehicles may present additional sources of driver distraction.

There are as yet few effective countermeasures to drivers engaging in distracting behavior. While surveys indicate that most people are opposed to cell-phone use while driving, they also indicate that most people engage in such behavior at least occasionally. Forty-eight states and the District of Columbia ban text messaging by all drivers, 39 states and the District of Columbia ban cell-phone use by novice drivers, and 19 states and the District of Columbia ban all drivers from using hand-held cell phones while driving.[92] Studies indicate that such laws alone have little impact; intensive enforcement of such laws can be effective in the short term, but it is relatively expensive in terms of the commitment of law enforcement resources required for intensive enforcement. The only countermeasure that has been clearly proven to work is graduated driver licensing—that is, limiting the driving opportunities for teens.[93]

Congress established a distracted driving incentive grant program in 2012 to encourage states to prohibit texting by all drivers, and prohibit cell-phone use entirely for drivers under age 18. To qualify for a grant, states were required to have these as primary violations, to have no exception for use while stopped in traffic, and to have a minimum fine for first offenders and an increased fine for repeat offenders. One state, Connecticut, qualified for a grant under this program in FY2014 and FY2015. In December 2015, Congress deleted the requirement for an increased fine for repeat offenders, and established a second distracted driving grant program for fiscal years 2017 and 2018 that included less demanding requirements; these changes were expected to allow more states to qualify for grants.[94] In 2018, four states received grants under the new temporary program and three states received grants under the amended 2012 program.[95]

Motorcycle Safety

Injuries to the head are the most common cause of fatalities among motorcyclists; they are also a common type of nonfatal injury.[96] The only policy approach that has been demonstrated to be effective in reducing motorcycle crash deaths is a law requiring all motorcyclists to wear helmets ("universal helmet law").[97]

As noted above, Congress enacted a penalty for states lacking a universal motorcycle helmet law in 1966, but repealed it in 1975. In 1966, no state had a universal motorcycle helmet law; by 1975, 47 states had adopted such legislation. The motorcycle fatality rate per 100,000

[91] Thomas A. Ranney, G. H. Scott Baldwin, and Ed Parmer, Transportation Research Center Inc.; John Martin, Ohio State University; Elizabeth N. Mazzae, National Highway Traffic Safety Administration, *Distraction Effects of Manual Number and Text Entry While Driving*, DOT HS 811 510, National Highway Traffic Safety Administration, August 2011.

[92] Governors Highway Safety Association, "Distracted Driving Laws," reviewed July 2019.

[93] National Highway Traffic Safety Administration, *Countermeasures That Work* (Ninth Edition), 2017, pp. 4–11.

[94] §4005 of the FAST Act, P.L. 114-94.

[95] National Highway Traffic Safety Administration, Office of Grants Management and Operations, *FY2018 S. 402, 405, 1906 and 154/164 Authorized Grant Amounts*, April 19, 2018, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/all-grant-awards-summary-fy2018.pdf.

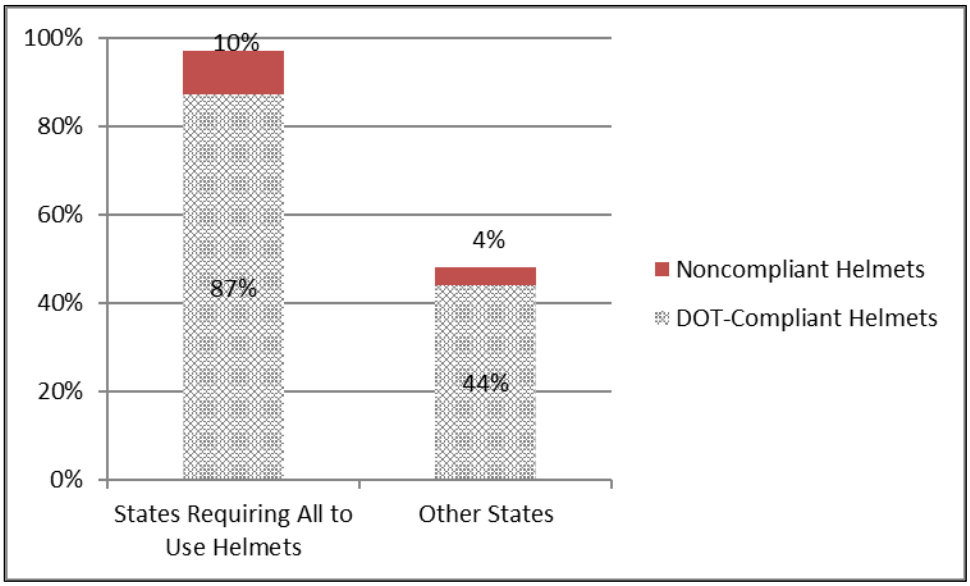
[96] National Highway Traffic Safety Administration, *Traffic Safety Facts: Bodily Injury Locations in Fatally Injured Motorcycle Riders*, DOT HS 810856, October 2007, available at http://www-nrd.nhtsa.dot.gov/Pubs/810856.pdf.

[97] U.S. Government Accountability Office, *Motorcycle Safety: Increasing Federal Funding Flexibility and Identifying Research Priorities Would Help Support States' Safety Efforts*, GAO-13-42, November 14, 2012, p. 16.

motorcycles declined from 127 (1966) to 67 (1976). After Congress repealed the law in 1976, 27 states repealed their mandatory helmet laws within three years, and the fatality rate per 100,000 motorcycles rose from 67 (1976) to 91 (1979). Universal helmet use legislation was again passed by Congress in 1991, repealed in 1995, and unsuccessfully proposed on occasion since then.

Currently, 19 states, the District of Columbia, and three territories have universal helmet laws; 28 states and one territory require helmets for young riders, and three states have no helmet requirements.[98] The observed use rate for helmets in states varies, but as a group, helmet use in universal helmet law states approaches 100%, while in other states it averages around 50% (see **Figure 11**). NHTSA has estimated that if every motorcyclist wore a helmet that met the DOT standard, around 650 to 800 motorcyclist deaths would be prevented each year.[99]

Figure 11. Motorcycle Helmet Use in 2017, by State Law and Helmet Type



Source: R. Li T. M. Pickrell, *Traffic Safety Facts Research Note: Motorcycle Helmet Use in 2017—Overall Results*, DOT HS 812 512, NHTSA, August 2018, Figure 3.

Some motorcyclists wear helmets that do not comply with the DOT standard; these so-called "novelty helmets" do not offer the same degree of protection in a crash. State enforcement authorities have observed that the existence of such helmets makes it difficult to enforce helmet use laws (which require a DOT-compliant helmet), since "novelty" aren't always easily distinguished visually from DOT-compliant helmets. In 2015 NHTSA initiated a notice of proposed rulemaking to restrict the sale and use of noncompliant helmets;[100] it now plans to withdraw that rulemaking due to "changed circumstances" and is to evaluate other alternatives that might prove effective in reducing novelty helmet availability and use.[101]

[98] Governors Highway Safety Association, "State Laws: Motorcyclists," https://www.ghsa.org/state-laws/issues/motorcyclists.

[99] The number varies each year with the number of fatal crashes, but has been between 660850 each year for the past decade; see National Highway Traffic Safety Administration, *Traffic Safety Facts: Lives Saved in 2017 by Restraint Use and Minimum-Drinking-Age Laws*, DOT HS 812 683, March 2019; *Lives Saved in 2012 by Restrain Use and Minimum-Drinking-Age Laws*, DOT HS 811 851, November 2013, Table 1.

[100] 80 *Federal Register* 29458, May 21, 2015.

[101] U.S. Department of Transportation, *June 2019 Significant Rulemaking Report*, #54: FMVSS No. 218 and

Congress has established a motorcycle safety incentive grant program under which DOT "shall award grants to states that adopt and implement effective programs to reduce the number of single- and multi-vehicle crashes involving motorcyclists."[102] States can qualify for a grant by meeting two of the six criteria set by Congress. Two of the criteria are numerical measures (reducing the number of motorcycle deaths and the rate of crashes involving motorcycles compared with the previous year; and reducing the number of deaths and rate of crashes involving impaired motorcyclists compared with the previous year). The four remaining criteria are policy measures

- offering motorcycle rider training courses;
- having a program to increase motorist awareness of motorcyclists;
- having a statewide program to reduce impaired driving that includes specific measures to reduce the number of motorcyclists riding while impaired; and
- using all fees collected for motorcycle training and safety programs for those purposes.

As noted above, there is no evidence that the types of training programs encouraged by the four policy criteria are effective in reducing crash or fatality rates.[103] The safety policy that has been proven to be effective in reducing motorcyclist deaths—a universal helmet law—is not among the options for qualifying for the motorcyclist safety grant program.

Emergency Response

The key element in emergency response is reducing the amount of time between a crash and the provision of medical assistance to injured victims. This is a growing challenge in rural areas due to the closure of rural hospitals and thus greater distance to travel for emergency medical care.[104] Federal highway safety programs play virtually no role in this aspect of emergency response.

Policy Options for Further Safety Improvements

Although U.S. highway safety statistics have generally improved over the previous decades, there is room for further improvement. After 2010 the reductions in U.S. fatality and injury rates stopped, and between 2014 and 2016 the rates have risen by around 10%. Also, while the U.S. highway safety record was once the world's best, in recent years the highway safety performance of several other industrialized nations has surpassed that of the United States.[105]

There are several policy actions Congress could consider that are recommended by safety advocates that they assert to be low-cost but effective interventions. These include actions dealing

Enforcement Policy Concerning Novelty Helmets, https://www.transportation.gov/regulations/report-on-significant-rulemakings.

[102] 23 U.S.C. §405(f)(1).

[103] National Highway Traffic Safety Administration, *Countermeasures That Work* (Eighth Edition: 2015), p. 5–6.

[104] The Sheps Center for Health Services Research at the University of North Carolina tracks rural hospital closures; it reports that as of June 2019 106 rural hospitals had closed since January 2010. https://www.shepscenter.unc.edu/programs-projects/rural-health/rural-hospital-closures/.

[105] Transportation Research Board, *Achieving Traffic Safety Goals in the United States: Lessons from Other Nations*, Special Report 300, Washington, DC, 2011; International Transport Forum, Road Safety Annual Report 2018.

with seat belt usage, motorcycle helmets, automated traffic enforcement, and implementation of new vehicle safety technologies.

Seat Belt Usage

A survey found that 90% of front-seat occupants wore seat belts in 2018. The rate was 91% in states with primary enforcement seat belt laws, and 86% in states with other laws.[106] Other countries have achieved higher use rates: Australia (96%), England (95%), and Canada (92%).[107] NHTSA estimated that in 2017 an additional 2,549 lives would have been saved if all unrestrained passenger vehicle occupants five years of age and older had worn seat belts.[108] As noted above, the incentive grant program Congress created in 2005 to encourage states to adopt mandatory belt use laws with primary enforcement was judged to have reached its ceiling by 2012, with 34 states and the District of Columbia having adopted such laws for front-seat passengers, and 17 states and the District of Columbia having adopted such laws for all vehicle occupants (front and rear seats). Options available to Congress to increase the number of states with primary enforcement laws for seat belt use by all occupants include an incentive program with a much greater value of incentive, a program that would penalize states that do not adopt such laws, or a combination of the two.

Universal Motorcycle Helmet Laws

NHTSA estimates that use of motorcycle helmets saved 1,872 lives in 2017, and that an additional 749 lives would have been saved if every motorcyclist wore a helmet meeting the DOT standard.[109] Universal helmet laws have been shown to be very effective in promoting helmet usage, because a violation of the law is easily seen. In Australia, for example, the reported helmet use rate by motorcycle operators is 99%.[110] Congress has prohibited NHTSA from lobbying state legislatures to encourage the adoption of universal helmet laws, and it omitted adoption of universal helmet laws from the list of safety measures required for a state to receive a motorcycle safety incentive grant. In the surface transportation authorization enacted in 2015, Congress prohibited states from using federal highway safety funding to check motorcycle helmet use or to create checkpoints that specifically target motorcyclists.[111]

Automated Traffic Enforcement

Automated traffic enforcement, such as the use of cameras to capture evidence of speeding and running red lights, has several advantages in encouraging compliance with traffic laws. Such tools reduce the risk that officers enforcing traffic laws will be attacked by suspects they approach or be hit by passing cars, allow monitoring of many more intersections and miles of roadway, and

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[106] National Highway Traffic Safety Administration, *Traffic Safety Facts: Seat Belt Use in 2018—Overall Results*, DOT HS 812 662, January 2019.

[107] National Highway Traffic Safety Administration, *Documenting How States Recently Upgraded to Primary Seat Belt Laws*, DOT HS 811524, September 2011, p. 6.

[108] National Highway Traffic Safety Administration, *Traffic Safety Facts: Lives Saved in 2013 by Restraint Use and Minimum Drinking Age Laws*, DOT HS 812137, April 2015.

[109] National Highway Traffic Safety Administration, *Traffic Safety Facts: Lives Saved in 2017 by Restraint Use and Minimum-Drinking-Age Laws*, DOT HS 812 683, March 2019, p. 1.

[110] Increasing Motorcycle Helmet Use, http://www.mrasa.asn.au/pdf/who_part_report.pdf.

[111] The Fixing America's Surface Transportation Act (FAST Act), P.L. 114-93, §4007.

may be less costly to deploy than police officers. In numerous studies, red-light cameras have been shown to decrease the number of both red-light violations and crashes involving injuries and fatalities at signalized intersections.[112] A review of 28 studies measuring the effect of speed cameras found that speed cameras reduced the number of crashes in an area, generally from between 14% to 25%, and also reduced the number of crashes resulting in injuries or deaths.[113] A number of other countries have made extensive use of speed cameras in their highway safety programs. For example, in France, use of automated enforcement was a key feature of a highway safety initiative announced in 2002, and resulted in reductions in both average speeds and fatal crashes.[114] Australia introduced such cameras in 1989; 2,300 cameras were in place by 2009. The percentage of light vehicles in free-flowing traffic exceeding the speed limit by more than 10 kilometers per hour (roughly 6 mph) dropped from 36% in 2001 to 10% in 2009.[115] In the United Kingdom, road deaths dropped by 34% from 1990-1999, compared to a 6.5% drop in the United States; one study suggested the greater reduction in fatal crashes in the U.K. was due largely to small decreases in the speed of drivers due to the introduction of speed cameras and other speed-calming measures in the U.K, while in the U.S. speed camera use was rare and speed limits were increasing.[116]

In the past two surface transportation authorization acts, Congress prohibited states from using any federal-aid highway funding or highway safety funding for automated traffic enforcement (except in school zones).[117] In what some see as a further disincentive to the use of automated enforcement, Congress requires states in which automated enforcement systems are in operation to use some of their federal safety funding to conduct a biennial survey of those systems.[118]

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[112] A. S. Aeron-Thomas and S. Hess, "Red-light Cameras for the Prevention of Road Traffic Crashes," *Cochrane Database of Systematic Reviews* 2005, Issue 2, Art. No. CD003862.

[113] Cecelia Wilson, Charlene Willis, Joan K. Hendrikz, Robyne Le Brocque, and Nicholas Bellamy, "Speed Cameras for the Prevention of Road Traffic Crashes, Injuries and Deaths," *Cochrane Database of Systematic Reviews* 2010, Issue 11, Art. No. CD004607.

[114] Laurent Carnis and Etienne Blais, "An Assessment of the Safety Effects of the French Speed Camera Program," *Accident Analysis and Prevention*, 51 (2013) 301-309.

[115] Transportation Research Board, *Achieving Traffic Safety Goals in the United States: Lessons from Other Nations*, Special Report 300, Washington, DC, 2011, pp. 77, 81.

[116] Elihu Richter, Lee S. Friedman, Tamar Berman, Avrahim Rivkind, "Death and Injury from Motor Vehicle Crashes: A Tale of Two Countries," *American Journal of Preventive Medicine*, vol. 29, no. 5, 2005, pp. 440-449.

[117] P.L. 112-141 §1533 & §31102; P.L. 114-94 §1401; codified at 23 U.S.C. §402(c)(4). This statute begins by directing states to maintain a highway safety program designed to reduce traffic deaths and injuries, then prohibits using federal funding for this tool for accomplishing those goals.

[118] P.L. 114-94 §4002. The survey is to include a list of the automated traffic enforcement systems in each state, data on the "transparency, accountability, and safety attributes" of each system, and comparison of each system with DOT guidelines for operation of automated enforcement systems.

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